DMEA Form 9
Rev. 6/57

UNITED STATES
DEPARTMENT OF THE INTERIOR
Defense Minerals Exploration Administration

OFFICIAL DOCKET FILE

Idm-E NO. 1199

DMEA NO. 4962

Application
- [ ] Denied
- [ ] Withdrawn

Contract
- [ ] Terminated - Not Certified
- [ ] Terminated - Certified
- [ ] Cancelled
- [ ] Royalty Agreement

The records contained in this file are marked (x) and arranged in this order:

Folder No. 1:

Left Side

- [ ] Royalty Audits
- [x] Certification of Discovery] 9-11-59
- [x] ~~Closing Letter~~
- [x] Cost Audits
- [x] Termination Notice or Agreement]
- [ ] Recision Notice]
- [ ] Assignment of Contract
- [ ] Contract Amendments
- [x] Contract with all exhibits and annexes
- [x] Owner's Consent to Lien and Subordination Agreement
- [x] Application and attachments
  lease in separate folder #2

Right Side

- [x] Project summary (final)
- [x] Work Completed analysis (final)
- All other material filed in chronological order including the following reports if checked:
- [ ] Field Team Semi-Annual Report for Certified Project
- [x] Final Field Team Report (Tab)
- [x] Operator's Final Report (Tab)
- [x] Interim Field Team Reports
- [x] Operator's monthly reports and all attachments
- [x] On-site Exam Report (Tab)
- [ ] Settlement Sheets
- [x] Drill Logs

Additional Folders:

Left Side

Folders No. _____ : Reports
- [ ] Analysis of Semi-Annual Inspection Reports
- [ ] Project Summary (Interim) by DMEA Engineers

Right Side

- [x] ~~Field Team Semi-~~Annual Report for Certified Project
- [ ] Field Team Interim Reports
- [ ] Operator's Monthly Reports with transmittal, narrative and maps.

Folders No. _____ : Maps (Use pocket folder or envelope)

Folders No. _____ : Settlement Sheets

Folders No. _____ : Drill Logs

Folders No. _____ : Royalty material

17963

OFFICE OF MINERALS EXPLORATION
CONTRACT ADMINISTRATION AND AUDIT DIVISION

REPORT OF ROYALTY REVIEW

I have reviewed the files of the Washington office pertaining to Contract Idm-E1199, Docket DMEA-4962 (fluorspar), dated June 3, 1958, with

Reynolds Metals Company
301 East Grace Street
Richmond 18, Virginia

for the purpose of determining the amount of royalty payable to the U. S. Government on sales of minerals from property referred to as the Watson Project on the Watson-Hicks-Tyner-Sunderland Properties located in Crittenden County, Kentucky, during the period June 3, 1958, through September 9, 1960.

A certification of discovery or development was issued on September 11, 1959, and, in accordance with Article 8 of the contract, royalty is payable on all minerals produced from the land described in Article 2, Annex I, and Amendment No. 1 of the contract for a period of 10 years from the date of the contract or until the total net amount contributed by the Government without interest is fully repaid, whichever occurs first. A Report of Review dated July 6, 1959, indicated accepted costs under the exploration contract amounting to $53,947.76 with the Government's contribution on a 50 percent basis being $26,973.88.

The status of the project, the scope of review, and the reasons therefor are stated on page 2.

This review established no sales subject to the Government's royalty for the period. Accordingly, as of September 9, 1960, the royalty account of this project was found to be:

Total Royalty Payable	$ -0-
Total Royalty Paid	-0-
Balance of Royalty Due	$ -0-

E. D. Talbert
E. D. Talbert, OME Auditor

June 11, 1962

STATUS OF PROJECT, SCOPE OF REVIEW
AND REASONS THEREFOR

This contract provides that the Operator, as principal if the producer or as surety if not the producer, shall pay to the Government a percentage royalty on all minerals produced within a maximum period of 10 years from (1) the four contiguous tracts of land thereunder and (2) any lands within 1500 feet of those tracts if the Operator or any subsidiary acquires any interest therein. The land under the contract is located in the western Kentucky fluorspar district. The Operator held possession of the mineral rights in three tracts by virtue of a December 26, 1957, lease from Fluorspar Consolidated, Inc., and the fourth and smaller tract by virtue of a November 29, 1958, lease from Ray and Margaret Sunderland. In consideration of the contract, the owners executed Consents to Lien and Subordination Agreements.

Exploration work under the contract was completed during May 1959. No minerals were produced during the exploration work. By a September 9, 1960, reply to an inquiry on MME Form 63, the Operator advised that neither production nor change in possessory interests had occurred.

This review was made in lieu of an on-site audit of the Operator's accounts and records for the following reasons:

(1) The files contain no evidence of production from the property under the contract during the period covered by this review; and

(2) The administrative cost to the Government of an on-site royalty audit at this time would be excessive in relation to the amount of possible royalty which might be disclosed.

Docket copy

aep
Jurisprudence
Talbert
J. Lynch
Hoffland
9/11
App'd. Sol. Off.

CERTIFICATION BY THE UNITED STATES OF AMERICA OF A DISCOVERY OR DEVELOPMENT UNDER AN EXPLORATION PROJECT CONTRACT

To: Reynolds Metals Company
301 East Grace Street
Richmond, Virginia

INTERIOR DEPT.
SEP 10 1959
SOLICITOR

Pursuant to the provisions of Exploration Project Contract No. Idm-E1199, dated June 3, 1958, Docket No. DMEA-4962, hereinafter called the "contract," between the Reynolds Metals Company, a Delaware corporation, and the United States of America, hereinafter called the "Government"; to establish and fix the Government's percentage royalty on production and its lien therefor and on the land described in the contract, the Government considers and therefore certifies that discovery or development from which production may be made has resulted from the exploration work.

The nature of said discovery or development is described broadly or indicated as follows:

Diamond drilling from the surface has indicated an appreciable tonnage of fluorite with subordinate sphalerite and galena in a gangue of calcite and barite, occurring as cavity-filling deposits along faults in the Fredonia, Renault, and Levias limestone members of the Chester and Meramec series of Upper Mississippian age.

Dated: SEP 11 1959

THE UNITED STATES OF AMERICA

By George C. Selfridge
Acting Director, Office of Minerals Exploration

JWAlt/gla 9-8-59
cc to: Operator (original)
Fluorspar Consolidated, Inc.
301 W. Main, Louisville, Kentucky
Roy and Margaret Sunderland,
Salem, Kentucky
The Peoples Bank, Marion, Kentucky
C. A. Fredell, Dir. DMS, GSA
Docket
Contract Adm. & Audit Division
OME Field Team, Region V (2)
Finance Office
Director's Reading File
Frank E. Johnson
Operating Committee
Frank D. Lamb, USBM
Harold Kirkemo, USGS
Chron

MME Form 7
(2/63)

OFFICIAL FILE COPY

Date	Surname	Code
7/10/68		110
		220

JUL 10 1968

Reynolds Metals Company
Reynolds Metals Building
Richmond, Virginia 23218

Re: DMEA-4962 (Fluorspar)
Reynolds Metals Company
Watson, Hicks, and Tyner Properties
Crittenden County, Kentucky
Contract Idm-E1199

Gentlemen:

By the terms of the subject Exploration Project Contract, as amended, and the certification of discovery or development dated September 11, 1959, all minerals mined or produced from June 3, 1958, to June 3, 1968, were subject to the Government's royalty as set forth in said contract.

As the period during which production was subject to royalty has now expired, the Government according to its present records retains no claim or lien against the property subject to the contract or any future production therefrom. We, therefore, are closing our books and records on this contract. Your attention, however, is called to the provisions of the contract which require the operator to keep and preserve certain records for the periods indicated.

Sincerely yours,

FRANK E. JOHNSON

Frank E. Johnson
Chief, Office of
Minerals Exploration

Copy to: Messrs. David Conyer
and Crawford Tharp
Salem, Kentucky 42078

cc: Director's Reading File
Economic Geology
OME docket ✓
Robert A. Laurence, USGS, Knoxville, Tenn.
w/cy MME Form 63
OME Reading File
130

GLAult/a 7-10-68

alb

OFFICE OF MINERALS EXPLORATION
CONTRACT ADMINISTRATION AND AUDIT DIVISION

REPORT OF REVIEW

I have reviewed the Monthly Reports of:

Reynolds Metals Company
301 East Grace Street
Richmond, Virginia

pertaining to Exploration Project Contract No. Idm-81199, DMEA No. 1962, including Amendments Nos. 1 and 2, for August 1958 to May 1959, inclusive, covering a fluorspar project on the Watson-Hicks-Tyner Prospect, Crittenden County, Kentucky.

My review included an examination of the Monthly Reports (Forms MF-104) and supporting documents, comparison of the claimed costs with the contract and pertinent schedules, verification of work performed by reference to Field Team reports and correspondence, and a determination of the reasonableness and propriety of the costs.

This review was made in lieu of a final audit of the Operator's accounts and records for the following reasons:

(a) the Monthly Reports were supported by documentary proof of that portion ($49,055.80) of the costs covering work performed at unit rates under independent contract;
(b) the balance ($4,891.96) of the costs was under a contract provision for payment by the Government at fixed unit costs for work performed; and
(c) the administrative cost to the Government of an audit would be excessive in relation to the estimated amount of possible disallowances.

The findings of this review are stated in the following summary:

Total cost billed by Operator		$53,947.76
Exceptions:		
Prior to this review	$ -0-	
Herewith	-0-	-0-
Total acceptable cost		$53,947.76

The contract calls for a 50 percent contribution of the allowable costs by the Government. Therefore, if the project is otherwise accepted as having met the terms of the contract, payments as follows are valid and proper:

Payable on audited claim	$26,973.88
Paid to date	25,168.27
Balance due Operator	$ 1,805.61

PD 9/9/60

E. D. Talbert

July 6, 1959

E. D. Talbert, OME Auditor

Government's copy

J. Lynch Hoffland
App'd. Sol. Off
ALL
Talbot

TERMINATION AGREEMENT

It is agreed this 30th day of June, 1959, between the United States of America, acting through the Department of the Interior, Office of Minerals Exploration, hereinafter called the "Government", and Reynolds Metals Company, hereinafter called the "Operator", parties to that certain Exploration Project Contract Idm-E1199, Docket No. DMEA-4962, dated June 3, 1958, as amended, hereinafter called the "Contract", that:

1. Effective June 4, 1959, the Contract and all obligations of the parties thereunder, except as otherwise herein expressly provided, shall be and are hereby terminated.

2. The Government shall contribute only to the costs of work performed prior to said effective date.

3. The Operator shall promptly perform all winding-up and settlement actions provided for in the Contract, including the rendering of the final report and final account.

4. All rights of the Government respecting certification of discovery or development, percentage royalty and liens to secure payment thereof, reports (including preservation of Operator's records), accounts, audits, and the right to recover any overpayment, are hereby preserved.

5. The Operator hereby releases and agrees to save the Government harmless from all claims or demands under or arising out of said Contract, except as otherwise provided in this Termination Agreement.

IN WITNESS WHEREOF, these parties have executed this agreement as of the day and year first above written.

THE UNITED STATES OF AMERICA

By Frank E. Johnson
Acting Director, Office of
Minerals Exploration

REYNOLDS METALS COMPANY

By Walter F. Rice
Title Vice President

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF MINERALS EXPLORATION
ROOM 2-B POST OFFICE BLDG.
KNOXVILLE 2, TENN.

February 20, 1959

OFFICIAL FILE COPY
O. M. E.
RECEIVED FEB 24 1959

DATE	INITIALS	CODE
2-24	C	220
		130
2/24		600

Memorandum

To: Operating Committee, OME - Washington, D. C.

From: Acting Executive Officer, OME - Region V

Subject: DMEA-4962, Idm-E1199, Reynolds Metals Co., Watson-Hicks-Tyner properties, Crittenden County, Kentucky. Signed Amendment No.2

Attached are the original and audit copies of the subject amendment.

The usual distribution of the other copies has been made.

V. J. Lynch

V. J. Lynch

Government Copy

OFFICIAL FILE COPY
O. M. E.
RECEIVED FEB 24 1959

DATE	INITIALS	CODE

EXPLORATION PROJECT CONTRACT
REYNOLDS METALS CO.

DOCKET No. DMEA-4962

AMENDMENT No. 2

It is agreed this 6th day of February 1959, between the United States of American acting through the Department of the Interior, Office of Minerals Exploration, and Reynolds Metals Company, the Operator, that exploration Project Contract No. Idm-E1199 (Docket No. DMEA-4962), dated June 3, 1958, is hereby further amended as follows:

1. In Article 3 of the Contract, the period for completion of the work is extended from March 10, 1959 to June 10, 1959.

This Amendment shall not be construed to increase the estimated total cost of the project, the aggregate amount which the Government may be required to contribute, the amount of any item designated as "maximum," nor the fixed unit cost of any item of work.

Executed in quintuplicate the day and year first above written

REYNOLDS METALS COMPANY

By: A. E. Cephell

Title Vice President and Treasurer

Robert A. Laurence
Robert A. Laurence
Executive Officer, OME
Field Team, Region V

J.T.K.

z

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF MINERALS EXPLORATION
ROOM 2-B POST OFFICE BLDG.
KNOXVILLE 2, TENN.
February 5, 1959

OFFICIAL FILE COPY
O. M. E.
RECEIVED FEB 9 1959

DATE	INITIALS	CODE
2/9	C	220
		130
2/10	Bond	600

Memorandum

To: Operating Committee, OME - Washington, D. C.
From: Executive Officer, OME - Region V - Knoxville, Tenn.
Subject: Signed Amendment No. 1, on DMEA-4962, Idm-E1199 Reynolds Metals Company, Watson-Hicks-Tyner properties, Crittenden County, Ky.

Transmitted are the Government and Audit copies of the subject amendment with Consent to Liens and maps attached.

Distribution of the other copies has been made by this office.

Robert A. Laurence
Robert A. Laurence

z

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF MINERALS EXPLORATION
ROOM 2-B POST OFFICE BLDG.
KNOXVILLE 2, TENN.

EXTRA COPY
O. M. E.
RECEIVED FEB 9 1959

DATE	INITIALS	CODE

February 5, 1959

Mr. John T. Kilpatrick
Reynolds Metals Company
Reynolds Metals Bldg.
Richmond 18, Virginia

Re: DMEA-4962, (fluorspar)
Watson-Ricks-Tyner properties
Crittenden County, Kentucky
Contract No. Ide-21199

Dear Mr. Kilpatrick:

Enclosed is your copy of Amendment No. 1 to the subject contract, with one copy of Consent to Lien form signed by Roy and Margaret Sunderland and one copy signed by the Peoples Bank of Marion, Kentucky. The amendment has been executed on behalf of the Government, and appropriate distribution of the other copies has been made.

Sincerely yours,

Robert A. Laurence
Executive Officer, OME
Region V

RAL/mm
cc
Opr. Com-2
Ames
Duymeister
Finance Office
Lynch
Files

REYNOLDS METALS COMPANY
REYNOLDS METALS BUILDING
RICHMOND 18 VIRGINIA

EXECUTIVE OFFICES

February 3, 1959

EXTRA COPY
S. M. E.
RECEIVED FEB 9 1959
DATE | INITIALS | CODE

Mr. Robert A. Laurence
Executive Officer
Office of Minerals Exploration
Room 2-B, Post Office Building
Knoxville 2, Tennessee

Dear Mr. Laurence:

Re: DMEA-4962, Idm-E1199-Fluorspar
Watson-Hicks-Tyner Properties
Crittenden County, Kentucky

As requested in your letter of January 16, we enclose the following:

1. Original and four copies of Amendment No. 1 to the subject contract adding the Sunderland tract. All of the enclosed copies have been signed on behalf of Reynolds Metals Company by Mr. C. E. Coghill, Vice President and Treasurer. We understand that you will have them executed by the Government and return to us a fully-executed copy for our files.

2. Original and four copies of the Consent of Lien form, all of which have been signed by Roy and Margaret Sunderland. One signed copy of this form was left with the Sunderlands. We understand that you will return one copy to us for our files when you return the signed copy of the amendment.

3. Original and four copies of a Consent to Lien form signed by The Peoples Bank of Merion, Kentucky, which holds a mortgage on this property. One copy of these forms was left with The Peoples Bank. We understand that you will return to us one copy with our signed copy of the amendment to the contract.

We trust that you will find all of the enclosed documents in order and can proceed to execute the amendment on behalf of the Government.

Very truly yours,

John T. Kilpatrick

John T. Kilpatrick

JTK:mjs

Enclosures (15)

cc Dr. John H. Moses
Mr. John W. Hook

Government Copy

OFFICIAL FILE COPY
O. M. E.
RECEIVED FEB 9 1959

DATE	INITIALS	CODE

EXPLORATION PROJECT CONTRACT

DMEA-4962, Idm-E1199

REYNOLDS METALS COMPANY

AMENDMENT No.1

It is agreed this 16th day of January 1959, between the United States of America acting through the Department of the Interior, Office of Minerals Exploration, and Reynolds Metals Company, the Operator, that Exploration Project Contract No. Idm-E1199 (Docket No. DMEA-4962), dated June 3, 1958, is hereby amended, effective November 29, 1958 as follows:

To the project area, as described in Exhibit "A", there is added the following property, in Crittenden County, Kentucky:

ROY SUNDERLAND and MARGARET SUNDERLAND

Beginning at a store with black gum and two hickories marked as pointers, corner to John T. Kirk; thence with Kirk's line S 12½W, 70 poles to a dogwood corner in the same original line; thence with same N43W, 30 poles to a white oak, original corner and also corner to W. C. Tyner; thence with his line N 11E, 55 poles to a stake near Henry Watson's white oak corner and same original corner to the Fred Kirk survey of land; thence with a line of same S73½E, 32 poles to the beginning, containing ten acres by survey, be the same more or less.

The Operator holds a mineral exploration lease on this property, dated November 29, 1958. This tract is designated " HICKS (Sunderland)" on a map entitled "Properties along Moore Hill Fault" which is hereby incorporated in the contract as Map No.2.

This Amendment shall not be construed to increase the estimated total cost of the project, the aggregate amount which the Government may be required to contribute, the amount of any item designated as "maximum," nor the fixed unit cost of any item of work.

Executed in quintuplicate the day and year first above written.

C. E. Cofield
REYNOLDS METALS CO.
Title: Vice President & Treasurer

Robert A. Laurence
Robert A. Laurence,
Executive Officer, OME, Reg.V

MF-205
(Combines and supercedes MF-2[illegible] and MF-203)
June 1956

For Government's Use Only
EXPLORATION PROJECT CONTRACT
Operator Reynolds Metals Co.
Docket No. DMEA- 4962
Contract No. Idm-E 1199
Contract Date June 3, 1958

FEB 9 1959 O.M.E.

CONSENT TO LIEN and SUBORDINATION AGREEMENT 1/

To the United States of America:

Referring to that certain land in the County of Crittenden, State of Kentucky, described as follows: 2/

"In a lease dated November 29, 1958, and recorded in Deed Book 89, page 429, official records of said County."

which is the subject of a proposed exploration project contract, hereinafter called the "contract," with the United States of America, hereinafter called the "Government;" in consideration of the contract and as an inducement to the Government to enter into it, the undersigned hereby--

1. Undertakes and agrees that property in which the Government may acquire an interest or equity under the contract may be dismantled, severed from the land, and removed, as may be provided in the contract; and the Government's interest and equity in such property shall be prior and superior to any adverse right or claim of the undersigned;

2. Grants to the Government a lien upon all of the undersigned's right, title, and interest in the land and upon any production of minerals therefrom, to secure the payment to the Government of a percentage royalty on production as may be provided for by the Contract;

3. Subordinates the undersigned's right, title, claim, or interest in or against the land and in any production therefrom to the rights of the Government under the contract with respect to royalty on production and liens to secure same;

4. Represents and undertakes that there is no claim, lien, or encumbrance upon the undersigned's right, title, claim, or interest in or against the land other than the following: (If "none" insert the word "none." Do not leave lines blank.)

Mortgage lien of Peoples Bank of Marion, Kentucky, to secure a note in the principle sum of $750.00, plus interest.

"Mining Lease & Option Agreement to Reynolds Metals Co. dated November 29, 1958."

1/ Mining or production from the land is not required, and in the absence of production there is no obligation to pay royalty to the Government.

2/ Either (a) insert the legal description of the land, or (b) strike out the words "as follows" and insert "in a lease [or contract, deed, or other document] dated _____, and recorded in Book _____, Page _____, official records of said county." If (b) is used, the book and page of recordation cannot be dispensed with. If the space provided is insufficient, use an Annex, and refer to the Annex in the space.

5. Undertakes and agrees (a) neither to commit any act nor assert any claim in conflict with the provisions of this Agreement; and (b) to give advance notice of the Government's rights under this Agreement to any subsequent transferee, mortgagee, encumbrancer, or lessee of any of the undersigned's right, title, claim, or interest in or against the land, or any production therefrom furnishing the Government with two copies of such notice; and

6. Consents to all amendments (including an agreement of termination) and assignments of the contract without notice thereof, and undertakes and agrees that this Agreement shall extend and apply thereto.

7. Added provision: None (State "None" or "See Annex No.____")

Dated this 26 day of Jan, 1959.

Roy Sunderland [Seal] Salem, Ky [Address]

Margaret Sunderland [Seal] Salem Ky. [Address]

_____ [Seal] _____ [Address]

_____ [Seal] _____ [Address]

_____ [Seal] _____ [Address]

_____ [Seal] _____ [Address]

I, _____ certify that I am the _____ _____ (Secretary, etc.) of the corporation named herein; that _____ _____ who signed this agreement was then _____ (President or Vice-President, etc.) of said corporation; that said agreement was duly signed for and in behalf of said corporation by authority of its governing body, and was within the scope of its corporate powers.

_____

[Corporate Seal]

MF-205
(Combines and supercedes MF-20[illegible] and MF-203)
June 1956

FEB 2 1959
O.M.E.

For Government's Use Only
EXPLORATION PROJECT CONTRACT
Operator Reynolds Metals Co.
Docket No. DMEA- 4962
Contract No. Idm-E 1199
Contract Date June 3, 1958

CONSENT TO LIEN
and
SUBORDINATION AGREEMENT 1/

To the United States of America:

Referring to that certain land in the County of Crittenden, State of Kentucky, described as follows: 2/

"In a lease dated November 29, 1958, and recorded in Deed Book 89, page 429, official records of said County."

which is the subject of a proposed exploration project contract, hereinafter called the "contract," with the United States of America, hereinafter called the "Government;" in consideration of the contract and as an inducement to the Government to enter into it, the undersigned hereby--

1. Undertakes and agrees that property in which the Government may acquire an interest or equity under the contract may be dismantled, severed from the land, and removed, as may be provided in the contract; and the Government's interest and equity in such property shall be prior and superior to any adverse right or claim of the undersigned;

2. Grants to the Government a lien upon all of the undersigned's right, title, and interest in the land and upon any production of minerals therefrom, to secure the payment to the Government of a percentage royalty on production as may be provided for by the Contract;

3. Subordinates the undersigned's right, title, claim, or interest in or against the land and in any production therefrom to the rights of the Government under the contract with respect to royalty on production and liens to secure same;

4. Represents and undertakes that there is no claim, lien, or encumbrance upon the undersigned's right, title, claim, or interest in or against the land other than the following: (If "none" insert the word "none." Do not leave lines blank.)

We hold first mortgage against said lands as evidenced by mortgage of record in Mortgage Book No.30 at page 174,Clerk's Office,Crittenden County Court,Marion,Ky

1/ Mining or production from the land is not required, and in the absence of production there is no obligation to pay royalty to the Government.

2/ Either (a) insert the legal description of the land, or (b) strike out the words "as follows" and insert "in a lease [or contract, deed, or other document] dated _____, and recorded in Book _____, Page _____, official records of said county." If (b) is used, the book and page of recordation cannot be dispensed with. If the space provided is insufficient, use an Annex, and refer to the Annex in the space.

5. Undertakes and agrees (a) neither to commit any act nor assert any claim in conflict with the provisions of this Agreement; and (b) to give advance notice of the Government's rights under this Agreement to any subsequent transferee, mortgagee, encumbrancer, or lessee of any of the undersigned's right, title, claim, or interest in or against the land, or any production therefrom furnishing the Government with two copies of such notice; and

6. Consents to all amendments (including an agreement of termination) and assignments of the contract without notice thereof, and undertakes and agrees that this Agreement shall extend and apply thereto.

7. Added provision: None (State "None" or "See Annex No.____")

Dated this _____ day of _____, 195__.

THE PEOPLES BANK, MARION, KENTUCKY

[illegible]	[Seal]	Marion Ky	[Address]
	[Seal]		[Address]
	[Seal]		[Address]
	[Seal]		[Address]
	[Seal]		[Address]
	[Seal]		[Address]

I, R W Croft certify that I am the Secretary (Secretary, etc.) of the corporation named herein; that R Buckner who signed this agreement was then President (President or Vice-President, etc.) of said corporation; that said agreement was duly signed for and in behalf of said corporation by authority of its governing body, and was within the scope of its corporate powers.

R W Croft
[Corporate Seal]

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF MINERALS EXPLORATION

ROOM 2-B POST OFFICE BLDG.
KNOXVILLE 2, TENN.

OFFICIAL FILE COPY
O. M. E.
RECEIVED JAN 19 1959

DATE	INITIALS	CODE
1-19	C	220
1/19	(EW)	800
		600

January 16, 1959

Mr. John T. Kilpatrick
Reynolds Metals Company
Reynolds Metals Building
Richmond 18, Virginia

Re: DMKA-4962, Idm-K1199-Fluorspar
Watson-Hicks-Tyner Properties
Crittenden County, Ky.

Dear Mr. Kilpatrick:

As requested in your letter of January 14, I enclose herewith the original and four copies of a proposed amendment adding the Sunderland tract to the contract area, as discussed with Mr. Hook. If the proposed amendment meets with your approval, please have all five copies signed by an authorized officer of the Company and return all copies to me for execution by the Government. If any part of it does not have your approval, please return all copies unsigned, with suggested changes for our consideration.

The amendment cannot be fully executed until we have the Consent to Lien executed by the owners. Therefore, if you will have Ray and Margaret Sunderland sign all six copies of the enclosed Consent to Lien, and return the original and four copies with the amendment, I will execute the amendment for the Government and return the Operator's copy to you. The sixth copy of the Consent to Lien should be given to Mr. and Mrs. Sunderland.

You will note that the effective date of the Amendment is November 29, 1958, the date of your lease, therefore any drilling which has the approval of our field representative Mr. Denny E. Amos, which has been done since that date on the Sunderland tract, or less than 100 feet from it on the adjoining Watson-Hicks, or Tyner tracts, may properly be included in the contract work after the Consent to Lien and Amendment No.1 are fully executed.

Sincerely yours,

Robert A. Laurence
Executive Officer, OME
Region V

RAL/zm
cc
Amos
Burmeister
Hook
Opr. Com-2
Lynch
Laurence

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF MINERALS EXPLORATION

[illegible] FROM SUNDOT OFFICE BLDG.
[illegible] AVENUE & [illegible]

[illegible]

REYNOLDS METALS COMPANY
REYNOLDS METALS BUILDING
RICHMOND 18, VIRGINIA

EXECUTIVE OFFICES

January 14, 1959

OFFICIAL FILE COPY
O. M. E.
RECEIVED JAN 19 1959

DATE	INITIALS	CODE

Mr. Robert A. Laurence
Executive Officer, Region V
Defense Minerals Exploration Administration
United States Department of the Interior
Room 13, Post Office Building
Knoxville 2, Tennessee

Dear Mr. Laurence:

Re: Docket No. DMEA-4962 - Watson-Hicks-Tyner Properties, Crittendon County, Kentucky, Contract No. Idm - E 1199

At the suggestion of our Mr. John W. Hook, we enclose three photostatic copies of a Mining Lease and Option Agreement dated November 29, 1958 between Roy Sunderland and Margaret Sunderland, lessors, and Reynolds Metals Company, lessee, under which our Company holds lease and option rights relating to the Sunderland property in Crittendon County, Kentucky.

I also enclose a map prepared by Mr. Hook which shows the location of the Sunderland property as it relates to the Watson-Hicks-Tyner properties covered by the subject DMEA contract. Mr. Hook advises that all of the Sunderland tract is situated within one thousand feet of the land described in the subject DMEA contract. It is my understanding that you are already familiar with this matter and were only awaiting receipt of copies of the enclosed Mining Lease and Option Agreement so that you might prepare an appropriate amendment to the subject DMEA contract to include the Sunderland property as contemplated by the reference in the contract to properties acquired within one thousand feet.

We will look forward to hearing from you about this at your earliest convenience. If there is anything which we can do to assist you or expedite this matter, please let us know.

Very truly yours,

John T. Kilpatrick

JTK:mjs

Enclosures (4)

cc Dr. John H. Moses
Mr. John W. Hook

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MINING LEASE AND OPTION AGREEMENT

This Mining Lease and Option Agreement is made and entered into as of the 29 day of November, 1958, by and between ROY SUNDERLAND and MARGARET SUNDERLAND, his wife, of Crittenden County, Kentucky, as parties of the first part, (hereinafter called Lessor) and REYNOLDS METALS COMPANY, a corporation organized and existing under the laws of the state of Delaware, with principal offices in Richmond, Virginia, and authorized to do business in the State of Kentucky, as second party (hereinafter called Lessee),

W I T N E S S E T H

WHEREAS, the Lessor is the owner in fee simple of the minerals of a certain tract or parcel of land situated in Crittenden County, Kentucky, which tract or parcel of land is more fully described hereinafter by metes and bounds:

NOW THEREFORE, for and in consideration of the sum of One Dollar ($1.00) cash in hand paid, the receipt of which is hereby acknowledged and of the further considerations hereinafter set forth, Lessor hereby grants to Lessee the right to enter upon the following described lands for the purpose of prospecting for and mining lead, zinc, fluorspar, or any and all other minerals, except oil and gas and gaseous substances, that may be found in or on said lands, and of washing, milling and transporting same to market, said tract or parcel of land being situated in Crittenden County, State of Kentucky, said property being on the waters of Clay Lick Creek and the same tract or parcel of land conveyed by Allie H. Hicks et al to Roy Sunderland and Margaret Sunderland, his wife, by Deed dated the 11th. day of September, 1958, recorded in Deed Book 89, Page 146, records of Crittenden County, containing 10 acres, more or less,

OFFICIAL FILE COPY
O. M. E.
RECEIVED JAN 19 1959

DATE	INITIALS	CODE

and described as follows:

> BEGINNING at a store with black gum and two hickories marked as pointers, corner to John T. Kirk; thence with Kirk's line S 12 1/2 W 70 poles to a dogwood corner to same in original line; thence with same N 43 W 30 poles to a white oak, original corner and also corner to W. C. Tyner; thence with his line N 11 E 55 poles to a stake near Henry Watson's white oak corner and same original corner to the Fred Kirk survey of land; thence with a line of same S 73 1/2 E 32 to the beginning, containing ten acres by survey, be the same more or less.

All of the above described property is hereinafter referred to as the "leased land".

This agreement is made for a term commencing on the date first above written and continuing thereafter for a period of three (3) years, subject to prior termination by Lessee as hereinafter provided, and the following terms and conditions shall be binding upon the parties hereto respectively:

Lessors (Parties of the First Part) Agree:

1. To give and grant to the party of the second part (Lessee), and Lessee is hereby granted, sole and undisturbed possession of the said "leased land", for the above stated purposes including the use of so much of the surface of said "leased land" as may be necessary and convenient for digging, boring, sinking shafts, erecting buildings and machinery, storing minerals, disposing of waste and waste waters, rights of way for ingress and egress, and for all other purposes necessary and incident to said operations.

2. To pay or cause to be paid all taxes and other liens on the "leased land" and to keep same free and clear and unencumbered of all claims or liens and to forever warrant and defend the title to the "leased land" against all claims whatever which might adversely affect Lessee's rights under this Agreement.

3. To grant to Lessee, and Lessee is hereby granted the right to terminate this Agreement at any time upon 30 days written notice,

and a reasonable time thereafter is granted to Lessee to remove any or all of the buildings and machinery belonging to Lessee, provided all "minimum royalties", if any, are paid up to the date of termination and all "earned royalties" are paid up to the time of removal.

4. To sell and convey the "leased land" in fee simple, by Deed of general warranty, to the Lessee, at Lessee's option at any time this Agreement is in effect, for cash, at a price of Three Thousand Dollars ($3,000.00).

Lessee (Party of the Second Part) Agrees:

1. To carry on the operations of the "leased land" in such a way as to avoid any unnecessary damage to the surface of said lands or to growing crops.

2. To pay to Lessors as rent for the "leased land" and as consideration for their rights hereunder royalties as follows:

(a) A royalty of Ten Percent (10%) of the "gross price per ton" for any and all minerals mined and removed from the "leased land" by Lessee or his agents during the existence of this lease. Such tonnage royalties are referred to in this Agreement as "earned royalties". The "gross price per ton" is hereby defined by the parties to be the most recent published price quotation f.o.b. shipping point appearing in the Engineering and Mining Journal prior to the start of each calendar month in which the minerals are removed from the "leased land" for the kind and grade of minerals removed, said price to apply to all such minerals removed by Lessee during that calendar month. For any minerals removed which are of a grade or kind not covered by quotation in the Engineering and Mining Journal the gross price per ton is hereby defined by the parties to be the average of

the local market price which would be quoted for such minerals f.o.b. the "leased land" by local custom millers of such minerals in the area during the calendar month of removal from the property or such average price quoted by other buyers of such minerals f.o.b. the"leased land", if there are no local millers in the area who process such minerals. Any disputes as to the proper "gross price per ton" shall be determined by arbitration with Lessors appointing one arbitrator, Lessee appointing one arbitrator and a third arbitrator to be selected by agreement between the first two arbitrators. The parties agree that the decision of a majority of the three arbitrators shall be final and binding upon them. It is understood and agreed that if Lessee purchases the "leased land" then no "earned royalties" will be due or payable with respect to any tonnage removed from the "leased land", subsequent to such purchase.

(b) Lessee shall pay to Lessor a minimum monthly royalty of Fifteen Dollars($15.00) per month, payable monthly in advance at the address hereinafter provided for mailing of notices, provided however, that for any month that "earned royalties" equal or exceed "minimum royalties" then for that month no "minimum royalties" will be due and payable.

(c) It is understood and agreed between all parties that Lessee shall be under no obligation to perform any minimum amount of exploration or development work nor to mine or remove any minimum quantity of minerals nor to make any minimum payments hereunder except such "minimum royalties" as may

Said payment shall be made by check (accepted by Lessors subject to collection in due course of banking transactions) to be delivered to Lessors upon delivery by Lessors to Lessee of a Deed, complete with legally required amount of documentary stamps, in the form required by this Agreement. No royalties paid by Lessee, as required by this Agreement, shall be returned to Lessee, regardless of whether or not Lessee purchases the "leased land."

3. If the Lessee enters upon the "leased land" and conducts any prospecting or core drilling upon the said "leased land", and thereafter terminates this lease as provided herein, then in that event Lessee shall furnish to Lessor a copy of such drill logs or prospecting data, free of geological interpretation as Lessee has compiled by virtue of said prospecting and/or core drilling.

4. All notices of termination, election to purchase, payment and other communications hereunder to be made by Lessee may be made by depositing same in the United States mail, first class postage prepaid, as registered mail addressed to Roy Sunderland, Route # 2, Salem, Kentucky. All notices and other communications to be made to Lessee may be made by depositing same in the United States mail, first class postage prepaid, as registered mail addressed to Reynolds Metals Company, Reynolds Metals Building, Richmond, Virginia.

It is understood and agreed that all of the terms and conditions of this agreement shall extend and apply to, and be binding upon, the heirs, executors, administrators, assigns and successors of the parties hereto.

This instrument is executed in duplicate originals so that each party will have one original so executed which shall stand as

an original and have the same effect as if it were the sole instrument executed between said parties.

In testimony whereof the parties hereto have hereunto respectively set their hands and signatures and acknowledged the execution of this instrument.

REYNOLDS METALS COMPANY

BY _____
Walter Rice
Vice-President

ATTEST: _____
Asst. Secretary

STATE OF KENTUCKY

COUNTY OF CRITTENDEN

I, Geo. F. HARRIS, a Notary Public in and for the County and State aforesaid do hereby certify that the foregoing Mining Lease and Option Agreement was on the 29th day of Nov, 1958, produced to me in my said County and State and duly signed and acknowledged before me by Roy Sunderland and his wife, Margaret Sunderland, parties thereto, to be their act and deed.

Witness my hand and seal this 29th day of November, 1958.

Geo. F. Harris
NOTARY PUBLIC

My commission expires
Oct 21, 1961.

STATE OF VIRGINIA

COUNTY OF Lunenburg

Delores C. Webb ack. 12-17-58

Personally appeared before me, _____, a Notary Public in and for the County and State aforesaid, Walter Rice, Vice President of Reynolds Metals Company, a corporation duly organized and incorporated and existing under and by virtue of the laws of the State of Deleware, and Richard Davies Assistant Secretary of said corporation, personally known to me and personally known to me to be such officers and to be the same persons who executed as such officers respectively, the within and foregoing instrument of writing and such persons duly acknowledged the execution of the same to be the act and deed of said corporation.

Subscribed to in my presence this 1st day of December, 1958.

Delores C. Webb
NOTARY PUBLIC

My commission expires [illegible].

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
ROOM 13 POST OFFICE BLDG.
KNOXVILLE 2, TENN.

RECEIVED

6/23	C	220
6/23	B	215
6/23	Hank	600

June 20, 1958

Memorandum

To: Operating Committee, DMEA - Washington

From: Acting Executive Officer, DMEA - Region V - Knoxville

Subject: Signed Contract, DMEA-4962, Idm-E1199-fluorspar Watson, Hicks & Tyner Properties, Crittendon County, Kentucky.

Transmitted are the Government and Audit copies of the subject contract signed by C. E. Coghill, Vice president of the Company.

Also is attached two copies of the transmittal letter from Mr. John T. Kilpatrick.

V. J. Lynch

REYNOLDS METALS COMPANY
REYNOLDS METALS BUILDING
RICHMOND 18 VIRGINIA

EXECUTIVE OFFICES

June 18, 1958

Mr. Robert A. Laurence
Executive Officer Region V
Defense Minerals Exploration Administration
United States Department of the Interior
Room 13 Post Office Building
Knoxville 2, Tennessee

Dear Mr. Laurence:

Re: Docket ~~No. DMEA-4962~~
Watson, Hicks & Tyner Properties
Crittendon Co., Kentucky
Contract No. Idm-E1199

I return herewith four copies of the subject contract which has been signed on behalf of Reynolds Metals Company. We have retained for our records the Operator's copy.

Pursuant to our telephone conversation the other day, I have inserted the words "and Indenture of Mortgage and Deed of Trust dated June 1, 1955, held by Manufacturers Trust Company which is by its terms subject to the lien provided for in this contract" in Article 2.b2 and this insertion has been initialled on the margin. If there is any question about this, please let me know immediately.

Yours very truly,

John T. Kilpatrick

JTK:mjs

Enclosures (4)

cc Mr. Richard I. Daves
Mr. Walter L. Rice
Mr. John Hook
Dr. John H. Moses

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RECEIVED JUN 23 1958

DATE	INITIALS	CODE

Government's copy

MF-200
(Revised June 1954)

Docket No. DMEA 4962

Commodity Fluorspar

Contract No. Idm-E 1199

UNITED STATES OF AMERICA
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION

EXPLORATION PROJECT CONTRACT[1]

It is agreed this 3 JUN 1958 day of ....., 195..., between the United States of America, acting through the Department of the Interior, Defense Minerals Exploration Administration, hereinafter called the "Government," and [2] Reynolds Metals Company, a Delaware corporation, whose mailing address is 301 East Grace Street, Richmond, Virginia, hereinafter called the "Operator," as follows:

ARTICLE 1. *This contract* is entered into under the authority of the Defense Production Act of 1950, as amended. It consists of this form (MF-200), the attached Exhibit "A," Annex I, ~~and~~ XXX Annex II, and one map.

The Operator shall not transfer or assign this contract or any right thereunder without the written consent of the Government.

ARTICLE 2. *Operator's property rights:*—(a) The land which is the subject of this contract (hereinafter called "the land") is in the State of Kentucky, County of Crittenden, and is described in Annex I.[3]

(b) The Operator represents and undertakes that:

(1) The Operator is the [4] Lessee of [5] mineral rights in the land, in possession and entitled to possession for all of the purposes of this contract, under and by virtue of a [6] lease, [7] recorded in Book ....., page ....., official records of said County; and

(2) The Operator's right, title, or interest (whether as owner, lessee, or otherwise) is subject only to the following claims, liens, or encumbrances: Interest of Lessors and Indenture of Mortgage and Deed of Trust dated June 1, 1955, held by Manufacturers Trust Company which is by its terms subject to the lien provided for in this contract.

(c) The Subordination Agreement of the holder of any claim, lien, or encumbrance listed above, and (if the Operator does not hold the legal title) the Consent to Lien of any holder of the legal title

[1] If sufficient space is not provided in any blank, use an extra sheet of paper and refer to it in the blank.
[2] Insert name, and if an organization, its nature (corporation and place of incorporation, partnership with names of partners, etc.).
[3] State on a separate sheet marked "Annex I" the legal description or enough to identify the property, particularly excluding any areas from which the production is not to be subject to the Government's percentage royalty.
[4] Insert "owner," "lessee," "contract purchaser," "locator," etc.
[5] Insert "the entire interest," "the mineral rights," "an undivided one-third," etc.
[6] Insert "deed," "lease," "contract," "location notice," "patent," etc.
[7] If not recorded, so indicate by inserting "un."

of the land (lessor, seller, optionor, etc.), are attached, as follows: Consent to Lien and Subordination Agreement, executed by the Lessor, Fluorspar Consolidated, Inc.

(d) The Operator shall preserve and maintain his right, title, and interest in the land and his right to the possession thereof for the purposes of this contract, and shall devote the land and all existing improvements, facilities, buildings, installations, and appurtenances to the purposes of this contract. Until the lapse of the time within which the Government may make a certification of discovery or development without any such certification having been made, and after any such certification has been made, the Operator shall neither transfer, convey, nor surrender the land nor any right, title, or interest therein, nor permit nor suffer any claim, lien, or encumbrance thereon, without expressly referring to and providing in the instrument of conveyance, lien, or encumbrance for the preservation of the Government's right to a percentage royalty on production and lien for the payment thereof. If the Government makes no certification of discovery or development within the time limited in Article 8, it shall thereafter have no claim against the land or any production therefrom except for any production referred to in Article 8(b)(1).

ARTICLE 3. *The exploration project.*—The project is a search for indicated or undeveloped deposits of Fluorspar. The work to be performed is described in Exhibit "A." The Operator on or before 30 days from the date of the Contract shall commence the work, and on or before March 10, 1959 (unless the Operator's obligation to prosecute the work is terminated—see Article 10) shall ~~either~~ have completed the work ~~or shall have incurred allowable costs (see Article 6) in a sum not less than the estimated total allowable cost set forth in Exhibit "A"~~ except as otherwise provided in Exhibit "A" with respect to stages of work. See Annex II.

ARTICLE 4. *Performance of the work.*—(a) *Operator's responsibility.*—The work shall be performed with reasonable diligence, efficiently, expertly, in a workmanlike manner, in accordance with good mining standards and State regulations for health and safety and for liability insurance covering employment; and with suitable and adequate equipment, facilities, materials, supplies, and labor, to bring it to completion within the time fixed.

(b) *Independent contracts.*—To the extent that the allowable costs are estimated in Exhibit "A" with express reference to performance by independent contractors on a unit-price basis (such as per foot of drilling, per foot of drifting, per hour of bulldozer operations), the work may be so performed; but if the reference in Exhibit "A" to any such independent contract requires the Government's approval thereof, payments under such contract will not be allowable costs unless the Government gives its written approval of the contract. Any such independent contract shall refer to some specific and identifiable part of the work, and shall be subject to all of the pertinent terms and conditions of this exploration contract; but the Government shall not be considered a party thereto, and its rights under this contract, including the right to terminate its contributions, shall not be affected thereby. Regardless of the provisions of any such independent contract and regardless of the Government's approval thereof, the Government will participate in payments to the independent contractor only on account of work performed in accordance with the provisions of this exploration project contract, and only to the extent that the Government deems the unit prices for the work under the independent contract to be reasonable.

(c) *Government may inspect.*—The Operator shall consult with and inform the Government on all phases of the work as it progresses. The Government may enter at all reasonable times to inspect the work under the contract, and also after a certification of discovery or development to inspect production operations and underground workings. The operator shall provide the Government with all reasonable means of access for such inspections.

ARTICLE 5. *Contribution by the Government.*—The estimated total allowable cost of the project, set forth in Exhibit "A," is the sum of $59,710.00. The Government shall contribute 50 percent of the allowable costs as they are incurred in a total sum not in excess of $29,855.00: *Provided,* That until the Operator has rendered to the Government his final report, and any final auditing required by the Government has been made, and a final settlement of the contract has been made, the Government may withhold from the last

voucher or vouchers such sums as it sees fit not in excess of 10 percent of the estimated total cost of the work or not in excess of the amount of the Government's contribution to the cost of property which is or may become subject to disposal as provided in Article 9(c), whichever is greater. The Government will make its contribution on the basis of the monthly vouchers referred to in Article 7(b), but all payments by the Government are provisional only, subject to audit, until the account between the Operator and the Government is finally audited and settled. "Costs incurred" mean costs that have been paid or have become due and payable, or that in the opinion of the Government have become an obligation. The Government may make payments directly to independent contractors and suppliers for the account of the Operator rather than to the Operator.

ARTICLE 6. *Estimated costs.*—(a) *Categories of costs.*—The allowable costs of the work to which the Government shall contribute are limited to those that are direct, reasonable, necessary, and that are estimated in Exhibit "A" by categories as specified in this article. If any category or subcategory is omitted from the estimate of costs, or if the word "none" is annexed to the listing thereof, costs under such category or subcategory are not allowable. Any excess over any estimate which is indicated as the maximum of any category, subcategory, or item, either as to requirement or related cost, and any excess over the estimated total allowable cost of the work, shall not be allowable. Any excess over the estimate of any category, subcategory, or item, either as to requirement or related cost, not indicated as a maximum shall be allowable within the limit of the estimated total allowable cost of the work. To the extent that excesses over maximums other than the estimated total allowable cost of the work may be necessary for the performance of the work, the Operator shall incur such excesses for his own account without contribution by the Government; ~~but except for any such excess any excesses in categories, subcategories, or items thereunder the Operator is not obligated to incur more than his agreed percentage of the estimated total allowable cost of the work~~ See Annex II.

To the extent specified in this article or in Exhibit "A" the following categories, subcategories, and elements thereof are maximums; but if not so specified either here or in Exhibit "A" they are not maximums, and may be exceeded within the limit of the estimated total allowable cost of the work:

CATEGORY (1)—INDEPENDENT CONTRACTS.—Work to be performed under independent contracts (see Article 4(b)). The estimated total amount of this category and the estimated cost of each unit of work for performance under an independent contract are maximums. See Annex II.

CATEGORY (2)—PERSONAL SERVICES.

Subcategory (a)—Supervision.—All elements of this subcategory (number of supervisors, periods of employment, rates of pay, and total) are maximums.

Subcategory (b)—Technical services.—All elements of this subcategory (number of technicians, periods of employment, rates of pay, and total) are maximums.

Subcategory (c)—Labor.

CATEGORY (3)—OPERATING MATERIALS AND SUPPLIES.—Includes such items as drill bits and steel, explosives, fuel, pipe, power, small tools costing less than $50 each, timber, track.

CATEGORY (4)—OPERATING EQUIPMENT.

Subcategory (a)—Rental.—The number of each object to be rented [6 mine cars, 1 truck], the rate of rental [$100 per month, $5 per hour], and the total of this subcategory are maximums.

Subcategory (b)—Purchases.—The estimated total of this subcategory is a maximum.

Subcategory (c)—Depreciation.—All elements of this subcategory (time periods, rate of depreciation, and subcategory total) are maximums.

CATEGORY (5)—INITIAL REHABILITATION AND REPAIRS.—Estimates under this category include all requirements and related costs, such as labor, materials and supplies, and supervision at a rate not higher than provided for in Category (2), and shall not be duplicated under any other category. The estimated total of this category is a maximum.

Subcategory (a)—Initial rehabilitation and repairs of existing buildings, fixtures, and installations (exclusive of mine workings).—The estimated total of this subcategory is a maximum.

Subcategory (b)—Initial rehabilitation and repairs of operating equipment.—The estimated total of this subcategory is a maximum.

CATEGORY (6)—NEW BUILDINGS, FIXTURES, AND INSTALLATIONS (EXCLUSIVE OF MINE WORKINGS).—Estimates under this category include all requirements and related costs, such as labor, materials and supplies, and supervision at a rate not higher than provided for in Category (2), and shall not be duplicated under any other category. The estimated total of this category is a maximum.

CATEGORY (7)—MISCELLANEOUS.—Repairs and maintenance (other than initial) of operating equipment, analytical work, prints and other reproductions, accounting, Operator's share of payroll taxes, liability insurance covering employment, travel, communications, and any other items of requirement or cost that do not fall within any of the first 6 categories.

THE ESTIMATED TOTAL ALLOWABLE COST of the work is a maximum.

(b) *Nonallowable costs.*—The following costs are not allowable for contribution by the Government:

(1) *Costs of the land,* such as rental, depreciation, depletion, or other cost of acquiring, owning, or holding possession;

(2) *Indirect costs,* such as general overhead, corporate management, interest, taxes (other than payroll and sales taxes), insurance (other than liability insurance covering employment), damages to persons, damages to property (other than necessary repairs or replacements of equipment or other property used in the work);

(3) *Previous work* performed or costs incurred before the date of this contract; and

(4) *Deferred payments.*—Any costs incurred by the Operator under any rental-purchase agreement, installment-purchase agreement, or any agreement for the purchase of goods under the provisions of which payment of the full purchase price is deferred more than 90 days from the delivery of the goods; unless the purchase agreement is approved by the Government in writing.

(c) *Reductions in costs.*—The Operator shall account for and give the Government credit for any incidental benefits, credits, or money received in the ordinary course of business in prosecuting the work (as by salvage or sale of materials or equipment, furnishing of room or board, furnishing of power or services to third persons, rebates or discounts on purchases, etc.), in the same ratio in which the Government contributes to costs; and such amounts shall be treated as a reduction in costs incurred so that they are available for use within the limit of the original estimated total cost. This provision does not apply to receipts from production which are subject to the Government's percentage royalty under the provisions of Article 9.8. See Annex II.

ARTICLE 7. *Reports, accounts, audits.*—(a) *Operator's records.*—The Operator shall keep suitable records and accounts of the work performed and of any production in which the Government may have an interest; and shall preserve those with respect to work performed for at least three years after final payment by the Government, and those with respect to production for at least three years after any obligation to pay royalties to the Government has terminated. The Government may inspect and audit said records and accounts at any time, either by itself or by a certified public accountant. If the Government elects to audit said records and accounts relating to the exploration work by certified public accountant, it may do so as a cost of the work to which the Operator shall contribute. The Comptroller General of the United States or his representative, until the expiration of said three-year periods, shall have access to and the right to examine any pertinent books, documents, papers, and records of the Operator. All of the Operator's vouchers and records and accounts relating thereto and the Government's payments thereof remain subject to adjustment until final audit by the Government. If work under this contract is carried on in conjunction with any other operations, or if labor, supervision, services, materials, supplies, equipment, facilities, or other requirements for carrying on the work are also used in connection with other operations, the costs shall be segregated and accounted for on a basis and by methods and accounts that are satisfactory to and approved by the Government.

(b) *Progress reports and vouchers.*—The Operator shall provide the Government with five copies of monthly progress reports in three sections as follows: (1) Operator's Monthly Report and Voucher showing detailed costs incurred during the reporting period; (2) Operator's Unit Cost and Progress Report showing the various types of work performed during the reporting period and costs incurred for each type of work; and (3) a Narrative Report of the work performed during the reporting period including adequate engineering-geological maps or sketches, drill hole logs and locations, and assay reports on samples taken concurrently with advance in mineralized ground. (Forms for reporting under (1) and (2) above will be provided by the Government.)

(c) *Final report.*—Upon completion of the work or termination of the Government's obligation to contribute to costs, the Operator shall furnish the Government with five copies of a final report (in addition to the final progress report and voucher). This final report shall include a geological and engineering evaluation of the results of the work performed under the contract with an estimate of the ore reserves resulting from such work, complete assay data, adequate geological and engineering maps or sketches, and a summary of the work performed and related costs incurred.

(d) *Report of sales.*—The Operator shall provide the Government with suitable accounting and documentary evidence covering all production to which the Government's percentage royalty relates, such as copies of smelter or concentrator settlement sheets, and certified accounts of production and sale or other disposition of production.

(e) *Compliance with requirements.*—If in the opinion of the Government any of the Operator's reports, records, or accounts are insufficient or incomplete, or if the Operator fails to make them, the Government may procure the making or completion of such with suitable attachments as an expense of the work to which the Operator shall contribute. The Government may withhold approval and payment of any vouchers relating to insufficient or incomplete reports, records, or accounts.

ARTICLE 8. *Repayment by Operator.*—(a) *Certification.*—If the Government considers that a discovery or development from which production may be made has resulted from the work, the Government, at any time not later than six months after a sufficient final report and final account (see Article 7) has been rendered, may so certify in writing to the Operator. Such certification shall describe broadly or indicate the nature of the discovery or development.

(b) *Royalty on production.*—The Operator, as principal if the Operator is the producer, or as surety if the Operator is not the producer, shall pay to the Government a royalty on all minerals mined or produced from the land, as follows: (1) regardless of any certification of discovery or development, from the date of the contract until the lapse of the time within which the Government may make such certification, or until the total net amount contributed by the Government without interest is fully repaid, whichever occurs first; or (2) if the Government makes a certification of discovery or development, within a period of ten years from the date of the contract, or until the total net amount contributed by the Government without interest is fully repaid, whichever occurs first.

(c) *Basis for computation.*—The Government's royalty shall be a percentage of the gross proceeds (including any bonuses, premiums, allowances, or other benefits) from the production sold, in the form sold (ore, concentrates, metal, or equivalent), at the point of delivery (the f. o. b. point); *except,* that charges of *the buyer* arising in the regular course of business, and shown as deductions on the buyer's settlement sheets, on account of the cost of treatment processes performed by *the buyer,* sampling and assaying to determine the value of the production sold, and freight paid by *the buyer* to a carrier (not the Operator), shall be allowed as deductions in arriving at the "gross proceeds" as that term is used herein. Any costs of treatment processes, sampling or assaying, or transportation, performed or paid by the Operator or by anyone other than the buyer, are not deductible in arriving at the "gross proceeds" as that term is here used. The term "treatment processes," as here used, means those processes (such as milling, concentrating, smelting, refining, or equivalent) applied to the crude ore or other production after it is extracted from the ground, to put it into a commercially marketable form; excluding fabricating or manufacturing.

(d) *Unsold production.*—If any production (ore, concentrates, metal, or equivalent), after the lapse of six months from the date the ore was extracted from the ground, remains neither sold nor used by the Operator in integrated manufacturing or fabricating operations (for instance, if it is stockpiled), the Government, at its option, as long as it so remains, may require the computation and payment of its royalty on the value of such production in the form (ore, concentrates, metal, or equivalent) it is in when the Government elects to require computation and payment. If any production is used by the Operator in integrated manufacturing or fabricating operations before the Government makes its election, the Government's royalty on such production shall be computed on the value therof in the form in which and at the time when it is so used. "Value" as here used means what is or would be gross income from mining operations for percentage depletion purposes in Federal income tax determination, or the market value, whichever is greater.

(e) *Percentages of royalty.*—The percentages of the Government's royalty shall be as follows:

One and one-half (1½) percent of amounts ("gross proceeds" or "value") not in excess of eight dollars ($8.00) per ton of production in the form in which sold, held, or used, plus one-half (½)

percent for each additional full fifty cents ($0.50) by which such amounts exceed eight dollars ($8.00) per ton, but not in excess of five (5) percent of such amounts.

(For instance: the royalty on an amount of five dollars ($5.00) per ton would be one and one-half (1½) percent; on an amount of ten dollars ($10.00) per ton, three and one-half (3½) percent.)

(f) *Time for computation and payment.*—The Government's royalty shall be computed and paid currently upon each lot sold, held, or used in integrated operations, as the case may be, as above provided in this article.

(g) *Lien for payment.*—To secure the payment of its percentage royalty, there is hereby granted to the Government a lien upon the land or the Operator's interest in the land and upon any production of minerals therefrom, until the royalty claim is extinguished by lapse of time or is fully paid.

(h) *Notice to purchasers.*—The Operator shall give notice of the Government's claim for royalty to any purchaser of the production, and shall authorize and direct such purchaser to pay the royalty directly to the Government and to furnish the Government with copies of the settlement sheets. If the records of any production and sales or other disposition of production, whether the production is by the Operator or by others, are not made available to the Government, the amount of the royalty may be estimated by the Administrator, Defense Minerals Exploration Administration, or his successor, and his estimate thereof shall be final and binding upon the Operator.

(i) *No obligation to produce.*—Nothing in this contract is to be construed as imposing any obligation on the Operator or the Operator's successor in interest to engage in any production operations.

(j) *Government not obligated to buy.*—Nothing in this contract shall be construed as imposing any obligation on the Government to purchase any minerals mined or produced from the land.

ARTICLE 9. *Interests in purchased property.*—(a) *Title and ownership.*—All costs under this contract shall be incurred by the Operator in the Operator's own name and for the Operator's own account; but any property acquired to the cost of which the Government contributes shall belong to the Operator and the Government jointly in proportion to their respective contributions, although title thereto shall be taken in the name of the Operator.

(b) *Preservation of property.*—Until the final disposal of any property in which the Government has an interest the Operator shall preserve and protect same for the best interest of the Government, any reasonable and necessary costs thereof to be treated as an allowable cost of the project. After the completion of the work or termination of the Government's obligation to contribute, or when such property is not in use for or needed for the work, the Operator shall neither use it without the written consent of the Government nor without paying a reasonable rental to be fixed by the Government for its interest.

(c) *Disposal of property.*—Upon the completion of the work or termination of the Government's obligation to contribute to costs, or when the property is no longer needed for the work, the Operator shall promptly dispose of salable or salvageable property in which the Government has an interest for the joint account of the Government and the Operator, either by return to the vendor, by sale to others, or purchase by the Operator or the Government at a price at least as high as could be obtained from others, unless the Government in writing waives its interest in any such property. Without advance approval of the sales price by the Government the Operator shall not sell at any price any item of property the cost of which was more than $500, and shall not sell at less than 25 percent of the purchase price any item of property which cost $500 or less. The Government, in lieu of approving the sales price for any such item, may itself purchase the item at the best price which the Operator is able to obtain or himself cares to give. Property remaining upon any termination of the work shall be considered in groups or categories (such as drill steel, or explosives, or pipe, or rails), and if the original cost of the remaining unexpended portion of any such group or category is less than $50, the Government waives its interest therein. If necessary to accomplish the disposal of any item the Operator shall dismantle and sever it from the land, the cost thereof to be treated as a cost of the project.

(d) *Default of the Operator re disposal.*—If within 90 days after the completion of the work or termination of the Government's obligation to contribute to costs, or after the property is no longer needed for the work, or after such further time as the Government may in writing allow, the Operator has failed to sell or otherwise liquidate or dispose of any property in which the Government has an interest, the Government, at any time prior to final settlement under the contract, may pursue one of the following two courses: (1) the Government, by written notice to the Operator, may place upon such property what in its opinion is a fair valuation thereof, not in excess of the cost less 1.66 percent per month from the

date such property was purchased under this contract to the termination of said 90-day period; and such property shall thereupon be considered and accounted for as having been purchased by the Operator at the valuation so fixed by the Government; or (2) the Government may enter and take possession of such property wherever it may be found, and remove and dispose of it for the joint account of the parties.

ARTICLE 10. *Termination of the Government's obligations.*—(a) If in the opinion of the Government operations at any time have failed to achieve anticipated results that indicate the probability of making a worthwhile discovery, and in the opinion of the Government further operations are not justified, the Government may give the Operator written notice thereof, and thereupon: (1) the Government shall be free of all obligation to contribute to costs not then incurred other than such as may be allowable under the provisions of the contract as necessary and incidental to winding up, reporting, and accounting; and (2) the Operator shall be free of all obligation to prosecute the work other than such as may be necessary and incidental to winding up, reporting, and accounting.

(b) If in the opinion of the Government the Operator is in any manner in default under the terms of the contract, the Government may give the Operator written notice of such default with a specification of reasonable time within which the default must be cured; and if the Operator fails to cure such default as required, thereupon: (1) the Government shall be relieved of all obligation to contribute to costs not incurred when the notice was given, other than such as may be allowable by the provisions of the contract as necessary and incidental to winding up, reporting, and accounting; and (2) the Operator shall be free of all obligation to prosecute the work other than such as may be necessary and incidental to winding up, reporting, and accounting. The remedy provided for the Government in this paragraph "(b)" is in addition to any other remedy provided in this contract, and in addition to any other remedy the law may provide for breach of contract.

(c) The giving of any notice by the Government under the provisions of this Article 10 shall not affect the Government's rights as provided for in the contract with respect to a percentage royalty, and such rights shall be fully preserved.

ARTICLE 11. *Notices to be given by the Government* may be delivered to the Operator, or may be sent by registered mail addressed to the Operator at his mailing address stated in this contract. If mailed, notices are deemed to have been delivered five days after the date of mailing.

ARTICLE 12. *Officials not to benefit.*—No member of or delegate to Congress or resident commissioner shall be admitted to any share or part of this contract or to any benefit that may arise therefrom; but this provision shall not be construed to extend to this contract if made with a corporation for its general benefit.

ARTICLE 13. *Changes and added provisions.*—

See Annex II.

Long
Dunger
App'd Col. Off
Anderson
Hook
Chambers
Selfridge
Johnson

Executed in sextuplicate the day and year first above written.

THE UNITED STATES OF AMERICA

By C. Mitteudorf
Administrator, Defense Minerals
Exploration Administration

REYNOLDS METALS COMPANY
(Operator)

By C. E. Coghill

Title VICE PRESIDENT

I, RICHARD I. DAWES, certify that I am ~~the~~ AN ASSISTANT secretary of the corporation named as Operator herein; that C. E. COGHILL who signed this contract on behalf of the Operator, was then VICE PRESIDENT of said corporation; that said contract was duly signed for and in behalf of said corporation by authority of its governing body, and is within the scope of its corporate powers.

Richard I. Dawes
ASS'T SECRETARY

[CORPORATE SEAL]

U. S. GOVERNMENT PRINTING OFFICE 16—70617-1

Long
Dunger
Anderson

35485

EXPLORATION PROJECT CONTRACT
REYNOLDS METALS COMPANY
DOCKET NO. DMEA-4962

ANNEX I

The land referred to in Article 2 of the Contract consists of three contiguous tracts, known as the Tyner, Hicks and Watson prospects, which are situated in the western Kentucky fluorspar district, near the west-central border of Crittenden County, Kentucky, about 9 miles southwest of the town of Marion. The three tracts, together with 63 other tracts excluded herefrom, were leased by the Operator from Fluorspar Consolidated, Inc., by lease dated December 26, 1957. A copy of the lease, to which reference is hereby made for a more complete description of the said three tracts, is contained in DMEA Docket No. 4962, and the same are referred to therein as tracts numbered 26, 27 and 28 respectively.

In the event the Operator or any subsidiary thereof at any time during 10 years from the date of this Contract acquires any interest, title, or equity (exclusive of agreements granting rights only to explore, purchase, or acquire a lease) in any land situate within 1,000 feet of the land described in this Contract, it is agreed that such land shall thereupon automatically be included as land subject to the provisions of this Contract.

205
(Combines and supercedes MF-201 and MF-203)
June 1956

RECEIVED
MAY 15 1958
D.M.E.A.

Dmea - 4962

For Government's Use Only
EXPLORATION PROJECT CONTRACT
Operator
Docket No. DMEA-
Contract No. Idm-E 1199
Contract Date

CONSENT TO LIEN
and
SUBORDINATION AGREEMENT 1/

To the United States of America:

Referring to that certain land in the County of Crittenden, State of Kentucky, described ~~as follows:~~ 2/ in Exhibit "A" attached hereto and made a part hereof.

, which is the subject of a proposed exploration project contract, hereinafter called the "contract," with the United States of America, hereinafter called the "Government;" in consideration of the contract and as an inducement to the Government to enter into it, the undersigned hereby--

1. Undertakes and agrees that property in which the Government may acquire an interest or equity under the contract may be dismantled, severed from the land, and removed, as may be provided in the contract; and the Government's interest and equity in such property shall be prior and superior to any adverse right or claim of the undersigned;

2. Grants to the Government a lien upon all of the undersigned's right, title, and interest in the land and upon any production of minerals therefrom, to secure the payment to the Government of a percentage royalty on production as may be provided for by the Contract;

3. Subordinates the undersigned's right, title, claim, or interest in or against the land and in any production therefrom to the rights of the Government under the contract with respect to royalty on production and liens to secure same;

4. Represents and undertakes that there is no claim, lien, or encumbrance upon the undersigned's right, title, claim, or interest in or against the land other than the following: (If "none" insert the word "none." Do not leave lines blank.)
Surface rights in all the land and an undivided 1/2 interest in the oil and gas underlying a portion thereof as described in Exhibit "A" - any public and private roadways - any railroad rights of way - any easements for public utilities - any cemetery or burial ground and any right of egress or ingress thereto.

1/ Mining or production from the land is not required, and in the absence of production there is no obligation to pay royalty to the Government.

2/ Either (a) insert the legal description of the land, or (b) strike out the words "as follows" and insert "in a lease [or contract, deed, or other document] dated _____, and recorded in Book _____, Page _____, official records of said county." If (b) is used, the book and page of recordation cannot be dispensed with. If the space provided is insufficient, use an Annex, and refer to the Annex in the space.

5. Undertakes and agrees (a) neither to commit any act nor assert any claim in conflict with the provisions of this Agreement; and (b) to give advance notice of the Government's rights under this Agreement to any subsequent transferee, mortgagee, encumbrancer, or lessee of any of the undersigned's right, title, claim, or interest in or against the land, or any production therefrom furnishing the Government with two copies of such notice; and

6. Consents to all amendments (including an agreement of termination) and assignments of the contract without notice thereof, and undertakes and agrees that this Agreement shall extend and apply thereto.

7. Added provision: See Exhibit "A" (State "None" or "See Annex No.____")

Dated this 7th day of May, 1958

Humphrys Consolidated Inc.	[Seal]	301 W. Main, Louisville	[Address]
by Eli H. Brown III	[Seal]		[Address]
	[Seal]		[Address]
	[Seal]		[Address]
	[Seal]		[Address]
	[Seal]		[Address]

I, Dorothy C. Cummings certify that I am the Secretary (Secretary, etc.) of the corporation named herein; that Eli H. Brown III who signed this agreement was then President (President or Vice-President, etc.) of said corporation; that said agreement was duly signed for and in behalf of said corporation by authority of its governing body, and was within the scope of its corporate powers.

Dorothy Cummings
[Corporate Seal]

OFFICIAL FILE
DMEA
RECEIVED MAY 1
DATE

EXHIBIT "A"

WATSON-HICKS-TYNER PROJECT

Docket No. DMEA - 4962, FLUORSPAR

This project consists of three tracts described as follows:

All the minerals, metals, oil and gas underlying all that tract or parcel of land in Crittenden County, Kentucky, on the waters of Claylick Creek, bounded and described as follows, to-wit:

Beginning at a stone, Bob Kirk's corner; thence S 11 3/4 W 76½ poles to a hickory in a rocky branch, near the mouth of a lane; thence S 78 W 53½ po to a black oak stump with small post oak pointers on the edge of an old roa thence N 57 W 40 poles to a black gum stump, with dogwood and five sassafra pointers; thence with W. C. Tyner's home survey; thence with line of same N 22 E 95 poles to a stone in a rock branch, also in John Conyer's line; thence with said Conyer's line S 69½ E. passing his (Conyer's stone corner at 65 poles, in all 69 poles to the beginning, containing 46 acres more or less.

All of the minerals of every kind, and marble metals, ore, oil and gas in ar underlying the following described tract of land in Crittenden County, Kentu to-wit:

Beginning at a white oak on the East bank of Clay Lick Creek, corner to W. C Tyner; running thence with said Tyner's line S 70 E 160 poles to a stone, with black gum and dogwood pointers, original corner to the Hall survey of land; thence with a line of said survey N 20 E 43 poles & 7 links to a stone with 3 white oak pointers, corner to said Geo. W. Conyer's; thence with his line N 70 W 160 poles to a stone with black oak pointers, corner to same, in T. A. Harpending line; thence with his line S 20 W 43 poles & 7 links to the beginning, containing 43¾ acres, by survey.

The minerals, except an undivided 1/2 interest in the oil and gas, underlyin the following tract of land lying in Crittenden County, Kentucky, on the wat of Claylick Creek, To-Wit:

Beginning at a stone in Austin's line, with a triple black oak pointer; then with division line between Pope and the Eagle Fluorspar Company S 76-3/4 E 1 poles & 8 feet to a stone and small persimmon in the East line of the Watson survey, with a hickory pointer; thence S 15¾ W 111¼ poles to a dead black oa Massey & Wring's corner; thence S 87½ W 9 poles to a rock branch, with hicko and ash pointers; thence N 40 W 34 poles to a stone with two hickory pointer thence N 51 W, passing Wring's and John Kirk's corner at 28 poles, in all 70 poles to a stone, John Kirk's corner; thence S 40 W 45½ poles to a stone in branch; thence N 72-3/4 W 48 poles to a stone with two hickory pointers; ther N 12½ E 16-3/4 poles to a stone, John Conyers & Harry Austin's corner; thence with said Austin's line N 20-3/4 E 62-3/4 poles to a small red bud; thence N 70 W 24 poles to a stone with elm and two sweet gum pointers; thence N 20 E 2 poles to the beginning, containing 95 acres and 110 square poles.

EXPLORATION PROJECT CONTRACT
REYNOLDS METALS COMPANY
DOCKET NO. DMEA-4962

ANNEX II

Article 13. Changes and added provisions.--

(a) That part of the last sentence of Article 3 beginning with the word "either" is deleted and replaced by the words "have completed the work, except as otherwise provided in Exhibit 'A' with respect to stages of work."

(b) That part of the last sentence in the first paragraph of Article 6(a) commencing after the semicolon is deleted.

(c) Categories (2) through (7) of Article 6(a) are deleted.

(d) In addition to the costs of work estimated in Exhibit "A" by categories of actual costs, the costs of work requirements specified in Exhibit"A" as "Fixed Unit Costs" are allowable costs of the project. The Government will contribute to the fixed unit costs as work units are performed. A "Fixed Unit Cost"is an agreed price for each unit of work to be performed regardless of costs incurred by the Operator. Costs set forth in Exhibit "A" include all allowable costs of the work to be performed under the Contract.

(e) In the last sentence of Article 6(c), the words "Article 8" are substituted for the words "Article 9."

(f) Notwithstanding any other provision of the Contract, the allowable unit cost per foot of a drilling item is the average unit cost per foot computed on the basis of all the actual unit costs of said drilling item incurred by the Operator: Provided, That the Government will not contribute to any portion of an average unit cost of a drilling item that exceeds the estimated unit cost of said item set forth in the Contract.

EXPLORATION PROJECT CONTRACT
REYNOLDS METALS COMPANY
DOCKET NO. DMEA-4962

EXHIBIT "A"

Description of the Work

General Provisions

Exploration for fluorspar shall be performed with conventional AX, BXWL, or BXM core drilling equipment in the area indicated on the map, entitled "Watson-Hicks-Tyner Props., Crittenden Co., Ky., DMEA-4962", attached hereto and made a part hereof.

The Government shall not contribute to the cost of an incompleted hole, or to one that bottoms less than AX size.

Records of each hole drilled, together with assay certificates of samples taken and type of rock penetrated, shall be submitted with the Operator's monthly progress report, which shall include a map showing the location, inclination and direction of all holes drilled during the reporting period. All samples shall be properly identified as to drill hole number and depths represented.

The holes shall be drilled into the fault zones as indicated on the map and as nearly normal to their strike as possible.

No hole shall be drilled closer than approximately 100 feet to a property line.

The work shall be divided into two stages as hereinafter described. The Operator shall complete Stage I, and shall perform as much of Stage II as the Government approves in writing.

The location, inclination, direction, and extent of all drilling are subject to the approval of the Government.

Stage I

Drill 18 diamond core holes at the approximate locations indicated on the map, aggregating not more than 6,900 feet, as follows:

No.	Property	Bearing	Inclination	Approximate Depth	Exploration Target
1	Watson	S.67°E.	-45°	725 ft.	Dip extension of Two Brothers ore body
2	Watson	N.55°W.	-45°	425 ft.	Western extension of Two Brothers ore body
3	Watson	S.48°E.	-45°	500 ft.	Faults 3 and 12
4	Watson	N.48°W.	-45°	400 ft.	Fault 3
5	Watson	S.48°E.	-45°	300 ft.	Fault 12B
6	Watson	N.44°W.	-45°	350 ft.	Fault 3
8	Hicks	S.60°E.	-45°	250 ft.	Fault 10
9	Hicks	S.56°E.	-45°	450 ft.	Fault 10
10	Hicks-Watson	S.35°E.	-45°	280 ft.	Fault 12B
11	Tyner	S.57°E.	-45°	340 ft.	Intersection of faults 10 and 12B
12	Tyner	S.55°E.	-45°	330 ft.	Fault 10
13	Tyner	S.53°E.	-45°	350 ft.	Fault 10
14	Tyner	S.37°E.	-45°	530 ft.	Faults 3 and 4
15	Tyner	N.53°W.	-45°	270 ft.	Intersection of faults 3 and 4
16	Tyner	N.42°W.	-45°	350 ft.	Fault 3
17	Tyner	S.43°E.	-45°	330 ft.	Fault 3
18	Hicks	N.49°W.	-45°	350 ft.	Dip extension of Hicks ore body
19	Hicks	S.49°E.	-45°	250 ft.	Western extension of Hicks ore body

The holes shall be drilled in numerical sequence beginning with Hole No. 1 as shown on the map, except when information obtained from completed holes indicates that deviation from the numerical sequence, change of location, or omission of holes is advisable. Such changes may be made only with prior Government approval.

Stage II

Significant mineralization encountered in Stage I holes shall be further explored by diamond drilling not in excess of 8,000 feet of additional holes. The number, locations, inclinations, and depths of the holes shall be determined by agreement of the Operator and the Government. No Stage II hole shall be closer than 100 feet to a previously completed hole.

Estimated Costs of the Project

Stage I

Actual Costs

Category (1) Independent Contracts

6,900 feet of diamond drilling @ $2.95/ft. 1/	$20,355.00
2,000 feet of reaming and casing @ $1.75/ft.	3,500.00
80 hours of cementing and hole survey @ $8.00/hr.	640.00
300 feet of lost casing, BX size @ $2.16/ft. 2/	648.00
300 feet of lost casing, AX size @ $1.70/ft. 2/	510.00

Categories (2) through (7)

None

Fixed Unit Costs (See Article 13 of the Contract)

Incidental allowance for each foot of drilling completed 3/, 6,900 feet @ $0.28/ft.	$ 1,932.00

75 wooden core boxes @ $3.00/box	$ 225.00	
75 samples to be assayed for CaF_2 @ $4.50/assay	337.50	
25 samples to be assayed for CaF_2, Pb and Zn @ $6.50/sample	162.50	
Estimated Total Cost of Stage I		$28,310.00

Stage II

Actual Costs

Category (1) Independent Contracts

8,000 feet of diamond drilling @ $2.95/ft.1/	$23,600.00
2,000 feet of reaming and casing @ $1.75/ft.	3,500.00
100 hours of cementing and hole survey @ $8.00/hr.	800.00
300 feet of lost casing, BX @ $2.16/ft.2/	648.00
300 feet of lost casing, AX size @ $1.70/ft.2/	510.00

Categories (2) through (7)

None

Fixed Unit Costs (See Article 13 of the Contract)

Incidental allowance for each foot of drilling completed,3/ 8,000 feet @ $0.28/ft.	$ 1,840.00 ? 2240.00	
75 samples to be assayed for CaF_2 @ $4.50/assay	337.50	
25 samples to be assayed for CaF_2, Pb and Zn @ $6.50/assay	162.50	
Estimated Total Cost Stage II (rounded)	2339.00	$31,399.00

SUMMARY

Estimated Total Cost, Stage I	$28,310.00	
Estimated Total Cost, Stage II	31,399.00	
Estimated Total Cost of Project (rounded)		$59,710.00
Government participation @ 50 percent		29,855.00

1/ Includes costs of moving in and out, changing of locations, water supply, replacement of bits, and all charges which may be incurred by the diamond drill contractor.

2/ The Government will not contribute to the cost of casing left in the hole at the option of the Operator.

3/ Includes all costs that otherwise would be allowable costs under categories (1) through (7) except as scheduled in Exhibit "A".

REYNOLDS METALS COMPANY
REYNOLDS METALS BUILDING
RICHMOND 18, VIRGINIA

EXECUTIVE OFFICES

March 12, 1958

OFFICIAL FILE COPY
DMEA
RECEIVED MAR 18 1958
DATE

REGISTERED MAIL

Defense Minerals Exploration Administration
Department of Interior
Washington 5, D. C.

Gentlemen:

Re: Application for Aid in an Exploration Project - Fluorspar Watson-Hicks-Tyner Properties - Kentucky

We enclose four copies of an application for aid in an exploration project pursuant to DMEA Order 1 with respect to exploration of fluorspar on three properties known as the Watson, Hicks and Tyner properties in Kentucky.

Your application, Form MF-103, does not request and we have not enclosed any "Owner's Consent to Lien". The owner is Fluorspar Consolidated, Inc., which is the lessor under the lease between Fluorspar Consolidated, Inc., and Reynolds Metals Company dated December 26, 1957, copies of which are enclosed with this application. We call your attention to paragraph 5(i) of that lease which provides that the lessor covenants and agrees:

> "To execute, with respect to any or all the properties leased hereunder, the Consent to Lien and Subordination Agreement, as prescribed by the Defense Minerals Exploration Administration, and all other agreements, obligations and documents as may be required by that Agency, to permit Lessee to borrow funds from the United States or an agency thereof for use in connection with Lessee's operations hereunder solely with respect to the properties leased hereunder."

Therefore, since the owner has agreed in the lease to execute

and provide upon request any appropriate consent to lien and subordination agreement, there should be no difficulty about obtaining these documents when needed. Since these documents are not requested by the application form, we did hope that you might prepare them in a form satisfactory to the Government after you have considered this application. They could then be submitted to the owner for execution in accordance with the owner's covenant under the lease.

We will look forward to hearing from you after you have had an opportunity to examine this application.

Yours very truly,

John T. Kilpatrick
Attorney

JTK:mjs

Enclosures (4)

cc Mr. Walter L. Rice
Dr. John H. Moses
Mr. John W. Hook
Mr. C. E. Coghill
Mr. Richard I. Dawes

MF-103
(Revised April 1952)

UNITED STATES DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION

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

RECEIVED MAR 18 1958

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. 4962
Metal or Mineral Thorsfar
Date Received 3/18/58
Estimated Cost $101,664
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: Reynolds Metals Company, 301 East Grace Street, Richmond, Virginia. A corporation incorporated in the State of Delaware. See attached rider "Instruction I. (a)" for list of officers.

(*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.

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 See instruction 3(a) on separate piece of paper

(*b*) State any mine name by which the property is known. Watson, Hicks and Tyner properties.

(*c*) State your interest in the land, whether owner, lessee, purchaser under contract, or otherwise Lessee of mineral rights with separate option to acquire all corporate stock of the owner of the land. See attached lease.

(*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.

(*e*) If you own the land, describe any liens or encumbrances on it See attached rider "Instruction 3(e)"

(*f*) If the land consists of unpatented claims, add to the description above, the book and page numbers for each recorded location notice.

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 attached rider 4.(a)

(*b*) State past and current production, and ore reserves, if any, giving quantities and grades. See attached rider 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 attached rider 4.(c)

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

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

See attached rider 4. (e)

16—66551-1

5. *The exploration project.*—(*a*) State the mineral or minerals for which you wish to explore Fluorspar

(*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 attached rider 5.(b)

(*c*) The work will start within 60 days and be completed within 15 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 attached rider 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 attached rider 6.(a)

(*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 attached rider 6.(b)

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

(*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. None

(*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. None

(*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. None

(*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 attached rider 6.(g)

(*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. See attached rider 6.(h)

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? See attached rider 7.(b)

☐ Money ☐ Use of equipment owned by you ☐ Other

Explain in detail on acompanying paper.

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 March 12, 1958

REYNOLDS METALS COMPANY
(Applicant)

By C. E. Coghill

C. E. Coghill

Vice President and Treasurer

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

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The fault identification numbers used in this report are the same as those used in the U.S. Geological Survey Bull. 1012-E. Fault 1 is commonly known as the Moore Hill fault and fault 3 corresponds to Weller's fault 72. Faults 1, 3, 4, 10, 12, 12-A and 12-B outcrop on these properties for a total strike length of about 11,200 feet, as presently projected.

> NOTE: Plate 2 is a 200 scale geologic map of the area. The property corners, shaft locations and exposed geology are based on a transit and stadia survey. The fault projections and formation contacts, along with the underground workings of the Davenport and Eagle Mines, have been adapted from maps of the U.S. Geological Survey Bulletin 1012-E. The coordinate system used is based on the common corner to the Watson, Davenport and Eagle-Watson properties which is designated 10,000 N and 10,000 E. This is apparently the same starting point used by the U.S. Geological Survey for the plane table map in Bulletin 1012-E. Discrepancies between plate 2 and the 200 scale map by the U.S. Geological Survey are due to transit vs. plane table accuracy.

Fault 1 (Moore Hill fault) strikes in a general N45E direction forming the northwest boundary of the complex fault system. A broad area of relatively undisturbed Fredonia limestone outcrops on the northwest side of the fault in contact with Chester formations ranging from Renault to Hardinsburg on the southeast side of the fault.

Fault 1 crosses the Hicks property and a small corner to the Tyner for a strike length of about 800 feet. The Hicks mine is near the northeast end of this portion of the fault. Two other prospect shafts were sunk along this general strike but apparently missed the fault. On the adjacent Davenport property, fault 1 was mined 1200 feet along the strike to the Eagle property where it was mined an additional 2,000 feet.

Along the northwest side of the Watson property, the vein roughly parallels 370 feet of the property line. The mine workings on the adjacent Davenport property are very close to the line with the vein dipping onto the Watson property. This relationship is shown on plates 5, 6 and 7. Faults 11 and 11-A are branches of fault 1 along this boundary and also carry veins of fluorspar which project onto the Watson property.

Fault 10 crosses the Watson property for a strike length of 400 feet. The vein on fault 10 was mined very close to the line on both sides of the property. This 400 foot section of the fault was core drilled by the U.S. Bureau of Mines, holes 7, 8 and 9, but no commercial mineralization was found. Plates 4, 5, 6, 7, 8, 9 and 10 are along this fault.

Fault 10 also crosses the Hicks and Tyner properties for a strike length of about 2100 feet as projected on the geological map. This entire strike length

Instruction 1(a)
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301 East Grace St.
Richmond, Virginia

REYNOLDS METALS COMPANY

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D. P. Reynolds	Executive Vice President
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Basil Horsfield	Vice President
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I, ALLYN DILLARD, Secretary of REYNOLDS METALS COMPANY, a Delaware corporation, do hereby certify that the above is a true, full and correct list of the officers of REYNOLDS METALS COMPANY as of March 5, 1958.

WITNESS my hand and the seal of said corporation on the 5th day of March, 1958.

Allyn Dillard
Secretary

SEAL

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Instruction 3(a)
Reynolds Metals Company
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There is attached hereto a lease dated December 26, 1957, between Fluorspar Consolidated, Inc., and Reynolds Metals Company covering sixty-six tracts of land. The particular tracts covered by this application are those tracts identified in the Exhibit A attached to that lease as tracts Nos. 26, 27 and 28. Tract No. 26 is sometimes commonly referred to as the "Tyner" property; tract No. 27 is sometimes commonly referred to as the "Hicks" property; and tract No. 28 is sometimes commonly referred to as the "Watson" property. Reference is directed to the legal description for said tracts attached to the aforesaid lease.

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Instruction 3(e)
Reynolds Metals Company
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Applicant's interest in this land is subject to the lien, which is generally applicable to almost all of applicant's property, of an Indenture of Mortgage and Deed of Trust from Reynolds Metals Company and Certain Subsidiary Mortgagors to Manufacturers Trust Company and A. F. Keuthen, as Trustees, dated June 1, 1955, as supplemented from time to time by Supplemental Indentures between the same parties, said Indenture being recorded in the Office of the Clerk of the County Court of Crittenden County, Kentucky on July 22, 1955 and also separately recorded in Livingston County, Kentucky. The lien of said Indenture, as supplemented, is, pursuant to the granting provisions thereof, expressly made subject to any liens theretofore or thereafter created coming within the provisions of Section 6.12(A)(6) of said Indenture, which reads:

> "Liens upon bauxite and fluorspar lands, or upon mineral estates relating thereto, securing Indebtedness of the Company and Consolidated Subsidiaries in an aggregate principal amount not exceeding $500,000 at any one time outstanding to the United States of America, or a department or agency thereof, with respect to payments or advances made by the Defense Minerals Exploration Administration for the exploration, development and mining of critical or strategic minerals or metals."

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Instruction 4 (a)

The mines of the Watson, Hicks and Tyner tracts were operated by various small companies and individual prospectors who made no maps of the workings, and, as far as known, kept no records of the production. The last mining operation was in 1938 and the shafts have since caved, leaving the workings inaccessible.

The Two Brothers Mine of the Watson property has had major production, probably in excess of 60,000 tons of fluorspar. The following is an attempt to correlate information from various sources into a generalized picture. The information has been drawn from a report of Dr. Stewart Weller and from a description of the mine in the U.S. Bureau of Mines' Report of Investigations 3943, plus conversations with miners who worked in the Two Brothers Mine. Both Weller's report and the Bureau of Mines' report were based on "second hand" information as the mines were closed at the times when these reports were prepared. Weller's report in 1925 was based on the files of the Pope Mining Company and conversations with the mine foreman, Raymond Babb. The Bureau of Mines' report in 1946 was based on descriptions given the Bureau's engineer by Milton Yandell, a lessee who took a prominent part in the operations. Additional information for this report has been compiled from conversations with Milton Yandell, James LaRue, Harley Howard and Marvin Turner. As can be expected, the various versions do not always check. Where there are discrepancies, the word of the miner who worked that particular part of the mine in question has been accepted. The Weller report is accepted as the authority on workings prior to 1925. For the record the Weller report to the Pope Mining Company is copied below:

(Direct copy from Dr. Stewart Weller's report to Dr. Curran Pope)

The Two Brothers Mine

1925

"This property has been the seat of extensive fluorspar mining operations, carried on by the Pope Mining Company, and has become an established and well known mine in the district. The Two Brothers Mine development consists of two shafts which were sunk at different periods of development of the property. The first shaft is about 90 feet in depth, out of which some tonnage of fluorspar was taken. The second shaft is 260 feet deep, well timbered throughout except perhaps needing to be retimbered now, down to water level, which is about 65 feet. Sufficient collars of ore have been left standing to preserve the shaft from caving as a result of mining operations.

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"N.E.----------Levels----------S.W.

About 200 feet----------90----------12 feet in length.
200 to 250 feet----------140----------300 to 350 feet.
200 to 250 feet----------170----------nothing.
200 to 250 feet----------190----------nothing.
about 100 feet----------250----------12 feet in length.

"The 90 foot level northeast was driven about 200 feet in surface spar, no walls were present beyond and around an old shaft which had been sunk in a good body of gravel spar, running from 3 to 8 or 10 feet in width. Stoping was carried on to the extent of about three sets high. To the southwest the same level was driven about 12 feet, but not being in paying "dirt" it was discontinued. It was believed to be necessary to cross cut to the "off set" ore body, which was not done.

"The 140 foot level was driven northeast between 200 and 250 feet in a good body of surface gravel spar, to where the spar deposit pinched. The ground between this level and the 90 foot level was removed by stoping. The southwest drift in this level was carried 300 to 350 feet in a good body of surface gravel spar running from 4 to 10 feet in width, and stoping to the extent of three or four sets high was done. From this level, near the shaft, a cross cut was driven 39 feet southeast where hard spar was encountered, being the best grade that had been mined from the property up to that time. This spar was followed with some stoping, and at a distance 250 feet back from the shaft the spar was present between two limestone walls about four feet apart.

"The 170 level to the northeast remained about the same as the 140 foot level in the same direction. Likewise the 190 foot level was essentially the same as the 140 and the 170 levels.

"In the 240 foot level to the northeast, the vein was followed and was still holding good for a distance of about 100 feet. Some distance from the shaft in this level, two cross cuts were driven, one for 30 feet to the southeast and one for 18 feet to the northwest. To the southeast hard spar was cut 3 or 4 feet wide, being of good grade between limestone walls. In the cross cut to the northwest hard spar was encountered 2-1/2 to 3 feet wide, also between limestone walls. But little mining was done in these cross cuts on account of closing down the mine. In the southwest direction the 240 foot level was driven only about 12 feet. The ore from the lower levels of the Two Brothers Mine is similar in character to that taken from the neighboring mine of the Eagle Fluorspar Company.

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"The Two Brothers Mine is equipped with steam power plant and the usual mining machinery, such as air compressor, rock drills, hoists, etc., pumps, pipe, rails and mining tools. Also there has been erected a small mill consisting of crusher, log washers, rolls, trommel screens, elevators, coarse and fine Hartz jigs and concentration tables. Altogether the mechanical equipment installed is adequate and sufficient to mine, hoist and prepare for market between 25 and 50 tons per day."

The Bureau of Mines' Report of Investigation 3943 (1946) reads as follows:

"The Two Brothers Property

"The Two Brothers property is in Crittenden County, Kentucky, about 7-1/4 miles southwest of Marion, and is part of the Henry Watson tract owned by Eli H. Brown, Jr., of Louisville, Ky., and leased to the Mahoning Mining Co. of Rosiclare, Ill. It is treated under a separate heading because the mineralization is on a different vein structure, which is being explored.

"The Two Brothers ore deposit is in a faulted zone, which is noted in Figure 1. as fault 12. This fault extends as an oblique cross fault from fault No. 3 to fault No. 1 (fig. 2).

"No authentic record of production was obtainable, but it was probably not less than 60,000 tons. Milton Yandell, a lessee who took a prominent part in operations, is authority for the following history of the property:

"Gravel spar was found on the surface in 1904, and work was begun on the property in 1914 by Dr. Curran Pope (deceased) and his brother, Thurston Pope, under the name Two Brothers Mining Co. They mined a large vein of gravel spar 16 feet wide to a depth of 140 feet and sank a shaft to 250 feet (fig. 2).

"In 1935 Milton Yandell leased the property. He timbered the shaft. At a depth of 140 feet the vein dipped out of the shaft to the east. On the 250 foot level Yandell excavated a drift from the shaft parallel to the vein and cross-cut northwest and southeast. The cross cut to the northwest cut through a solid vein of good fluorite ore 7 feet wide. Yandell mined this ore for about 8 months. Production was 40 tons a day. The ore was milled at the neighboring Davenport mill.

"Yandell sold his lease to the Delhi Fluorspar Corporation in 1935. The Delhi Corporation sank a 50-foot winze to the 300-foot level and

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mined the ore to that point. All the Yandell and Delhi ore was mined from a vein or veins west of the shaft. However, Yandell had found a solid vein east of the shaft, but he did not extend his work far enough eastward to find the vein from which the Pope brothers had mined gravel spar.

"In 1938 Turner, Flannery & Summers obtained a lease and sank the shaft 60 feet to the 310 foot level. They were only 10 feet below the bottom of the Delhi workings. They mined the 10 feet of ore from beneath the Delhi stope and then sank the shaft to the 350 feet level. A cross cut was excavated eastward to the large vein "gravel spar". This cross cut passed through the east vein (solid, not "gravel spar") which Yandell had discovered. That vein contained ore, but when the gravel spar vein was cut into the gravel flooded the level and rose up into the shaft a few feet. The lessees had built a small mill and had gone to considerable expense; they failed to obtain a loan to finance further work, gave up their lease in 1939, and removed the mill.

"Eli H. Brown, Jr., attained title from the Two Brothers Mining Co. and about January 1945 gave an option and lease to the Mahoning Mining Co. which is now drilling the first of several core-drill holes to explore the property.

"Two diamond drill holes known as Wietzell No. 1 and No. 2 were drilled upon the property in 1942. The Bureau's engineer saw pieces of drill core scattered about but failed to learn details of this work. However, the holes were said to have been short, and it is not believed that the fault was reached by drilling.

"The Mining workings are not accessible. No mining or milling plant remains on the property. No work other than the diamond drilling by Mahoning Mining Co. was in progress at the property in April 1945."

James LaRue of Salem has given the following additional information on the 140 level mining. The long drift to the southwest started on the gravel spar vein, but the ore stopped about 60 or 70 feet from the shaft. (Weller lists this drift as being in ore for 300 to 350 feet.) Beyond the ore the drift went into "stream gravel" which LaRue thinks is valley fill. LaRue claims that the drift was continued in this material for a total length of about 500 to 550 feet and broke into a solid face of fluorspar on the other side of the valley. Rather than tram the ore through this long drift, Pope decided to sink a new shaft on the south bank of the stream. Timbers for the headframe and necessary installations were assembled at the proposed shaft site, but Pope died and the shaft was not sunk.

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Harley Howard of Salem worked for both Pope and the Delhi Corporation during their respective periods of mining. Howard claims that it was the 180 level which was driven through the "valley fill" and found ore in the face of the drift. According to Howard, the 140 level was driven in ore for about 75' where the vein pinched. The level was driven for an additional 50 feet with no indication of a vein. At this point, a crosscut to the east was driven about 20 feet and found the extension of the vein. Ore was mined from this point for an additional 100 to 150 feet to the southwest where the vein again pinched and the level discontinued. Most of the ore above this level was stoped.

According to Howard, a 180 level (probably the 190 of Weller) was driven to the southwest on this vein. The level was in ore for about 75 feet, cut through the 50 foot "pinch" and found ore for an additional 100 to 150 feet as did the 140 level. The level was continued to the southwest and encountered the "stream gravel". At a distance of about 450 to 500 feet from the shaft, the drift cut out of the "stream gravel" and into a 4 foot face of solid fluorspar. The ore between the 180 and the 140 levels was mined. The ore back to the first "pinch" (75 feet southwest of the shaft) was also stoped to the 240 level.

Because the elevations of the 140 or 190 levels in relation to the major drainage features are too low for the zone to be a filled valley, it is probable that the stream gravel moved downward along the fault zone as a result of sink-hole action. The only other explanation would be recent movement along the Moore Hill fault system which resulted in a dropping of the fault block at this point. The material is described as being too clean and well rounded to be gouge and angular fault breccia.

In recent conversations, Milton Yandell gave a somewhat different version of his mining activities than attributed to him in the Bureau of Mines' report. This later version conforms more closely to the picture given by Weller (1925).

Yandell's principal mining was from the 240 level. According to Yandell, there was a small vein of hard spar averaging about 18 inches wide in the shaft at the 240 level. Pope had originally opened the level by drifting about 30 feet northeast on the vein and then crosscutting southeast and northwest. The north-west crosscut was about 15 feet long and cut a vein of hard spar. The southeast crosscut intersected the gravel spar vein which Pope then mined. Later Yandell began to mine the vein in the northwest crosscut. The vein was reportedly 7 feet wide and dipped 45° to the northwest. From the crosscut he drove about 40 feet to the northeast and about 40 feet to the southwest and stoped the ore about 25 feet high. Yandell sold his lease to the Delhi Corporation, and according to Yandell, the Delhi miners sank a 50 foot winze on this vein.

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Harley Howard, the Delhi miner who sank the winze, gives the following version which differs from Yandell's. According to Howard, he continued the drift on the small middle vein about 15 feet beyond the cross-cuts made by Pope. At this point, the vein had widened to about 4 feet of high-grade fluorspar, and it was here that he sank the 50 feet winze. Exceptionally good ore was mined along the vein from the winze until a cavity was cut that produced more water than could be handled by the small pumps which they were using, and the mine was closed. This vein also dipped to the northwest.

In 1938, the mine was reopened by Turner, Flannery and Summers. Marvin Turner of Marion, one of the three contractors, gives this history of their operations. The shaft was sunk to the 300 level, at which point they cut out to the west to the vein mined by Delhi. From the crosscut they drove 100 to 150 feet southwest, and also northwest, almost to the Eagle Watson property line. The vein pinched at both extremities of the drift. Turner is of the opinion that most of the ore above this level was removed. However, near the close of their operations on this level they were in a hurry to load a barge and pulled too many timbers, resulting in a collapse of the level. Four of the miners were trapped by this collapse, but they were able to escape through higher workings.

No cross-cut to the gravel spar vein to the east was made from this level.

Turner, Flannery and Summers deepened the shaft to the 350 level and crosscut about 45 feet to the west, where they found the vein to be too soft to mine. A second cross-cut was driven about 45° north of the first, and the ground was found to be in good condition. The level was driven northeast along the vein almost to the Eagle-Watson property line and most of the ore between the 350 and 300 level was stoped.

In the meantime, they had cross-cut about 45 feet to the southeast from the shaft to the gravel spar vein. The cross-cut found red mud, but no fluorspar, and a bulkhead was built. Later, during a time of very heavy rains, this bulkhead collapsed, the level flooded, and mud came up into the shaft.

Except for minor clean-up operations on the higher levels, and a reworking of the mine dumps, there have been no further operations to the present time.

Summary

From the collective histories above, it seems that four separate veins were mined and a fifth discovered in the Two Brothers Mine. For clarity, these veins are referred to as "A", "B", "C", "D", and "E", in order of their discovery.

Gravel fluorspar was discovered at the surface on vein "A", the large gravel spar vein. This vein cropped out northwest of the Two Brothers shaft and dipped

southeast, crossing the shaft at the 140 level. Apparently most of the ore on this vein has been mined from the 240 level to the surface for a distance of 75 feet to the southwest and 250 feet to the northeast from the shaft. The vein pinches about 75 feet southwest of the shaft and a second ore shoot starts about 125 feet from the shaft, continuing for an additional 100 to 150 feet where it ends against "stream gravel". This second orebody has been mined to the 180 or 190 level. A third ore shoot was discovered by a drift through the "stream gravel", about 500 feet southwest of the shaft but the ore was not mined.

There has been no mining on vein "A" below the 240 level. A crosscut to this vein found mud at the 350 level.

Vein "A" is reported to have ranged from 4 to 24 feet in width. Most of the miners agree that the average width was about 8 feet.

Vein "B" was discovered by a crosscut driven east from the 140 level on vein "A". The vein was followed, with some stoping, for 250 feet to the northeast. A crosscut from the 240 level also cut the vein, but very little mining was done. This vein was 3.5 to 4 feet wide, and on the 140 level, it was described as being "the best grade that had been mined on the property up to that time". This vein seems to have had a steep dip and may intersect vein "A" at depth.

Vein "C" was discovered in the shaft at the 240 level at which point it was about 18 inches wide according to Yandell and Howard. (Weller does not mention this vein.) The vein was followed to the northeast for about 30 feet by Pope and later for an additional 15 feet by Delhi at which point the 50 foot winze was sunk. This was followed by the 300 level of Turner, Flannery, and Summers who mined the vein for a distance of 100 to 150 feet to the southwest and about 250 feet to the northeast. Vein "C" was also mined from the 350 level northeast from Turner's second (45°) crosscut. Vein "C" dips to the northwest. The vein was 6 to 10 feet wide on the 300 and 350 levels.

Vein "D" was discovered by Pope by a crosscut to the northwest on the 240 level. Yandell mined this vein for a distance of 40 feet in both directions from the crosscut, stoping about 25 feet high. Yandell apparently mined good ore but the vein apparently was mostly calcite on either end of Yandell's stope. Vein "D" dips to the northwest and probably intersects vein "A" a short distance above Yandell's stope. This vein was reported to have been 7 feet wide. It has not been prospected below the 240 level.

The fifth vein, vein "E", was cut by the crosscut to the east from the 350 level. The only mention of this vein is in the Bureau of Mines' report: "This crosscut

passed through the east vein (solid, not "gravel" spar) which Yandell had discovered." This correlation seems very improbable. It probably represents the discovery of a new vein, diverging from vein "A".

From the above descriptions, schematic maps and sections have been prepared to graphically portray the present interpretations (plate 1).

The Hicks Shaft on the Hicks property, about 40 feet southwest of the Davenport property line, was sunk by Allie Croft for the Pope Mining Company, on a surface showing of gravel spar along fault 1.

According to Croft, he drove levels at 21 feet, 50 feet and 100 feet. The vein was high grade gravel spar about 15 feet wide with "mill-grade" fluorspar in limestone breccia on either side of the vein. The concentrate from the log washer averaged 85.5% CaF_2.

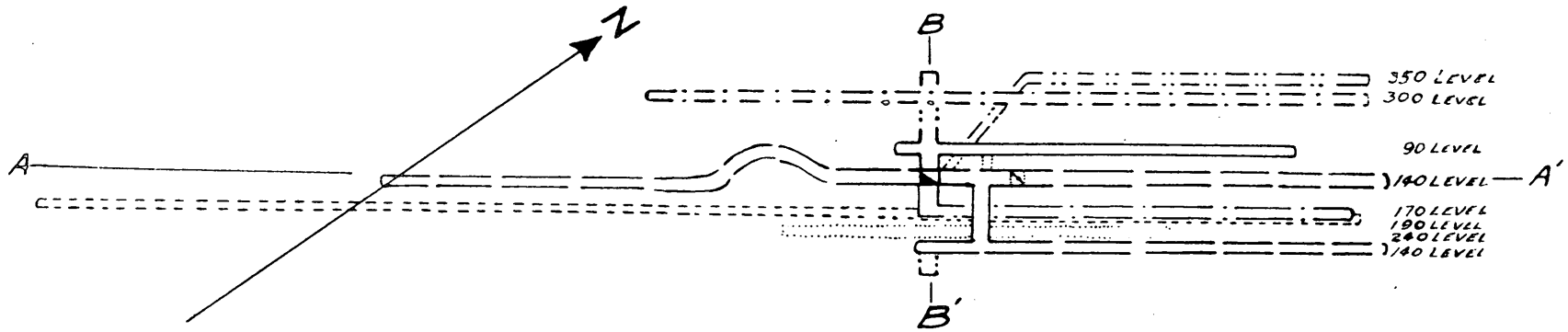
Northeast of the shaft the levels were in ore to the property line. To the southwest the ore cut off at a distance of 7 feet at the 21 level, 15 feet at the 50 level and 70 feet at the 100 level. From Croft's description the ore seemed to be cutting off against an old sink hole or similar structure resulting from deep weathering.

The shaft was later deepened by Schley Frazer to 150 feet and at this level the vein mined about 100 feet to the southwest where it pinched, and mining was discontinued.

The numerous prospect pits and shafts, along with prospect drill holes on the Watson, Hicks, and Tyner properties will be discussed in rider 4 (c) in connection with the geology.

TWO BROTHERS MINE

SKETCH MAP FROM ORAL DESCRIPTIONS



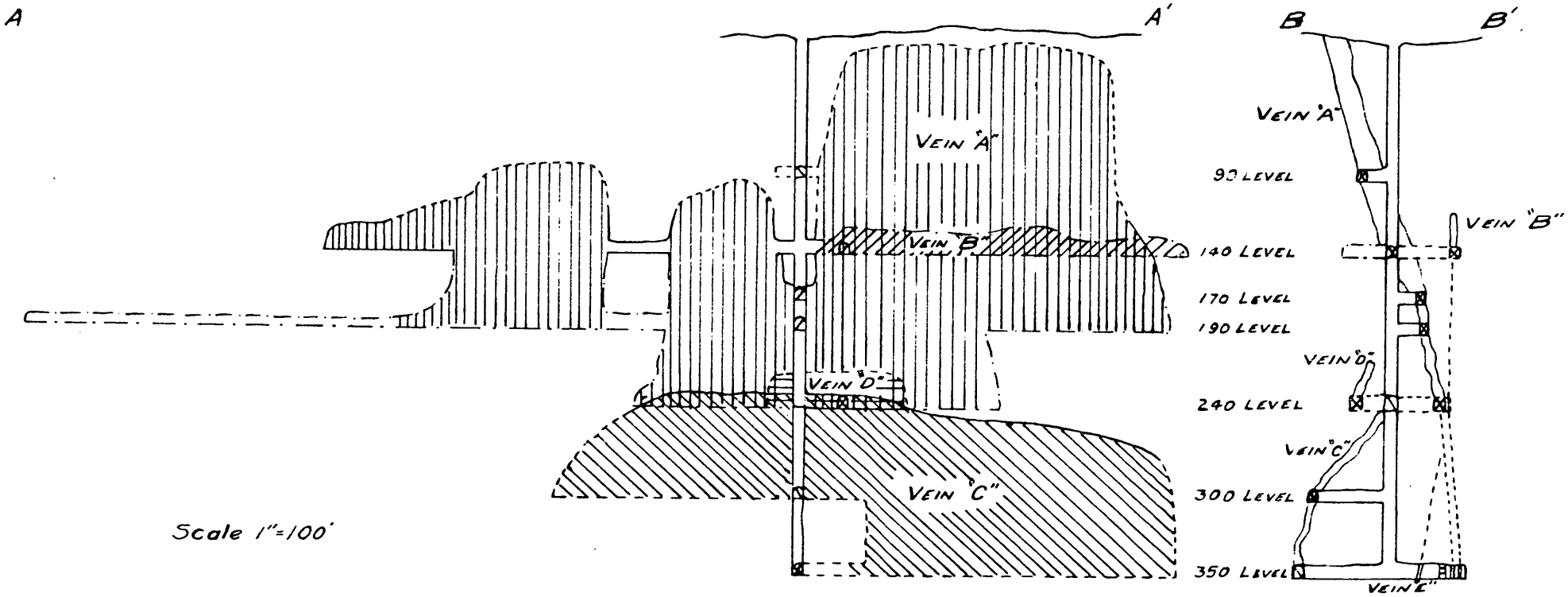


PLATE 1

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Instruction 4 (b)

Past production is estimated in the Bureau of Mines' report of Investigations 3943 as follows:

Two Brothers Mine	60,000 tons
Hicks Mine	5,000 tons

Calculations based on the schematic maps are as follows:

Two Brothers Mine	68,000 tons
Hicks Mine	7,500 tons

A very rough estimate of the ore reserves has also been made on the schematic maps by projecting the veins downward from the mine levels to the theoretical 400 foot level for the Two Brothers Mine and to the 200 foot level for the Hicks Mine:

Two Brothers Mine	65,000 tons
Hicks Mine	5,000 tons

Reynolds Metals Company
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Instruction 4 (c)

The properties covered in this report lie along the very complex Moore Hill fault system. Basically, the area is traversed by two sub-parallel faults, the Moore Hill fault and Weller's fault 72, with an intricate network of intersection cross faults.

The formations present at the surface are of Mississippian Age, ranging from Fredonia (Ste. Genevieve) to Hardinsburg (Chester). The St. Louis limestone is found at relatively shallow depth in some of the mines, and has been cut in prospect drill holes. The stratigraphic section is shown in Plate 3. Because of the highly variable nature of the Chester formations in the Kentucky-Illinois district, this section was compiled from information on the Eagle, Watson, and Davenport properties. The sources used were the U.S. Geological Survey Bulletin 1012-E; Bulletin of American Association of Petroleum Geologists, Vol. 36, No. 9; and logs of the U.S. Bureau of Mines' diamond drill holes 7, 8, 9, 80, and 83, which were drilled on the Watson and Davenport properties.

The geology of the Watson, Hicks, and Tyner properties is described in the U.S. Geological Survey Bulletin 1012-E and by Stewart Weller in a report to Dr. Curran Pope. (Since the U.S. Geological Survey Bull. 1012-E is certainly on file at all DMEA offices dealing with this application, we are not sending a copy with this report. The Weller report has been copied and is enclosed.) Additional information on these properties is given in the U.S. Bureau of Mines' Report of Investigations 3943, referred to in rider 4 (a).

Exposures of bed rock in the area are poor. Much of the geologic mapping is based on a study of the rock found on the dumps of mines and prospect pits, and from the logs of prospect drill holes. In an area of such complex faulting, the information available is inadequate to map the structure with accuracy. Projections of major faults have been made on the maps of the U.S. Geological Survey Bull. 1012-E and these projections are used as the basis of the tentative exploration program outlined in rider 5 (b). These projections will likely change somewhat as the drilling progresses and more detailed information is added. Also it is the usual experience in the district that the drilling will find the structure to be considerably more complicated than could be determined from surface mapping. Thus, a prospect drilling program should be flexible and proposed hole locations subject to change as new information is added from previous holes.

The fluorspar deposits occur as veins along the faults. In this area a very high percentage of the faults are mineralized. In addition to the Two Brothers Mine, the adjacent Eagle-Watson and Davenport properties have had major production (200,000 and 75,000 tons respectively), and are reported to have substantial reserves. There is an excellent chance that the practically untested faults of the Watson, Hicks and Tyner properties will be equally productive or perhaps much greater.

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is untested except for one shallow shaft which did not penetrate the formations deeply enough to reach a favorable horizon. Fault 10 intersects fault 4 near the southwestern side of the Tyner property as projected. The average displacement along this fault is about 150 feet.

Fault 4 has a 700 foot projection on the Tyner tract before it intersects fault 3. The projections are through an area lacking both outcrops and prospect pits.

Fault 12-B is projected to intersect fault 10 on the Tyner property near the shallow shaft mentioned above, and fault 12, at the Two Brothers Mine, for a total strike length of 2,800 feet. Vein "C" or "D" was probably on this fault in the Two Brothers Mine. The Kentucky fluorspar shaft is the only prospect along this fault. This shaft is 103 feet deep, with a 100 foot crosscut to the southeast and a 30 foot crosscut to the northwest. The workings were entirely in sandstone (Bethel) except the end of the northwest crosscut which crossed fault 12-B and ended in the shaley limestone of the Renault formation. The fault was barren at this point, containing only "blue biff", the miners' term for shale which has been deformed along a fault zone. An old drill hole was discovered about 100 feet northeast of the shaft which would have intersected the fault at a depth of about 70 feet. The details of the drilling were not learned, but it certainly did not intersect the fault deeply enough to test the favorable Fredonia horizon.

The Wietzel DDH 1 was evidently planned to test this fault also, but we have no information on the results or depth of this hole.

Fault 12 may correspond to the large gravel spar vein of the Two Brothers Mine. The 190 level apparently followed the fault; however, some of the miners believe the level was further west, closer to fault 12-B.

As projected, fault 12 intersects fault 3 and has a total strike length on the Watson property of 1,000 feet.

Fault 3 (Weller's fault 72) is sub-parallel to fault 1 and forms the southeast boundary of the Moore Hill fault system. This fault traverses about 1,500 feet of the Tyner property and 1,900 feet of the Watson property. Vein "B" in the Two Brothers Mine is probably on this fault. The Flannery shaft is on or near this fault, but the shaft was too shallow to prospect for a vein. The dump of the Flannery shaft shows only quartizitic sandstone. Fault 3 is unprospected on the Tyner property.

Dr. Stewart Weller prepared a geological report on the Watson, Hicks (Conyer) and Tyner properties in 1925. Subsequent mining and prospecting has revealed

CROSS SECTION, WATSON-DAVENPORT AREA
[illegible] ENDEN COUNTY, KENTUCKY

SCALE 1 IN

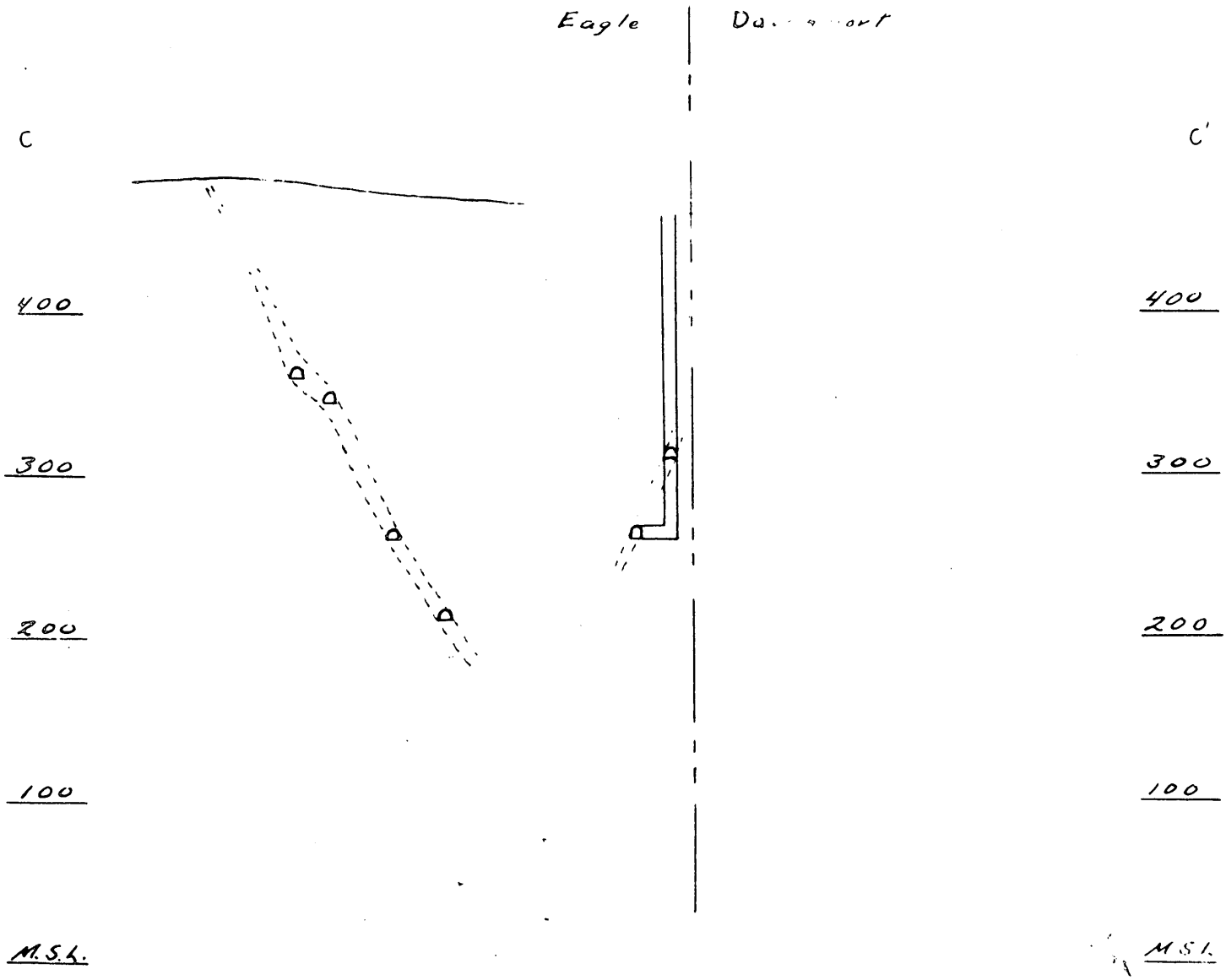

PLATE 4

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geological information which is not completely in accord with his interpretations. Nevertheless, Weller made a valuable contribution and for the record the following is a direct copy from the Weller report:

"HENRY WATSON, JOHN CONYER, AND W. C. TYNER PROPERTIES. The Watson property is that upon which is situated the Two Brothers Mine, which has been a large producer of fluorspar in the past, although it is not in operation at the present time. The property is situated three and one-half miles east of Salem, and is a little more than one-half mile from the state highway. The western portion of these properties is situated within the fractured belt between the Moore Hill fault and its companion parallel fault, No. 72, to the southeast, the Two Brothers Mine being situated upon one of the more or less diagonal cross faults which traverse this belt and make it a veritable fault complex. A reconnaissance survey, such only as could be made during the examination for this report, is wholly inadequate to fully bring out the fault situation upon these properties, and should be supplemented by a careful instrumental survey. Under these circumstances, the fault pattern presented upon the accompanying plates can only be an approximation to the actual conditions, and must not be taken as being entirely authoritative. The complex faulting across the property is established, however, beyond any possible question and most of the faults are shown more or less clearly in the topographic configuration of the ground.

"The main fault that crosses the properties is No. 72, the parallel companion of the Moore Hill fault, its direction being about North 40° East. The position of this fault can be clearly recognized in the banks of the small stream flowing west, just south of the Two Brothers Mine. East of the fault the exposures of shale of the Golconda formation are well exhibited, while to the west are the more or less quartzitic sandstone beds probably of the Cypress age. Higher up in the ravine in which these shales are exposed, a little distance east of the fault, the Hardinsburg sandstone overlying the Golconda limestone and shale, may be seen. At a point of the Watson property, perhaps even North of the Eagle Fluorspar Company, a fault diverges to the southwest from fault 72, and crosses the Watson property west of the house, its direction being about North 58° East. This is designated as Fault A on the plat. Between the main fault and this diverging one, there lies a slender, wedgeshaped block with its apex directed to the northeast. This wedge-shaped block widens to the southwest and crosses not only the Watson but also the Conyer and Tyner properties, and it is broken across by a number of cross faults so that the several formations ranging from the Renault limestone to the Cypress sandstone are

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now exposed at the surface. The first of these cross faults connecting Fault 72 with Fault A is one upon which the Two Brothers Mine is situated, and it may be designated as Fault B. Its direction is approximately North 30° East and it must intersect Fault A somewhere in the property of the Eagle Fluorspar Co. A second cross fault between Faults 72 and A, having an approximate north-south direction seems to be located wholly or almost wholly upon the Watson property a short distance west of Fault B, it may be designated as Fault C. Still a third cross fault, Fault D, crosses the Conyer and Tyner properties. Fault E diverges from Fault D in a southwest direction, in a direction sub-parallel with the Moore Hill and its companion Fault 72.

"The fault block bounded by faults 72, A, and B, seems to be wholly of sandstone and is probably altogether Cypress at the surface, and this sandstone with the underlying Paint Creek and Bethel must form the east wall of the vein at the Two Brothers Mine, but at the depth to which this mine has been carried the Renault limestone is probably close at hand in this east wall. The actual depth to which the sandstone extends must depend upon the amount of tilting to which the block has been subjected in its downward movement, and this is a factor which cannot be determined from the surface examination.

"The block founded by the Faults A, B, and C, forms the west wall of the Two Brothers Mine. This block consists of Bethel sandstone at the surface in its northern and southern portions, but the underlying Renault limestone is present near or probably at the surface in the valley of the small stream south of the mine. The broadening out of this valley southwest of the mine is doubtless due to the presence of this limestone, and its abrupt contraction a little farther west marks the point where it crosses fault A, beyond which it is cut in hard quartzite.

"The geological conditions at the Two Brothers Mine, therefore, are a Renault limestone west wall at or close to the surface, with a Cypress sandstone east wall. In most situations throughout the district mineralization is likely to begin with the Renault limestone, although the richest deposits are commonly associated with the underlying St. Genevieve limestone. At the 260 foot depth to which the mine shaft has been sunk, the west wall is well down in the Ste. Genevieve limestone and the east wall is the Renault limestone, which may be 75 to 100 feet thick above the Ste. Genevieve limestone on that side. Under these conditions the expectation is that the vein will become richer in mineralization with increased depth, to perhaps 1,000 feet or even to greater depths.

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"The block lying west of Renault C extends from the Watson property across the Conyer and into the Tyner. This seems to be entirely a sandstone block at the surface and doubtless is the Cypress. The conditions, therefore, along Fault C are probably identical with those of Fault B, except that along Fault C the east wall is limestone from near the surface and the west wall the sandstone. Situated as it is in this proven mineralized region, ore deposits entirely similar to those which are present in the Two Brothers Mine, may be expected in the vein along fault C.

"Fault D must again repeat the conditions of B and C. The block east of D is the Cypress sandstone mass limited by fault C on the east. West of Fault D the Renault limestone and shale are exposed along the bank of the creek between the Conyer and Tyner properties. A shaft sunk on this fault would reveal a sandstone wall on the east, as in the Two Brothers Mine, and a Renault limestone wall on the west, which would give place to the Ste. Genevieve limestone at 100 feet or perhaps less, depending upon the amount of inclination of the strata.

"The wedge between Faults D and E on the Tyner property, is a Cypress sandstone mass downdropped in relation to the blocks on either side. The conditions west of E are like those along Fault D farther north, except that the expected mineralization may be 50 to 100 feet deeper and still deeper mineralization may be expected along the southern extension of Fault D in the Tyner property.

"In addition to the faults which traverse the wedge between Faults 72 and A, the main Moore Hill fault itself crosses the John Conyer property. This fault has been exploited on the property of the Eagle Fluorspar Co., just north of the Watson tract, and a large quantity of high grade spar has been produced. On the Davenport property, just west of the Watson tract, recent work has demonstrated the presence of fluorspar of a quality similar to that in the Eagle Fluorspar mine. The geological conditions along the fault where it crossed the Conyer property seem to be entirely similar to those on the Davenport tract, and a like condition of mineralization may be expected. Lying on the northwest side of this fault is the great, undisturbed area of Ste. Genevieve limestone which is faulted against the Cypress sandstone. Mineralization may be expected near the surface, and at no great depth the vein has the St. Louis limestone on the foot wall and the Ste. Genevieve limestone on the handing wall, an ideal condition for the accumulation of fluorspar.

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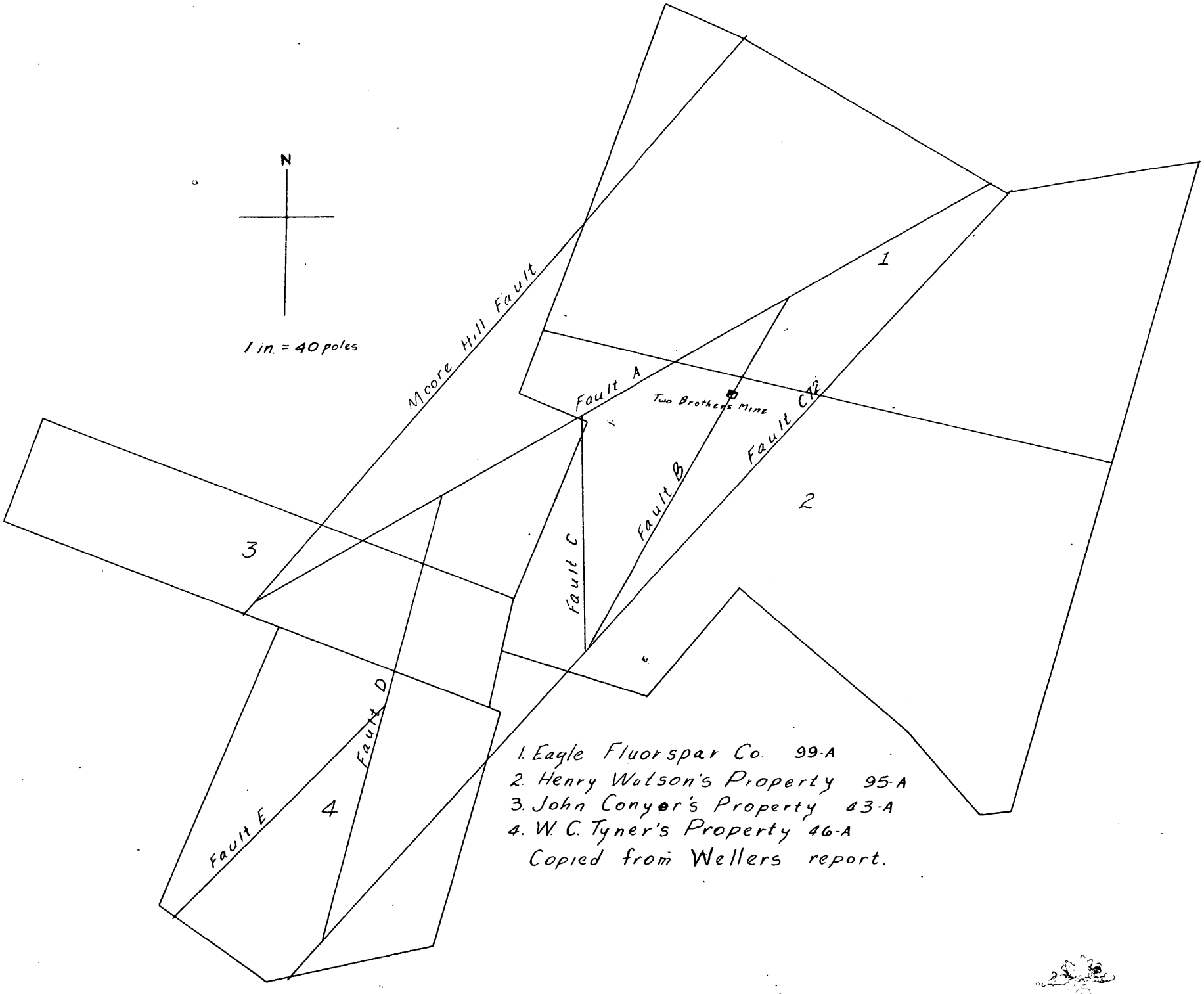
"An estimate of the lengths of the several faults upon the Watson, Conyer and Tyner properties is as follows:

Fault 72	3217 feet
Fault A	1188 feet
Fault B	1460 feet
Fault C	1114 feet
Fault D	2202 feet
Fault E	1435 feet
Moore Hill	594 feet."


N
1 in. = 40 poles
Moore Hill Fault
Fault A
Two Brothers Mine
Fault C½
Fault B
Fault C
Fault D
Fault E
1
2
3
4
1. Eagle Fluorspar Co. 99-A
2. Henry Watson's Property 95-A
3. John Conyer's Property 43-A
4. W. C. Tyner's Property 46-A
Copied from Wellers report.

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Instruction 4 (d)

The nearest railroad shipping point is Marion, Kentucky. The Two Brothers Mine is reached by one mile of gravel road from the New Salem school on U.S. Highway 60, 8 miles southwest of Marion. The Watson, Hicks, and Tyner properties are covered in part with second growth timber and access beyond the mine is poor. The relief is moderate, however, and road construction to any part of the area would not be difficult.

Instruction 4 (e)

Experienced mining personnel could be obtained from near-by farms and from the towns of Salem and Marion.

Material, supplies and equipment could be shipped into Marion by rail or purchased locally.

Water pumped from the mines would be sufficient for milling and other needs.

Except during times of heavy rains, there would not be an adequate supply of surface water for core drilling needs. The No. 4 shaft on the Davenport property is in good condition and we have permission to set a pump on this shaft to supply water for the drills.

An electric power line runs to the Two Brothers Mine.

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Instruction 5 (b)

The exploration program is designed to test by core drilling the various faults on the Watson, Hicks, and Tyner properties for vein type deposits of fluorspar. The program is set up in two stages, the first stage to explore the faults on relatively widely spaced centers as outlined below and the second stage to explore on more closely spaced centers or at greater depth any favorable showings of mineralization discovered during stage I.

Stage I

In general, stage I is planned to test the major faults at favorable stratigraphic horizons on 400 foot centers. This spacing should be sufficient to detect veins of major economic importance. The holes will be drilled on a minus 45° angle to give a wide horizontal coverage which will test for parallel veins and allow for deviations from the projected strikes and dips of the faults. Some of the holes are designed to prospect two or more faults.

Since the exposure is poor over much of the area, drilling will start at known points on the faults and move systematically along the projections. It will probably be necessary to shift the positions of some of the proposed holes as the program progresses and the geologic picture is defined. Thus the program for stage I would be flexible to accommodate any deviations of the faults from the projections made on the geological map.

The depth of the holes will be variable, depending on the depth to a favorable stratigraphic horizon. The holes will be planned to intersect the faults at horizons where the Fredonia limestone is on one wall, preferably in contact with another competent formation. Rough estimates of the depth of each hole have been made on the basis of surface formations indicated on the geologic map. As the program progresses, the stratigraphic information from preceeding holes will give better control for the planning of subsequent drilling.

The following list gives the tentative location, bearing, angle, and estimated depth of each hole. These tentative locations are also shown on the geologic map (plate 2). For reasons given above, these plans are subject to change as additional geological data are acquired.

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Stage I Proposed Holes

Hole	Property	Coordinates North	Coordinates East	Bearing	Angle	Depth
1	Watson	9815	10675	S56E	-45°	725
2	"	9185	11065	N55W	"	425
3	"	9230	10435	S48E	"	500
4	"	8545	10605	N48W	"	400
5	"	8940	10170	S48E	"	300
6	"	8250	10310	N44W	"	350
7	"	8730	9850	S44E	"	300
8	Hicks	8675	9285	S60E	"	250
9	"	8310	9140	S56E	"	450
10	"	8520	9540	S35E	"	280
11	Tyner	7980	8910	S57E	"	340
12	"	7665	8675	S55E	"	330
13	"	7340	8460	S53E	"	350
14	"	7090	8245	S37E	"	530
15	"	7005	8885	N53W	"	270
16	"	7150	9220	N42W	"	350
17	"	7735	9225	S43E	"	330
18	Hicks	8740	9190	N49W	"	350
19	"	8625	8580	S49E	"	250
20	Watson	9670	10350	N71W	-54°	770
						7800
					Additional footage --	200
						8000

The "additional footage" has been added to give a margin of safety to the estimate.

The holes will probably, but not necessarily, be drilled in the sequence listed above.

Stage II

If the widely spaced drilling of stage I indicates orebodies, additional holes willbe needed to delineate the horizontal and vertical extent to the ore. It is also possible that the drilling may indicate additional faults which offer good prospects. In either case, the planning of the stage II drilling much await the results of stage I.

It is highly probable that some additional drilling will be needed and for this purpose, a drilling footage, roughly equivalent to the stage I footage, should be set up for stage II. Only the footage actually needed will be used. The stage II drilling can be planned and submitted to the DMEA representatives for approval near the close of stage I. Eight thousand (8,000) feet of core drilling should be set up for this purpose.

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Instruction 5 (d)

Reynolds Metals Company has had extensive mining and prospecting experience in fluorspar ores, and in the past has successfully carried out operations similar to those proposed in this report. The program will be under the direct supervision of competent personnel in the Geological Division of the Company.

Instruction 6 (a)

The core drilling will be contracted to a competent drilling company on the basis of competitive bids. These bids will be available at the time the DMEA Field Team makes their examination.

Because of the deep weathering encountered in the Watson mine and in other mines along the Moore Hill Fault System, we do not consider AX standard or BX wireline drilling to be adequate to test the ore deposits. They may be used where the formations are solid, but in the fractured and weathered zones along the faults it will be necessary to cut larger cores or resort to a method of "dry sampling" described below.

From the standpoint of core recovery and cost, we find the following procedure to be the most efficient:

1. The holes are collared with N or B casing and "dry sampled" (casing with shoe rotated without water through overburden) to solid rock. This gives valuable geological information and prospects for shallow deposits of gravel fluorspar.

2. B casing is set in solid rock and the hole is drilled with BX wireline tools through solid formations.

3. If a zone of soft or broken rock, or a vein of fluorspar is encountered, the wireline tools are pulled and a BX "L" series (Longyear) or a BX "M" series (Joy) bit with bottom discharge will be used. This gives a BX core which is larger and thus stronger than the BX wireline core and results in better recovery in the strategic zones of the hole.

4. If clay, gravel fluorspar, or other very soft material is encountered, it is "dry sampled" with a BX wireline drill rod fitted with a shoe bit. Water is used to wash the rods down the hole to the point where the sample is to start and to remove contaminating materials from the upper part of the hole. The water is then turned off and the rods are rotated into the soft material. Before pulling the sample, a 3/4 inch steel ball is dropped into the top of the string of tools

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Instruction 6 (a) continued

and seats in a special coupling at the top of the bottom rod, preventing the head of water in the rods from dislodging the sample as the rods are pulled.

5. If a deep cavity is encountered and the need for casing arises, A casing can be set in the BX hole and the drilling continued with AX tools, thus avoiding costly reaming.

6. Should a zone of soft material be found after the hole was reduced to AX, it could be dry sampled with a barrel made of E casing, fitted with a shoe and a coupling to receive the steel ball.

The above procedures are more expensive than standard AX or BX wireline drilling, but they are effective in obtaining samples in the strategic parts of the holes where the standard methods so often fail. Ore bodies have been discovered in the district by using standard procedures but we wonder how many fluorspar veins are recorded as "cavities" in the drill logs because there was no recovery. We know of several places in the district where good ore has been found at points where drill logs had indicated cavities or low-grade mineralization because of poor recovery.

Some of the most closely supervised drilling in the district was done by the U.S. Bureau of Mines, yet a study of the logs indicates that the recovery from standard AX drilling often left much to be desired. There are statements throughout the reports (Bureau of Mines Reports of Investigations 3943, 3953, and 4049) of difficult drilling conditions and poor core recovery.

The dry sampling method outlined was developed and found to be very successful during our recent exploration program at the Ben Belt Mines (DMEA-4372, Idm-E1015). After the experimental work on the first hole (following an unsuccessful attempt with BX wireline drilling), we were able to recover nearly 100% of the weathered material in the fault zones, including gravel fluorspar. We lost a few samples in some of the smaller cavities where the material was apparently too thin to stick in the barrel.

Because of the variable nature of the drilling procedures, the Ben Belt contract with the E. J. Longyear Company was revised to the following terms: $9.00 per hour for drilling operations with a two man crew, plus $0.75 per foot for footage drilled, plus the costs of bits, plus the cost of drill rods and casing lost or rendered unserviceable due to damage caused by other than ordinary wear. After revising the contract, 2,476 feet were drilled at a total cost of $15,732.29, or $6.35 per foot. The cost per foot is expected to be about the same on the Watson-Hicks-Tyner project.

At this rate, 8,000 feet of drilling for Stage I will cost $50,832.00, and 8,000 feet of drilling for Stage II will cost $50,832.00 for a total of $101,664.00.

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Instruction 6 (b)

Reynolds Metals Company does not anticipate hiring labor for this project.

Costs of salaries personnel are as follows:

Supervisor	Days/Mo.	Cost/Mo.	15 Months
Resident Geologist	7	$200.00	$3,000.00
Engineering Assistant	7	100.00	1,500.00
Geological Assistant	10	150.00	2,250.00
		$450.00	$6,750.00

The use of consultants is not anticipated in this project.

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Instruction 6 (c)

The drilling contractor will furnish all operating materials and supplies except core boxes. Since it will be necessary to store all core until such time as it can be examined by DMEA personnel, the estimate is based on storing up to 2,400 feet. This will require 75 boxes costing $3.00 each for a total cost of $225.00.

Instruction 6 (g)

The assays will be made at Reynolds Metals Hurricane Creek Plant, Bauxite, Arkansas, at an approximate cost of $6.00 per sample. Assuming that the 20 holes proposed for stage I will require an average of five samples per hole, a total of 100 samples will be assayed at a total cost of $600.00. A similar figure should be set up for use in stage II, making the total for both stages $1,200.00.

The following are rates applicable to payroll taxes and insurance:

Federal Old Age Benefits	2%
Federal Unemployment	3/10 of 1%
Public Liability	$ .0729 per $100.00 payroll
Workmen's Compensation	$ .722 per $100.00 payroll

Instruction 6 (h)

Contengencies should not exceed $3,000.00.

Instruction 7 (b)

Reynolds Metals is to provide the services of its geologists and to pay in full the monthly invoices submitted by the drilling contractor.

Docket copy

PROJECT SUMMARY REPORT

By: J. W. Alt

September 8, 1959

1. Docket No. DMEA-4962 (Fluorspar)
Contract No. Idm-E1199

Operator - Reynolds Metals Company
301 East Grace Street
Richmond, Virginia

Property - Watson, Hicks, and Tyner Properties
Crittenden County, Kentucky

Operator's Property Rights - Lessee.

Lease from the Fluorspar Consolidated, Inc., dated December 26, 1957. Consent to Lien and Subordination Agreement, dated May 7, 1958.

Mining Lease and Option Agreement from Roy and Margaret Sunderland, dated November 29, 1958. Consent to Lien and Subordination Agreement, dated January 26, 1959.

2. Contract (Form MF-200 (June 1954), dated June 3, 1958.

Exploration for fluorspar shall be performed with conventional AX, BXWL, or BXM core drilling equipment in the area indicated on the map. The work shall be divided into two stages. The Operator shall complete Stage I and shall perform as much of Stage II as the Government approves in writing.

Stage I — Drill 18 diamond core holes, aggregating not more than 6,900 feet.

Stage II — Significant mineralization encountered in Stage I holes shall be further explored by diamond drilling not in excess of 8,000 feet of additional holes.

Estimated Costs of the Project

Stage I
Actual Costs
Category (1) Independent Contracts

6,900 feet of diamond drilling @ $2.95/ft.	$20,355.00
2,000 feet of reaming and casing @ $1.75/ft.	3,500.00

Stage I (continued)

Category (1) Independent Contracts (continued)

80 hours of cementing and hole survey @ $8.00/hr.	$ 640.00	
300 feet of lost casing BX size @ $2.16/ft.	648.00	
300 feet of lost casing AX size @ $1.70/ft.	510.00	

Fixed Unit Costs

Incidental allowance for each foot of drilling completed, 6,900 feet @ $0.28/ft.	$ 1,932.00	
75 wooden core boxes @ $3.00/box	225.00	
75 samples to be assayed for CaF_2 @ $4.50/assay	337.50	
25 samples to be assayed for CaF_2, Pb and Zn @ $6.50/sample	162.50	
Estimated Total Cost of Stage I		$28,310.00

Stage II

Actual Costs

Category (1) Independent Contracts

8,000 feet of diamond drilling @ $2.95/ft.	$23,600.00
2,000 feet of reaming and casing @ $1.75/ft.	3,500.00
100 hours of cementing and hole survey @ $8.00/hr.	800.00
300 feet of lost casing, BX @ $2.16/ft.	648.00
300 feet of lost casing, AX size @ $1.70/ft.	510.00

Fixed Unit Costs

Incidental allowance for each foot of drilling completed, 8,000 feet @ $0.28/ft.	$ 1,840.00 *

* This is an error; it should be $2,240.00

Stage II (continued)

Fixed Unit Costs (continued)

75 samples to be assayed for CaF_2 @ $4.50/assay	$ 337.50	
25 samples to be assayed for CaF_2, Pb and Zn @ $6.50/assay	162.50	
Estimated Total Cost Stage II (rounded)		$31,399.00

S U M M A R Y

Estimated Total Cost, Stage I	$28,310.00	
Estimated Total Cost, Stage II	31,399.00	
Estimated Total Cost of Project (rounded)		$59,710.00
Government participation @ 50%		$29,855.00

Amendments -

No. 1 - Agreed January 16, 1959, effective November 29, 1958. Adds property of Roy and Margaret Sunderland.

No. 2 - Agreed February 6, 1959. Completion time extended from March 10, 1959, to June 10, 1959.

Work Completed -

Stage I

Actual and Agreed Unit Costs

Diamond drilling, 6,900 feet, total cost	$25,449.50	

Stage II

Actual and Agreed Unit Costs

Diamond drilling, 7,482 feet, total cost	$28,498.26	
Total Cost of the Project		$53,947.76
Government participation @ 50%		$26,973.88

Final Reports -

Operator's final report, not dated, received July 7, 1959.

Field Team final report, dated August 20, 1959, received August 31, 1959.

Drilling under the terms of the contract was started on July 3, 1958, and was completed on May 13, 1959. A total of 518 feet of drilling provided for under Stage II of the contract was not utilized. The project was mutually terminated, effective June 4, 1959.

3. Audit Report of Review, made in lieu of final audit, dated July 6, 1959.

Total cost billed by Operator	$53,947.76
Exceptions	-0-
Total accepted cost	$53,947.76
Government participation @ 50%	$26,973.88

4. Certification of discovery ~~issued~~ dated September 11, 1959.

5. Comments -

The work completed under the contract was done in a satisfactory manner. The Operator is to be commended for care taken and extra cost assumed in obtaining adequate core samples.

A total of 24 diamond core drill holes totaling 14,382 feet were completed under the contract. Ore-grade mineralization constitutes two small ore bodies; one on the Hicks property and one on the Watson property. At the present market price, both bodies are too small to amortize development work and mining and milling facilities.

A total of 518 feet of drilling provided under Stage II of the contract was not utilized as all favorable structures on the properties were adequately explored by the completed work.

The indicated ore reserves are:

Hicks Ore Body

C.V. Cutoff	Tons Ore	Av. % C.V.	Av. % CaF_2	Av. % Pb	Av. % Zn
35%	42,904	48.01	26.99	0.18	3.90
25%	148,287	30.37	19.25	0.82	2.34

Watson Ore Body

35%	44,638	37.52	33.94	0.45	0.31
25%	57,368	34.06	30.75	0.41	0.43

This calculation utilized a combined value (C.V.) where 1% CaF_2= 1% C.V., 1% Pb = 5% C.V., and 1% Zn = 3% C.V.

Additional exploration work with Government financial assistance is not warranted on this property.

J. W. Alt

JWAlt/gla
cc: Director's Reading File
Frank E. Johnson
Docket

MME Form 17
Mar. 59

Stages I and II

OFFICE OF MINERALS EXPLORATION

WORK COMPLETED ANALYSIS

___ Certified

After final audit or review report is received, prepare in duplicate. File original in official docket. Send copy to Code 210.

Operator: Reynolds Metals Company

Actual Cost: X

State: Kentucky

Agreed Unit Cost: X

Final Report of Audit

Commodity: Fluorspar

Docket No.: DMEA-4962

Final Report of Review: July 6, 1959

Contract No.: Idm-E 1199

Type of Work (Use these categories only)	Authorized by Contract and Amendments		Completed and Paid for		Net cost after sale of Gov't. Property
	Units	Cost 1/	Units	Cost 1/	
Fixed Unit Costs ~~Drifting & Crosscutting~~		$4,997.00		$5,170.96	
Lost Casing ~~Raising~~ BX-Size	600'	1,296.00	240'	518.40	
AX-Size	600'	1,020.00	400'	680.00	
~~Shafts~~ Cementing & Hole Survey	180 hrs.	1,440.00	30 hrs	240.00	
~~Winzes~~ Reaming & Casing Drill Holes	4,000'	7,000.00	2,966'	5,190.50	
Drilling (Specify) Diamond AX, BXWL or BXM	14,900'	43,955.00	14,382'	42,426.90	
Surface Excavation					
Underground Excavation					
Roads and Trails					
Operating Equipment Purchased					
Surface Rehabilitation & Repairs					
Underground Rehabilitation					
New Building, Improvements, etc.					
Other (Specify)					
Totals	(rounded to)	$59,710.00		$53,947.76	2/

1/ Round off to dollars.
2/ Net cost total must agree with final report of audit or review.

Exceeded amount Authorized by Contract
se of error in Stage II - incidental allowance

Prepared by J. W. Allen

Date 7/30/59

52616

MME Form 17
Mar. 59

OFFICE OF MINERALS EXPLORATION

Stage I

WORK COMPLETED ANALYSIS

___ Certified

After final audit or review report is received, prepare in duplicate. File original in official docket. Send copy to Code 210.

Operator: Reynolds Metals Company

Actual Cost: X

State: Kentucky

Agreed Unit Cost: X

Final Report of Audit

Commodity: Fluorspar

Docket No.: DMEA - 4962

Final Report of Review: July 6, 1959

Contract No.: Idm-E 1199

Type of Work (Use these categories only)	Authorized by Contract and Amendments		Completed and Paid for		Net cost after sale of Gov't. Property
	Units	Cost[1]	Units	Cost[1]	
Fixed Unit Costs ~~Drifting & Crosscutting~~		$2,657.00		$2,378.00	
Lost Casing ~~Raising~~ BX - Size	300'	648.00	100'	216.00	
AX - Size	300'	510.00	10'	17.00	
~~Shafts~~ Cementing & Hole Survey	80 hrs	640.00	23 hrs.	184.00	
~~Winzes~~ Reaming & Casing Drill Holes	2,000'	3,500.00	1,314'	2,299.50	
Drilling (Specify) Diamond AX, BXWL or BXM	6,900'	20,355.00	6,900'	20,355.00	
Surface Excavation					
Underground Excavation					
Roads and Trails					
Operating Equipment Purchased					
Surface Rehabilitation & Repairs					
Underground Rehabilitation					
New Building, Improvements, etc.					
Other (Specify)					
Totals		$28,310.00		$25,449.50	[2]

[1] Round off to dollars.
[2] Cost total must agree with final report of audit or review.

Prepared by J. W. Allen Date 7/30/59

52616

MME Form 17
Mar. 59

Stage II

OFFICE OF MINERALS EXPLORATION

WORK COMPLETED ANALYSIS

___ Certified

After final audit or review report is received, prepare in duplicate. File original in official docket. Send copy to Code 210.

Operator: Reynolds Metals Company

Actual Cost: X

State: Kentucky

Agreed Unit Cost: X

Final Report of Audit:

Commodity: Fluorspar

Docket No.: DME A-4962

Final Report of Review: July 6, 1959

Contract No.: Idm-E 1199

Type of Work (Use these categories only)	Authorized by Contract and Amendments		Completed and Paid for		Net cost after sale of Gov't. Property
	Units	Cost[1]	Units	Cost[1]	
Fixed Unit Costs ~~Drifting & Crosscutting~~		$2,340.00		$2,513.96	
Lost Casing - BX-Size ~~Raising~~	300'	648.00	140'	302.40	
AX-Size	300'	510.00	390'	663.00	
~~Shafts~~ Cementing and hole survey	100 hrs	800.00	7 hrs.	56.00	
~~Winzes~~ Reaming & Casing Drill Holes	2,000'	3,500.00	1652'	2,891.00	
Drilling (Specify) Diamond AX, BXWL or BXM	8,000'	23,600.00	7,482'	22,071.90	
Surface Excavation					
Underground Excavation					
Roads and Trails					
Operating Equipment Purchased					
Surface Rehabilitation & Repairs					
Underground Rehabilitation					
New Building, Improvements, etc.					
Other (Specify)					
Totals		$31,399.00		$28,498.26	[2]

Round off to dollars.
Net cost total must agree with final report of audit or review.

Prepared by J. M. Cell

Date 7/30/59

52616

☐ Audited

☐ Certified

WORK ANALYSIS SHEET - DMEA PROJECT

Analysis as of Since 12, 1959
Incl. Voucher for April 1959

☑ Actual Cost

☐ Agreed Unit Costs

Name Reynolds Metals Co.

Docket No. 4962

State Kentucky

Commodity Fluorspar

Idm-E No. 1199

Stages I & II.

OPERATION	AUTHORIZED Units	AUTHORIZED Cost	COMPLETED Units	COMPLETED Cost	NET COST
Fixed Ind. Costs ~~Drifting & Crosscutting~~		$ 4997.00		$ 4,644.75	
Raising Lost Casing	600 Ft	$ 1296.00	40	68.00	✓
A & B Sizes	600 Ft.	1020.00	210	455.60	✓
Shafts Cementing & Hole Surveying	180 hours	$ 1440.00	30	240.00	✓
Winzes Reaming & Casing Drill Holes.	4000 Ft.	$ 7000.00	2,992	5,061.00	
Drilling (Specify) Diamond AX, BXW, or BXM	14,900 Ft.	$ 43,955.00	13,515	39,929.25	✓
Surface Excavation					
Underground Excavation					
Roads and Trails					
Operating Equipment Purchased					
Surface Rehabilitation & Repairs					
Underground Rehabilitation					
Building, Improvements, etc.					
Other (Specify)					
Totals		$ 59,710.00		$ 50,336.55	

Prepared by Walter C. Cochran
Jr. Acct. Auditor
with Ofc 1959 rel/ord.

71626

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Room 11, Post Office Building
Knoxville, Tennessee 37902

July 2, 1968

Memorandum

To: Frank E. Johnson, Chief, Office of Minerals Exploration, USGS
Washington, D. C. 20242

From: Robert A. Laurence, U. S. Geological Survey
Room 11, Post Office Bldg., Knoxville, Tennessee 37902

Subject: DMEA-4962 (Fluorspar)
Reynolds Metals Company
Watson, Hicks, and Tyner Properties
Crittenden County, Kentucky
Contract Idm-E1199

The Knoxville office of the Bureau of Mines checked their records for Crittenden County, Kentucky, for 1965, 1966 and 1967, and found no report of any production from the Watson, Hicks and Tyner properties.

I am reasonably sure that there has been no production, and that no royalty is due.

Bob

Robert A. Laurence
Geologist
Branch of Resources Research

OFFICIAL COPY
O. K. E.
RECEIVED
JUL 3 1968

INITIALS	CODE
	130
	110
	220

IN REPLY REFER TO:
Office of Minerals Exploration

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON, D.C. 20242

90
OME

June 27, 1968

Messrs. David Conyer
and Crawford Tharp
Salem, Kentucky 42078

OFFICIAL COPY
O. M. E.
RECEIVED
JUL 8 1968

INITIALS	CODE
gla	130
	~~120 OME~~
gly	110
	220

Re: DMEA-4962 (Fluorspar)
Reynolds Metals Company
Watson, Hicks, and Tyner
Properties
Crittenden County, Kentucky
Contract Idm-E1199

Gentlemen:

After the completion of the approved exploration work under the contract identified above, we asked to be informed about changes in the status of the property and production from it during the period of royalty obligation.

To assist you to furnish this information and to assure the accuracy of our records, please answer the questions on the back of this letter and return two copies to this office with copies of any pertinent documents.

Sincerely yours,

(SIGNED) FRANK E. JOHNSON

Frank E. Johnson
Chief, Office of
Minerals Exploration

Copy to Region IV

MME Form 63
Revised 7-65

REQUEST FOR INFORMATION ON CERTIFIED PROJECT AND PROJECT UNDER ROYALTY AGREEMENT

1. **From October 2, 1967, to June 3, 1968,** ~~Since~~ , has there been a change in ownership, lease, or sublease? If yes, please state details of the transaction below and provide a true or signed copy of the pertinent documents, unless they have been provided before. Yes ☐ No ☑

2. **From October 2, 1967, to June 3, 1968,** ~~Since~~ , has there been any production from the land subject to the contract? Yes ☐ No ☑

   A. If so and it was shipped, give quantity, value, and name and address of purchaser.

	Quantity	Value

   B. If stockpiled awaiting sale, state quantity, grade, and location.

Type	Quantity		Estimated Grade	Location
Ore		Tons		
Concentrates		Tons		
Other		Tons		

3. Since , has any production been transported through workings (see of contract)? Yes ☐ No ☐

   If so, state quantity, value, and disposition of material.

Disposition of Material	Quantity	Value

Submitted by:

Name [signature] Title Partner

Address Salem Ky. Date 7-1-68

IN REPLY REFER TO:
Office of Minerals Exploration

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON, D.C. 20242

June 27, 1968

Mr. Wilson D. Michell
Assistant Chief Geologist
Reynolds Metals Company
Reynolds Metals Building
Richmond, Virginia 23218

Re: DMEA-4962 (Fluorspar)
Reynolds Metals Company
Watson, Hicks, and Tyner
Properties
Crittenden County, Kentucky
Contract Idm-E1199

OFFICIAL
COPY
O. M. E.
RECEIVED
JUL 1 1968

INITIALS	CODE
	130
	110
	130
	220

Dear Mr. Michell:

After the completion of the approved exploration work under the contract identified above, we asked to be informed about changes in the status of the property and production from it during the period of royalty obligation.

To assist you to furnish this information and to assure the accuracy of our records, please answer the questions on the back of this letter and return two copies to this office with copies of any pertinent documents.

Sincerely yours,

(Signed) FRANK E. JOHNSON

Frank E. Johnson
Chief, Office of
Minerals Exploration

Copy to Region IV

MME Form 63
Revised 7-65

REQUEST FOR INFORMATION ON CERTIFIED PROJECT AND PROJECT UNDER ROYALTY AGREEMENT

1. ~~Since~~ From August 10, 1967, to June 3, 1968, , has there been a change in ownership, lease, or sublease? If yes, please state details of the transaction below and provide a true or signed copy of the pertinent documents, unless they have been provided before. Yes [ ] No [X]

   Since August 1967, has any interest, title, or equity been acquired in the land situate within 1,000 feet of the land described in the subject contract? If so, please give details. (See Annex I of the contract. Yes [ ] No [X]

2. ~~Since~~ From August 10, 1967 to June 3, 1968, , has there been any production from the land subject to the contract? Yes [ ] No [X]

   A. If so and it was shipped, give quantity, value, and name and address of purchaser.

	Quantity	Value

   B. If stockpiled awaiting sale, state quantity, grade, and location.

Type	Quantity		Estimated Grade	Location
Ore		Tons		
Concentrates		Tons		
Other		Tons		

3. Since through workings (see of contract)? Yes [ ] No [ ]

   If so, state quantity, value, and disposition of material.

Disposition of Material	Quantity	Value

Submitted by: Wilson D. Michell

Name Wilson D. Michell
Reynolds Metals Company
Address Richmond, Virginia 23218

Title Assistant Chief Geologist
Date June 28, 1968

MME Form 7
(2/63)

OFFICIAL FILE COPY

Date	Surname	Code
6/28/68		110
		220

JUN 28 1968

Memorandum

To: Robert A. Laurence, U. S. Geological Survey
Room 11, Post Office Building, Knoxville, Tennessee 37902

From: Chief, Office of Minerals Exploration

Subject: DMEA-4962 (Fluorspar)
Reynolds Metals Company
Watson, Hicks, and Tyner Properties
Crittenden County, Kentucky
Contract Idm-E1199

The royalty repayment period of the subject contract expired on June 3, 1968. Will you please check with the U. S. Bureau of Mines on possible production from the property since April 1965, and advise.

FRANK E. JOHNSON

Frank E. Johnson

cc: Director's Reading File
Economic Geology File
OME docket
OME Reading file
130 (2)

GLAult/a 6-28-68

IN REPLY REFER TO:
Office of Minerals Exploration

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON, D.C. 20242

August 9, 1967

Messrs. David Conyer
and Crawford Tharp
Salem, Kentucky 42078

Re: DMEA-4962 (Fluorspar)
Reynolds Metals Company
Watson, Hicks, and Tyner
Properties
Crittenden County, Kentucky
Contract Idm-E1199

OFFICIAL
COPY
O. M. E.
RECEIVED
OCT 6 1967

INITIALS	CODE
gla	130
JEJ	110
	~~130~~
	220

Gentlemen:

After the completion of the approved exploration work under the contract identified above, we asked to be informed about changes in the status of the property and production from it during the period of royalty obligation.

To assist you to furnish this information and to assure the accuracy of our records, please answer the questions on the back of this letter and return two copies to this office with copies of any pertinent documents.

Sincerely yours,

Frank E. Johnson
Chief, Office of
Minerals Exploration

Cy to P-IV

MME Form 63
Revised 7-65

REQUEST FOR INFORMATION ON CERTIFIED PROJECT AND PROJECT UNDER ROYALTY AGREEMENT

1. Since **August 1966**, has there been a change in ownership, lease, or sublease? If yes, please state details of the transaction below and provide a true or signed copy of the pertinent documents, unless they have been provided before. Yes ☐ No ☑

2. Since **August 1966**, has there been any production from the land subject to the contract? Yes ☐ No ☑

   A. If so and it was shipped, give quantity, value, and name and address of purchaser.

	Quantity	Value

   B. If stockpiled awaiting sale, state quantity, grade, and location.

Type	Quantity		Estimated Grade	Location
Ore		Tons		
Concentrates		Tons		
Other		Tons		

3. Since , has any production been transported through workings (see of contract)? Yes ☐ No ☑

   If so, state quantity, value, and disposition of material.

Disposition of Material	Quantity	Value

Submitted by:

Name Dave Cooper Title Partner

Address Salem Ky Date 10-2-67

INSTRUCTIONS TO DELIVERING EMPLOYEE

☐ Show to whom and date delivered ☐ Show to whom, date, and address where delivered ☐ Deliver ONLY to addressee

(*Additional charges required for these services*)

RECEIPT

Received the numbered article described below.

REGISTERED NO.

CERTIFIED NO. 13540

INSURED NO.

SIGNATURE OR NAME OF ADDRESSEE (*Must always be filled in*)

1

SIGNATURE OF ADDRESSEE'S AGENT, IF ANY

2

DATE DELIVERED

OCT 1 1967

OCT 2 1967

SHOW WHERE DELIVERED (*only if requested*)

c55—16—71548-9 GPO

POST OFFICE DEPARTMENT
OFFICIAL BUSINESS

PENALTY FOR PRIVATE USE TO AVOID
PAYMENT OF POSTAGE, $300

c55—16—71548-9

SALEM, KY
OCT 2
AM
1967
42010

~~POSTMARK OF~~
DELIVERING OFFICE

INSTRUCTIONS: Show name and address below and complete instructions on other side, where applicable. Moisten gummed ends, attach and hold firmly to back of article. Print on front of article *RETURN RECEIPT REQUESTED.*

RETURN TO

NAME OF SENDER U. S. Geological Survey, Office of Minerals Exploration

STREET AND NO. OR P.O. BOX

Department of the Interior Building, Rm. 4450

POST OFFICE, STATE, AND ZIP CODE

Washington, D. C. 20242

POD Form 3811 June 1966

DMEA4962
Idm-E1199
Reynolds Metals Company

IN REPLY REFER TO:
Office of Minerals Exploration

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON, D.C. 20242

August 9, 1967

Reynolds Metals Company
Reynolds Metals Building
Richmond, Virginia 23218

Re: DMEA-4962 (Fluorspar)
Reynolds Metals Company
Watson, Hicks, and Tyner
Properties
Crittenden County, Kentucky
Contract Idm-E1199

OFFICIAL
COPY
O. M. E.
RECEIVED
AUG 11 1967

INITIALS	CODE
sla	120 M
GSJ	110
	120 M
	220

Gentlemen:

After the completion of the approved exploration work under the contract identified above, we asked to be informed about changes in the status of the property and production from it during the period of royalty obligation.

To assist you to furnish this information and to assure the accuracy of our records, please answer the questions on the back of this letter and return two copies to this office with copies of any pertinent documents.

Sincerely yours,

FRANK E. JOHNSON

Frank E. Johnson
Chief, Office of
Minerals Exploration

Copy to R-IV 8/14/67

MME Form 63
Revised 7-65

REQUEST FOR INFORMATION ON CERTIFIED PROJECT AND PROJECT UNDER ROYALTY AGREEMENT

1. Since **August 1966**, has there been a change in ownership, lease, or sublease? If yes, please state details of the transaction below and provide a true or signed copy of the pertinent documents, unless they have been provided before. Yes [ ] No [X]

   Since August 1966, has any interest, title, or equity been acquired in the land situate within 1,000 feet of the land described in the subject contract? If so, please give details. (See Annex I of the contract.) Yes [ ] No [X]

2. Since **August 1966**, has there been any production from the land subject to the contract? Yes [ ] No [X]

   A. If so and it was shipped, give quantity, value, and name and address of purchaser.

	Quantity	Value

   B. If stockpiled awaiting sale, state quantity, grade, and location.

Type	Quantity		Estimated Grade	Location
Ore		Tons		
Concentrates		Tons		
Other		Tons		

3. Since through workings (see of contract)? Yes [ ] No [ ]

   If so, state quantity, value, and disposition of material.

Disposition of Material	Quantity	Value

Submitted by: Wilson D. Michell

Name **Wilson D. Michell** Title **Assistant Chief Geologist**

Address **Reynolds Metals Company Richmond, Virginia 23218** Date **August 10, 1967**

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON, D.C. 20242

AUG 17 '66 S.P.W.

August 17, 1966

Reynolds Metals Company
Reynolds Metals Building
Richmond 18, Virginia

OFFICIAL COPY
O. N. E.
RECEIVED
AUG 30 1966

INITIALS	CODE
8/30 M	120 M
GD	110
HKO	120 K
	520

Re: DMEA-4962 (Fluorspar)
Reynolds Metals Company
Watson, Hicks, and Tyner
Properties
Crittenden County, Kentucky
Contract Idm-E1199

Gentlemen:

After the completion of the approved exploration work under the contract identified above, we asked to be informed about changes in the status of the property and production from it during the period of royalty obligation.

To assist you to furnish this information and to assure the accuracy of our records, please answer the questions on the back of this letter and return two copies to this office with copies of any pertinent documents.

Sincerely yours,

Frank E. Johnson

Frank E. Johnson
Chief, Office of
Minerals Exploration

MME Form 63
Revised 7-65

REQUEST FOR INFORMATION ON CERTIFIED PROJECT AND PROJECT UNDER ROYALTY AGREEMENT

1. Since _____, has there been a change in ownership, lease, or sublease? If yes, please state details of the transaction below and provide a true or signed copy of the pertinent documents, unless they have been provided before. Yes [ ] No [ ]

   Since April 1965, has any interest, title, or equity been acquired in the land situate within 1,000 feet of the land described in the subject contract? If so, please give details. (See Annex I of the contract.) Yes/ /No/ x /

2. Since **April 1965**, has there been any production from the land subject to the contract? Yes [ ] No [x]

   A. If so and it was shipped, give quantity, value, and name and address of purchaser.

	Quantity	Value

   B. If stockpiled awaiting sale, state quantity, grade, and location.

Type	Quantity	Estimated Grade	Location
Ore	_____ Tons	_____	_____
Concentrates	_____ Tons	_____	_____
Other	_____ Tons	_____	_____

3. Since _____, has any production been transported through _____ workings (see _____ of contract)? Yes [ ] No [ ]

   If so, state quantity, value, and disposition of material.

Disposition of Material	Quantity	Value

Submitted by:

Name Wilson D. Michell Title Assistant Chief Geologist

Address Reynolds Metals Company Date August 29, 1966
Richmond, Virginia 23218

Wilson D. Michell

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON, D.C. 20242

90
OME

August 17, 1966

Messrs. David Conyer
and Crawford Tharp
Salem, Kentucky

Re: DMEA-4962 (Fluorspar)
Reynolds Metals Company
Watson, Hicks, and Tymer
Properties
Crittenden County, Kentucky
Contract Idm-E1198

OFFICIAL
COPY
O. M. E.
RECEIVED
AUG 31 1966

INITIALS	CODE
8/31 m	120 m
	110

Gentlemen:

After the completion of the approved exploration work under the contract identified above, we asked to be informed about changes in the status of the property and production from it during the period of royalty obligation.

To assist you to furnish this information and to assure the accuracy of our records, please answer the questions on the back of this letter and return two copies to this office with copies of any pertinent documents.

Sincerely yours,

FRANK E. JOHNSON

Frank E. Johnson
Chief, Office of
Minerals Exploration

MME Form 63
Revised 7-65

REQUEST FOR INFORMATION ON CERTIFIED PROJECT AND PROJECT UNDER ROYALTY AGREEMENT

1. Since January 1965, has there been a change in ownership, lease, or sublease? If yes, please state details of the transaction below and provide a true or signed copy of the pertinent documents, unless they have been provided before. Yes ☐ No ☑

2. Since January 1965, has there been any production from the land subject to the contract? Yes ☐ No ☑

   A. If so and it was shipped, give quantity, value, and name and address of purchaser.

	Quantity	Value

   B. If stockpiled awaiting sale, state quantity, grade, and location.

Type	Quantity	Estimated Grade	Location
Ore	Tons		
Concentrates	Tons		
Other	Tons		

3. Since , has any production been transported through workings (see of contract)? Yes ☐ No ☐

   If so, state quantity, value, and disposition of material.

Disposition of Material	Quantity	Value

Submitted by: Crawford Sharp

Name [signature] Title Owners

Address Salem, Ky Date 8-25-66

DMEA-4962

MME Form 7
(2/63)

OFFICIAL FILE COPY

Date	Surname	Code
6/25	Johnson	

JUN 2 5 1965

Mr. C. W. Sohosky, Assistant Secretary
Ozark-Mahoning Company
Mining Division
Rosiclare, Illinois

Re: DMEA-4907 (Fluorspar-Zinc-Lead)
The New Jersey Zinc Company
Project II
Pope County, Illinois
Contract Idm-E1206

Dear Mr. Sohosky:

There are two properties in addition to the O'Roark property referred to in your letter dated June 16, 1965, which are subject to the above mentioned exploration contract. Descriptions of the properties are as follows:

1. Approximately 469 acres described in Agreement dated June 21, 1954, by and between Laura Baumer, a spinster, and the New Jersey Zinc Company, recorded in Volume 32 of Mortgages, page 48, in the Office of the Recorder of Pope County, Illinois.

2. Approximately 264 acres described in an Agreement dated July 29, 1954, by and between Robert S. Barnett and wife, Marjorie W. Barnett, and the New Jersey Zinc Company, recorded in Volume 30 of Mortgages, page 556, in the Office of the Recorder of Pope County, Illinois.

The Government will look to the New Jersey Zinc Company for the payment of royalty on the value of any production from the three properties as provided by the terms of the exploration contract and the certification of discovery or development through June 16, 1968, or until the amount of the Government's contribution to the exploration costs have been fully repaid, whichever occurs first.

23263

The Office of Minerals Exploration will appreciate advice from you regarding any mineral production from these properties during the remainder of the period for which the Government is entitled to royalty.

A review of the files of this office has disclosed one additional project in the general region on which the Government retains a lien for royalty on production through June 3, 1968. This relates to an exploration project by Reynolds Metals Company on property referred to as the Watson Project consisting of three contiguous tracts, known as the Tyner, Hicks and Watson prospects, which are situated in the western Kentucky fluorspar district, near the west-central border of Crittenden County, Kentucky, about nine miles southwest of the town of Marion.

Sincerely yours,

George Fumich, Jr.

Acting Director

CEFisher:fh rewritten 6/25/65

cc: Region IV,
Director's reading file
CA&A Division
120 M
Mr. Selfridge
Docket DMEA-4907
Docket DMEA-4962

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

April 9, 1965

Re: DMEA-4962 (Fluorspar)
Reynolds Metals Company
Watson, Hicks, and Tyner
Properties
Crittenden County, Kentucky
Contract Idm-E1199

REGISTERED MAIL
RETURN RECEIPT REQUESTED

Mr. and Mrs. Roy Sunderland

Salem, Kentucky

Dear Mr. and Mrs. Sunderland:

After the completion of the approved exploration work under the contract identified above, we asked to be informed about changes in the status of the property and production from it during the period of royalty obligation.

To assist you to furnish this information and to assure the accuracy of our records, please answer the questions on the back of this letter and return two copies to this office with copies of any pertinent documents.

This inquiry relates to the Consent to Lien and Subordination Agreement signed by you on January 26, 1959, and also to the expiration of the Mining Lease and Option Agreement dated November 29, 1958, between you and Reynolds Metals Company, which was allowed to expire on November 29, 1961.

Sincerely yours,

George C. Selfridge

George C. Selfridge, Chief
Division of Exploration Operations

OFFICIAL
COPY
O. M. E.
RECEIVED
APR 15 1965
INITIALS CODE
ama 800
100
JEC ~~110~~
Gibson 120
Fowler 120
320

MME Form 63
Revised 3-62

DMEA-4962
Idm-R1199

REQUEST FOR INFORMATION ON CERTIFIED PROJECT AND PROJECT UNDER ROYALTY AGREEMENT

1. Since November 1961, has there been a change in ownership, lease, or sublease? If yes, please state details of the transaction below and provide a true or signed copy of the pertinent documents, unless they have been provided before. Yes ☐ No ☒

2. Since November 1961, has there been any production from the land subject to the contract? Yes ☐ No ☒

   A. If so and it was shipped, give quantity, value, and name and address of purchaser.

	Quantity	Value

   B. If stockpiled awaiting sale, state quantity, grade, and location.

Type	Quantity	Estimated Grade	Location
Ore	Tons		
Concentrates	Tons		
Other	Tons		

3. Since , has any production been transported through workings (see of contract)? Yes ☐ No ☒

   A. If so, state quantity, value, and disposition of material.

Disposition of Material	Quantity	Value

Submitted by:

Name Mrs. Margaret (Sunderland) Myrick Title

Address Salem, Kan. Route #2. Date

4511

4-12-1965

Mr. George C. Selfridge:

Dear Sir:

Enclosed is the paper you ask us to fill out. And here is some more information to help you clear your records. On Sept. 25, 1959 Mr. Sunderland died. Since then I have remarried and on Jan. 1965 I sold this farm to David Conyer and Crawford Shark whose address are Salem, Ky. There has been no other lease to any Company since Reynolds gave their release up in Nov. 1961.

Thank you,

Mrs. Margaret (Sunderland) Myrick
Salem, Kentucky
Route #2.

#1-INSTRUCTIONS TO DELIVERING EMPLOYEE

☐ Deliver *ONLY* to addressee

☐ Show address where delivered

(Additional charges required for these services)

RETURN RECEIPT

Received the numbered article described on other side.

SIGNATURE OR NAME OF ADDRESSEE *(must always be filled in)*

Mr. & Mrs. Roy Sunderland

SIGNATURE OF ADDRESSEE'S AGENT, IF ANY

Mrs. Margaret Sunderland Myrick

DATE DELIVERED

APR 12 1967

ADDRESS WHERE DELIVERED *(only if requested in item #1)*

C55—16—71548-4 GPO

POST OFFICE DEPARTMENT
OFFICIAL BUSINESS

PENALTY FOR PRIVATE USE TO AVOID PAYMENT OF POSTAGE, $300

POSTMARK OF DELIVERING OFFICE

USPO SALEM

INSTRUCTIONS: Fill in items below and complete #1 on other side, when applicable. Moisten gummed ends and attach to back of article. Print on front of article RETURN RECEIPT REQUESTED.

RETURN TO

REGISTERED NO.	NAME OF SENDER
598199	OFFICE OF MINERALS EXPLORATION
CERTIFIED NO.	STREET AND NO. OR P. O. BOX
	DEPT. OF THE INTERIOR
INSURED NO.	CITY, ZONE AND STATE
	WASHINGTON, D. C. 20240

POD Form 3811 Jan. 1958

C55—16—71542-6

MEA 4962

MME Form 7
(2/63)

OFFICIAL FILE COPY

Date	Surname	Code
	Selfridge	120
4/8	Murphy	120
11	Johnson	110
11	[illegible]	100
		220

APR 8

Mr. J. H. Moses
Chief Geologist
Reynolds Metals Company
Reynolds Metals Building
Richmond 18, Virginia

Re: DMMA-4962 (Fluorspar)
Reynolds Metals Company
Watson, Hicks, and Tyner Properties
Crittenden County, Kentucky
Contract Idm-K1199

Dear Mr. Moses:

Thank you for your letter of April 6, 1965, in reply to ours of March 31 which enclosed our MME Form 63.

In the light of your letter we shall not require any documents relating to the dissolution of the Fluorspar Consolidated, Inc. Completing the boxes of MME Form 63 and attaching to each a copy of the attorney's letter of November 16, 1961, to Mrs. Sunderland as you suggest will be sufficient.

Sincerely yours,

George Fumich, Jr.

Acting Director

GCSelfridge/mm (4/8/65)
cc: Director's Reading File
R. A. Laurence, Knoxville, Tenn., w/cy of incoming ltr and enclosure
Docket
120M
Mr. Selfridge

23263

OFFICIAL
COPY
O. M. E.
RECEIVED
APR 7 1965

INITIALS	CODE
ama	800
	120
	120

REYNOLDS METALS COMPANY
REYNOLDS METALS BUILDING
RICHMOND 18, VIRGINIA

April 6, 1965

Mr. George Fumich, Jr., Acting Director
Office of Minerals Exploration
U. S. Department of The Interior
Washington 25, D. C.

Re: DMEA - 4962 (Fluorspar)

Dear Sir:

Your letter of March 31 to the attention of Mr. John Galea, Attorney, together with Mr. Selfridge's letter of March 29 on the same subject, has been forwarded to me for reply.

Reynolds Metals Company did exercise its option from Fluorspar Consolidated, Inc. on December 26, 1961 to purchase the stock of that corporation. On May 1, 1963 Fluorspar Consolidated, Inc. was dissolved and Reynolds Metals Company, as sole owners of 100% of the stock, acquired all of its assets.

The lease from Roy and Margaret Sunderland to Reynolds Metals Company was allowed to expire on November 29, 1961.

From the questions asked on the reverse side of Mr. Selfridge's letter it is evident that you have need for certain supporting documents. So that I may correctly instruct our Law Department, kindly advise whether the "Certificate of Dissolution", which can be exhumed from the archives in a nearby warehouse, would be satisfactory and sufficient evidence of the change in ownership from Fluorspar Consolidated, Inc. to Reynolds Metals Company or whether copies of the several deeds covering the specific parcels are essential for your purpose.

As evidence that our Mining Lease and Option with Mr. and Mrs. Roy Sunderland was allowed to expire on November 29, 1961, I am attaching a copy of our Attorney's letter of November 16, 1961 to Mrs. Sunderland. If this is adequate, I will attach prints to each of the two copies of MME Form 63 required by Mr. Selfridge. If not adequate, please let me know what other document is desired.

Since June 3, 1958 Reynolds Metals Company has not acquired any interest, title, or equity in any land situated within 1,000 feet of the land described in the subject contract.

And since September 1959, there has been no production of mineral from the land subject to the contract in question.

I shall hold the questionnaire from Mr. Selfridge until I hear from you, to be sure that we do submit the details you need. Please accept the apologies of our overworked Law Department for not acting on the questionnaires which were sent on to them by my office in October and January while I was overseas.

Sincerely,

J. H. Moses

J. H. Moses
Chief Geologist

JHM:fg

November 16, 1961

REGISTERED
MAIL

Mrs. Roy Sunderland
Route Two
Salem, Kentucky

Dear Mrs. Sunderland:

Please be advised that Reynolds Metals Company will not exercise its option to purchase the land described in that certain Mining Lease and Option Agreement dated November 29, 1958, by and between Roy Sunderland and Margaret Sunderland, his wife, and Reynolds Metals Company. Accordingly said Mining Lease and Option Agreement will be allowed to expire by its terms on November 29, 1961.

Yours very truly,

Charles W. Margolf
Attorney

CWM:mm

bcc: John W. Hook
R. H. Gladden
John H. Moses
R. I. Dawes

MME Form 7
(2/63)

OFFICIAL FILE COPY

Date	Surname	Code
	Selfridge	120
		120
3/29	Johnson	110
3/30		100
		220

MAR 31 1965

Reynolds Metals Company
Reynolds Metals Building
Richmond 18, Virginia

Attention: Mr. John Galea, Attorney

Re: DMEA-4962 (Fluorspar)
Reynolds Metals Company
Watson, Hicks, and Tyner Properties
Crittenden County, Kentucky
Contract Idm-X1199

Gentlemen:

On June 3, 1958, the Reynolds Metals Company executed an Exploration Project Contract with the Defense Minerals Exploration Administration. The exploration project involved land held under leases from the Fluorspar Consolidated, Inc. and Roy and Margaret Sunderland dated December 26, 1957, and November 29, 1958, respectively.

Based on the results of the project work, a certification of discovery or development was issued on September 11, 1959, whereby royalty was to be paid to the Government on all minerals produced from said land from the date of the contract until June 3, 1968, or until the total net amount contributed by the Government without interest was fully repaid whichever occurred first.

We have just been informed that Reynolds Metals Company had acquired all of the stock of Fluorspar Consolidated, Inc. As the successor agency to the Defense Minerals Exploration Administration, the Office of Minerals Exploration has the responsibility of administering royalty matters relating to the DMEA contracts.

Enclosed are three copies of our questionnaire MME Form 63 which, please execute and return to us in duplicate. Your cooperation in this matter will be sincerely appreciated.

Sincerely yours,

George Fumich, Jr.

Acting Director

Enclosures

GCSElfridge/mm (3/29/65)
cc: Director's Reading File
R. A. Laurence w/cy of incoming 63 dated 3/17/65
Docket
Mr. Selfridge
120M

23263

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

March 29, 1965

Re: DMEA-4962 (Fluorspar)
Reynolds Metals Company
Watson, Hicks, and Tyner
Properties
Crittenden County, Kentucky
Contract Idm-E1199

Reynolds Metals Company
Reynolds Metals Building
Richmond 18, Virginia

Gentlemen:

After the completion of the approved exploration work under the contract identified above, we asked to be informed about changes in the status of the property and production from it during the period of royalty obligation.

To assist you to furnish this information and to assure the accuracy of our records, please answer the questions on the back of this letter and return two copies to this office with copies of any pertinent documents.

Sincerely yours,

George C. Selfridge

George C. Selfridge, Chief
Division of Exploration Operations

OFFICIAL
COPY
O. M. E.
RECEIVED
APR 13 1965

INITIALS	CODE
ama	800
	100
	110
4/13	120
	120

200

MME Form 63
Revised 3-62

DMEA-4962
Idm-E1199

REQUEST FOR INFORMATION ON CERTIFIED PROJECT AND PROJECT UNDER ROYALTY AGREEMENT

1. Since September 1959, has there been a change in ownership, lease, or sublease? If yes, please state details of the transaction below and provide a true or signed copy of the pertinent documents, unless they have been provided before. Yes [✓] No [ ]
   Is the Mining Lease and Option Agreement dated November 29, 1958, between Roy and Margaret Sunderland and Reynolds Metals Company still valid in its entirety? If not, please give details. Yes [ ] No [✓]
   Since June 3, 1958, the date of the subject contract, has any interest, title, or equity been acquired in any land situate within 1,000 feet of the land described in the contract. If so, please give details. (See Annex I of the contract). Yes [ ] No [✓]
2. Since September 1959, has there been any production from the land subject to the contract? Yes [ ] No [✓]

   A. If so and it was shipped, give quantity, value, and name and address of purchaser.

	Quantity	Value

   B. If stockpiled awaiting sale, state quantity, grade, and location.

Type	Quantity	Estimated Grade	Location
Ore	Tons		
Concentrates	Tons		
Other	Tons		

3. Since, has any production been transported through workings (see of contract)? Yes [ ] No [ ]

   A. If so, state quantity, value, and disposition of material.

Disposition of Material	Quantity	Value

Submitted by:

Name J. H. Moses Title Chief Geologist

Address Reynolds Metals Co. Date April 12, 1965
Richmond 18, Va.

4511

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

April 8, 1965

Mr. J. d. Moses
Chief Geologist
Reynolds Metals Company
Reynolds Metals Building
Richmond 18, Virginia

Re: DMEA-4962 (Fluorspar)
Reynolds Metals Company
Watson, Hicks, and Tyner Properties
Crittenden County, Kentucky
Contract Idm-E1199

Dear Mr. Moses:

Thank you for your letter of April 6, 1965, in reply to ours of March 31 which enclosed our MME Form 63.

In the light of your letter we shall not require any documents relating to the dissolution of the Fluorspar Consolidated, Inc. Completing the boxes of MME Form 63 and attaching to each a copy of the attorney's letter of November 16, 1961, to Mrs. Sunderland as you suggest will be sufficient.

Sincerely yours,

Acting Director

November 16, 1961

REGISTERED
MAIL

Mrs. Roy Sunderland
Route Two
Salem, Kentucky

Dear Mrs. Sunderland:

Please be advised that Reynolds Metals Company will not exercise its option to purchase the land described in that certain Mining Lease and Option Agreement dated November 29, 1953, by and between Roy Sunderland and Margaret Sunderland, his wife, and Reynolds Metals Company. Accordingly said Mining Lease and Option Agreement will be allowed to expire by its terms on November 29, 1961.

Yours very truly,

Charles W. Margolf
Attorney

CWM:mm

bcc: John W. Hook
R. H. Gladden
John H. Moses
R. I. Dawes

P 3

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

March 17, 1965

Re: DMEA-4962 (Fluorspar)
Reynolds Metals Company
Watson, Hicks, and Tyner
Properties
Crittenden County, Kentucky
Contract Idm-E1199

Fluorspar Consolidated, Inc.
301 West Main
Louisville, Kentucky

OFFICIAL COPY
O. M. E.
RECEIVED
MAR 26 1965

INITIALS	CODE
	~~200~~
	~~100~~
SEJ	~~110~~
	120
	~~120~~

Gentlemen:

After the completion of the approved exploration work under the contract identified above, we asked to be informed about changes in the status of the property and production from it during the period of royalty obligation.

To assist you to furnish this information and to assure the accuracy of our records, please answer the questions on the back of this letter and return two copies to this office with copies of any pertinent documents.

This inquiry relates to the Consent to Lien and Subordination Agreement signed by Mr. Eli H. Brown, III, on May 7, 1958.

Sincerely yours,

George C. Selfridge

George C. Selfridge, Chief
Division of Exploration Operations

This letter should be addressed: Fluorspar Consolidated, Inc.
c/o Reynolds Metals Co.
Richmond, Virginia

MME Form 63
Revised 3-62

DMEA-4962
Idm-E1199

REQUEST FOR INFORMATION ON CERTIFIED PROJECT AND PROJECT UNDER ROYALTY AGREEMENT

1. Since September 1959, has there been a change in ownership, lease, or sublease? If yes, please state details of the transaction below and provide a true or signed copy of the pertinent documents, unless they have been provided before. Yes ☐ No ☐

   Is the lease dated December 26, 1957, between Fluorspar Consolidated, Inc. and Reynolds Metals Company still valid in its entirety? If not, please give full details. Yes ☐ No ☐

2. Since September 1959, has there been any production from the land subject to the contract? Yes ☐ No ☐

   A. If so and it was shipped, give quantity, value, and name and address of purchaser.

	Quantity	Value
_____		
_____	_____	_____

   B. If stockpiled awaiting sale, state quantity, grade, and location.

Type	Quantity		Estimated Grade	Location
Ore	_____	Tons	_____	_____
Concentrates	_____	Tons	_____	_____
Other	_____	Tons	_____	_____

3. Since , has any production been transported through workings (see of contract)? Yes ☐ No ☐

   A. If so, state quantity, value, and disposition of material.

Disposition of Material	Quantity	Value
_____	_____	_____

Submitted by:

Name _____ Title _____

Address _____ Date _____

4511

4962

INSTRUCTIONS TO DELIVERING EMPLOYEE

☐ Deliver *ONLY* to addressee

☒ Show address where delivered

(Additional charges required for these services)

RECEIPT

Received the numbered article described on other side.

SIGNATURE OR NAME OF ADDRESSEE *(must always be filled in)*

SIGNATURE OF ADDRESSEE'S AGENT, IF ANY

Thomas E. Brooks

DATE DELIVERED

DEC 10 1964

SHOW WHERE DELIVERED *(only if requested)*

Mein P.O. Reg Sec Richm

548-5—F

POST OFFICE DEPARTMENT
OFFICIAL BUSINESS

PENALTY FOR PRIVATE USE TO AVOID PAYMENT OF POSTAGE, $300

RICH... VA.
PM
DEC
'964

POSTMARK OF DELIVERING OFFICE

INSTRUCTIONS: Fill in items below and complete instructions on other side, if applicable. Moisten gummed ends, attach and hold firmly to back of article. Print on front of article RETURN RECEIPT REQUESTED.

RETURN TO

REGISTERED NO. 590006	NAME OF SENDER **OFFICE OF MINERALS EXPLORATION**
CERTIFIED NO.	STREET AND NO. OR P. O. BOX **DEPT. OF THE INTERIOR**
INSURED NO.	CITY, ZONE AND STATE **WASHINGTON, D. C. 20240**

POD Form 3811 Apr. 1962

C55—16—71548-5—F

DMEA 4962

REYNOLDS METALS COMPANY
REYNOLDS METALS BUILDING
RICHMOND 18, VIRGINIA

December 11, 1963

Mr. F. M. Murphy, Acting Chief
Division of Minerals
Office of Minerals Exploration
U. S. Department of the Interior
Washington 25, D. C.

Re: DMEA-4962 (Fluorspar)
Reynolds Metals Company
Watson, Hicks, and Tyner
Properties
Crittenden County, Kentucky
Contract Idm-E1199

Dear Mr. Murphy:

Enclosed are two copies of the completed form concerning the above mentioned property, as requested in your letter of December 5, 1963.

Sincerely yours,

Wilson D. Michell

Wilson D. Michell
Assistant Chief Geologist

WDM:fg
Attach.

OFFICIAL FILE COPY
O. M. E
RECEIVED DEC 12 1963

DATE	IN...	CODE
12/16	[illegible]	800
[illegible]	[illegible]	100
12/16	[illegible]	110
~~12/16~~	~~Murphy~~	~~500~~
		920

MME Form 63
Revised 3-62

RECEIVED
DEC 9 1963
EXECUTIVE SALES

REQUEST FOR INFORMATION ON CERTIFIED PROJECT AND PROJECT UNDER ROYALTY AGREEMENT

1. Since **October 8, 1962**, has there been a change in ownership, lease, or sublease? If yes, please state details of the transaction below and provide a true or signed copy of the pertinent documents, unless they have been provided before. Yes ☐ No ☒

2. Since **October 8, 1962**, has there been any production from the land subject to the contract? Yes ☐ No ☒

   A. If so and it was shipped, give quantity, value, and name and address of purchaser.

	Quantity	Value

   B. If stockpiled awaiting sale, state quantity, grade, and location.

Type	Quantity		Estimated Grade	Location
Ore		Tons		
Concentrates		Tons		
Other		Tons		

3. Since Oct. 8, 1962, has any production been transported through workings (see [illegible] of contract)? Yes ☐ No ☒

   A. If so, state quantity, value, and disposition of material.

Disposition of Material	Quantity	Value

Submitted by:

Name Wilson D. Michell Title Assistant Chief Geologist

Address Reynolds Metals Co. Date December 11, 1963
Richmond 18, Va.

4511

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

December 5, 1963

Re: DMEA-4962 (Fluorspar)
Reynolds Metals Company
Watson, Hicks, and Tyner
Properties
Crittenden County, Kentucky
Contract Idm-E1199

Reynolds Metals Company
Reynolds Metals Building
Richmond 18, Virginia

Gentlemen:

After the completion of the approved exploration work under the contract identified above, we asked to be informed about changes in the status of the property and production from it during the period of royalty obligation.

To assist you to furnish this information and to assure the accuracy of our records, please answer the questions on the back of this letter and return two copies to this office with copies of any pertinent documents.

Sincerely yours,

s/F. M. Murphy

F. M. Murphy, Acting Chief
Division of Minerals

REYNOLDS METALS COMPANY
REYNOLDS METALS BUILDING
RICHMOND 18, VIRGINIA

OFFICIAL FILE COPY
O. M. E
RECEIVED OCT 10 1962

DATE	INITIALS	CODE
		800
10/10		100
		110
"	Griswold	500
"	Hoot S.P.H	500
		220

October 8, 1962

Mr. W. R. Griswold, Chief
Division of Minerals
Office of Minerals Exploration
U. S. Department of the Interior
Washington 25, D. C.

Re: DMEA-4962 (Fluorspar)
Reynolds Metals Company
Watson, Hicks, and
Tyner Properties
Crittenden County, Ky.
Contract Idm-E1199

Dear Mr. Griswold:

Enclosed is the information requested in your letter of October 1, 1962, concerning the above-mentioned properties.

Sincerely yours,

Wilson D. Michell

Wilson D. Michell
Assistant Chief Geologist

WDM/ss

Encl.

M

OCT 5 1962 W. L. R.

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

OCT 8 1962

October 1, 1962

Re: DMEA-4962 (Fluorspar)
Reynolds Metals Company
Watson, Hicks, and
Tyner Properties
Crittenden County, Ky.
Contract Idm-E1199

Reynolds Metals Company
Reynolds Metals Building
Richmond 18, Virginia

Gentlemen:

After the completion of the approved exploration work under the contract identified above, we asked to be informed about changes in the status of the property and production from it during the period of royalty obligation.

To assist you to furnish this information and to assure the accuracy of our records, please answer the questions on the back of this letter and return two copies to this office with copies of any pertinent documents.

Sincerely yours,

W. R. Griswold, Chief
Division of Minerals

MME Form 63
Revised 3-62

DMEA-4962
Idm-E1199

RECEIVED OCT 4 1962 EXECUTIVE SALES

REQUEST FOR INFORMATION ON CERTIFIED PROJECT AND PROJECT UNDER ROYALTY AGREEMENT

1. Since September 9, 1960, has there been a change in ownership, lease, or sublease? If yes, please state details of the transaction below and provide a true or signed copy of the pertinent documents, unless they have been provided before. Yes ☐ No ☒

2. Since September 9, 1960, has there been any production from the land subject to the contract? Yes ☐ No ☒

   A. If so and it was shipped, give quantity, value, and name and address of purchaser.

	Quantity	Value

   B. If stockpiled awaiting sale, state quantity, grade, and location.

Type	Quantity		Estimated Grade	Location
Ore		Tons		
Concentrates		Tons		
Other		Tons		

3. Since Sept. 9, 1960, has any production been transported through workings (see of contract)? Yes ☐ No ☒

   A. If so, state quantity, value, and disposition of material.

Disposition of Material	Quantity	Value

Submitted by:

Name Wilson D. Michell Title Asst. Chief Geologist

Address Reynolds Metals Co. Date Oct. 8, 1962
Third & Grace Sts.
Richmond 18, Va.

4511

MME Form 7
(10-58)

OFFICIAL FILE COPY

Date	Surname	Code
6/12	GCS	120
		225

JUN 12 1962

Memorandum

To: Chief, Fiscal Section, Division of Administrative Services, Office of the Secretary

From: Chief, Division of Field Operations, OME

Subject: DMEA-4962 (Fluorspar)
Reynolds Metals Company
Watson, Hicks, and Tyner Properties
Crittenden County, Kentucky
Contract Idm-E1199

Enclosed for your files is the original of a Report of Royalty Review on the subject contract.

George C. Selfridge

(GCS)

Enclosure

GCSelfridge/hb (6/12/62)
cc to: Docket DMEA-4962
Director's Reading File
CA&A Division
G. C. Selfridge
R. A. Laurence, USGS, Reg. IV, w/cy of Report of Royalty Review dtd 6/11/62 & orig. cy of memo dtd 6/11/62 to Chief, Div. of Field Operations from CA&A Division.
Avery Reed, USBM, Reg. IV, w/cy of ea. item sent to Mr. Laurence.

43683

MME Form 7
(10-58)

OFFICIAL FILE COPY

Date	Surname	Code
		220

JUN 11 1962

Memorandum

To: Chief, Division of Field Operations

From: E. D. Talbert, Acting Chief (Signed) E. D. Talbert
Contract Administration and Audit Division

Subject: [illegible]-4962 (Fluorspar)
Reynolds Metals Company
Watson, Hicks, and Tyner Properties
Crittenden County, Kentucky
Contract Idm-81199

Enclosed are the original and two copies of a Report of Royalty Review covering the subject Region IV contract. If you concur in the facts stated therein, please make the following distribution:

(a) Original to the Fiscal Section, Division of Administrative Services, Office of the Secretary; and

(b) Two copies to Region IV files.

This report is for DMS record purposes only; therefore, no copy has been provided for the Operator.

As evidence of your concurrence, a copy of your memorandum transmitting the original of the report to the Department's Fiscal Section should be furnished this Division. If for any reason you do not concur, the original and both copies should be returned to this Division with your comments.

Enclosures

EDTalbert/ama 6-11-62

cc:
Docket
Director's Reading File
CA & A Division
Mr. Rothrock

43683

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

MAY 21 1962

Re: EIEA-4962 (Fluorspar)
Reynolds Metals Company
Watson, Hicks, and Tyner Properties
Crittenden County, Kentucky
Contract Ida-31199

Mr. J. H. Moses, Chief Geologist
Reynolds Metals Company
Reynolds Metals Bldg.
Richmond 19, Virginia

After the completion of the approved exploration work under the contract identified above, we asked to be informed about changes in the status of the property and production from it during the period of royalty obligation.

To assist you to furnish this information and to assure the accuracy of our records, please answer the questions on the back of this letter and return two copies to this office with copies of any pertinent documents.

Sincerely yours,

W. R. Griswold

W. R. Griswold, Chief
Division of Minerals

MME Form 63
Revised 3-62

REQUEST FOR INFORMATION ON CERTIFIED PROJECT AND PROJECT UNDER ROYALTY AGREEMENT

1. Since September 9, 1960, has there been a change in ownership, lease, or sublease? If yes, please state details of the transaction below and provide a true or signed copy of the pertinent documents, unless they have been provided before. Yes ☐ No ☐

2. Since September 9, 1960, has there been any production from the land subject to the contract? Yes ☐ No ☐

   A. If so and it was shipped, give quantity, value, and name and address of purchaser.

	Quantity	Value
_____		
_____	_____	_____

   B. If stockpiled awaiting sale, state quantity, grade, and location.

Type	Quantity		Estimated Grade	Location
Ore	_____	Tons	_____	_____
Concentrates	_____	Tons	_____	_____
Other	_____	Tons	_____	_____

3. Since _____, has any production been transported through _____ workings (see _____ of contract)? Yes ☐ No ☐

   A. If so, state quantity, value, and disposition of material.

Disposition of Material	Quantity	Value
_____	_____	_____

Submitted by:

Name _____ Title _____

Address _____ Date _____

4511

124

REYNOLDS METALS COMPANY
REYNOLDS METALS BUILDING
RICHMOND 18, VIRGINIA

September 15, 1960

Mr. Lawrence G. Houk
Acting Field Officer - Region IV
Office of Minerals Exploration
United States Department of the Interior
Washington 25, D. C.

Dear Mr. Houk:

Re: Docket No. DMEA-4962
Watson, Hicks, Tyner
Crittenden, Livingston Counties,
Kentucky. Contract Idm-E1199

Attached herewith is the information you recently requested on the subject properties.

Very truly yours,

Sheldon P. Wimpfen

Sheldon P. Wimpfen

SPW/jc

Enclosure

cc: Mr. Walter L. Rice
Dr. John Moses
Mr. Richard I. Dawes

RECEIVED AUG 31 1960 AUG 3 1 1960 W.L.R.

REQUEST FOR INFORMATION
FROM OPERATOR ON CERTIFIED PROJECT
AND PROJECT UNDER ROYALTY AGREEMENT

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF MINERALS EXPLORATION

From: ACTING Field Officer, OME
Region IV
Washington 25, D. C.

Date: August 29, 1960

Concerning:
Docket No. DMEA-4962
Property Reynolds Metals Company
Watson, Hicks, Tyner
Location Crittenden, Livingston
Counties, Kentucky
Contract Idm-E1199

Reynolds Metals Company
301 East Grace Street
Richmond, Virginia

With the certification of the exploration project identified above, you were asked to inform our office about changes in the status of the property and production from it.

To assist you to furnish this information and to assure the accuracy of our records, we ask that you answer the questions below and return one copy to this office with copies of any pertinent documents.

ACTING Field Officer Lawrence G. Hoch

1. Since Sept. 11, 1959, has there been a change in ownership, lease, or sublease about which the OME has not been notified? If yes, please state details of the transaction below and provide a true or signed copy of the pertinent documents. Yes ☐ No ☑

2. Since Sept. 11, 1959, has there been any production from the property?* Yes ☐ No ☑

A. If so and it was shipped, give name and address of purchaser?

	Quantity	Value

B. If stockpiled awaiting sale, state quantity, grade, and location.

Type	Quantity		Estimated Grade	Location
Ore		Tons		
Concentrates		Tons		
Other		Tons		

Submitted by:

Name J. H. Moses Title Chief Geologist

Address Reynolds Metals Bldg, Richmond 18, Va Date September 9, 1960

MME Form 63 8-60 * Property means land subject to the contract. 79340-60

DMEA Form 7
(12-56)

OFFICIAL FILE COPY

Date	Surname	Code
9/8	[illegible]	500
	[illegible]	500
9/11	Filgard	140
		140
9/10	Talbert	800
		130
9/15	Lamb	
"	Filgard	
		~~110~~
9-15	gad	220
		500

SEP 15 1959

Reynolds Metals Company
301 East Grace Street
Richmond, Virginia

Re: Docket No. DMEA-4962 (Fluorspar)
Reynolds Metals Company
Watson, Hicks, and Tyner Properties
Crittenden County, Kentucky
Contract No. Idm-E1199

Gentlemen:

Enclosed is a certification of discovery or development that covers all the land described in Article 2 of the contract.

By the terms of the Exploration Project Contract, as amended, and the certification, all minerals mined or produced from June 3, 1958, to June 3, 1968, are subject to the Government's percentage royalty as set forth in the contract until the sum of $26,973.88 is repaid to the Government.

Royalty payments should be made to the Executive Officer, OME Field Team, Region V, Room 11, Post Office Building, Knoxville 2, Tennessee, by the purchaser with checks drawn payable to the Office of Minerals Exploration. The purchaser should be advised to deduct royalties from the amount due on each shipment and send the check directly to the Executive Officer. Each check should be accompanied by suitable sales evidence - such as copies of settlement sheets - showing the name of the purchaser, the quantity and grade of the products sold, and the price and charges, certified to be correct by the purchaser.

You are requested to notify the Executive Officer of any changes in ownership or production rights that may have any effect on the Government's right to its percentage royalty. Your attention is called particularly to Article 2(d) of the contract relating to the preservation of the Government's right to a percentage royalty on production. Also when production starts, please notify the Executive Officer. Thereafter, if production ceases for any extended period, please notify him accordingly at six-month intervals.

Sincerely yours,

George C. Selfridge (GCS)

Acting Director

Enclosure

JWAlt/gla 9-8-59
cc to: Fluorspar Consolidated, Inc.
Roy and Margaret Sunderland
The Peoples Bank

Director's Reading File
Mr. Johnson
Operating Committee
Frank D. Lamb, USBM
Harold Kirkemo, USGS
Contract Division

OME Field Team, Region V (2)
Docket
Chron

8623

DMEA Form 7
(12-56)

OFFICIAL FILE COPY

Date	Surname	Code
9/8	Alt	500
	Manuel	500
9/11	J. Lynch	140
		140
9/10	Talbut	800
		130
9/15	Lamb	
"	Kilsgaard	
		~~110~~
9-15	gad	220
		500

SEP 15 1959

Mr. Eli H. Brown, III, President
Fluorspar Consolidated, Inc.
301 West Main
Louisville, Kentucky

Re: Docket No. DMEA-4962 (Fluorspar)
Reynolds Metals Company
Watson, Hicks, and Tyner Properties
Crittenden County, Kentucky
Contract No. Idm-E1199

Dear Mr. Brown:

Enclosed is a copy of a certification of discovery or development, with copy of covering letter to the Operator, which has been issued pursuant to the terms of the above-cited contract.

This correspondence relates to the Consent to Lien and Subordination Agreement signed by you on May 7, 1958. The Government's prior lien on the land and upon any production therefrom will continue in existence for the length of time mentioned in the enclosed copy of the letter to the Operator. You are obligated during that period to commit no act and to assert no claim in conflict with the Government's rights under the agreement signed by you, and to give advance notice of the Government's rights to any transferee or lessee of any part of your interest in the land or the production therefrom.

Sincerely yours,

George C. Seitriage (for)

Acting Director

Enclosures

JWAlt/gla 9-8-59
cc to: Director's Reading File
Operating Committee
Frank D. Lamb, USBM
Harold Kirkemo, USGS
OME Field Team, Region V (2)
Docket
Chron

8623

DMEA Form 7
(12-56)

OFFICIAL FILE COPY

Date	Surname	Code
9/8	ab	500
	Dwarnold	500
9/11	T. Lynch	140
		140
9/10	Talbot	800
		130
9/15	Lamb	
"	Kilogaard	
		~~110~~
9-15	gad	220
		500

SEP 15 1959

Mr. Roy Sunderland and
Mrs. Margaret Sunderland
Salem, Kentucky

Re: Docket No. DMEA-4962 (Fluorspar)
Reynolds Metals Company
Watson, Hicks, and Tyner Properties
Crittenden County, Kentucky
Contract No. Idm-E1199

Dear Mr. and Mrs. Sunderland:

Enclosed is a copy of a certification of discovery or development, with copy of covering letter to the Operator, which has been issued pursuant to the terms of the above-cited contract.

This correspondence relates to the Consent to Lien and Subordination Agreement signed by you on January 26, 1959. The Government's prior lien on the land and upon any production therefrom will continue in existence for the length of time mentioned in the enclosed copy of the letter to the Operator. You are obligated during that period to commit no act and to assert no claim in conflict with the Government's rights under the agreement signed by you, and to give advance notice of the Government's rights to any transferee or lessee of any part of your interest in the land or the production therefrom.

Sincerely yours,

George C. Selfridge

Acting Director

Enclosures

JWAlt/gla 9-8-59
cc to: Director's Reading File
Operating Committee
Frank D. Lamb, USBM
Harold Kirkemo, USGS
OME Field Team, Region V (2)
Docket
Chron

8623

DMEA Form 7
(12-56)

OFFICIAL FILE COPY

Date	Surname	Code
9/8	Alt	500
	[illegible]	500
9/11	J. Lynch	140
		140
9/10	Talbert	800
		130
9/15	Lamb	
"	Kilegaard	~~110~~
9-15	gad	220
		500

SEP 15 1959

Mr. R. G. Guess, President
The Peoples Bank
Marion, Kentucky

Re: Docket No. DMEA-4962 (Fluorspar)
Reynolds Metals Company
Watson, Hicks, and Tyner Properties
Crittenden County, Kentucky
Contract No. Idm-E1199

Dear Mr. Guess:

Enclosed is a copy of a certification of discovery or development, with copy of covering letter to the Operator, which has been issued pursuant to the terms of the above-cited contract.

This correspondence relates to the Consent to Lien and Subordination Agreement signed by you on January 27, 1959. The Government's prior lien on the land and upon any production therefrom will continue in existence for the length of time mentioned in the enclosed copy of the letter to the Operator. You are obligated during that period to commit no act and to assert no claim in conflict with the Government's rights under the agreement signed by you, and to give advance notice of the Government's rights to any transferee or lessee of any part of your interest in the land or the production therefrom.

Sincerely yours,

George C. Selfridge (for)

Acting Director

JWAlt/gla 9-8-59
cc to: Director's Reading File
Operating Committee
Frank D. Lamb, USBM
Harold Kirkemo, USGS
OME Field Team, Region V (2)
Docket
Chron

8623

DMEA Form 7
(12-56)

OFFICIAL FILE COPY

Date	Surname	Code
9/8	all	500
	[illegible]	500
9/11	T. Lynch	140
		140
9/10	Talbert	800
		130
9/15	Lamb	
"	Kilogaard	~~110~~
9-15	gad	220
		500

SEP 15 1959

Mr. C. A. Fredell, Director
Technical Research and Development Division
Defense Materials Service
General Services Administration
6018 GSA Building
Washington 25, D. C.

Re: Docket No. DMEA-4962 (Fluorspar)
Reynolds Metals Company
Watson, Hicks, and Tyner Properties
Crittenden County, Kentucky
Contract No. Idm-K1199

Dear Mr. Fredell:

Enclosed is a copy of a certification of discovery or development issued under the subject contract.

The contract was dated June 3, 1958, with the Government participating to the extent of 50 percent in an exploration project estimated to cost $59,710.00. Actual expenditures were $53,947.76, with the Government's share being half of such amount, or $26,973.88.

The total amount of work provided for under the contract consisted of 14,900 feet of diamond drilling. Work actually completed consisted of 14,382 feet of such work.

The discovery consisted of fluorite with subordinate sphalerite and galena as cavity-filling deposits along faults with minor replacement of adjacent wall rock in Fredonia, Renault, and Levias limestones of Upper Mississippian age. The reserves, with a cut-off value of 35 percent, are estimated to be 87,572 tons of ore averaging 30.54 percent CaF_2, 1.12 percent Pb, and 2.07 percent Zn, and with a cut-off value of 25 percent are estimated to be 205,655 tons of ore averaging 22.46 percent CaF_2, 0.71 percent Pb, and 1.80 percent Zn.

Sincerely yours,

George C. Selfridge (kw)

Acting Director

Enclosure

JWAlt/gla 9-8-59
cc to: Director's Reading File
Mr. Johnson
Operating Committee
Frank D. Lamb, USBM
Harold Kirkemo, USGS
OME Field Team, Region V (2)
Docket
Chron

8623

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF MINERALS EXPLORATION
ROOM 2-B POST OFFICE BLDG.
KNOXVILLE 2, TENN.

August 20, 1959

OFFICIAL FILE COPY
O. M. E.
RECEIVED AUG 24 1959

DATE	INITIALS	CODE
8/24	gad	220
8/28	HB	130
8/28	gad	220
8/31		140
8/31	[illegible]	800
"	[illegible]	500

Memorandum

To: Operating Committee, OME - Washington, D. C.

From: OME Field Team, Region V - Knoxville, Tennessee

Subject: Field Team Final Report - DMEA-4962, Idm-E1199-CaF_2.
Reynolds Metals Co., Richmond, Virginia.
Watson-Hicks-Tyner Properties, Crittenden County, Ky.

Transmitted are the original and two copies of the subject final report, with a map attached to each copy.

We agree with the recommendation for certification on the subject property.

Robert A. Laurence

Robert A. Laurence, Executive Officer
OME Field Team, Region V

V. J. Lynch

V. J. Lynch, Member
Field Team, U. S. Bureau of Mines

FINAL F.T. REPORT

z

Reviewed by
OME OPERATING COMMITTEE
8-28-59
(date)

DEPARTMENT OF THE INTERIOR

OFFICE OF MINERALS EXPLORATION

OFFICIAL FILE COPY
O. M. E.
RECEIVED AUG 24 1959

DATE	INITIALS	CODE
8/28	JB	130
		220

FINAL REPORT
REGION V

DMEA-4962, Idm-E1199(Fluorspar) REYNOLDS METALS CO.
Crittenden County, Kentucky

BY

Dewey H. Amos, Geologist
U. S. Geological Survey

August 20, 1959

Reviewed by
OME OPERATING COMMITTEE
8-28-59
(date)

FINAL REPORT

DMEA-4962 Idm-E1199(fluorspar)

Operator: Reynolds Metals Company, Richmond, Virginia

Location: Watson-Hicks-Tyner-Sunderland properties, Crittenden County, Kentucky

SUMMARY

A total of 24 diamond core drill holes totaling 14,387 feet were completed under the contract. Ore grade mineralization of mineable thickness was encountered in 9 of the holes and indicative mineralization in 9 other holes. This mineralization constitutes two ore bodies; one on the Hicks property and one on the Watson property. Additional exploratory drilling in the contract area is not warranted. Any subsequent work would be development. It is recommended that a certification of discovery be issued.

LOCATION

The Watson, Hicks, Tyner and Sunderland properties are contiguous tracts near the west-central boundary of Crittenden County in the western Kentucky fluorspar district. The properties are about nine miles southwest of the town of Marion and are about one mile south of U.S. Highway No. 60. All weather gravel roads extend from Highway 60 to the Two Brothers mine which is along the northeast border of the Watson property and to the Davenport mine near the property line between the Watson and Hicks properties (see attached map).

WORK COMPLETED

A total of 24 diamond core drill holes were completed under the contract. The holes totaled 14,387 feet, 14,382 feet of which were drilled under the terms of the contract. Thirteen holes totaling 6,906 feet were drilled under Stage I of the contract. As only 6,900 feet of drilling were provided in Stage I of the contract, six feet of the last Stage I hole (W-15) was done entirely at the Operator's expense. Eleven holes totaling 7,482 feet were drilled under Stage II. A total of 518 feet of drilling provided under Stage II of the contract was not utilized as all favorable structures on the properties were regarded as adequately explored by the completed work. Thus, the contract was terminated by mutual agreement, effective June 4, 1959. One hole (W-17) was lost due to caving ground but was replaced entirely at the Operator's expense by Hole No. 17B. Hole locations are shown on the attached map. In addition to the drilling, 120 assays were made under the contract.

A summary of the drilling is as follows:

Hole No.	Total Depth	Bearing	Inclination	Remarks
Stage I				
W-1	916 ft.	S.67½°E.	-46½°	Ore hole.
W-2	553 ft.	N.54½°W.	-46°	Ore hole.
W-3	829 ft.	S.50°E.	-45°	Indicative hole.
W-4	411 ft.	N.67°W.	-44½°	Blank hole.
W-5	351 ft.	N.50°W.	-45°	Indicative hole.
W-6	351 ft.	N.50°W.	-45°	Blank hole.
W-7	540 ft.	S.50°E.	-45°	Indicative hole.
W-8	335 ft.	S.51°E.	-45°	Blank hole.
W-10	514 ft.	S.51½°E.	-45°	Trace hole.
W-11	436 ft.	S.50½°E.	-70°	Indicative hole.
W-12	453 ft.	S.49°E.	-45°	Ore hole.
W-14	362 ft.	S.49°E.	-80°	Indicative hole.

Stage II				
W-9	757 ft.	N.64°W.	-60°	Indicative hole.
W-13	642 ft.	S.50°E.	-45°	Ore hole.
W-15	534 ft.	S.57°E.	-45°	Indicative hole.
W-16	619 ft.	S.57°E.	-40°	Trace hole.
W-17	592 ft.	S.47°E.	-45°	Ore hole.
W17B	661 ft.	S.47°E.	-45°	Ore hole.
W-18	577 ft.	S.50°E.	-40°	Ore hole.
W-19	734 ft.	S.50°E.	-40°	Indicative hole.
W-20	507 ft.	N.47°W.	-65°	Ore hole.
W-21	555 ft.	S.47°E.	-80°	Trace hole.
W-22	853 ft.	S.61°E.	-40°	Ore hole.
W-23	710 ft.	S.47°E.	-45°	Ore hole.
W-24	452 ft.	S.47°E.	-54°	Indicative hole.

To ore bodies

GEOLOGY

The western Kentucky fluorspar district is underlain by flat-lying sedimentary beds of Upper Mississippian age which are displaced by numerous gravity-type faults. The faults commonly have steep dips and the major ones have a northeasterly strike. Many minor faults of limited displacement and extent occur transverse to the regional structural trend. Mineralization consists of fluorite with subordinate sphalerite and galena in a gangue of calcite and barite. This mineralization occurs as cavity-filling deposits along the faults and is sometimes accompanied by minor replacement of the adjacent wall rock.

Stratigraphic units present in the vicinity of the properties are as follows:

	Stratigraphic Unit	Average Thickness
	Hardinsburg sandstone	100 ft.
	Golconda limestone and shale	135 ft.
	Cypress sandstone	90 ft.
Chester series	Paint Creek shale	10 ft.
	Bethel sandstone	75 ft.
	Renault limestone and shale	90 ft.

	Ste. Genevieve formation	
Meramac series	Levias limestone	15 ft.
	Rosiclare sandstone	10 ft.
	Fredonia limestone	205 ft.
	St. Louis limestone	500 ft.

Detailed lithologic descriptions of these units are given in USGS Bulletin 1012-E.

Since the deposits are chiefly of cavity-filling origin, major mineralization is restricted along the faults to places where both walls consist of competent rock units (massive limestone and/or sandstone). Significant mineralization tends to occur at certain favored stratigraphic positions along the faults; namely, (1) the middle and upper part of the Fredonia limestone member, (2) the upper part of the Renault limestone, and (3) the upper part of the Levias limestone member and the basal portion of the Renault limestone. The largest deposits and the major production of the western Kentucky district occur where at least one wall of the faults consist of the Fredonia limestone member of the Ste. Genevieve formation. Individual ore bodies commonly have a strike extent of 250 to 700 feet and may have a dip extent up to 250 feet. They are often most productive at or near fault intersections.

The Watson, Hicks, Tyner and Sunderland properties lie along the Moore Hill fault system, one of the major producing units of the district. On and in the vicinity of these properties, the Moore Hill fault system is 1000 to 1200 feet wide and trends in a N.45°E. direction. This system is bounded by two major faults which are approximately parallel; the Moore Hill fault on the northwest side and a fault, designated as "Fault No. 3" by the

Operator, on the southeast side (see attached map). Drilling completed under this contract has indicated at least seven cross-faults traverse the fault system on the properties (see attached map).

Drilling done under the contract has revealed two small ore bodies on the properties. One of these ore bodies is on the Hicks property along the Moore Hill fault zone (designated Fault 1 and Fault 1A by the Operator) and the other is on the Watson property along Fault 3 downdip and westward from the Two Brothers mine. The southwest strike extent of the Hicks ore body could not be determined because of proximity to an exterior property line. At the present market price, both bodies are too small to amortize development work and mining and milling facilities. Both deposits could possibly be exploited with a more favorable price and the utilization of a central or custom mill.

RESERVES

The Operator has presented a realistic calculation of indicated reserves revealed by the contract drilling (see Operator's Final Report). to which the writer is in agreement. This calculation utilizes a combined value (C.V.) where 1% CaF_2 = 1% C.V., 1% Pb = 5% C.V., and 1% Zn = 3% C.V. A summary of the calculations is as follows:

Hicks Ore Body

C.V. Cutoff	Tons Ore	Ave. % C.V.	Ave. % CaF_2	Ave. % Pb	Ave. % Zn
35%	42,904	48.01	26.99	0.18	3.90
25%	148,287	30.37	19.25	0.82	2.34

Watson Ore Body

C.V. Cutoff	Tons Ore	Ave. % C.V.	Ave. % CaF_2	Ave. % Pb	Ave. % Zn
35%	44,638	37.52	33.94	0.45	0.31
25%	57,368	34.06	30.75	0.41	0.43

Based on geology and the district habit reserves equivalent to about one-half of the indicated ones can be inferred on the properties.

COMPETENCY OF OPERATOR

The work completed under the contract was done in a satisfactory manner. The Operator is to be commended for care taken and extra cost assumed in obtaining adequate core samples.

RECOMMENDATIONS

Additional exploratory work is not warranted on the properties. Any additional drilling would be developmental in nature.

Although the two bodies discovered by the contract work could not be exploited economically at current prices, it is recommended that a certification of discovery be issued as the deposits could possibly be mined under more favorable economic conditions.

SUMMARY LOG OF HOLE W-1

Depth in Feet	Description
0-25	Overburden.
25-97	Renault limestone and shale.
97-473	Ste. Genevieve limestone. Scattered shines of fluorite, sphalerite and galena.
473-475½	Fault.
475½-505	St. Louis limestone.
505-516	Fault, Shines of fluorite and galena (see assay).
516-543	St. Louis limestone. Shines of fluorite and sphalerite (see assays).
543-545	Fault. Vein fluorite with traces of sphalerite and galena (see assays).
545-725	Ste. Genevieve limestone. Shines of fluorite, sphalerite and galena (see assay).
725-728	Fault.
728-805	St. Louis limestone.
805-870½	Fault.
870½-916	St. Louis limestone. Shines of fluorite.
916	Bottom.

Inclination -46½°
Bearing S. 67½° E.

SUMMARY LOG OF HOLE W-2

Depth in Feet	Description
0-30	Overburden.
30-163½	Golconda limestone and shale.
163½-205	Cypress sandstone.
205-214	Fault.
214-227½	Cypress-Bethel sandstone.
227½-236½	Fault.
236½-253	Ste. Genevieve limestone. Trace of fluorite.
253-264	St. Louis limestone. Shines of fluorite.
264-266	Fault.
266-281	St. Louis limestone. Shines of fluorite.
281-304	Fault. Shines of fluorite, sphalerite and galena.
304-340	St. Louis limestone. Shines of fluorite, sphalerite and galena (see assays).
340-341½	Fault. Shines of fluorite, sphalerite and galena (see assay).
341½-553	St. Louis limestone. Shines of fluorite, sphalerite and galena.
553	Bottom.

Inclination -46°
Bearing N. 54½° W.

SUMMARY LOG OF HOLE W-3

Depth in Feet	Description
0-3	Overburden.
3-140	Renault limestone and shale.
140-156	Levias limestone.
156-175	Rosiclare sandstone and limestone.
175-319	Fredonia limestone.
319-328	Fault. Shines of fluorite, sphalerite, and galena.
328-461	St. Louis limestone. Shines of fluorite and sphalerite.
461-468	Fault. Shines of fluorite.
468-475½	St. Louis limestone.
475½-489½	Fault. Shines of fluorite.
489½-782	St. Louis limestone. Scattered shines of fluorite (see assay).
782-829	Ste. Genevieve limestone.
829	Bottom.

Inclination -45°
Bearing S. 50° E.

SUMMARY LOG OF HOLE W-4

Depth in Feet	Description
0-14	Overburden.
14-82	Hardinsburg sandstone and shale.
82-219	Golconda limestone and shale.
219-267	Cypress sandstone.
267-279	Fault.
279-411	Ste. Genevieve limestone.
411	Bottom

Inclination -44½°
Bearing N. 67° W.

SUMMARY LOG OF HOLE W-5

Depth in Feet	Description
9-15	Overburden.
15-222	Cypress-Bethel sandstones.
222-233	Fault. Shines of fluorite (see assay).
233-313	Ste. Genevieve limestone. Scattered shines of fluorite and sphalerite (see assays).
313-321½	Fault. Shines of fluorite and sphalerite (see assay).
321½-351	St. Louis limestone.
351	Bottom.

Inclination -45°
Bearing N. 50° W.

SUMMARY LOG OF HOLE W-6

Depth in Feet	Description
0-19	Overburden.
19-250	Cypress-Bethel sandstones.
250	Probable fault.
250-265	Rosiclare sandstone.
265-351	Fredonia limestone.
351	Bottom.

Inclination -45°
Bearing N. 50° W.

SUMMARY LOG OF HOLE W-7

Depth in Feet	Description
0-40	Overburden.
40-127	Bethel sandstone.
127-264	Renault limestone and shale.
264-286½	Levias limestone. Shines of fluorite at 283½-286½ feet.
286½-309	Rosiclare sandstone.
309-349½	Fault.
349½-660	St. Louis limestone. Shines of fluorite, sphalerite and galena.
660-673½	Fault. Shines of fluorite, sphalerite and galena.
673½-789	St. Louis limestone. Scattered shines of fluorite and sphalerite (see assays).
789-850	Fault.
850-860	Ste. Genevieve limestone.
860	Bottom.

Inclination -45°
Bearing S. 50° E.

SUMMARY LOG OF HOLE W-8

Depth in Feet	Description
0-15	Overburden.
15-123	Cypress sandstone.
123-129	Paint Creek shale.
129-186	Bethel sandstone.
186	Fault.
186-213	Renault limestone.
213-235	Levias limestone.
235-266½	Rosiclare shale and limestone.
266½-335	Fredonia limestone.
335	Bottom.

Inclination -45°
Bearing S. 51° E.

SUMMARY LOG OF HOLE W-9

Depth in Feet	Description
0-8	Overburden.
8-100	Hardinsburg sandstone.
100-228	Golconda limestone.
228-250	Fault.
250-438	Ste. Genevieve limestone. Scattered shines of fluorite and galena.
438-447	Fault. Shines of fluorite and galena.
447-637	Ste. Genevieve limestone. Scattered shines of fluorite, sphalerite and galena (see assay).
637-700½	St. Louis limestone.
700½-703½	Fault. Vein fluorite with traces of sphalerite and galena.
703½-757	St. Louis limestone.
757	Bottom.

Inclination -60°
Bearing N. 64° W.

SUMMARY LOG OF HOLE W-10

Depth in Feet	Description
0-21	Overburden.
21-145	Cypress sandstone.
145-162	Paint Creek shale.
162-286	Bethel sandstone and shale.
286-293	Fault.
293-353½	Renault limestone and shale.
353½-356	Fault.
356-514	Fredonia limestone. Shines of fluorite at 356-380 feet.
514	Bottom.

Inclination -45°
Bearing S. 51½° E.

SUMMARY LOG OF HOLE W-11

Depth in Feet	Description
0-18	Overburden.
18-66	Golconda shale.
66-156	Cypress sandstone.
156-175	Paint Creek shale.
175-264	Bethel sandstone and shale.
264-352	Renault limestone and shale.
352-373½	Fault. Shines of fluorite and sphalerite.
373½-436	Fredonia limestone.
436	Bottom.

Inclination -70°
Bearing S. 50½° E.

SUMMARY LOG OF HOLE W-12

Depth in Feet	Description
0-126	Overburden.
126-189	St. Louis limestone.
189-216	Fault. Shines of fluorite, sphalerite and galena (see assays).
216-231	Rosiclare sandstone. Shines of fluorite (see assays).
231-351	Fredonia limestone. Shines of fluorite and sphalerite.
351-392	Fault. Shines of fluorite, sphalerite and galena.
392-430	Rosiclare sandstone. Scattered shines of fluorite and galena (see assays).
430-453	Fredonia limestone.
453	Bottom.

Inclination -45°
Bearing S.49° E.

SUMMARY LOG OF HOLE W-13

Depth in Feet	Description
0-40	Overburden.
40-141	Renault limestone and shale.
141-157	Fredonia limestone. Traces of fluorite.
157-199	Rosiclare sandstone. Traces of fluorite.
199-207	Fredonia limestone
207-209	Fault. Shines of fluorite (see assay).
209-223	Fredonia limestone. Shines of fluorite (see assays).
223-232	Fault. Shines of fluorite, sphalerite and galena (see assays).
232-274	St. Louis limestone. Scattered shines of fluorite (see assays).
274-306	Fault. Shines of fluorite, sphalerite and galena (see assays).
306-353	St. Louis limestone. Shines of fluorite (see assays).
353-354	Fault. Shines of fluorite (see assays).
354-443	St. Louis limestone. Shines of fluorite (see sassays).
443-446½	Fault.
446½-499½	St. Louis limestone. Shines of fluorite (see assay).
499½-513½	Fault. Scattered shines of fluorite (see assays).
513½-523	St. Louis limestone. Shines of fluorite (see assays).
523-547½	Fault. Shines of fluorite (see assays).
547½-595	St. Louis limestone. Traces of fluorite and sphalerite.
595-596½	Fault. Shines of fluorite (see assays).
596½-616	St. Louis limestone. Scattered shines of fluorite (see assays).
616-635	Fault. Shines of fluorite (see assays).
635-642	Ste. Genevieve limestone.
642	Bottom.

Inclination -45°
Bearing S. 50° E.

SUMMARY LOG OF HOLE W-14

Depth in Feet	Description
0-10	Overburden.
10-136	Golconda shale.
136-215	Cypress sandstone.
215-226½	Paint Creek shale.
226½-298½	Bethel sandstone. Shines of fluorite at 233 feet.
298½-324	Renault limestone and shale.
324-334½	Ste. Genevieve limestone.
334½-338	Fault. Shines of fluorite.
338 -362	Ste. Genevieve limestone.
362	Bottom.

Inclination -80°
Bearing S. 49° E.

SUMMARY LOG OF HOLE W-15

Depth in Feet	Description
0-20	Overburden.
20-133	Cypress sandstone.
133-138	Paint Creek shale.
138-205½	Bethel sandstone.
205½-333	Renault limestone and shale.
333-356½	Levias limestone.
356½-364	Rosiclare shale and limestone.
364-372	Fault.
372-386	Ste. Genevieve limestone.
386-392	Fault.
392-396	Ste. Genevieve limestone.
396-432	Fault. Shines of fluorite.
432-484	Ste. Genevieve limestone. Shines of fluorite at 446 feet.
484-494½	Fault. Shines of fluorite and sphalerite.
494½-534	Ste. Genevieve limestone.
534	Bottom.

Inclination -45°
Bearing S. 57° E.

SUMMARY LOG OF HOLE W-16

Depth in Feet	Description
0-100	Overburden.
100-254	Bethel sandstone.
254-377	Renault limestone and shale.
377-387	Levias limestone.
387-410	Rosiclare shale and limestone.
410-511	Fredonia limestone.
511-537½	Fault. Trace of fluorite.
537½-619	Renault limestone and shale.
619	Bottom.

Inclination -40°
Bearing S. 57° E.

SUMMARY LOG OF HOLE W-17

Depth in Feet	Description
0-90	Overburden.
90-200	St. Louis limestone.
200-205	Fault.
205-316½	Renault limestone. Scattered shines of fluorite, sphalerite and galena (see assays).
316½-318½	Fault. Shines of fluorite and sphalerite.
318½-326½	Renault limestone. Traces of fluorite and sphalerite.
326½-329	Fault. Shines of fluorite and sphalerite.
329-353	Renault limestone. Scattered shines of fluorite and sphalerite.
353-373½	Levias and Rosiclare members.
373½-463½	Fredonia limestone.
463½-465	Fault. Vein fluorite (see assay).
465-592	Fredonia limestone.
592	Hole lost.

Inclination -45°
Bearing S. 47° E.

SUMMARY LOG OF HOLE W-17B

Depth in Feet	Description
0-117	Overburden.
117-205	St. Louis limestone.
205-212	Fault. Shines of fluorite, sphalerite and galena (see assays).
212-241	Renault limestone. Scattered shines of fluorite (see assays).
241-243	Fault. Shines of fluorite (see assays).
243-251	Renault limestone. Shines of fluorite (see assay).
251-326	Fault. Scattered heavy fluorite, sphalerite and galena (see assay).
326-379	Renault limestone and shale.
379-393	Levias limestone.
393-432	Rosiclare shale and limestone.
432-593	Fredonia limestone.
593-631	Fault. Shines of fluorite.
631-661	St. Louis limestone. Shines of fluorite, sphalerite and galena.
661	Bottom.

Inclination -45°
Bearing S. 47° E.

SUMMARY LOG OF HOLE W-18

Depth in Feet	Description
0-35	Overburden.
35-132	Renault limestone.
132-165	Bethel sandstone.
165-232½	Fredonia limestone. Shines of fluorite 176-232½ feet.
232½-273	Fault. Scattered traces of fluorite.
273-387½	St. Louis limestone.
387½-392	Fault.
392-521	St. Louis limestone. Shines of fluorite at 398½-521 feet (see assays).
521-547	Fault.
547-577	Ste. Genevieve limestone.
577	Bottom.

Inclination -40°
Bearing S. 50° E.

SUMMARY LOG OF HOLE W-19

Depth in Feet	Description
0-31	Overburden.
31-84	Bethel sandstone.
84-262	Renault limestone and shale.
262-307	Cavity.
307-392	Fault. Limestone and calcite breccia.
392-490½	St. Louis limestone.
490½-564	Fault. Scattered shines of fluorite and sphalerite.
564-581	St. Louis limestone.
581-610½	Fault. Shines of fluorite.
610½-638	St. Louis limestone. Scattered traces of fluorite.
638-641	Fault. Scattered traces of fluorite.
641-668	St. Louis limestone. Shines of fluorite.
668-712	Fault. Shines of fluorite (see assays).
712-734	Ste. Genevieve limestone.
734	Bottom.

Inclination -40°
Bearing S. 50° E.

SUMMARY LOG OF HOLE W-20

Depth in Feet	Description
0-10	Overburden.
10-103	Cypress sandstone and shale.
103-109	Paint Creek shale.
109-189	Bethel sandstone.
189-305½	Renault limestone and shale.
305½-310	Ste. Genevieve limestone.
310-313	Fault. Traces of fluorite.
313-317½	Levias limestone.
317½-319	Rosiclare shale.
319-450	Fault zone. Scattered fluorite, sphalerite and galena; ore-grade fluorspar and zinc at 353.6-380.0 feet (see assays).
450-507	St. Louis limestone.
507	Bottom.

Inclination -65°
Bearing N. 47° W.

SUMMARY LOG OF HOLE W-21

Depth in Feet	Description
0-24	Overburden.
24-83	Golconda limestone and shale.
83-181	Cypress sandstone and shale.
181-183	Paint Creek shale.
183-272	Bethel sandstone.
272-377	Renault limestone and shale.
377-387	Levias limestone.
387-389½	Fault. Limestone and calcite breccia.
389½-486	Fredonia limestone. Scattered traces of fluorite.
486-555	St. Louis limestone.
555	Bottom.

Inclination -60°
Bearing S. 47° E.

SUMMARY LOG OF HOLE W-22

Depth in Feet	Description
0-65	Overburden.
65-174	Renault limestone and shale.
174-207½	Levias limestone.
207½-253	Rosiclare sandstone and shale.
253-411	Fredonia limestone.
411-428	Fault. Traces of fluorite and sphalerite.
428-491	St. Louis limestone. Scattered shines of fluorite (see assays).
491-501	Fault. Possible ore-grade fluorite (see assays).
501-606	St. Louis limestone. Scattered traces of fluorite, sphalerite and galena.
606-608	Fault. Shines of fluorite.
608-621	St. Louis limestone. Traces of fluorite.
621-650	Fault. Shines of fluorite, sphalerite and galena.
650-752	St. Louis limestone. Scattered traces of fluorite.
752-754	Fault. Vein calcite.
754-844	St. Louis limestone. Scattered traces of fluorite.
844-851½	Fault.
851½-853	St. Louis limestone.
853	Bottom.

Inclination -40°
Bearing S. 61° E.

SUMMARY LOG OF HOLE W-23

Depth in Feet	Description
0-75	Overburden.
75-180	St. Louis limestone
180-229	Fault zone. Scattered shines of fluorite and sphalerite (see assays).
229-245	Fredonia limestone. Scattered shines of fluorite and sphalerite (see assay).
245-249	Fault. Heavy shines of fluorite and galena; possible ore grade (see assay).
249-331	Fredonia limestone. Heavy shines of fluorite and shines of galena and sphalerite (see assays).
331-358	Fault. Shines of fluorite, galena and sphalerite (see assays).
358-366	Levias limestone. Shines of fluorite, galena and sphalerite (see assay).
366-430	Rosiclare sandstone and limestone.
430-577	Fredonia limestone. Scattered traces of fluorite and sphalerite.
577-588	Fault.
588-602	Fredonia limestone.
602-603	Fault. Shines of fluorite.
603-635½	Fredonia limestone. Scattered traces of fluorite and sphalerite.
635½-645	Fault, Traces of fluorite, galena and sphalerite.
645-710	St. Louis limestone.
710	Bottom

Inclination -45°
Bearing S. 47° E.

SUMMARY LOG OF HOLE W-24

Depth in Feet	Description
0-90	Overburden.
90-646	St. Louis limestone.
646-703	Fault. Calcite and limestone breccia.
703-760	St. Louis limestone.
760-763	Fault.
763-790	St. Louis limestone.
790-794½	Fault. Limestone and calcite breccia; shines of fluorspar, sphalerite and galena (see assay).
794½-810	St. Louis limestone. Shines of fluorite, sphalerite and galena (see assay).
810-837	Fault. Scattered shines of fluorite and traces of sphalerite and galena.
837-867	St. Louis limestone
867	Bottom.

Inclination -54°
Bearing S. 47° E.

ASSAY VALUES

Hole No.	Depth in Feet	% CaF_2	% Pb	% Zn
W-1	504.8 - 516.8	4.72	0.12	0.20
	530.6 - 533.0	6.24	0.53	1.49
	533.0 - 538.0	0.98	0.11	0.50
	538.0 - 540.5	7.50	0.16	0.39
	540.5 - 543.1	15.50	0.16	0.10
	543.1 - 545.3	76.28	1.83	0.69
	545.3 - 546.3	10.02	0.11	0.30
W-2	333.9 - 340.2	4.56	0.32	0.30
	340.2 - 341.5	92.38	3.84	0.00
	341.5 - 344.8	4.80	0.21	0.30
	301.6 - 303.0	86.56	2.13	0.69
	303.0 - 303.9	15.36	0.21	5.18
	327.0 - 340.2	8.76	0.27	0.80
W-3	639.0- 643.0	17.72	-	-
W-5	226.0 - 235.0	6.58	-	0.80
	235.0 - 256.0	0.88	-	0.10
	256.0 - 285.0	3.80	-	0.20
	285.0 - 313.0	5.46	-	1.99
	313.0 - 321.5	1.46	-	4.68
W-7	660.6 - 665.7	5.76	0.32	3.28
	665.7 - 673.1	18.38	0.27	1.59
	673.1 - 681.4	7.42	0.11	0.10
	681.4 - 687.7	12.76	0.13	0.80
W-9	444.0 - 445.0	90.90	-	-
W-12	189.5 - 194.1	16.24	-	-
	194.1 - 197.1	50.68	-	-
	197.1 - 200.1	3.76	0.21	0.60
	200.1 - 208.1	2.52	0.16	0.30
	208.1 - 212.6	18.04	0.43	0.90
	212.6 - 215.1	3.90	0.11	1.39
	215.1 - 225.0	8.16	0.40	0.31
	225.0 - 231.5	11.64	0.64	0.21
	345.2 - 351.0	16.04	0.32	0.90
	351.0 - 357.9	12.58	0.27	2.49
	357.9 - 365.4	4.20	0.16	0.50
	365.4 - 371.0	30.84	4.16	1.39
	371.0 - 374.9	39.78	0.32	0.99
	374.9 - 384.6	5.46	0.11	0.20

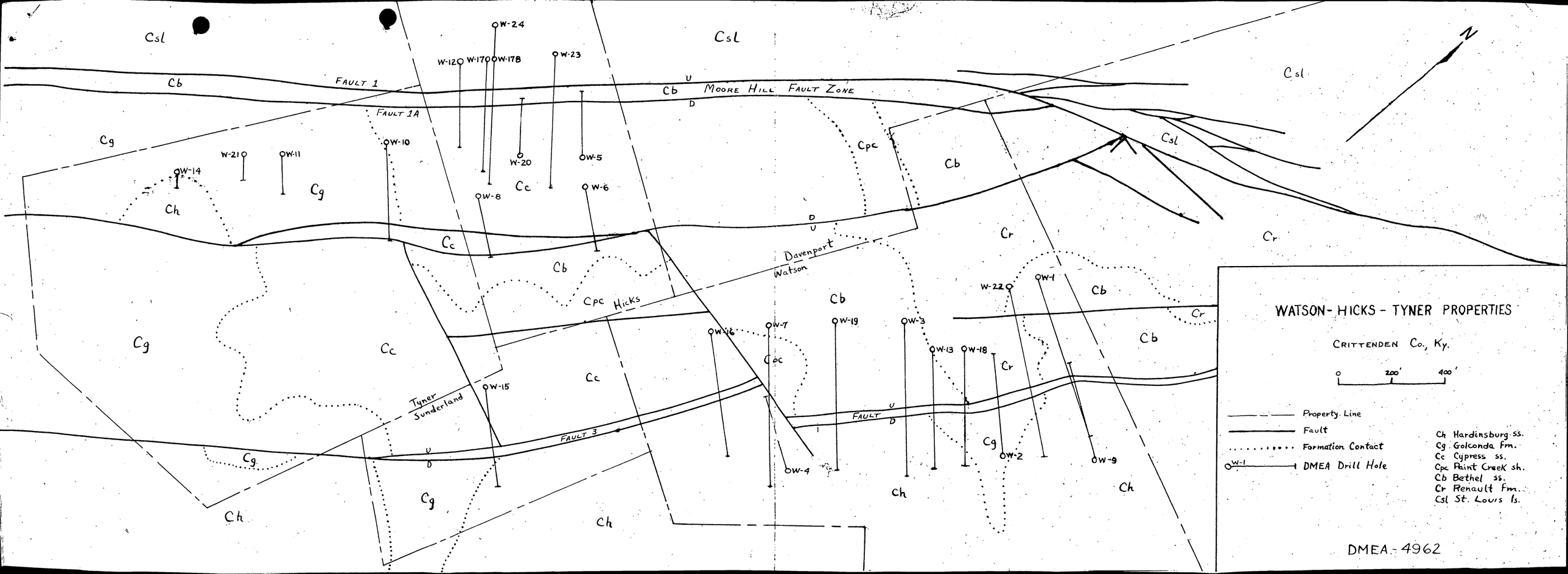
Assay Values.--Continued.

Hole No.	Depth in Feet	% CaF_2	% Pb	% Zn
W-13	207.3 - 209.0	21.56	0.37	0.20
	209.0 - 222.0	3.58	0.16	0.10
	222.0 - 226.3	3.28	0.11	0.30
	226.3 - 228.2	4.38	0.21	2.99
	228.2 - 230.0	81.67	1.28	0.39
	230.0 - 232.0	6.56	0.21	0.79
	232.0 - 235.0	6.68	0.16	0.20
	235.0 - 244.5	4.72	0.22	0.49
	275.0 - 276.9	52.36	0.75	1.49
	276.9 - 280.0	10.04	0.27	1.59
	280.0 - 287.9	4.94	0.43	0.59
	287.9 - 293.0	19.16	0.43	2.68
	297.0 - 300.5	6.56	0.16	0.89
	329.0 - 331.0	24.74	0.32	-
	331.0 - 336.7	5.40	0.21	-
	336.7 - 363.7	4.38	-	-
	497.0 - 510.5	7.90	-	-
	510.5 - 517.5	12.92	-	-
	517.5 - 528.5	6.72	-	-
	589.0 - 594.8	2.98	-	-
	594.8 - 597.2	39.32	-	-
	597.2 - 608.6	8.22	-	-
	608.6 - 615.5	24.22	-	-
	615.5 - 627.0	9.92	-	-
*W-17	224.0 - 228.0	27.88	1.49	0.80
	228.0 - 240.0	19.52	0.16	0.55
	240.0 - 248.0	19.88	0.53	0.30
	463.0 - 466.5	30.78	-	-
W-17B	205.3 - 209.5	43.32	0.43	0.89
	209.5 - 212.0	5.74	0.53	0.10
	212.0 - 225.8	8.16	0.21	0.20
	225.8 - 236.5	14.42	0.05	0.69
	236.5 - 240.8	40.12	0.11	0
	240.8 - 243.0	23.74	0.11	0
	243.0 - 251.0	2.16	0.05	0.10
	251.0 - 269.0	9.22	0.27	1.09
	269.0 - 279.2	11.24	0.16	1.19
	279.2 - 283.0	8.08	0.11	0.59
	283.0 - 288.4	39.58	11.29	6.97
	288.4 - 291.0	14.68	0.21	3.18
	291.0 - 299.8	7.36	0.16	2.89

*Hole lost, replaced by Hole W-17B.

Assay Values.--Continued.

Hole No.	Depth in Feet	% CaF_2	% Pb	% Zn
W-18	478.3 - 487.1	13.24	-	-
	487.1 - 494.2	36.28	-	-
	494.2 - 498.3	11.38	-	-
W-19	676.8 - 684.7	5.28	-	-
	684.7 - 688.5	21.16	-	-
	688.5 - 691.5	32.90	-	-
	691.5 - 694.2	5.32	-	-
W-20	321.3 - 324.1	6.82	0	0
	324.1 - 327.6	15.86	0	0
	327.6 - 349.3	0.94	0	0.10
	349.3 - 353.6	17.38	0.05	0.20
	353.6 - 355.0	28.98	0.05	2.09
	355.0 - 359.9	18.90	0.43	3.08
	359.9 - 363.5	13.58	0.11	7.07
	363.5 - 370.0	2.16	0.06	4.28
	370.0 - 374.0	12.58	0.16	7.27
	374.0 - 380.0	24.46	0.53	10.66
	380.0 - 382.7	2.06	0.11	1.49
	382.7 - 388.1	7.02	0.37	2.69
	388.1 - 395.0	5.22	0.21	4.98
	395.0 - 424.7	2.20	0.11	0.89
	424.7 - 429.3	28.87	0.16	2.09
	429.3 - 434.2	11.34	0.11	1.09
	434.2 - 452.8	2.56	0.16	0.69
W-22	476.0 - 480.0	8.24	0.32	0
	480.0 - 487.0	10.58	0.06	0
	487.0 - 492.4	2.78	0	0
	492.4 - 496.8	9.54	0	0
	496.8 - 498.7	94.48	0.16	0
	498.7 - 501.2	1.44	0.16	0
W-23	215.8 - 219.0	8.02	0.27	0.10
	221.0 - 229.0	12.54	0.32	0.60
	229.0 - 246.0	4.46	0.21	0.15
	246.0 - 249.4	26.96	0.32	0.70
	249.4 - 251.8	20.06	0.26	0.20
	251.8 - 258.2	14.98	0.16	0.10
	349.2 - 351.6	12.78	0.11	3.99
	351.6 - 357.5	37.32	0.16	0.39
	357.5 - 363.5	5.64	0.11	0
W-24	792.5 - 796.5	17.00	0.85	1.69


WATSON- HICKS - TYNER PROPERTIES
CRITTENDEN Co., Ky.
0 200' 400'
Property Line
Fault
Formation Contact
W-1 DMEA Drill Hole
Ch Hardinsburg ss.
Cg Golconda Fm.
Cc Cypress ss.
Cpc Paint Creek sh.
Cb Bethel ss.
Cr Renault Fm.
Csl St. Louis ls.
DMEA - 4962
N
Csl
Cb
Cg
Ch
Cc
Cpc
Cr
FAULT 1
FAULT 1A
MOORE HILL FAULT ZONE
Davenport
Watson
Hicks
Tyner
Sunderland
FAULT 3
FAULT
W-24
W-12
W-17C
W-17B
W-23
W-21
W-11
W-14
W-10
W-20
W-5
W-6
W-8
W-16
W-7
W-19
W-3
W-13
W-18
W-22
W-1
W-15
W-4
W-2
W-9

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DATE	INITIALS	CODE

Form MF-104 (Rev.)
(April 1952)

Budget Bureau No. 42-R1036.5

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION

JUL 20 1959 PAID ON VOUCHER & SCHEDULE OF PAYMENTS

xStagexIx OPERATOR'S MONTHLY REPORT AND VOUCHER

1

Month of May, 1959 Docket No. DMEA 4[illegible]2 Contract No. Idm-R1199
Operator's Name Reynolds Metals Company Minerals Fluorspar
Address Richmond, Virginia
Contract Amount, $ 59,710.00 Government Participation: 50 % Amount, $ 29,855.00

ITEMS OF COSTS	FOR OPERATOR'S USE: Monthly Total	Totals Previously Reported	Totals To Date	FOR GOVERNMENT USE ONLY: Approved Monthly Total	Approved Totals Previously Reported	Approved Totals To Date
(1) Independent Short Form Contracts:						
Drilling Core	2,557.65	39,869.25	42,426.90			
Bulldozing Reaming	129.50	5,061.00	5,190.50			
Hole Abandonment cementing		240.00	240.00			
Drifting Lost BX Casing	64.80	453.60	518.40			
Lost AX Casing	612.00	68.00	680.00			
(2) Labor and Supervision:						
Labor						
Supervision						
Technical Services						
(3) Operating Mat'ls. and Supplies:						
Timber						
Explosives						
Pipe						
Track						
Core Boxes		225.00	225.00			
(4) Operating Equipment:						
Rental						
Purchase						
Depreciation						
(5) Initial Rehabilitation and Repairs						
(6) New Bldgs., Improvements, etc.						
(7) Miscellaneous:						
Repairs to Equipment						
Sampling and Analysis CaF2	4.50	310.50	315.00			
Payroll Taxes CaF2, Pb, Zn		325.00	325.00			
Liability Insurance						
Incidental Allowance	242.76	3,784.20	4,026.96			
(8) Contingencies (specify):						
TOTALS	3,611.21	50,336.55	53,947.76	3611.21	50,336.55	53,947.76

I certify that the above bill is correct and just and that payment therefor has not been received.

Date 6-4-59 *Payee Reynolds Metals Company

Per H. E. McDaniel Jr. Title Accounting Official

*When a voucher is signed or receipted in the name of a company or corporation, the name of the person writing the company or corporate name, as well as the capacity in which he signs, must appear. For example: "John Doe Company, per John Smith, Secretary," or "Treasurer," as the case may be.

NOTE.—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.

(Instructions on reverse)

Pursuant to authority vested in me, I certify that this account is correct and proper for payment in the amount of:

$ 1805.61

Signature Helen R. Miller
(Authorized Certifying Officer)

Date JUL 17 1959 Vou. No. 1

(See other side)

1805.60

(For Government use only)

CERTIFICATION BY GOVERNMENT REPRESENTATIVE:

I certify that to the best of my knowledge and belief the contractor submitting this voucher is operating a Defense Minerals Exploration Administration project under Contract No. E-1199 in accordance with the terms of the contract.

Signature [signature] Title GEOLOGIST, U. S. G. S. Date JUL 9 1959

APPROVAL BY DMEA EXECUTIVE OFFICER OR ALTERNATE:

Signature [signature] Title ACTING EXECUTIVE OFFICER DME - REGION V Date JUL 9 1959

MONTHLY REPORT OF OPERATOR

The Operator (Contractor) of an exploration project is required to make a monthly report to the Government through the Regional Executive Officer. This report consists of three parts as follows:

(a) *Form MF-104—Operator's Monthly Report and Voucher.*—This form details expenditures and constitutes a voucher for reimbursing the Operator for the Government's share of costs;

(b) *Form MF-104A—Operator's Unit Cost and Progress Report.*—This is a statistical report of expenditures which shows costs for the various types of operation; and

(c) *Narrative.*—A concise narrative description of progress made, results accomplished, and any unusual difficulties encountered must be furnished as an attachment to this Report and Voucher. Wherever possible, the narrative is to be illustrated with maps or sketches showing formations penetrated and location and assays of samples taken as well as advances in workings. In the case of diamond drilling or churn drilling, the location and inclination of holes is to be shown on a map; logs and assays also are to be submitted.

The Monthly Report of Operator should be prepared in an original and four copies all of which must be sent to the Executive Officer of the Region not later than the 15th of the month following.

Preparation of Form MF-104—Operator's Monthly Report and Voucher.—All the applicable spaces in Form MF-104 should be filled in by the Operator, and the Operator or his agent should sign the certification in the lower left corner of the form.

The items of costs are arranged in the order they appear in Article 6 (a) of Form MF-200 (Revised February 1952), however, this form is readily adaptable for use in reporting activities under other contract forms.

Under Item (1) delete words "Short Form" if the contract is a sub-contract under Form MF-200; and delete word "Independent" if the contract reported is on Form MF-200 (A). Also, report work paid for on a unit basis under contract Form MF-200 as though it were performed under an independent contract.

Under Item (2) include labor, supervision and technical services incurred for the exploratory operations. Do not include labor, supervision and technical services used for work performed under items (5) and (6).

Under Item (3) include the costs of material and supplies used in the project other than that used under items (5) and (6).

Under Item (4) appear the three types of operating equipment expenditures, that is, rental, purchase and depreciation. The expenditures made for renting equipment belonging to a third party will be reported under "Rental". The amount paid or duly obligated for payment for the purchase of equipment will be reported under "Purchase". The amount of expenditures due the Operator to reimburse him for depreciation of equipment owned will be reported under "Depreciation".

Item (5) comprises costs of labor, supervision, technical services, materials, etc., which are used in the initial rehabilitation and repair of existing buildings, installations, fixtures, and equipment. These costs, therefore, should not be reported under items (2) and (3).

Item (6) includes the labor, supervision, technical services, materials, etc., used in the installation or construction of new buildings, fixed improvements, etc., necessary for the project. These costs, therefore, should not be reported under items (2) and (3).

Item (7) covers miscellaneous types of expenditure such as payroll taxes, liability insurance, workmen's compensation insurance, repairs to equipment and sampling and analysis. Only that part of payroll taxes, liability insurance and workmen's compensation which are paid by the operator should be reported under item (7). The share paid by the employee as a payroll deduction is to be included under item (2) as labor costs.

Item (8) includes any unforeseen costs not included in the other seven categories.

The original of Form MF-104 when submitted for reimbursable expenses incurred under contract Form MF-200 must be supported by original documentation or by certified copies of purchase orders, payrolls or transcripts of payrolls, unless such documentation has been waived by the Regional Executive Officer. This certification may be stated thus, "Certified True Copy (or Transcript)", followed by appropriate signature. If the Executive Officer of the Region determines that a contract under Form MF-200 should have an "on-site" audit, that is, a Government auditor should make an audit of the Operator's books and records of account, the Operator need not support his monthly voucher with original or certified documents except in cases of equipment purchases whose individual costs exceed $50.00. In these cases the original or a certified copy of the purchase order or invoice should be attached to the Monthly Voucher. N. B.—Only the *original* of Form MF-104 is required to be documented. The four copies of Form MF-104 are not to be thus supported.

Form MF-104 submitted for reimbursement under fixed price contracts on Form MF-200 (A), however, are not required to be supported by documentation of any kind. The Operator will submit his claim under item (1) of Form MF-104 by deleting as stated above the word "Independent" and by showing the number of feet or other units immediately after the appropriate descriptive word, such as, drilling, bulldozing, crosscutting, drifting, etc., and giving the "Monthly Total" amount due. "Totals Previously Reported", and "Totals to Date" columns should also be filled in.

Form MF-104A
(April 1952)

Budget Bureau No. 42-R1151.2

JUL 20 1959
O.M.E.

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION

Stage I

OPERATOR'S UNIT COST AND PROGRESS REPORT

Month of May 1959 Docket No. DMEA 4962 Contract No. 10m-21199
Operator's Name Reynolds Metals Company Minerals Fluorspar
Address Richmond, Virginia

OPERATION	UNIT	COSTS THIS MONTH	UNITS THIS MONTH	COSTS TO DATE	UNITS TO DATE	UNIT COSTS TO DATE	AUTHORIZED BY CONTRACT Units	AUTHORIZED BY CONTRACT Unit Costs
Drifting								
Crosscutting								
Raising								
Core Boxes	1			225.00	75		75	3.00
Winzes								
Drilling: Core	Ft.			20,355.00	6900		6900	2.95
Reaming	Ft.			2,299.50	1314		2000	1.75
Hole Surveys Cementing	Hr.			184.00	23		60	8.00
Casing Lost By Casing	Ft.			216.00	100		300	2.16
Lost At Casing	Ft.			17.00	10		300	1.70
Assay CaF2	1			58.50	13		75	4.50
CaF2, Pb, Zn	1			162.50	25		25	6.50
Incidental Allowance	Ft.			1,932.00	6900		6900	0.28
TOTAL DISTRIBUTED COSTS								TOTAL COSTS AUTHORIZED BY CONTRACT
Operating Equipment Purchased								
Initial Rehabilitation and Repairs								
New Buildings, Improvements, etc.								
TOTAL COSTS				25,449.50				59,710.00

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

Date 6-4-59 Operator Reynolds Metals Company

Per H. E. McDaniel Title Accounting Official

REMARKS: Stage I has been completed and no further work has been done.

NOTE.—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.

(Instructions on reverse)

(For Government use only)

MINING ENGINEER
U. S. BUREAU OF MINES

INSTRUCTIONS

Preparation of Form MF-104A—Operator's Unit Cost and Progress Report.—Applicable places on Form 104A should be filled in by the Operator. The purpose of this form is twofold as follows: (1) to furnish the supervising engineers and other administrators with statistical information necessary to better determine the progress of the project; and (2) to furnish more permanent information on mining costs for future use. The more important phases of operation on which permanent information is desired have been outlined in the form. There are blank lines, however, for those unusual phases which may need to be reported for a particular project. It will be necessary for the Operator to distribute his costs among the applicable phases reported with the exception of three items the costs of which are not to be distributed by the Operator. These three items are: "Operating Equipment Purchased", "Initial Rehabilitation and Repairs", and "New Buildings, Improvements, etc." The reason for not distributing these items on a monthly basis is doubtless clear to the Operator, since such distribution might well overstate the cost for any one month or period short of the entire contract period.

Form MF-104A has been designed to tie in with Form MF-104 for both monthly and cumulative costs. The "Total Costs" on Form MF-104A for each month should equal the monthly "Total Costs" as reported on Form MF-104. This is also true of the "Total Costs To Date".

In preparing Form MF-104A, it will be necessary frequently to distribute certain costs over a number of items. For instance, supervisory and engineering costs may have to be distributed over several phases, such as, drifting, crosscutting, raising, etc., provided that these items were reported active for the month. Such distributions should be made on the basis of time spent on the various phases, on man days of labor charged to such phases, or on some other equitable basis. "Operating Equipment", "Initial Rehabilitation and Repairs", and "New Buildings Improvements, etc.", will be distributed to the several phases of the project by the Washington Office of DMEA at the close of the project if determined necessary. The last two columns headed "Authorized by Contract" will be filled in by the Operator if such information is found in the contract. This information is usually a part of Exhibit "A" of the contract. A space for remarks has been provided for the use of the Operator to call attention to any unusual circumstances causing excessive or disproportionate unit costs.

GPO 872894

Form MF-104A
(April 1952)

Budget Bureau No. 42-R1151.2

JUL 20 1959
O.M.E.

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION

Stage II

OPERATOR'S UNIT COST AND PROGRESS REPORT

Month of May 1959 Docket No. DMEA 4962 Contract No. Idm-R1199
Operator's Name Reynolds Metals Company Minerals Fluorspar
Address Edmond, Virginia

OPERATION	Unit	Costs This Month	Units This Month	Costs to Date	Units to Date	Unit Costs to Date	Authorized by Contract: Units	Authorized by Contract: Unit Costs
Drifting								
Crosscutting								
Raising								
Shafts								
Winzes								
Drilling: Core	Ft	2,557.65	867	22,071.90	7482		8000	2.95
Down Reaming	Ft	129.50	74	2,891.00	1652		2000	1.75
Hole Cementing	Hr			56.00	7		100	8.00
Lost BX Casing	Ft	64.80	30	302.40	140		300	2.16
Lost AX Casing	Ft	612.00	360	663.00	390		300	1.70
Assay CaF2	1	4.50	1	256.50	57		75	4.50
Assay CaF2,Pb,Zn	1			162.50	25		25	6.50
Incidental Allowance	Ft	242.76	867	2,094.96	7482		8000	0.23
Total Distributed Costs								Total Costs Authorized by Contract
Operating Equipment Purchased								
Initial Rehabilitation and Repairs								
New Buildings, Improvements, etc.								
Total Costs		3,611.21		28,498.26				59,710.00

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

Date 6-4-59 Operator Reynolds Metals Company

Per H. E. McDaniel Title Accounting Official

NOTE.—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.

Remarks: Costs are for Hole 4-24 and lost AX casing for Hole 22. Overage shown on AX casing to be billed to the project as a whole.

Project completed.

(Instructions on reverse)

(For Government use only)

T. B. Lynch
ENGINEER
U. S. BUREAU OF MINES

INSTRUCTIONS

Preparation of Form MF-104A—Operator's Unit Cost and Progress Report.—Applicable places on Form 104A should be filled in by the Operator. The purpose of this form is twofold as follows: (1) to furnish the supervising engineers and other administrators with statistical information necessary to better determine the progress of the project; and (2) to furnish more permanent information on mining costs for future use. The more important phases of operation on which permanent information is desired have been outlined in the form. There are blank lines, however, for those unusual phases which may need to be reported for a particular project. It will be necessary for the Operator to distribute his costs among the applicable phases reported with the exception of three items the costs of which are not to be distributed by the Operator. These three items are: "Operating Equipment Purchased", "Initial Rehabilitation and Repairs", and "New Buildings, Improvements, etc." The reason for not distributing these items on a monthly basis is doubtless clear to the Operator, since such distribution might well overstate the cost for any one month or period short of the entire contract period.

Form MF-104A has been designed to tie in with Form MF-104 for both monthly and cumulative costs. The "Total Costs" on Form MF-104A for each month should equal the monthly "Total Costs" as reported on Form MF-104. This is also true of the "Total Costs To Date".

In preparing Form MF-104A, it will be necessary frequently to distribute certain costs over a number of items. For instance, supervisory and engineering costs may have to be distributed over several phases, such as, drifting, crosscutting, raising, etc., provided that these items were reported active for the month. Such distributions should be made on the basis of time spent on the various phases, on man days of labor charged to such phases, or on some other equitable basis. "Operating Equipment", "Initial Rehabilitation and Repairs", and "New Buildings Improvements, etc.", will be distributed to the several phases of the project by the Washington Office of DMEA at the close of the project if determined necessary. The last two columns headed "Authorized by Contract" will be filled in by the Operator if such information is found in the contract. This information is usually a part of Exhibit "A" of the contract. A space for remarks has been provided for the use of the Operator to call attention to any unusual circumstances causing excessive or disproportionate unit costs.

GPO 872894

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Reynolds Metals Company
Monthly Report - May, 1959
Watson Project - DMMA 4962 - Idm-H1199
Crittenden County, Kentucky

By
John W. Hook

The final hole, W-24, of the Watson Project was completed on May 15, 1959 at a depth of 867 feet. The report includes a log of W-24 and a combined cross section of W-24, W-17B, W-8 and W-15.

In addition to the costs for W-24, casing lost in hole W-22, not reported last month, is included in this month's accounting. There is a 90 feet over run of lost AX casing shown in the Stage II account. We understand that this over run can be charged to the project as a whole. Only 10 of an authorized 300 feet were used in Stage I, thus the total for Stages I and II is 600 feet of which 400 feet were used.

W-24 cut faults 1 and 1A 300 feet below the W-17B penetration and apparently below the juncture of faults 1 and 10. Fault 1 consisted mainly of cavities from 646 to 674 feet (rod length) with brecciated limestone to 703 feet.

Unbrecciated St. Louis limestone blocks are separated by smaller faults from 760 to 763, 790 to 794.5 and 815 to 837 feet. These faults consist mainly of limestone and calcite breccia with shine mineralization in the latter two. Assays taken from 792.5 to 796.5 feet (rod length, 4.0 feet) showed 17.06% CaF_2, 0.85% Pb and 1.69% Zn.

The hole was bottomed in slightly brecciated St. Louis limestone which had scattered traces of CaF_2.

Drilling Summary

Hole No.	Started	Finished	Depth
W-24	4-22-59	5-13-59	867 feet.

REYNOLDS METALS COMPANY

Diamond Drill Hole No. W-24; Angle, -54°; Bearing, S47E; Depth, 867'
Coordinates, N 8787 E 8585; Elevation, 417.0'
Property, Watson; Area, SE Salem; County, Crittenden; State, Kentucky
Contractor, Joy Manufacturing Company; Foreman, Miles Minner
Started 4-22-59; Finished 5-13-59

From	To	FM	Description
0	90		Overburden, chert and weathered limestone fragments.
90	124	Cal	Limestone, dark grey, medium crystalline, cherty, fossiliferous, slightly weathered cherts are medium grey to brown.
124	150	Cal	Limestone, light brown, medium crystalline, fossiliferous, light brown cherts, slightly weathered.
150	171	Cal	Limestone, light brown, fine crystalline, fossiliferous, cherty, cavities from 154-161, 163-171.
171	226	Cal	Limestone, dark brown, medium crystalline, white weathered chert, stylolitic, few small calcite veinlets.
226	236	Cal	Limestone, light brownish grey, medium crystalline, very fossiliferous.
236	273.5	Cal	Limestone, light grey, fine crystalline, white cherts, fossiliferous, few shale partings, few calcite fractures and few shale partings at base.
273.5	368	Cal	Limestone, medium to light grey, fine to medium crystalline, fossiliferous, vuggy, cherts are black, some weathered to white, scattered coral colonies.
368	386	Cal	Limestone, shale partings, zones of calcareous shale from 376-378, limestone is dark grey brown, medium crystalline, fossiliferous, sandy, shale is medium grey, fossiliferous, conglomeritic in places.
386	400	Cal	Limestone, fine crystalline, dark grey heavy cherts, few small calcite stringers.
400	452	Cal	Shaley limestone, light grey, fossiliferous, numerous corals, few calcite stringers, numerous small cavities.

From	To	Fm	Description
452	462		Cavity
462	499	Cal	Limestone, dark grey, fine to medium crystalline, fossiliferous, silty, slickensides along some joints, few black cherts.
499	646	Cal	Limestone, dark grey, fine crystalline, fossiliferous, vuggy, shaley, laminated from 499-509, dark grey cherts, fossils replaced by white calcite, few calcite stringers.
646	703		Fault. Cavities from 646-648.5, 650-651, 653-655, 656,658, 659.5-661.5, 662-663, 664-665, 666-674. Limestone between cavities is brecciated, calcite, calcite vein from 680-681, slightly less breccia from 649 on, limestone is partially weathered.
703	760	Cal	Limestone, dark grey, fine to medium crystalline, few calcite stringers, few shale partings, scattered chert, cavity from 729-730.
760	763		Fault, limestone and calcite breccia.
763	790	Cal	Limestone, dark grey, fine to medium crystalline, fossiliferous, shaley partings, few small calcite stringers.
790	794.5		Fault. Limestone and calcite breccia, good shines CaF2 and Pb and Zn from 792-792.5, vein CaF2 with shines of Pb and Zn in lower 10".
794.5	810	Cal	Limestone, dark grey, fine crystalline, fossiliferous, slightly fractured. Good shines CaF2, Pb and Zn 794.5-796.5.
810	815		Cavity.
815	837		Fault. Vein calcite, some limestone breccia, sand filled cavities from 821-823, 824-826, scattered shines of CaF2, traces of Zn and Pb.
837	867	Cal	Limestone, dark grey, fine crystalline, fossiliferous, brecciated, few scattered traces of CaF2, shaley partings from 857-859, limestone is partially weathered.

Bottom Depth----867'

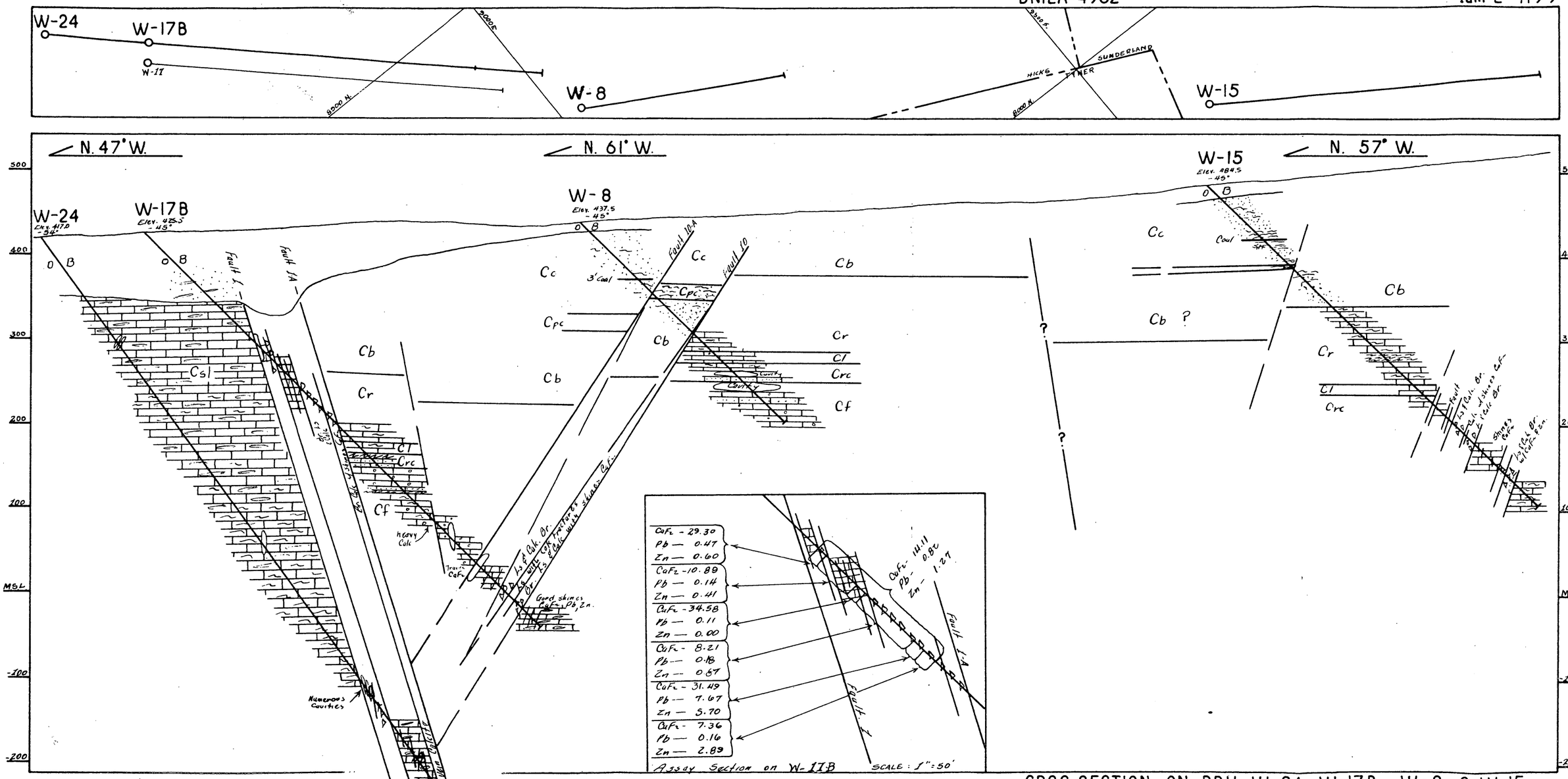
Assay Report -- Hole W-24

From	To	%CaF2	%Pb	%Zn
792.5	796.5	17.06	0.85	1.69

WATSON PROJECT
CRITTENDEN COUNTY, KY.

DMEA-4962

Idm E-1199



CRSS SECTION ON D.D.H. W-24, W-17B, W-8 & W-15

VERT. & HORZ. SCALES: 1" = 100'

0 50 100 200 300 FT.

REVISED 17 May 1959

J.W.H.

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O. M. E.
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DATE | INITIALS | CODE

REYNOLDS METALS COMPANY

(A DELAWARE CORPORATION)

GENERAL OFFICES: RICHMOND, VIRGINIA

PLEASE MAIL ALL REMITTANCES TO:
REYNOLDS METALS COMPANY
REYNOLDS METALS BUILDING,
RICHMOND 18, VIRGINIA

ORIGINAL

MO.	SCHEDULE	WK.	SHIPPING POINT
			Bauxite

CABLE ADDRESS: "FOILWAX"

CODES USED: WESTERN UNION—A. B. C. AND LIEBLERS

REYNOLDS ORDER NO.	TERMS (FROM DATE OF INVOICE)	DATE	INVOICE NO.
	NET 30 DAYS	6-4-59	49-6-1

CUSTOMER ORDER NO.	CUST. ORDER DATE	USE CODE	CONTRACT NO.	BILL OF LADING NO.	CHECK IF ORDER COMPLETE	TALLY NO.

CUSTOMER CODE	TAX	SALES CREDIT	ITEMS SHIPPED COMPLETE	ITEMS SHIPPED PARTIAL

SOLD TO
Department of the Interior
Defense Minerals Exploration Admin.
Attention: H. L. Burmeister
U. S. Bureau of Mines
College Park, Maryland

SHIP TO (SAME AS SOLD TO UNLESS INDICATED.)

ROUTE

ITEM	DESCRIPTION	PRODUCT CODE	PRICE	CASES	GROSS WGT.	NET WGT.	QUANTITY (IF OTHER THAN #)	AMOUNT
	To bill you with 50% of May, 1959 items of costs per the Operator's Monthly Report and Voucher for contract number Idm-E-1199, Docket Number DMEA 4962. Monthly total $3,611.21 Less 50% 1,805.61		$					$1,805.60

TRANSPORTATION CLAUSE APPLICABLE (SEE ACKNOWLEDGMENT BACK)

PPD OR COL	VIA:
P	AS DIRECTED BY REYNOLDS' TRAFFIC DEPARTMENT

Dr. A-03-1

Cr. A-03-18

R-142.52 (REV. 4-58)

SELLER REPRESENTS THAT WITH RESPECT TO THE PRODUCTION OF THE MATERIAL AND/OR THE PERFORMANCE OF THE SERVICES COVERED BY THIS INVOICE, IT HAS FULLY COMPLIED WITH THE REQUIREMENTS OF THE FAIR LABOR STANDARDS ACT OF 1938 AS AMENDED. OUR RESPONSIBILITY FOR SAFE DELIVERY OF GOODS CEASES WHEN WE OBTAIN CLEAR BILL OF LADING FROM CARRIER

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF MINERALS EXPLORATION
ROOM 2-B POST OFFICE BLDG.
KNOXVILLE 2, TENN.

July 10, 1959

Memorandum

To: Operating Committee, OME - Washington, D. C.

From: Acting Executive Officer, OME - Region V, Knoxville

Subject: Signed Termination Agreement - DMEZ-4962, Idm-E1199
Reynolds Metals Company-
Watson-Hicks-Tyner Properties, Crittenden County, Kentucky.

Attached are the Government and Audit copies of the subject termination agreement signed by the Vice President for the company.

The usual distribution of the other copies has been made.

V. J. Lynch

V. J. Lynch

OFFICIAL FILE COPY
O. M. E.
RECEIVED JUL 13 1959

DATE	INITIALS	
7-13	gad	VVO
7-15	J.W.L.	500

MME Form 7
(10-58)

OFFICIAL FILE COPY

Date	Surname	Code
7-7	gad	220
7-8	[illegible]	~~500~~
V		

JUL 7 1959

Memorandum

To: Acting Executive Officer, OME Field Team, Region V

From: E. D. Talbert, Acting Chief (Signed) E. D. Talbert
Contract Administration and Audit Division

Subject: Docket No. DMEA-4962 (Fluorspar)
Reynolds Metals Company
Watson-Hicks-Tyner Prospect
Crittenden County, Kentucky
Contract No. Idm-E1199

Receipt of the subject Operator's final engineering and geological report now permits the release of the Report of Review requested by Mrs. Miller's June 17 memorandum. Enclosed are the original and three copies of the Report of Review.

If you concur with the facts as stated therein, the original and one copy should be forwarded to Mrs. Miller, one copy should be mailed to the Operator, and one copy should be retained in your files. If for any reason you do not concur, please return the original and all copies to this Division with your comments.

Enclosures

EDTalbert/ama
July 7, 1959

Copy to: Docket
Director's Reading File
CA & A Division
Mrs. Helen R. Miller

43683

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF MINERALS EXPLORATION
ROOM 2-B POST OFFICE BLDG.
KNOXVILLE 2, TENN.

July 2, 1959

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DATE	INITIALS	CODE
7-6	gad	210
7-6	[illegible]	800
7-7	[illegible]	500

Memorandum

To: Operating Committee, OME, Washington 25, D. C.

From: Field Team, OME, Region V, Knoxville, Tennessee

Subject: Final Engineering and Geological Report
DMEA-4962, Idm-E1199, Watson Project
Reynolds Metals Company, Crittenden County, Kentucky

Enclosed are the original and two copies of the Operator's Final Engineering and Geological Report covering the subject contract.

V. O. Lynch
Acting Executive Officer

Frank G. Lesure
Geologist, USGS

Enclosures 3

OPERATOR'S
FINAL REPT

FINAL REPORT
WATSON PROJECT
DMEA 4962 - Idm-E1199

By
J.W. Hook and T.R. Winans

INTRODUCTION

The Watson Project included the Watson, Hicks, and Tyner properties, located in Crittenden County, 3 miles east of Salem, Kentucky. After the project had started, the DMEA contract was amended to include the Sunderland property. Drilling started on July 3, 1958, and was completed May 13, 1959. A total of 24 holes were drilled to test extensions of fluorspar veins from the Watson, Davenport, and Eagle mines.

A revised Stratigraphic Section (Plate I), a Block Diagram (Plate II), a revised 200 scale geologic map showing drill hole locations (Plate III) and assay maps (Plates IV, V, VI, and VII) accompany this report. Logs and cross sections of the holes have been submitted previously with the Monthly Reports and are not duplicated here.

SUMMARY AND CONCLUSIONS

87,542 tons of ore averaging 30.54% CaF_2, 1.12% Pb, and 2.07% Zn are indicated by the exploratory drilling. At the present market, this tonnage is too small to amortize the development work, the mining and the milling facilities needed to extract the ore.

The drilling found considerably larger tonnages of low grade mineralization which will probably be mineable at some future date. Calculations based on a cut-off grade of 25% CaF_2, or the equivalent with Pb and Zn, indicated reserves of 205,655 tons. At 15% CaF_2 or the equivalent, 506,343 tons are indicated.

Watson Project
Summary of Costs

Stage I

Operation	Unit	Units Authorized	Cost per Unit	Units used	Total
Core Drilling	Ft	6,900	2.95	6,900	20,355.00
Reaming	Ft	2,000	1.75	1,314	2,299.50
Hole Survey and Cementing	Hr	80	8.00	23	184.00
Lost BX Casing	Ft	300	2.16	100	216.00
Lost AX Casing	Ft	300	1.70	10	17.00
Assay CaF_2	1	75	4.50	13	58.50
Assay CaF_2, Pb, Zn	1	25	6.50	25	162.50
Core Boxes	1	75	3.00	75	225.00
Incidental Allowance	Ft	6,900	0.28	6,900	1,932.00
			TOTAL STAGE I COSTS		25,449.50

Stage II

Core Drilling	Ft	8,000	2.95	7,482	22,071.90
Reaming	Ft	2,000	1.75	1,652	2,891.00
Hole Survey and Cementing	Hr	100	8.00	7	56.00
Lost BX Casing	Ft	300	2.16	140	302.40
Lost AX Casing	Ft	300	1.70	390	663.00
Assay CaF_2	1	75	4.50	57	256.50
Assay CaF_2, Zn, Pb	1	25	6.50	25	162.50
Incidental Allowance	Ft	8,000	0.28	7,482	2,094.96
			TOTAL STAGE II COSTS		28,498.26
			TOTAL STAGE I COSTS		25,449.50
			PROJECT COST		53,947.76
			TOTAL COST AUTHORIZED BY CONTRACT		59,710.00

GEOLOGY

The Watson, Hicks, and Tyner properties are along the Moore Hill fault system which separates the major horst of Ste. Genevieve and St. Louis limestones of the Salem valley from the graben of middle Chester formations forming Moore Hill.

Stratigraphy. The formations involved are of Mississippian age, ranging from St. Louis to Hardinsburg (Middle Chester). Since the formations are well described in the literature of the district, and particularly in USGS Bulletin 1012-E, which deals with the Moore Hill fault system, only certain variations will be discussed here. A detailed stratigraphic section based on the recent drilling is shown on Plate I.

The most outstanding variations in lithology are found in the Cypress and Bethel sandstones. Elsewhere in the Kentucky-Illinois Fluorspar District it is usually impossible to distinguish between these formations without reference to the overlying or underlying shale or limestone formations. Both are usually massive, fine grained sandstones of very similar heavy mineral content. In this local area, however, the lithology of each is very distinctive. The Cypress has several thick greenish gray shaly and silty zones, a coal horizon, but very little black shale. The Bethel has thin irregular sandy beds separated by black shale seams giving it a distinctive mottled effect. In some holes, the lower 15 feet of the Bethel is massive sandstone, the remainder of the formation being very shaley and quite similar to the lithology of the overlying Paint Creek, making the contact difficult to recognize.

Another variation is an unusually thick section of the Rosiclare member of the Ste. Genevieve. The upper ten feet is the usual greenish calcareous, sandy shale. This is underlain by 0 to 10 feet of light gray, oolitic limestone, identical to the upper Fredonia member, and this, in turn, is underlain by 6 to 25 feet of sandy limestone with little or no silt or shale. The overall thickness averaged about 24 feet, but is as much as 35 feet in places.

The Renault is capped with black shale 0 to 20 feet thick. This shale is absent in some holes, probably due to an unconformity at the base of the Bethel.

STRUCTURE

The Moore Hill fault system in the Watson area is bounded by two sub-parallel master faults, faults 1 and 3, about 1200 feet apart and striking approximately N40E. Fault 1 is along the northwest side of the fault system, bordering the Salem valley horst of Ste. Genevieve and St. Louis limestones, and fault 3 is along the southeast side of the system, adjacent to the Moore Hill graben of middle Chester formations.

The zone between the master faults is lower Chester and upper Ste. Genevieve formations and is traversed by sub-parallel synthetic and antithetic faults forming minor horst and graben features. The intervening formations dip gently to the south. The master faults and the associated sythetic faults dip steeply to the southeast, and the antithetic faults dip about 60 degrees to the northwest.

In addition to the above sub-parallel faults, there are at least two cross faults, and probably many more with small displacements.

Apparently all of the faults are normal, representing gravity adjustments to tensional stresses.

Plate II is a block diagram of the Watson, Hicks, and Tyner properties with cross sections of the Watson and Davenport mines of the faces of the block, and illustrates the master, synthetic, antithetic, and cross faults of the Moore Hill fault system. Plate III is a 200 scale geologic map.

Because of the complexity of the faulting, the following descriptions are necessarily complicated, and it is suggested that the reader refer to the block diagram and geologic map as the individual faults are discussed.

Fault 1 has a strike length of over twenty five miles. This fault crosses the Hicks property, part of the Tyner, and dips under a portion of the Watson. Most of the production from the Davenport and Eagle Watson mines has been from fault 1 and its associated synthetic faults. On the Hicks property, the fault is paralleled by several synthetic faults giving a zone of brecciation 50 to 75 feet wide. The formations in the breccia zone are predominately Ste. Genevieve, Renault and Bethel. The synthetic fault on the hanging wall side of this zone is designated as fault 1-A. The combined displacement across this zone (from the hanging wall of 1-A to the footwall of 1) ranges from less than 200 feet on the Eagle property to 600 feet on the southwest side of the Tyner.

Fault 10 is an antithetic fault dipping about 60 degrees to the northwest toward fault 1. It branches from fault 1 on the Eagle property and crosses a portion of the Watson property. At the Davenport Mine it is about 500 feet from fault 1 and the faults are approximately parallel southeast of this point. The down dip termination of fault 10 against fault 1 is at an elevation of -100 to -200 feet on the Davenport, Hicks, and Tyner properties.

Fault 10 splits into two components shown as faults 10 and 10-A on the Hicks property which converge again on the Tyner property.

The fault block between faults 1 and 10 is a minor graben in which the formations plunge gently to the southwest with a secondary component of dip toward the southeast. At its beginning on the Eagle property, the surface formation is Ste. Genevieve, while on the southwest side of the Tyner property it is Hardinsburg, about 400 feet higher in the section.

The actual displacement along fault 10 changes little because of the formations in the fault block on the southeast side have a similar plunge to those of the minor graben. However, as mentioned earlier, the displacement along fault 1 changes from less than 200 feet to about 600 feet because the formations of the Salem valley horst are nearly flat or perhaps even rise slightly toward the southwest.

Fault 3, the master fault bordering the Moore Hill graben, has a wide fault zone with numerous, closely spaced synthetic faults. Rather than attempt to unravel this lacework of faults we have used the designation "fault 3" loosely to apply to this fault zone. Unlike

the other master fault which has a relatively straight strike, fault 3 tends to have a somewhat jagged trace, offset by at least one cross fault.

The displacement along fault 3 decreases toward the southwest due to the northeast plunge of the Moore Hill graben and the southwest plunge of the formations between the master faults. Fault 3 actually hinges southwest of the Tyner property and the displacement is reversed beyond this point. At the Watson mine the Golconda is on the southeast side of the fault with Bethel on the northwest, a displacement of 300 feet. Two miles to the southwest, on the Grimes property, the displacement is reversed with Bethel on the southeast side and Golconda on the northwest.

Faults 12, 12-A, 12-B and 12-C are antithetic faults closely parallel to fault 3. At the Watson mine faults 12 and 12-C terminate against fault 3 underground, 12-B has approximately the same trace as fault 3 and the trace of 12-A is 150 feet northwest of fault 3. A minor subterranian horst is produced by faults 3 and 12.

A cross fault was recognized in hole W-4, and a probable cross fault was cut by W-9. Erratic departures from projected dips of the formations between holes W-8 and W-15 indicate the presence of an additional cross fault. The approximate locations of these structures are indicated on the maps, but the data is insufficient to determine exact locations.

The faults mentioned above are segments of the numerous faults which make up the Moore Hill fault system. This system, in

turn, is one of many in the Kentucky--Illinois fluorspar district which border massive grabens that have been down dropped in a keystone manner to compensate for the increase in area due to a stretching of the formations.

The faults of the Watson area are all normal with dips varying from 55° to vertical. The hanging walls moved down to fill the voids created by tensional forces. Wide zones of brecciation and associated secondary mineralization had important, though lesser, roles in filling these voids. On the individual fault, the throw greatly exceeds the heave, but, because of the cancellation of footage due to differential displacement, the difference between the net heave and the net throw of the fault system is much less, the net heave being 400 feet and the net throw only 600 feet. Since the fault system is 1200 feet wide and 400 feet is heave, there is a 33% increase in area at this part of the Moore Hill system.

The tensional forces, causing the stretching of formations and the consequent faulting, were district-wide. The areal increase has been along the major fault systems traversing the district, and this increase is directly related to the heave component of the faulting.

MINERALIZATION

The principal mineralization is calcite, fluorite, sphalerite, and galena occurring as open-space filling. There is also some limited replacement of the limestones in the fault zones.

Massive calcite veins occur along several of the faults.

The calcite is often barren but in places high-grade ore forms a distinct vein on either side of the calcite. The ore minerals also occur as a low-grade breccia-filling or replacement in the wall rock. The brecciated wall rock is usually not commercial unless it can be sweetened by an adjacent high-grade vein. For example, 4 feet of 20% CaF_2 in the wall rock beside a 1 foot vein assaying 95% CaF_2 would give a mineable width of 5 feet averaging 35% CaF_2. In general, the wider and higher grade veins occur in the upper part of the Ste. Genevieve. The deeper tests found the veins to be somewhat smaller and composed principally of calcite.

Fault 1. The major production from the Eagle and the Davenport mines was from veins along fault 1 and its associated synthetic faults. The drilling on the Hicks property, southwest of the Davenport, found the zone of brecciation between faults 1 and 1-A to be 50 to 75 feet wide with low grade fluorspar, lead and zinc throughout. At hole W-20 the zone had an actual width of 67 feet which averaged 7.93% CaF_2, 0.4% Pb, and 2.32% Zn. In hole W-17B the breccia zone was 53 feet wide averaging 14.11% CaF_2, 0.82% Pb, and 1.27% Zn. In general, the better-grade assays were near either side of the breccia zone along faults 1 and 1-A, but only a few assays exceeded 35% CaF_2.

Fault 10. A very productive vein of fluorspar was mined along fault 10 on the Eagle property and also on the Davenport property. However, the intervening stretch on the Watson property was tested by USBM holes 7, 8, and 9 and had only shine mineralization. The extension of fault 10 on the Hicks and Tyner properties

was drilled during the recent explorations and also had only shine mineralization.

Fault 3. About 40,000 tons of gravel fluorspar were mined from the weathered vein along fault 3 in the Watson mine. The deepest workings on this vein were at the 240 level, and according to reports, the vein was still soft at this depth. Deep drilling below the old workings found a massive calcite vein with low-grade fluorspar, lead, and zinc in the brecciated wall rock. Drilling along the strike to the southwest of the old mine found much the same condition with the vein being mostly barren calcite and the ore minerals occuring in the brecciated wall rock.

Fault 12 and associated faults. The veins along faults 12 and 12-C in the Watson mine were reported to have been solid and probably produced about 20,000 tons of ore. Hole 1 cut fault 12-C (vein D) about 20 feet below the 350 level and found 12 feet of calcite with 5% CaF_2 and shines of lead and zinc. In this case, the fluorspar was disseminated in the calcite rather than occurring on the wall of the vein. The same hole penetrated fault 12 (vein C) about 40 feet below the 350 level and found 5.8 feet of 37.09% CaF_2, 0.78% Pb and 0.34% Zn. This assay included low-grade breccia with a 2-foot vein of high grade. Hole W-9 tested the same vein 200 feet deeper and found only 4 inches of high-grade fluorspar with the remainder of the vein being calcite. The wall rock had weak shine mineralization.

Drilling along strike of fault 12 and its related faults found wide zones of low-grade breccia, but very narrow veins of high grade. The distribution of fluorspar was erratic from one hole to another.

Weathering. The faults of the Moore Hill system are deeply weathered. Large cavities made drilling difficult and would present serious problems in mining. Even the deepest drilling failed to get below some of the cavities. Hole W-24 found sand-filled cavities in the St. Louis limestone at an elevation of -250 feet (675 feet below the surface). The sand-filled cavities necessitated much reaming and casing.

Hole W-17 was lost due to the weathered condition of the ground and had to be replaced by W-17B.

ORE RESERVES

Reserves have been calculated on a cut-off grade of 35% CaF_2 or a combined value of CaF_2, Pb and Zn which would be equivalent to 35% CaF_2. In the following calculations, 1% Pb is considered equivalent in value to 5% CaF_2, and 1% Zn equals 3% CaF_2. Thus an assay of 1% Pb and 2% Zn with 24% CaF_2 would be the equivalent of a 35% CaF_2 only assay. The combined assay would be listed as 35% C.V. Pb or Zn assays of less than 0.50% are not used in these calculations.

While we consider 35% CaF_2 or the equivalent to be the minimum grade which could be mined profitably at the present time, we have also calculated reserves using a 25% cut-off.

The tonnages have been blocked on the basis of individual holes. The width is the actual vein width, the length is one half the distance to adjacent holes, and the depth of the blocks is set at 200 feet unless other holes or old mine workings indicate that it should be otherwise. The 200-foot depth figure is somewhat arbitrary

but reasonable for these deposits. Most of the ore was in brecciated Ste. Genevieve, a formation which is a little over 200 feet thick. A deep test under the Hicks ore body found sub-ore grade mineralization in the St. Louis limestone.

The following tables show the calculations based on +35% C.V. and +25% C.V.

ORE RESERVES

HICKS BLOCK

35%+ C.V.

Hole	Width	Length	Depth	Feet³	Tons	CaF_2	Pb.	Zn.	C.V.	Tons CaF_2	Tons C.V.	Tons Pb.	Tons Zn.
W-12	5.0	150	200	150,000	12,500	34.51	2.58	1.23	51.10	4,314	6,388	323	154
W-17	2.3	60	200	27,600	2,300	27.88	1.49	0.80	37.73	641	868	34	18
W-17B	9.4	68	200	141,440	11,787	19.69	3.75	4.25	51.19	2,321	6,034	442	500
W-20	5.9	110	200	129,800	10,817	20.85	--	9.25	48.60	2,255	5,257	--	1,000
W-23	3.0	110	200	66,000	5,500	37.32	--	--	37.32	2,053	2,053	--	--
		TOTAL TONS ORE			42,904		TOTAL TONS			11,584	20,609	779	1,672
							AVERAGE GRADE			26.99%	48.01%	1.81%	3.90%

25%+ C.V.

W-12	4.2	150	200	126,000	10,500	29.84	--	--	29.84	3,133	3,133	--	--
W-12	15.8	150	200	474,000	39,500	18.07	0.98	1.27	26.78	7,138	10,578	387	502
W-17	13.7	60	200	164,400	13,700	21.03	0.51	0.51	25.11	2,881	3,440	70	70
W-17B	3.7	68	200	51,680	4,307	29.30	0.47	0.60	33.45	1,262	1,441	26	20
W-17B	3.7	68	200	51,680	4,307	34.58	--	--	34.58	1,489	1,489	--	--
W-17B	30.8	68	200	418,880	34,907	15.00	2.11	2.78	33.89	5,236	11,830	737	970
W-20	18.1	110	200	398,200	33,183	15.24	--	5.38	31.38	5,057	10,413	--	1,785
W-23	4.3	110	200	94,600	7,883	29.90	--	1.47	34.31	2,357	2,705	--	116
		TOTAL TONS ORE			148,287		TOTAL TONS			28,553	45,029	1,220	3,463
							AVERAGE GRADE			19.25%	30.37%	0.82%	2.345

Watson & Hicks Combined Reserves	35%+	25%+
ORE	87,542 T	205,655T
CaF2	26,736 T = 30.5%	46,183 T = 22.46%
C.V.	37,178 T	64,568 T = 31.4[illegible]
Pb	980 T	1,453 T = [illegible]
Zn	1,809 T	3,711 T = 1.80%

T.R.W. May 1959

ORE RESERVES

WATSON BLOCK

35%+ C.V.*

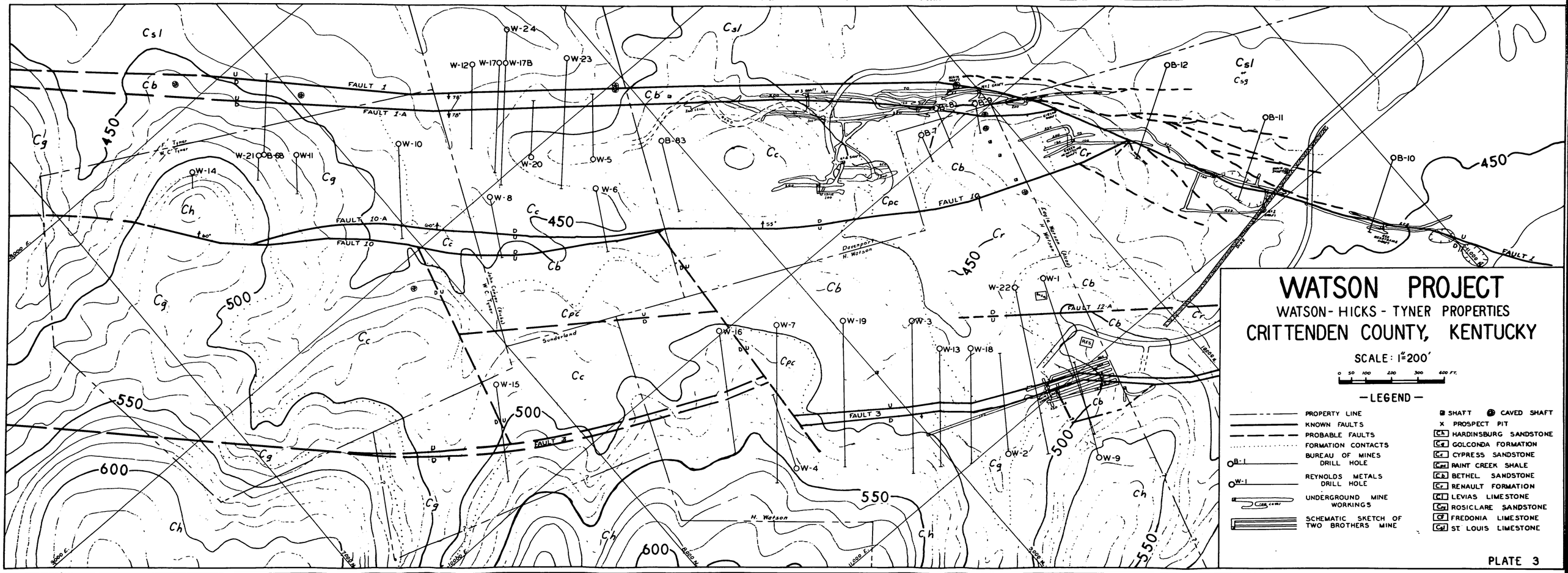
Hole	Width	Length	Depth	Feet³	Tons	CaF_2	Pb.	Zn.	C.V.	Tons CaF_2	Tons C.V.	Tons Pb.	Tons Zn.
W-1	4.3	230	100	98,900	8,241	37.61	0.78	--	41.51	3,099	3,421	64	--
W-22	6.1	145	150	132,675	11,056	35.15	--	--	35.15	3,886	3,886	--	--
W-2	3.0	120	200	72,000	6,000	30.19	1.38	--	37.09	1,811	2,225	83	--
W-18	4.4	130	200	114,400	9,533	36.28	--	--	36.28	3,458	3,458	--	--
W-13	5.5	107	200	117,700	9,808	29.55	0.55	1.40	36.50	2,898	3,579	54	137
		TOTAL TONS ORE			44,638		TOTAL TONS			15,152	16,569	201	137
							AVERAGE GRADE			33.94%	37.52%	0.45%	0.31%

25%+ C.V.

W-1	4.3	230	100	98,900	8,241	37.61	0.78	--	41.51	3,099	3,421	64	--
W-22	6.1	145	150	132,675	11,056	35.15	--	--	35.15	3,886	3,886	--	--
W-2	3.0	120	200	72,000	6,000	30.19	1.38	--	37.09	1,811	2,225	83	--
W-18	6.9	130	200	179,400	14,950	27.25	--	--	27.25	4,073	4,073	--	--
W-13	5.5	107	200	117,700	9,808	29.55	0.55	1.40	36.50	2,898	3,579	54	137
W-13	4.0	107	200	85,600	7,133	26.12	0.45	1.55	33.02	1,863	2,344	32	111
		TOTAL TONS ORE			57,368		TOTAL TONS			17,630	19,539	233	248
							AVERAGE GRADE			30.73%	34.06%	0.41%	0.43%

* C.V. = Combined values express the Pb and Zn assays in their equivalent value to CaF_2.
1% CaF_2=1% C.V.
1% Pb = 5% C.V.
1% ZN = 3% C.V.

TRH. May 1959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WATSON- HICKS - TYNER PROPERTIES
CRITTENDEN COUNTY, KENTUCKY
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PROPERTY LINE
KNOWN FAULTS
PROBABLE FAULTS
FORMATION CONTACTS
BUREAU OF MINES DRILL HOLE
REYNOLDS METALS DRILL HOLE
UNDERGROUND MINE WORKINGS
SCHEMATIC SKETCH OF TWO BROTHERS MINE
SHAFT
CAVED SHAFT
PROSPECT PIT
Ch HARDINSBURG SANDSTONE
Cg GOLCONDA FORMATION
Cc CYPRESS SANDSTONE
Cpc PAINT CREEK SHALE
Cb BETHEL SANDSTONE
Cr RENAULT FORMATION
Cl LEVIAS LIMESTONE
Csr ROSICLARE SANDSTONE
Cf FREDONIA LIMESTONE
Csl ST LOUIS LIMESTONE
FAULT 1
FAULT 1-A
FAULT 10
FAULT 10-A
FAULT 12
FAULT 12-A
FAULT 3
FAULT 3-A
W-24
W-120
W-170
W-17B
W-23
W-21
B-68
W-11
W-10
W-14
W-20
W-5
W-8
W-6
B-83
B-12
B-11
B-10
B-7
W-22
W-1
W-16
W-7
W-19
W-3
W-13
W-18
W-15
W-4
W-2
W-9
Sunderland
H. Watson
Davenport
Eagle Nest
REF.
450
500
550
600

PLATE 3

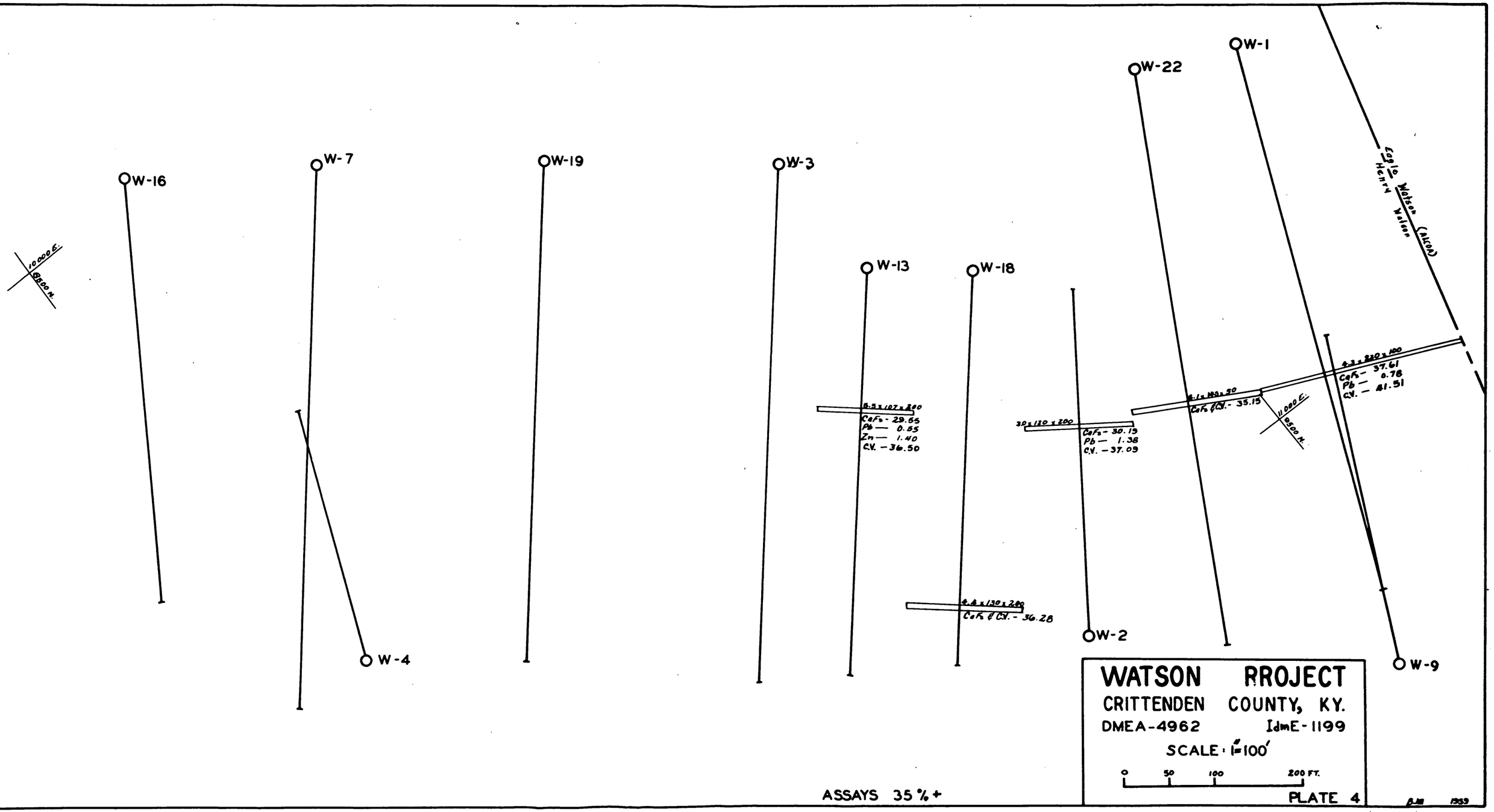
W-16
W-7
W-19
W-3
W-13
W-18
W-22
W-1
W-4
W-2
W-9
10 000 E.
8200 N.
11 000 E.
8500 N.
Eagle Henry Watson (ALCOA)
8.5 x 107 x 280
CaF2 - 29.55
Pb — 0.55
Zn — 1.40
C.V. — 36.50
30 x 120 x 200
CaF2 - 30.19
Pb — 1.38
C.V. — 37.09
4.1 x 145 x 50
CaF2 & C.V. - 35.15
4.3 x 220 x 100
CaF2 - 37.61
Pb — 0.78
C.V. — 41.51
4.4 x 130 x 240
CaF2 & C.V. - 36.28
ASSAYS 35 % +
WATSON PROJECT
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PLATE 4
1959

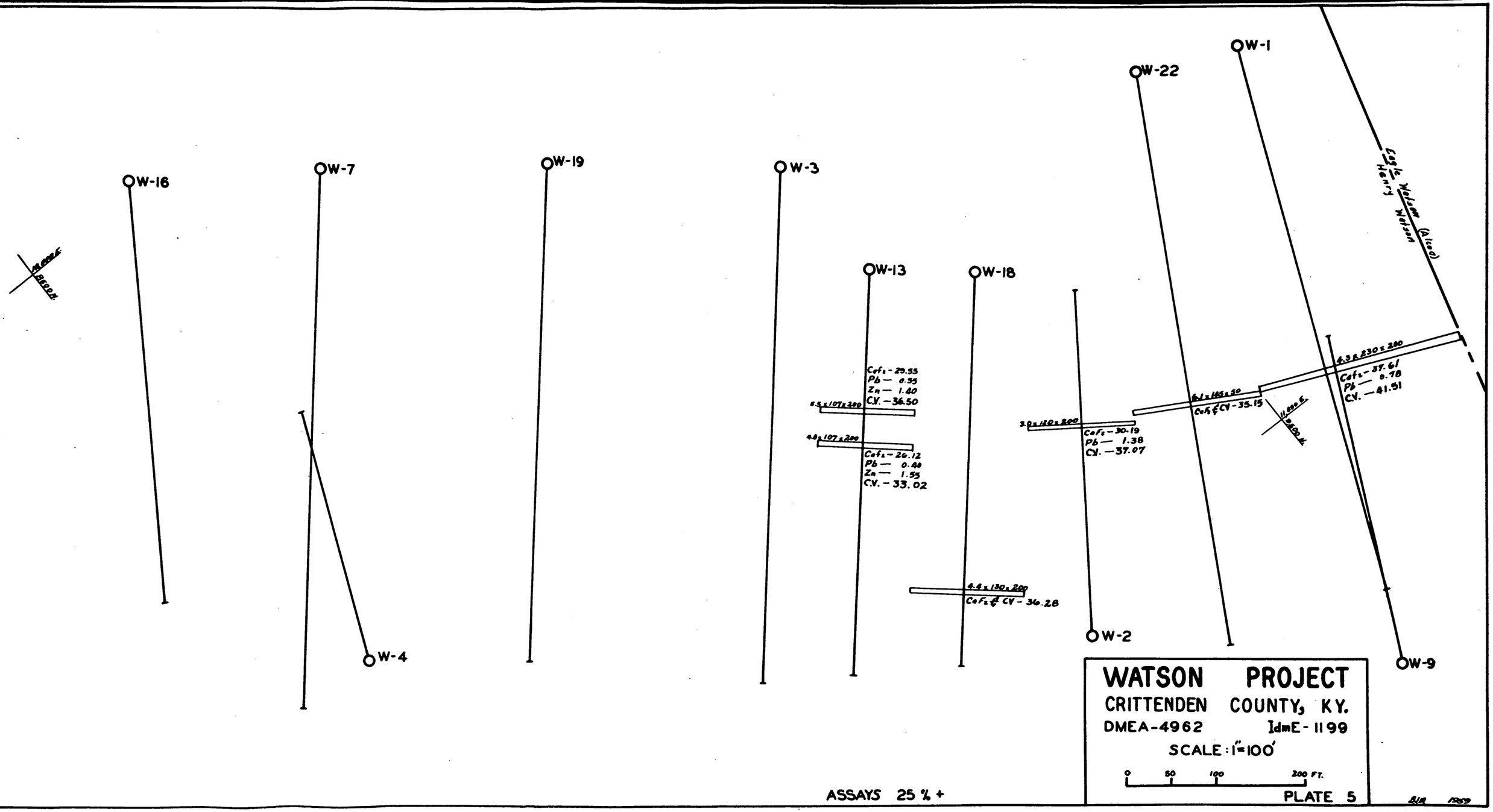
W-16
W-7
W-4
W-19
W-3
W-13
W-18
W-2
W-22
W-1
W-9
Eagle Henry Watson (Alco)
Cafe - 29.55
Pb — 0.55
Zn — 1.40
C.V. — 36.50
8.5 x 107 x 200
4.8 x 107 x 200
Cafe - 26.12
Pb — 0.40
Zn — 1.55
C.V. - 33.02
4.4 x 130 x 200
Cafe & CV - 36.28
3.0 x 120 x 200
Cafe - 30.19
Pb — 1.38
CV. — 37.07
6.1 x 145 x 50
Cafe & CV - 35.15
4.3 x 230 x 280
Cafe - 37.61
Pb — 0.78
CV. — 41.51
WATSON PROJECT
CRITTENDEN COUNTY, KY.
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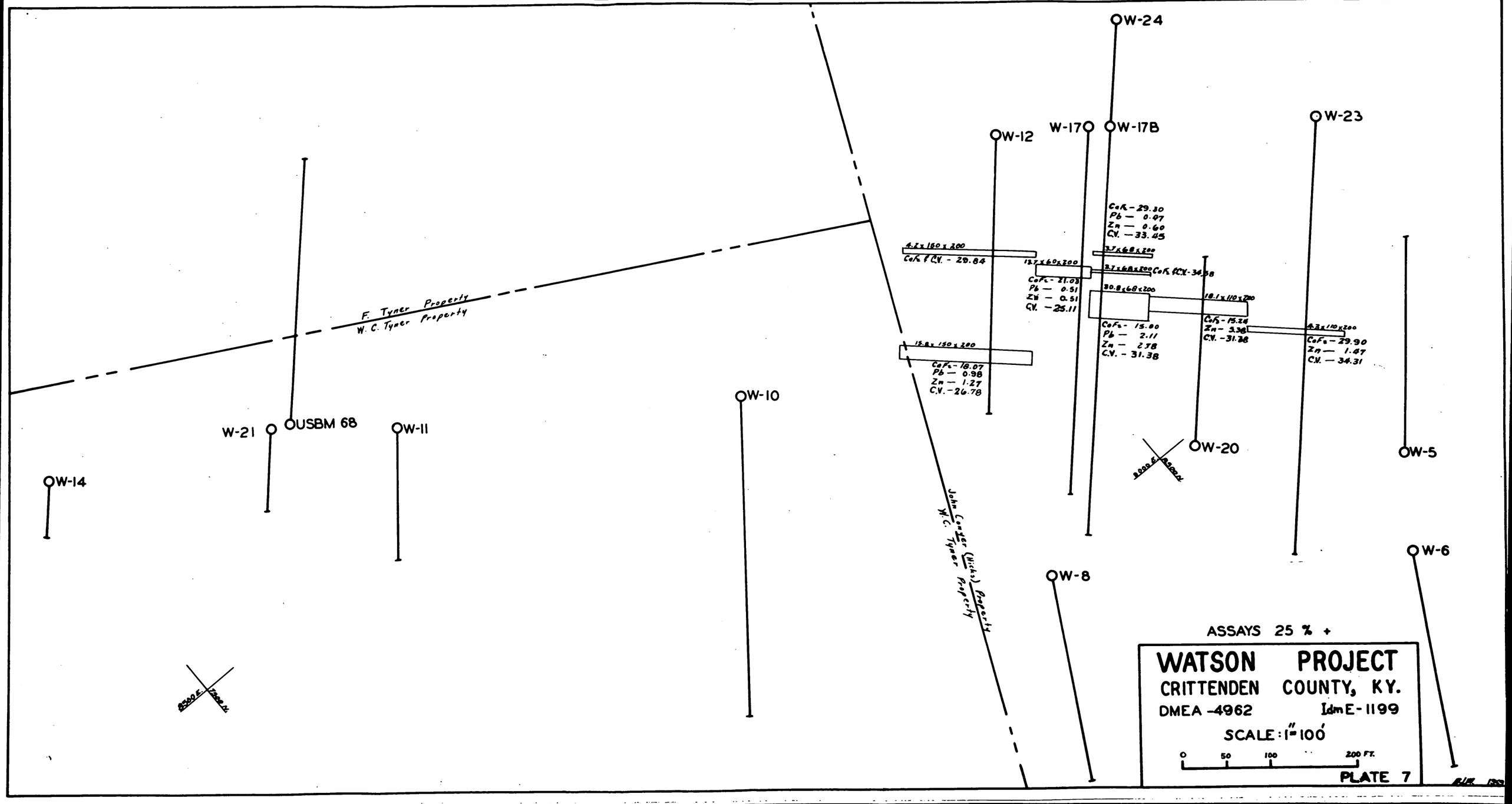
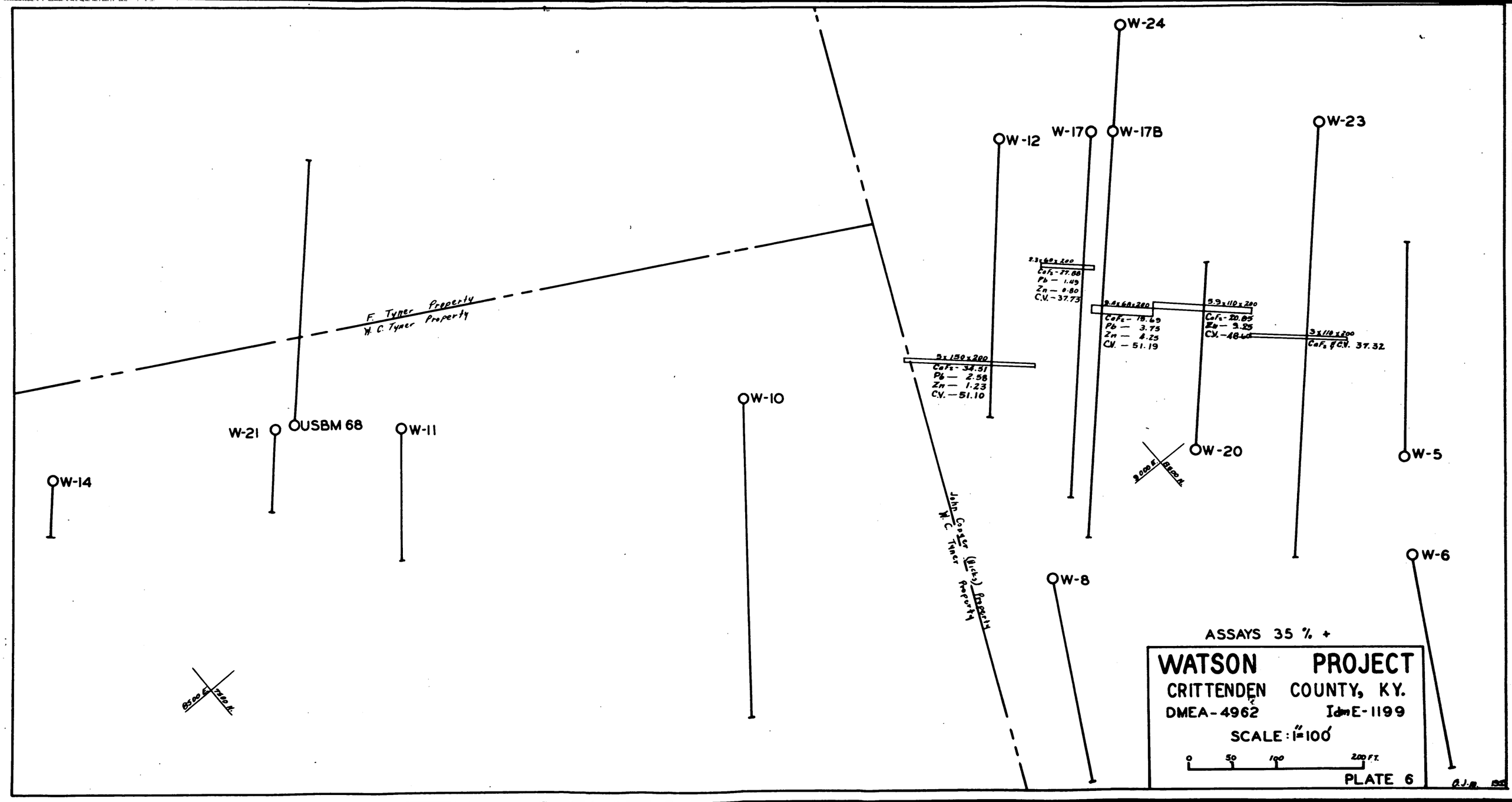
PLATE 5
ASSAYS 25 % +


W-24
W-12
W-17
W-17B
W-23
W-21
USBM 68
W-11
W-10
W-14
W-20
W-5
W-8
W-6
F. Tyner Property
W. C. Tyner Property
John Conner (Wicks) Property
W. C. Tyner Property
4.2 x 150 x 200
CaF₂ & C.V. - 29.84
15.7 x 60 x 200
CaF₂ - 21.03
Pb — 0.51
Zn — 0.51
C.V. — 25.11
15.8 x 150 x 200
CaF₂ - 18.07
Pb — 0.98
Zn — 1.27
C.V. - 26.78
CaF₂ - 29.30
Pb — 0.07
Zn — 0.60
C.V. — 33.45
3.7 x 68 x 200
3.7 x 68 x 200
CaF₂ & C.V. - 34.58
30.8 x 68 x 200
CaF₂ - 15.00
Pb — 2.11
Zn — 2.78
C.V. - 31.38
18.1 x 110 x 200
CaF₂ - 15.24
Zn - 3.38
C.V. - 31.38
4.3 x 110 x 200
CaF₂ - 29.90
Zn — 1.47
C.V. — 34.31
8500 E
7500 N
8000 E
8500 N
ASSAYS 25 % +
WATSON PROJECT
CRITTENDEN COUNTY, KY.
DMEA -4962
IdmE-1199
SCALE: 1" = 100'
0 50 100 200 FT.
PLATE 7


W-24
W-12
W-17
W-17B
W-23
F. Tyner Property
W. C. Tyner Property
2.3 x 60 x 200
CaF2 - 27.88
Pb — 1.49
Zn — 0.80
C.V. - 37.73
9.8 x 68 x 200
CaF2 - 19.69
Pb — 3.75
Zn — 4.25
C.V. — 51.19
5.9 x 110 x 200
CaF2 - 20.85
Pb — 9.25
C.V. - 48.40
3 x 110 x 200
CaF2 & C.V. 37.32
5 x 150 x 200
CaF2 - 34.51
Pb — 2.58
Zn — 1.23
C.V. — 51.10
W-10
W-21
USBM 68
W-11
W-14
W-20
W-5
9,000 E
8,800 N.
John Cooper (Wicks) Property
W. C. Tyner Property
W-8
W-6
8500 E
7400 N.
ASSAYS 35 % +
WATSON PROJECT
CRITTENDEN COUNTY, KY.
DMEA-4962
IdmE-1199
SCALE: 1" = 100'
0 50 100 200 FT.
PLATE 6

STRATIGRAPHIC SECTION FOR WATSON MINE AREA

CRITTENDEN COUNTY, KENTUCKY

SCALE: 1" = 100'

FORMATION	THICKNESS		
Hardinsburg	80' +		Ss., massive, med. grey 6' green shale 40' Ss., massive, med. grey 20' Ss., med. grey w/ shale partings
Golconda	135'		23-50' Shale, dark greenish 15-30' Ls., brown, coarse Xln, w/shale partings 48' Dark grey shale w/ few thin Ls. beds 10' Ls., dark grey, silty 25' Alternating Ls. and shale
Cypress	81' (75-92)		8' Ss., X-bedded, w/few shale partings 10-12' Sh, green, sandy w/some congl. and calc. sh. 10-35' Ss, massive, light grey 10-15' Ss., silty, shaley, green, some black shale, some coal 10' Laminated Ss. & Sh., green, 3-20 Ss. massive, some congl. at base
Paint Creek	13' (5-18)		5-18' Sh, black - dark grey or green w/some congl.
Bethel	74' (66-82)		66-82' Ss., irregulary bedded w/black Sh. occasionally massive Ss. at base or top.
Renault	87' (70-100)		0-20' Sh., black, fossiliferous 7-10' Ls., silty or shaley, green w/green sh. at base 15-20' Ls., grey brown, med. Xln., w/green shale partings 30-35' Ls., grey - green, med. Xln., with sh. partings, possible congl. at base 30-35' Ls., dark grey or brown, fine - med. Xln., dark grey-brown sh., Ss. at base
Ste. Genevieve (226-257)	237'	Levias (10-22) 15	10-22' Ls., light grey, med. Xln., may be sh. or oolite
		Rosiclare (16-38) 24'	10' Ss., Sh., or Ls. at top 0-10' Ls, oolitic, light grey 16-25' Ls. sandy, shaley, oolitic, possibly some sh. or ss. at base
		Fredonia 200'	20-35' Ls., oolitic, some shaley zones possible 0-10' Sandy or shaley zone 135-180' Ls., light grey, oolitic, scattered shaley zones, possible cherty zones near base associated with or above lowermost oolite.
St. Louis	500' ?		Ls., med-dark grey, med.-fine Xln, cherty, w/scattered shale zones (Very dark grey, shaley, fossiliferous zone w/ black chert about 250' below top.)

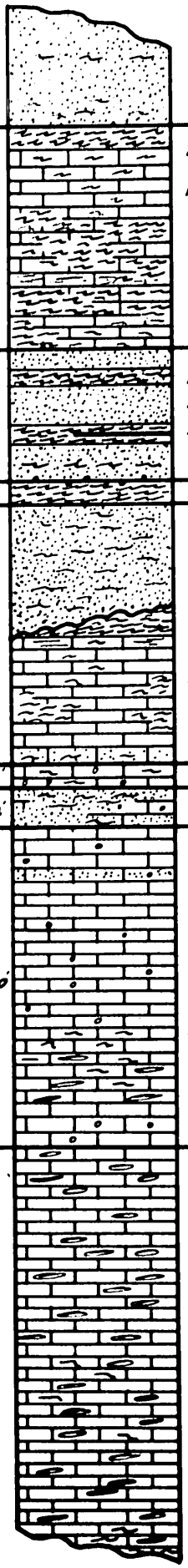


PLATE I

B.N.-T.R.N. May 1959

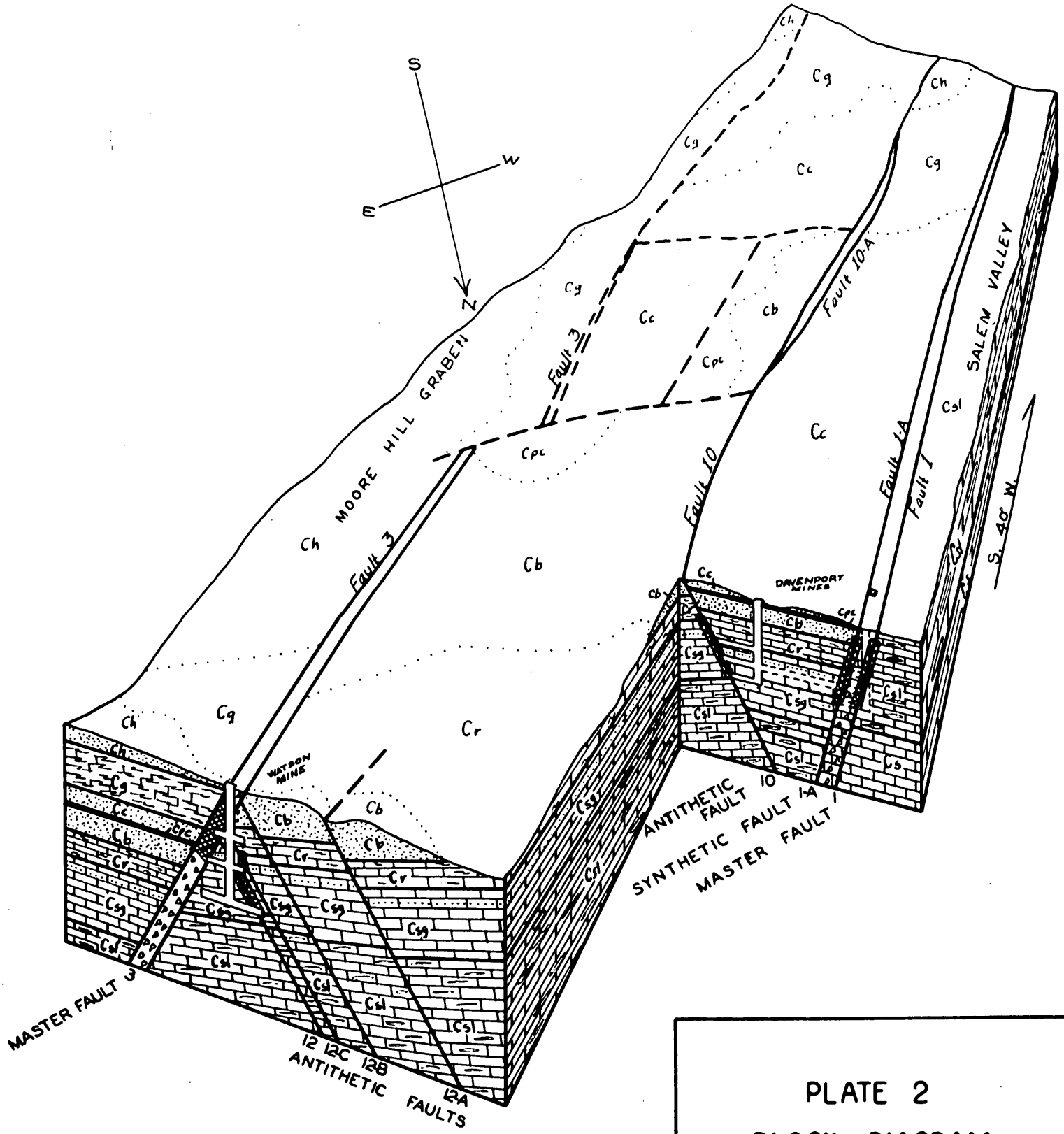


PLATE 2

BLOCK DIAGRAM OF WATSON MINE AND VICINITY

LENGTH OF BLOCK IS 3500 FT. WIDTH IS 1700 FT.

B. J. M.

May 1959

MME Form 7
(10-58)

OFFICIAL FILE COPY

Date	Surname	Code
6/26	[illegible]	600
6/29	Griswold	500
6/29	Talbert	800
6/30	Griswold	130
"	[illegible]	110
7-10	gad	220
		600

600

JUN 30 1959

Memorandum

To: Acting Executive Officer, OAE Field Team, Region V

From: ACTING Chairman, OAE Operating Committee

Subject: Docket No. DMA-4962 - Fluorspar
Reynolds Metals Company
Watson, Hicks and Tyner Properties
Crittenden County, Kentucky

Reference is made to the Field Team's memorandum of June 11, 1959, and to the attached interim report recommending termination agreement.

Attached are the original and four copies of a proposed termination agreement signed by the Acting Director for the Government. Two extra copies are attached for the use of the Field Team.

If the proposed termination agreement meets with your approval, present it to the Operator for execution. If any part of this agreement does not have either your approval or that of the Operator, and cannot be amended within your delegated authority, then the original and all copies are to be returned to this office, together with the proposed changes for consideration.

After execution of the termination agreement, the copies are to be distributed in the usual manner.

/s/ W. R. Griswold (HB)

Approved:

Frank D. Lamb (HB)
Member, Bureau of Mines

Harold Kirkemo (HB)
Member, Geological Survey

Attachments 6

JWAlt:gad 6/26/59
Copy to: Dir. R. File
Operating Committee
Mr. Kirkemo, USGS
Mr. McDougal, USBM

43683

MME Form 7
(10-58)

OFFICIAL FILE COPY

Date	Surname	Code
6/24	a	220
6/24	WLP	600

JUN 24 1959

Memorandum

To: Mrs. Helen R. Miller, Administrative Assistant, Bureau of Mines, Region V

From: E. D. Talbert, Acting Chief (Signed) E. D. Talbert
Contract Administration and Audit Division

Subject: Docket No. DMEA-4962 (Fluorspar)
Reynolds Metals Company
Watson-Hicks-Tyner Properties
Crittenden County, Kentucky
Contract No. Idm-E1199

The original of the final (April 1959) MF-104, MF-104A and attachments, together with invoices from previously paid vouchers, which you submitted with your June 17 memorandum request for a Report of Review, are returned herewith. Although your memorandum advised that 21 invoices from prior vouchers were attached, only 18 aggregating 21 pages were received.

The review in lieu of a final audit has been completed but a report may not be issued at this time because Mr. Lynch's memorandum of June 11 indicates that the Operator's final engineering report has not been received. Instructions promulgated to the Field Team Executive Officers by the Operating Committee's letter of January 17, 1957, prohibit the issuance of a Report of Review without advice from the Executive Officer that the Operator's final engineering and geological report has been received, waived, or charged against the Operator.

A copy of this memorandum is being sent to Mr. Lynch.

Enclosures

EDTalbert/ama
June 24, 1959

Copy to: Docket
Director's Reading File
Code 800
Mr. V. J. Lynch

43683

MME Form 7
(10-58)

OFFICIAL FILE COPY

Date	Surname	Code
6/23	[illegible]	600
		220

600

June 23, 1959

Memorandum

To: Associate Solicitor, Division of Mineral Resources

From: Division of Nonmetallic Minerals, OME

Subject: Preparation of mutual termination agreement for
Docket No. DMEA-4962-Fluorspar
Reynolds Metals Company
Watson, Hicks and Tyner Properties
Crittenden County, Kentucky
Contract No. Idm-E1199

Will you please prepare a termination agreement for the cited contract. A draft of the proposed agreement is attached for your use.

J. W. Alt

J. W. Alt

Attachment

JWAlt:gad 6/23/59
Copy to: Dir. R. File

43683

EXTRA COPY O. M. E. RECEIVED JUN 22 1959		
DATE	INITIALS	CODE
6/24	J.W.A.	600

June 11, 1959

Memorandum

To: E. D. Talbert, Office of Minerals Exploration
Room 4446 Interior Building, Washington, D. C.

From: Acting Executive Officer, OME Field Team, Region V

Subject: DMEA-4962, Idn-11199 - Fluorspar
Reynolds Metals Company, Richmond, Virginia
Watson-Hicks-Tyner Properties, Crittenden County, Kentucky

Work on the subject contract has been recessed pending termination. Termination of the contract by mutual agreement has been recommended.

The following units of work have been acceptably performed as verified by our field examiner.

1. A total of 14,382 feet of diamond drilling was completed in 24 drill holes. (An additional 5 feet of drilling was done by the Operator at his expense.)

2. 2,966 feet of reaming was done and 30 hours were were required to complete cementing of holes.

3. 240 feet of BX casing and 400 feet of AX casing were lost in holes.

4. 70 fluorspar analyses and 50 fluorspar-lead-zinc analyses were made.

The final Operator's monthly report and voucher are being held in this office until the Operator's final engineering report and the Auditor's Report of Review have been received.

V. J. Lynch

VJL/mg
cc - Operating Committee (2)
Mr. Dewey H. Amos
Mr. H. L. Burmeister
Mr. V. J. Lynch
Mr. R. A. Laurence

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF MINERALS EXPLORATION
ROOM 2-B POST OFFICE BLDG.
KNOXVILLE 2, TENN.

OFFICIAL FILE COPY
O. M. E.
RECEIVED JUN 15 1959

DATE	INITIALS	CODE
6/15	L	220
6/16	[illegible]	110
6/16	[illegible]	800
6/22	[illegible]	600

June 11, 1959

Memorandum

To: Operating Committee, OME, Washington, D. C.

From: Field Team, OME, Region V, Knoxville, Tennessee

Subject: DMEA-4962, Idm-E1199 - Fluorspar
Reynolds Metals Company, Richmond, Virginia
Watson-Hicks-Tyner Properties, Crittenden County, Kentucky

Enclosed are the original and two copies of the latest interim report on the subject contract. Attached to each report is a copy of a letter from the Company's Chief Geologist requesting termination of the contract.

We are in agreement with the recommendations contained in the interim report to terminate the contract by mutual agreement as of June 4, 1959.

Certification of discovery will be recommended. //

V. J. Lynch
V. J. Lynch
Acting Executive Officer

Helmuth Wedow, Jr.
Helmuth Wedow, Jr.
U. S. Geological Survey

Enclosures 3

INTERIM REPORT
DMEA-4962 Idm-E1199

Operator: Reynolds Metals Company, Richmond, Virginia

Location: Watson-Hicks-Tyner properties, Crittenden County, Kentucky

A project inspection of the subject contract was conducted on June 4, 1959. Results obtained by the drilling completed under this contract were discussed with Messrs. John Hook and Thomas Winans, the Operator's geologists, and cores obtained since the last project inspection were examined.

Drilling done on this project has discovered two ore bodies on the properties. A total of 518 feet of drilling remains uncompleted under Stage II of the contract. Additional drilling is not warranted on the properties as all of the favorable structures have been adequately explored. It is recommended that the contract be terminated by mutual agreement, effective June 4, 1959.

Drilling completed under the contract is summarized as follows:

Total number of holes completed	24
Total footage in holes completed	14,387*
Number of holes completed since last inspection	2
Footage in holes completed since last inspection	1,720
Number of ore holes	10
Number of indicative holes	7
Number of shine holes	1
Number of trace holes	2
Number of barren holes	4

*This total includes 5 feet drilled in a Stage I hole entirely at the Operator's expense.

Of the two holes completed since the last project inspection, one (W-22) discovered ore-grade mineralization and the other hole (W-24) indicative mineralization. Summary logs of these two holes are as follows:

Hole No.	Depth in Feet	Description
W-22	0-65	Overburden.
	65-174	Renault limestone and shale.
	174-207½	Fredonia limestone.
	207½-253	Rosiclare sandstone.
	253-411	Fredonia limestone.
	411-428	Fault; limestone and calcite breccia with shines of fluorite and sphalerite.
	428-491	St. Louis limestone; shines of fluorite (see assays).
	491-501	Fault; calcite vein with ore-grade fluorite (see assays).
	501-606	St. Louis limestone.
	606-608	Fault; shines of fluorite.
	608-621	St. Louis limestone.
	621-650	Fault; trace of fluorite.
	650-844	St. Louis limestone.
	844-851½	Fault; limestone and calcite breccia.
	851½-853	St. Louis limestone.
	853	Bottom.

Inclination -40°
Bearing S.61°E.

W-24	0-90	Overburden.
	90-646	St. Louis limestone.
	646-703	Fault; cavities 646-674 feet; vein calcite.
	703-760	St. Louis limestone.
	760-763	Fault; limestone and calcite breccia.
	763-790	St. Louis limestone.
	790-794½	Fault; limestone and calcite breccia; shines of fluorite, galena nad sphalerite.
	794½-810	St. Louis limestone.
	810-815	Cavity.
	815-837	Fault; limestone breccia; shines of fluorite and traces of galena and sphalerite.
	837-867	St. Louis limestone; traces of fluorite.
	867	Bottom.

Inclination -54°
Bearing S.47°E.

Assay results of mineralization encountered in Holes W-22 and W-24 are as follows:

Hole No.	Depth in Feet	%CaF_2	%Pb	%Zn
W-22	476.0-480.0	8.24	0.32	0.00
	480.0-487.0	10.58	0.06	0.00
	487.0-492.4	2.78	0.00	0.00
	492.4-496.8	9.54	0.00	0.00
	496.8-498.7	94.48	0.16	0.00
	498.7-501.2	1.44	0.16	0.00
W-24	792.5-796.5	17.00	0.85	1.69

Dewey H. Amos
Geologist
U. S. Geological Survey

REYNOLDS METALS COMPANY
BOYLE BUILDING
LITTLE ROCK, ARKANSAS

Salem, Kentucky
June 8, 1959

OFFICIAL FILE COPY
O. M. E.
RECEIVED JUN 15 1959
DATE INITIALS

Mr. Robert A Laurence
Executive Officer
OME Field Team, Region V
U.S. Department of the Interior
Room 2-B, Post Office Building
Knoxville 2, Tennessee

Re: Watson Project
Docket No. DMEA 4962 (Fluorspar)
Watson Property
Livingston County, Kentucky
Contract No. Idm-E1199

Dear Mr. Laurence:

The final Stage II hole of the Watson Project was completed May 13, 1959. Since only 7,482 feet of the 8,000 feet authorized by the contract have been drilled, we were advised by the DMEA Field Team representative, Mr. Dewey Amos, that a termination agreement might be necessary.

If one is necessary, we hereby request a termination of the contract with the completion of these holes on May 13, 1959.

It is understood that Mr. Amos agrees with the termination and the date.

Yours very truly,

John W. Hook

cc; Mr. Dewey Amos
Mr. H.L. Burmeister
Dr. J.H. Moses
Mr. J.T. Kilpatrick
Mr. H.E. McDaniel
File

RECEIVED
JUN 10 1959
U. S. Geological Survey
Geologic Division
Knoxville, Tenn.

Form MF-104 (Rev.)
(April 1952)

Budget Bureau No. 42-R1036.5

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION

PAID ON VOUCHER & SCHEDULE
ON PAYMENTS

OPERATOR'S MONTHLY REPORT AND VOUCHER

Watson Project
Stages 1 and 11

Month of April, 1959 Docket No. DMEA 4962 Contract No. Idm-E1199
Operator's Name Reynolds Metals Company Minerals Fluorspar
Address Richmond, Virginia
Contract Amount, $ 59,710.00 Government Participation: 50 % Amount, $ 29,855.00

ITEMS OF COSTS	FOR OPERATOR'S USE: Monthly Total	Totals Previously Reported	Totals To Date	FOR GOVERNMENT USE ONLY: Approved Monthly Total	Approved Totals Previously Reported	Approved Totals To Date
(1) Independent Short Form Contracts:						
Drilling Core	7,743.75	32,125.50	39,869.25			
Reaming	393.75	4,667.25	5,061.00			
Cementing	56.00	184.00	240.00			
Lost BX Casing	21.60	432.00	453.60			
Lost AX Casing	34.00	34.00	68.00			
(2) Labor and Supervision:						
Labor						
Supervision						
Technical Services						
(3) Operating Mat'ls. and Supplies:						
Timber						
Explosives						
Pipe						
Track						
Core Boxes		225.00	225.00			
(4) Operating Equipment:						
Rental						
Purchase						
Depreciation						
(5) Initial Rehabilitation and Repairs						
(6) New Bldgs., Improvements, etc.						
(7) Miscellaneous:						
Repairs to Equipment						
CaF2	144.00	166.50	310.50			
CaF2, Pb, Zn		325.00	325.00			
Liability Insurance						
Incidental Allow	735.00	3,049.20	3,784.20			
(8) Contingencies (specify):						
TOTALS	9,128.10	41,208.45	50,336.55	9128.10	41208.45	50 336.55

I certify that the above bill is correct and just and that payment therefor has not been received.

Date ..... *Payee Reynolds Metals Company

Per H. E. McDaniel Title Accounting Official

*When a voucher is signed or receipted in the name of a company or corporation, the name of the person writing the company or corporate name, as well as the capacity in which he signs, must appear. For example: "John Doe Company, per John Smith, Secretary," or "Treasurer," as the case may be.

NOTE.—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.

(Instructions on reverse)

Pursuant to authority vested in me, I certify that this account is correct and proper for payment in the amount of:

$ 4564.05

Signature Helen R. Miller
(Authorized Certifying Officer)

Date JUN 2 1959 Vou. No. 115

(See other side)

4564.05

(For Government use only)

CERTIFICATION BY GOVERNMENT REPRESENTATIVE:

I certify that to the best of my knowledge and belief the contractor submitting this voucher is operating a Defense Minerals Exploration Administration project under Contract No. E-1199 in accordance with the terms of the contract.

Signature [signature] Title MINING ENGINEER U. S. BUREAU OF MINES Date MAY 28 1959

APPROVAL BY DMEA EXECUTIVE OFFICER OR ALTERNATE:

Signature [signature] Title EXECUTIVE OFFICER OME FIELD TEAM REGION V Date MAY 28 1959

MONTHLY REPORT OF OPERATOR

The Operator (Contractor) of an exploration project is required to make a monthly report to the Government through the Regional Executive Officer. This report consists of three parts as follows:

(a) *Form MF-104—Operator's Monthly Report and Voucher.*—This form details expenditures and constitutes a voucher for reimbursing the Operator for the Government's share of costs;

(b) *Form MF-104A—Operator's Unit Cost and Progress Report.*—This is a statistical report of expenditures which shows costs for the various types of operation; and

(c) *Narrative.*—A concise narrative description of progress made, results accomplished, and any unusual difficulties encountered must be furnished as an attachment to this Report and Voucher. Wherever possible, the narrative is to be illustrated with maps or sketches showing formations penetrated and location and assays of samples taken as well as advances in workings. In the case of diamond drilling or churn drilling, the location and inclination of holes is to be shown on a map; logs and assays also are to be submitted.

The Monthly Report of Operator should be prepared in an original and four copies all of which must be sent to the Executive Officer of the Region not later than the 15th of the month following.

Preparation of Form MF-104—Operator's Monthly Report and Voucher.—All the applicable spaces in Form MF-104 should be filled in by the Operator, and the Operator or his agent should sign the certification in the lower left corner of the form.

The items of costs are arranged in the order they appear in Article 6 (a) of Form MF-200 (Revised February 1952), however, this form is readily adaptable for use in reporting activities under other contract forms.

Under Item (1) delete words "Short Form" if the contract is a sub-contract under Form MF-200; and delete word "Independent" if the contract reported is on Form MF-200 (A). Also, report work paid for on a unit basis under contract Form MF-200 as though it were performed under an independent contract.

Under Item (2) include labor, supervision and technical services incurred for the exploratory operations. Do not include labor, supervision and technical services used for work performed under items (5) and (6).

Under Item (3) include the costs of material and supplies used in the project other than that used under items (5) and (6).

Under Item (4) appear the three types of operating equipment expenditures, that is, rental, purchase and depreciation. The expenditures made for renting equipment belonging to a third party will be reported under "Rental". The amount paid or duly obligated for payment for the purchase of equipment will be reported under "Purchase". The amount of expenditures due the Operator to reimburse him for depreciation of equipment owned will be reported under "Depreciation".

Item (5) comprises costs of labor, supervision, technical services, materials, etc., which are used in the initial rehabilitation and repair of existing buildings, installations, fixtures, and equipment. These costs, therefore, should not be reported under items (2) and (3).

Item (6) includes the labor, supervision, technical services, materials, etc., used in the installation or construction of new buildings, fixed improvements, etc., necessary for the project. These costs, therefore, should not be reported under items (2) and (3).

Item (7) covers miscellaneous types of expenditure such as payroll taxes, liability insurance, workmen's compensation insurance, repairs to equipment and sampling and analysis. Only that part of payroll taxes, liability insurance and workmen's compensation which are paid by the operator should be reported under item (7). The share paid by the employee as a payroll deduction is to be included under item (2) as labor costs.

Item (8) includes any unforeseen costs not included in the other seven categories.

The original of Form MF-104 when submitted for reimbursable expenses incurred under contract Form MF-200 must be supported by original documentation or by certified copies of purchase orders, payrolls or transcripts of payrolls, unless such documentation has been waived by the Regional Executive Officer. This certification may be stated thus, "Certified True Copy (or Transcript)", followed by appropriate signature. If the Executive Officer of the Region determines that a contract under Form MF-200 should have an "on-site" audit, that is, a Government auditor should make an audit of the Operator's books and records of account, the Operator need not support his monthly voucher with original or certified documents except in cases of equipment purchases whose individual costs exceed $50.00. In these cases the original or a certified copy of the purchase order or invoice should be attached to the Monthly Voucher. N. B.—Only the *original* of Form MF-104 is required to be documented. The four copies of Form MF-104 are not to be thus supported.

Form MF-104 submitted for reimbursement under fixed price contracts on Form MF-200 (A), however, are not required to be supported by documentation of any kind. The Operator will submit his claim under item (1) of Form MF-104 by deleting as stated above the word "Independent" and by showing the number of feet or other units immediately after the appropriate descriptive word, such as, drilling, bulldozing, crosscutting, drifting, etc., and giving the "Monthly Total" amount due. "Totals Previously Reported", and "Totals to Date" columns should also be filled in.

Form MF-104A
(April 1952)

Budget Bureau No. 42-R1151.2

UNITED STATES
DEPARTMENT OF THE INTERIOR

DEFENSE MINERALS EXPLORATION ADMINISTRATION

Watson Project
Stage I

OPERATOR'S UNIT COST AND PROGRESS REPORT

Month of April 1959 Docket No. DMEA 4962 Contract No. Idm-K1199
Operator's Name Reynolds Metals Company Minerals Fluorspar
Address Richmond, Virginia

OPERATION	UNIT	COSTS THIS MONTH	UNITS THIS MONTH	COSTS TO DATE	UNITS TO DATE	UNIT COSTS TO DATE	AUTHORIZED BY CONTRACT Units	AUTHORIZED BY CONTRACT Unit Costs
Drifting								
Crosscutting								
Raising								
Core Boxes	1			225.00	75		75	3.00
Winzes								
Drilling: Core	Ft.			20,355.00	6900		6900	2.95
Reaming	Ft.			2,299.50	1314		2000	1.75
Hole Surveys Cementing	1			184.00	23		80	8.00
Lost BX Casing	Ft.			216.00	100		300	2.16
Lost AX Casing	Ft.			17.00	10		300	1.70
Assay CaF2	1			58.50	13		75	4.50
CaF2,Pb,Zn	1			162.50	25		25	6.50
Incidental Allowance	Ft.			1,932.00	6900		6900	0.28
TOTAL DISTRIBUTED COSTS								TOTAL COSTS AUTHORIZED BY CONTRACT
Operating Equipment Purchased								
Initial Rehabilitation and Repairs								
New Buildings, Improvements, etc.								
TOTAL COSTS		0000		25,449.50				59,710.00

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

REMARKS: Stage I has been completed and no further work has been done.

Date ..... Operator Reynolds Metals Company

Per W. E. McDaniel Title Accounting Official

NOTE.—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.

(Instructions on reverse)

(For Government use only)

W. J. Lynch
MINING ENGINEER
U. S. BUREAU OF MINES

INSTRUCTIONS

Preparation of Form MF–104A—Operator's Unit Cost and Progress Report.—Applicable places on Form 104A should be filled in by the Operator. The purpose of this form is twofold as follows: (1) to furnish the supervising engineers and other administrators with statistical information necessary to better determine the progress of the project; and (2) to furnish more permanent information on mining costs for future use. The more important phases of operation on which permanent information is desired have been outlined in the form. There are blank lines, however, for those unusual phases which may need to be reported for a particular project. It will be necessary for the Operator to distribute his costs among the applicable phases reported with the exception of three items the costs of which are not to be distributed by the Operator. These three items are: "Operating Equipment Purchased", "Initial Rehabilitation and Repairs", and "New Buildings, Improvements, etc." The reason for not distributing these items on a monthly basis is doubtless clear to the Operator, since such distribution might well overstate the cost for any one month or period short of the entire contract period.

Form MF–104A has been designed to tie in with Form MF–104 for both monthly and cumulative costs. The "Total Costs" on Form MF–104A for each month should equal the monthly "Total Costs" as reported on Form MF–104. This is also true of the "Total Costs To Date".

In preparing Form MF–104A, it will be necessary frequently to distribute certain costs over a number of items. For instance, supervisory and engineering costs may have to be distributed over several phases, such as, drifting, crosscutting, raising, etc., provided that these items were reported active for the month. Such distributions should be made on the basis of time spent on the various phases, on man days of labor charged to such phases, or on some other equitable basis. "Operating Equipment", "Initial Rehabilitation and Repairs", and "New Buildings Improvements, etc.", will be distributed to the several phases of the project by the Washington Office of DMEA at the close of the project if determined necessary. The last two columns headed "Authorized by Contract" will be filled in by the Operator if such information is found in the contract. This information is usually a part of Exhibit "A" of the contract. A space for remarks has been provided for the use of the Operator to call attention to any unusual circumstances causing excessive or disproportionate unit costs.

GPO 872894

Form MF-104A
(April 1962)

Budget Bureau No. 42-R1151.2

UNITED STATES
DEPARTMENT OF THE INTERIOR

DEFENSE MINERALS EXPLORATION ADMINISTRATION

Watson Project
Stage II

OPERATOR'S UNIT COST AND PROGRESS REPORT

Month of April 1959 Docket No. DMEA 4962 Contract No. Idm-E1199
Operator's Name Reynolds Metals Company Minerals Fluorspar
Address Richmond, Virginia

OPERATION	UNIT	COSTS THIS MONTH	UNITS THIS MONTH	COSTS TO DATE	UNITS TO DATE	UNIT COSTS TO DATE	AUTHORIZED BY CONTRACT Units	AUTHORIZED BY CONTRACT Unit Costs
Drifting								
Crosscutting								
Raising								
Shafts								
Winzes								
Drilling: Core Ft.		7,743.75	2625	19,514.25	6615		8000	2.95
Reaming	Ft.	393.75	225	2,751.50	1578		2000	1.75
Hole Surveys, Cementing	Hr.	56.00	7	56.00	7		100	8.00
Lost Bx Casing	Ft.	21.60	10	237.60	110		300	2.16
Lost AX Casing	Ft.	34.00	20	51.00	30		300	1.70
Assay CaF2	1	144.00	32	252.00	56		75	4.50
CaF2, Pb, Zn	1			162.50	25		25	6.50
Incidental Allow	Ft.	735.00	2625	1,652.20	6615		8000	0.28
TOTAL DISTRIBUTED COSTS								TOTAL COSTS AUTHORIZED BY CONTRACT
Operating Equipment Purchased								
Initial Rehabilitation and Repairs								
New Buildings, Improvements, etc.								
TOTAL COSTS		9,128.10		24,887.05				59,710.00

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

Date ..... Operator Reynolds Metals Company

Per J. E. McDaniel Title Accounting Official

NOTE.—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.

REMARKS: Costs are for holes W-20, W-21, W-22, W-23. The Joy invoice includes all costs for hole W-22 except for lost casing. This amount will be included on the May report.

(Instructions on reverse)

(For Government use only)

MINING ENGINEER
U. S. BUREAU OF MINES

INSTRUCTIONS

Preparation of Form MF-104A—Operator's Unit Cost and Progress Report.—Applicable places on Form 104A should be filled in by the Operator. The purpose of this form is twofold as follows: (1) to furnish the supervising engineers and other administrators with statistical information necessary to better determine the progress of the project; and (2) to furnish more permanent information on mining costs for future use. The more important phases of operation on which permanent information is desired have been outlined in the form. There are blank lines, however, for those unusual phases which may need to be reported for a particular project. It will be necessary for the Operator to distribute his costs among the applicable phases reported with the exception of three items the costs of which are not to be distributed by the Operator. These three items are: "Operating Equipment Purchased", "Initial Rehabilitation and Repairs", and "New Buildings, Improvements, etc." The reason for not distributing these items on a monthly basis is doubtless clear to the Operator, since such distribution might well overstate the cost for any one month or period short of the entire contract period.

Form MF-104A has been designed to tie in with Form MF-104 for both monthly and cumulative costs. The "Total Costs" on Form MF-104A for each month should equal the monthly "Total Costs" as reported on Form MF-104. This is also true of the "Total Costs To Date".

In preparing Form MF-104A, it will be necessary frequently to distribute certain costs over a number of items. For instance, supervisory and engineering costs may have to be distributed over several phases, such as, drifting, crosscutting, raising, etc., provided that these items were reported active for the month. Such distributions should be made on the basis of time spent on the various phases, on man days of labor charged to such phases, or on some other equitable basis. "Operating Equipment", "Initial Rehabilitation and Repairs", and "New Buildings Improvements, etc.", will be distributed to the several phases of the project by the Washington Office of DMEA at the close of the project if determined necessary. The last two columns headed "Authorized by Contract" will be filled in by the Operator if such information is found in the contract. This information is usually a part of Exhibit "A" of the contract. A space for remarks has been provided for the use of the Operator to call attention to any unusual circumstances causing excessive or disproportionate unit costs.

GPO 872894

REYNOLDS METALS COMPANY
Monthly Report - April, 1959
Watson Project-DMEA 4962 - Idm-E1199
Crittenden County, Kentucky

By
John W. Hook

Holes W-20, W-22, and W-23 were completed in April. W-24, the final hole, is in progress at a depth of 452'.

W-20 cut fault 1-A and 1 from the SE (hanging wall) side. Continuous samples from 321.3 to 452.8 averaged 131.5' (rod length) of 7.17% CaF_2, 0.13% Pb, and 2.09% Zn. Within this zone there was a 30.7' run from 349.3 to 380.0 which averaged 15.24% CaF_2, 0.23% Pb, and 5.38% Zn, and a 4.6' run from 424.7 to 429.3 which assayed 28.78% CaF_2, 0.16% Pb, and 2.09% Zn. All of the assays were less than 30% CaF_2 but the Zn assays help give combined values which may be considered as low grade ore. Please refer to the log and cross section for detailed information on the geology and assays.

W-22 was drilled under the workings of the Watson mine about 160' southwest of the W-1 and W-9 penetrations. It cut 1.9' of high grade (98.48%) from 496.8 to 498.7 with low grade in the calcite and brecciated wall rock. The average from 492.4 to 498.7 feet was 35.15% CaF_2, 0.05% Pb, and 0.00% Zn. This mineralization probably represents the junction of veins C and D, 25' below the 300 foot level. The other structures had only shine mineralization.

W-23 cut faults 1 and 1A from the foot wall side and was continued to make a hanging wall penetration of Faults 10-A and 10 (see cross section). The hole found shines of CaF_2, Pb, and Zn from 188 to 390 in the breccia associated with Faults 1 and 1-A. A few scattered shines were encountered from 460' to 527' within the graben. Faults 10-A and 10 had shines from 602' to 645'. Fault 10 had very little brecciation and there was some doubt that this breccia represented the fault. For this reason, the hole was continued to a depth of 710' but the lower 65 feet found only a few calcite stringers in otherwise unbroken St. Louis limestone.

W-24 was collared 125' in back of W-17B and is being drilled on a -54° angle to cut the brecciated zone associated with Faults 1 and 1-A at the projected intersection of Fault 10. This penetration will be 300 feet down dip from the low grade ore found in W-17B and if successful will add substantial tonnages to the blocking of reserves along faults 1 and 1-A.

Also included in this report are 8 cross sections of hole W-16. The original cross section submitted was in error and the mistake, the wrong inclination, has been corrected.

DRILLING SUMMARY

Hole	Location North	Location East	Bearing	Angle	Depth	Start	Finish
W-20	8540	9015	N47W	-65	507	3-28-59	4-3-59
W-22	9615	10593	S61E	-40	853	3-30-59	4-25-59
W-23	8890	8814	S47E	-45	710	4-6-59	4-15-59
W-24	8787	8585	S47E	-54	452	4-22-59	In Progress

REYNOLDS METALS COMPANY

Diamond Drill Hole No. W-20; Angle, -65°; Bearing N47W; Depth, 507'
Coordinates, N 8450 E 9015; Elevation 453.0
Property, Watson; Area, SE Salem; County, Crittenden; State, Kentucky
Contractor, Joy Manufacturing Company; Foreman, Niles Minner
Started 3-28-59; Finished 4-3-59

From	To	Fm	Description
0	10		Overburden
10	18	Cc	Massive sandstone (boulders ?). Recovery 3'.
18	36	Cc	Sandy shale, green to grey, weathers tan, recovery 10'.
36	56	Cc	Sandstone, massive quartzitic, 5' recovery.
56	66	Cc	Black sandy shale, pieces of quartzitic sandstone in bottom of run, recovery 5'.
66	76	Cc	Green sandy shale and sandstone, recovery 4'.
76	93	Cc	Massive sandstone, somewhat quartzitic, recovery 6.5'.
93	103	Cc	Black shale, few sandy seams and pebbles in lower 3'.
103	109	Cpc	Black shale as above but with more sandy shale beds and conglomeritic.
109	179.5	Cb	Bethel sandstone, thin bedded, irregular, light grey sand and grey shale.
179.5	189	Cb	Sandstone, massive, fine grained, light grey, few black shaley streaks, 189-190.5 cavity.
189	200	Cr	Black shale.
200	207	Cr	Limestone, medium to dark grey, fine crystalline, silty, with shale partings, shale and limestone are fossiliferous, increase in shale from 503-505. Few calcite stringers.
207	224	Cr	Limestone, medium crystalline, medium grey, fossiliferous.
224	226	Cr	Black shale.
226	233	Cr	Limestone, light grey, medium crystalline, with few shale partings, few small calcite stringers.
233	234	Cr	Black shale.

From	To	Fm	Description
234	237.5	Cr	Limestone, dark grey, medium crystalline, sandy
237.5	256.5	Cr	Limestone and shale. Limestone is fine crystalline and light grey, fossiliferous, silty. Shale is medium to dark grey.
256.5	264	Cr	Shale, dark grey.
264	279	Cr	Shale and limestone, predominately shale to 275'. Shale is dark grey, fossiliferous with irregular limestone lenses. Below 275' limestone has shaley partings, fine to medium crystalline, medium grey, fossiliferous, silty.
279	289.5	Cr	Limestone, dark grey, fine to medium crystalline, fossiliferous, few fossils in shaley zones.
289.5	305.5	Cr	Limestone, dark grey, medium crystalline, fossiliferous, sandy, few shale partings, calcite veinlets, calcite vein from 297 to 297.5.
305.5	310	Cf	Limestone, brown grey fossiliferous, slightly oolitic, few calcite stringers with increase toward bottom.
310	313		Fault. Brecciated limestone and calcite with trace of CaF_2 at 310.5
313	317.5	Cl	Limestone, brown, grey, fine crystalline, fossiliferous, few stylolites.
317.5	319	Crc	Green shale with irregular limestone lenses, fossiliferous, few calcite veinlets.
319	450		Fault.
			319.0 - 321.2 Brecciated calcareous sandstone, 0.2' of shale at bottom.
			321.2 - 324.1 Sandstone, calcareous, with good shines of CaF_2 with calcite in fractures.
			324.1 - 329.0 Calcite vein with some brecciated sandstone on top and bottom. Good shines of CaF_2.
			329.0 - 338.0 Sandstone, calcareous, grey, fine grained, few shale partings, few calcite stringers.
			338.0 - 349.0 Brecciated limestone with few shines of Zn and Pb.
			349.0 - 349.8 Vein CaF_2 with shines of Pbs.

From	To	Fm	Description	
			349.8 - 353.5	Limestone, brecciated, medium grey, medium crystalline.
			353.5 - 355.0	Vein CaF_2 and calcite, trace of Zn.
			355.0 - 374.0	Brecciated oolitic limestone with good shines of Zn, scattered shines of CaF_2.
			374.0 - 391.5	Vein calcite with some scattered breccia. The vein is weathered in places, shines of Zn, Pb, and CaF_2.
			391.5 - 409.0	Brecciated limestone and calcite. Silty limestone with few shale partings.
			409.0 - 410.5	Limestone and CaF_2 breccia with some calcite. Vein running sub-parallel to core.
			410.5 - 412.5	Limestone and calcite breccia.
			412.5 - 422.5	Limestone, medium to dark grey, fossiliferous, slightly fractured, disseminated zinc throughout run. Few scattered traces of CaF_2.
			422.5 - 430.5	Limestone and CaF_2 breccia with some calcite. Vein running with core from 429-429.3.
			430.5 - 438.0	Brecciated limestone and calcite, with few shines of CaF_2, Pb, and Zn.
			438.0 - 450.0	Brecciated limestone and calcite, few scattered traces of CaF_2.
450	478	Csl	Limestone, dark grey, fine to medium crystalline, few shale partings.	
478	489	Csl	Limestone, medium to dark grey, medium crystalline, sandy.	
489	507	Csl	Limestone, medium grained, medium grey, shaley, fossiliferous, numerous large horn corals.	

Bottom 507.

ASSAY VALUES FOR HOLE W-20

From	To	CaF2	Pb	Zn
321.3	324.1	6.82	0.00	0.00
324.1	327.6	15.86	0.00	0.00
327.6	349.3	0.94	0.00	0.10
349.3	353.6	17.38	0.05	0.20
353.6	355	28.98	0.05	2.09
355	359.9	18.90	0.43	3.08
359.9	363.5	13.58	0.11	7.07
363.5	370	2.16	0.06	4.28
370	374	12.58	0.16	7.27
374	380	24.46	0.53	10.66
380	382.7	2.06	0.11	1.49
382.7	388.1	7.02	0.37	2.69
388.1	395.0	5.22	0.21	4.98
395.0	424.7	2.20	0.11	0.89
424.7	429.3	28.78	0.16	2.09
429.3	434.2	11.34	0.11	1.09
434.2	452.8	2.56	0.16	0.69

REYNOLDS METALS COMPANY

Diamond Drill Hole W-22; Angle -40°; Bearing S61E; Depth 853'.
Coordinates N 9615 E 10593; Elevation 475.5
Property, Watson; Area, SE Salem; County, Crittenden; State, Kentucky
Contractor, Joy Manufacturing Company; Foreman, Miles Minner.
Started 3-30-59, Finished 4-25-59

From	To	Fm	Description
0	65		Overburden
65	70	Cr	Weathered brown limestone and green shale.
70	80	Cr	Limestone, with shale partings, shale is brown grey and limestone is dark grey, fine crystalline, fossiliferous, 6" shale at base.
80	94	Cr	Limestone, light grey, medium crystalline, fossiliferous, stylolitic, with shale partings from 90', cavity from 82-85 feet.
94	105	Cr	Limestone, light grey, medium to fine crystalline, large fossils, silty, conglomeritic from 102-105.
105	124	Cr	Green shale, fossiliferous, irregular limestone lenses, bedding horizontal, more limestone at base.
124	126	Cr	Grey shale, irregular bedding, fossiliferous limestone lenses.
126	133.5	Cr	Limestone, fossiliferous, with green shale, shale decreases with depth, limestone is light grey brown, medium crystalline, and conglomeritic from 129-129.5.
133.5	148	Cr	Limestone, green, sandy, few silty zones, stylolitic, calcite veinlet with oil shows.
148	156		Cavity with 3" of fossiliferous limestone.
156	172	Cr	Limestone, medium grey, fine crystalline, with coarse crystalline zones, clear calcite replacing fossils.
172	174		Cavity. (Base of Renault ?)
174	207.5	Cl	Limestone, light grey, medium crystalline, very oolitic, stylolitic.
207.5	213	Crc	Sandstone, medium grey, medium grained, few calcite stringers, calcareous.
213	218	Crc	Shale, medium grey, with irregular limestone lenses.

From	To	Fm	Description
218	235	Crc	Limestone, medium grey, fossiliferous, oolitic.
235	253	Crc	Shale, greenish grey, fossiliferous, with limestone lenses.
253	267	Cf	Limestone, coarse crystalline, medium to dark grey, oolitic, fossiliferous, styolitic, few small calcite stringers with oil shows.
267	271.5	Cf	Alternating shale and limestone, shale in upper foot is conglomeritic, limestone and shale are fossiliferous.
271.5	281.5	Cf	Limestone, dark brown, medium to coarse crystalline, fossiliferous, few shale partings, few calcite veinlets with oil shows.
281.5	286	Cf	Limestone, coarse crystalline, fossiliferous, slightly styolitic with slickensides along jointing.
286	302	Cf	Limestone, fine to medium crystalline, brown to grey, fossiliferous, scattered traces of CaF_2 from 289.5-290, heavy styolites, few calcite veinlets.
302	304	Cf	Limestone, medium grey, fossiliferous, very shaley.
304	315	Cf	Limestone, medium to dark grey, medium crystalline, fossiliferous, slightly oolitic.
315	344	Cf	Limestone, medium grey, medium crystalline, coquinite.
344	355	Cf	Limestone, dark grey, fine to medium crystalline, fossiliferous, small calcite veins with oil shows, styolitic.
355	359	Cf	Grey shale with limestone lenses.
359	392	Cf	Limestone, light brown grey, medium crystalline very oolitic, few heavy styolites, traces of CaF_2 in calcite veinlets from 390 to 392 and some disseminated zinc.
392	393		Cavity.
393	402.5	Cf	Limestone, dark grey, oolitic.
402.5	407	Cf	Limestone, medium grey, fine crystalline, fossiliferous, shaley.
407	411	Cf	Limestone, dark brown, fine crystalline, silty.

From	To	Fm	Description
411	428	F	Fault. 411-422.5 Brecciated limestone, with good scattered shines of CaF_2, heavy Zn from 422-422.5. 422.5-425.0 Calcite vein with trace of CaF_2 at base. 425.0-428.0 Brecciated limestone and calcite.
428	471.5	Csl	Limestone, fine crystalline, medium grey, heavy light grey chert, few calcite veinlets with oil shows, brecciated limestone and chert from 451-452. Scattered traces of CaF_2 from 455.5-456.5.
471.5	491	Csl?	Limestone as above, good shines of CaF_2, fractured.
491	501	F	Fault. 491.0-496.0 Calcite vein with good shines of CaF_2. 496.0-498.5 Vein CaF_2. 498.5-501.0 Vein calcite.
501	541	Csl	Limestone, light grey, fine to medium crystalline, heavy light grey cherts, fossiliferous, stylolitic, few calcite veinlets, broken core from 539.5-565.5.
565.5	571	Csl	Limestone, light grey, medium crystalline, increase in fractures, fossiliferous, scattered traces of CaF_2, some disseminated Zn.
571	575.6	Csl	Broken core, limestone as above but slightly weathered, scattered traces of CaF_2, Pb, and Zn.
575.6	584.5	Csl	Limestone, light grey, fine to medium crystalline, fossiliferous, cherty, heavy stylolites, scattered traces of CaF_2, Pb, and disseminated Zn.
584.5	606	Csl	Limestone, dark grey, medium to fine crystalline, fossiliferous, scattered shines of CaF_2 in calcite veinlets, brecciated from 602-604.
606	608	F	Fault. Brecciated limestone and calcite, local concentrations of marcasite, good shines of CaF_2.
608	621	Csl	Limestone, dark grey, fine to medium crystalline, fossiliferous, stylolitic, few calcite stringers, 3" calcite veinlet at 616, traces of CaF_2, slightly brecciated in lower 6".
621	650	F	Fault. 621-629 Vein calcite, little limestone, breccia, few shines of greyish tan CaF_2, shines of Pb. 629-650 Brecciated limestone and calcite, some brecciated chert, scattered shines of CaF_2, Zn and Pb.

From	To	Fm	Description
650	731.5	Csl	Limestone and calcite breccia, less fractured than run above, limestone is dark grey, fine crystalline, styolitic, fossiliferous, scattered shines of CaF_2, oil shows, heavy concentrations of marcasite, scattered brecciated chert zones.
731.5	752	Csl	Limestone, dark grey, fine crystalline, fossiliferous, slightly fractured, styolitic, calcite stringers, up to 6", few scattered traces of CaF_2.
752	754	F	Vein calcite with little limestone breccia.
754	797	Csl	Limestone, dark grey, fine to medium crystalline, slightly fractured, styolitic, few scattered traces of CaF_2, oil shoes in calcite veinlets, 3" calcite vein at 772 and 775, 776½-778, little calcite below 778.
797	804.5	Csl	Vein calcite with few shines of CaF_2, some limestone breccia in lower 6".
804.5	844	Csl	Limestone, medium brownish grey, coarse crystalline, cherty (light grey chert), slightly fractured with scattered traces of CaF_2, oil shows in calcite veinlets.
844	851.5	F	Fault. Limestone, chert and calcite breccia and some chert and calcite breccia.
851.5	853	Csl	Limestone, medium brown, slightly fractured, styolitic, calcite veinlets with oil shows, slickensides along jointing.

Bottom 853

ASSAY VALUES FOR HOLE W-22

From	To	CaF_2	Pb	Zn
476.0	480.0	8.24	0.32	0.00
480.0	487.0	10.58	0.06	0.00
487.0	492.4	2.78	0.00	0.00
492.4	496.8	9.54	0.00	0.00
496.8	498.7	94.48	0.16	0.00
498.7	501.2	1.44	0.16	0.00

REYNOLDS METALS COMPANY

Diamond Drill Hole No. W-23; Angle, -45°; Bearing, S47E; Depth, 710'
Coordinates N8890 E8814; Elevation 423.0'
Property, Watson: Area, SE Salem; County, Crittenden; State, Kentucky
Contractor, Joy Manufacturing Company; Foreman, Miles Minner
Started, 4-6-59; Finished 4-15-59

From	To	Fm	Description
0	75		Overburden
75	144	Csl	Limestone, dark brown, fine crystalline, cherty, fossiliferous, numerous cavities, (cavities from 112-120, 139-141). 33 feet recovery.
144	163		Cavity.
163	180	Csl	Limestone, light brown, fine crystalline, cherty, slightly weathered, cavity from 173-179, heavy styolites.
180	229	F	Fault. 180.0 - 188.0 Cavity, mud filled with chert fragments. 188.0 - 229.0 Limestone and calcite breccia, scattered shines of CaF_2, and Zn, increase in CaF_2 from 219-229.
229	237	Cf	Limestone, grey, fine crystalline, slightly fractured, scattered shines of CaF_2.
237	245	Cf	Limestone, medium brown, medium to coarse crystalline, scattered shines of CaF_2 and disseminated Zn.
245	249.3	F	Fault. Limestone and calcite breccia with CaF_2 vein, shines of Pb.
249.3	252	Cf	Limestone, dark brown, medium crystalline, fossiliferous, slightly brecciated, good shines of CaF_2.
252	292.5	Cf	Limestone, medium grey, medium crystalline, oolitic, good shines of CaF_2 down to 257 and good but scattered shines below 257.
292.5	317.5	Cf	Limestone, brown grey, fine crystalline, scattered shines of CaF_2, heavy styolites, calcite stringers, some running with core.
317.5	331	Cf	Limestone, slightly brecciated, medium grey, fine crystalline, cherty, scattered shines of CaF_2.

From	To	Fm	Description
331	358	F	Fault. Brecciated limestone and calcite, partially weathered, good shines of CaF_2, scattered, disseminated Zn, heavy stylolites, calcite vein from 346-348, with shines of Pb and Zn, increase in Pb and Zn with few good shines of CaF_2.
358	366	Cl	Limestone, brown, medium crystalline, fossiliferous, oolitic, few scattered shines of CaF_2 and Zn, calcite vein with good shines of CaF_2, trace of Pb, running with core from 373-380.
366	390	Crc	Sandstone, greenish grey, calcareous, few shale partings with good shines of CaF_2 at 376-377, good scattered shines throughout run, green shale at base.
390	396	Crc	Limestone, medium grey, medium crystalline, oolitic, stylolitic, few calcite stringers, green shale at base.
396	401	Crc	Limestone, medium grey, fine crystalline, with shale partings, fossiliferous, few calcite stringers with oil shows.
401	410	Crc	Limestone, light grey, medium crystalline, very oolitic, slightly fractured with calcite veinlets.
410	418	Crc	Limestone, dark grey green, fine to medium crystalline, fossiliferous, few calcite stringers, few shale partings, sandy.
418	430	Crc	Limestone, grey brown, sandy, with green shale partings in lower 3'.
430	433.5	Cf	Limestone, medium grey, medium crystalline, oolitic, fossiliferous, stylolitic, calcite veinlet running with core in lower 6".
433.5	439	Cf	Green shale, fossiliferous, with irregular limestone, lenses, increase in limestone in lower 3'.
439	459	Cf	Limestone, medium to light grey, medium to coarse crystalline, fossiliferous, numerous calcite veinlets.
459	460	Cf	Grey green shale.
460	481	Cf	Limestone, dark grey brown, medium to coarse crystalline, fossiliferous, stylolitic, fractured, broken core, good scattered shines of CaF_2, some veins running with core.

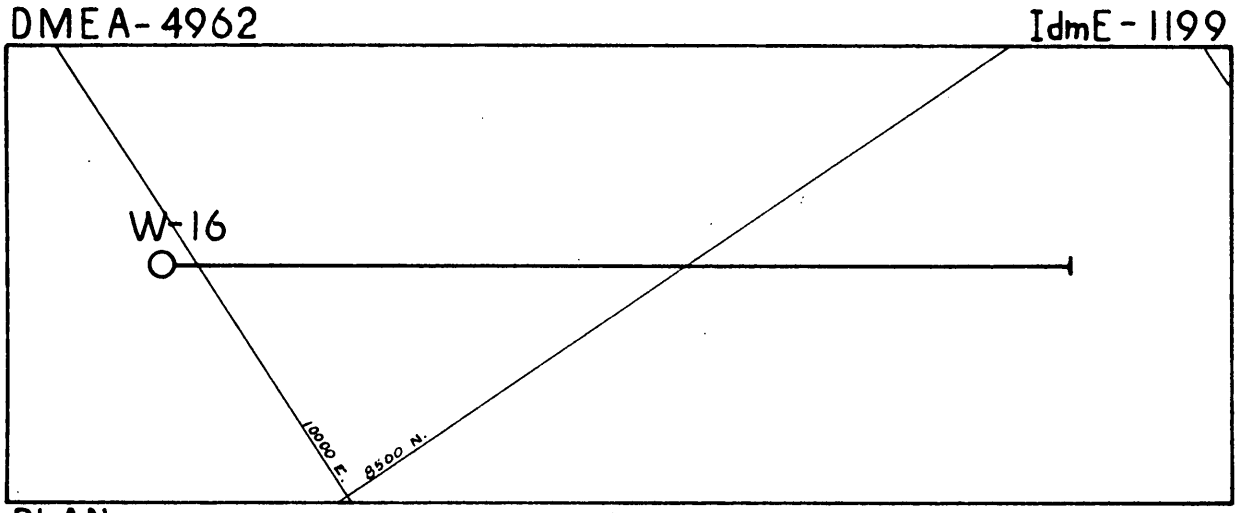
From	To	Fm	Description
481	489	Cf	Limestone, medium brownish grey, medium crystalline, styolitic, few calcite stringers, scattered traces of CaF_2.
489	492	Cf	Limestone, dark grey, fine crystalline, fossiliferous, shaley.
492	508	Cf	Limestone, brown, medium to coarse crystalline, fossiliferous, some disseminated Zn, few calcite stringers.
508	510	Cf	Limestone, light grey, medium crystalline, oolitic, few calcite stringers.
510	527	Cf	Limestone, dark brownish grey, medium crystalline, slightly sandy and oolitic, little disseminated Zn.
527	538	Cf	Limestone, light grey, medium crystalline, oolitic, slightly weathered.
538	551	Cf	Limestone, dark grey, medium crystalline, fossiliferous, styolitic, weathered in lower 2'.
551	572	Cf	Limestone, dark brownish grey, fine crystalline, slightly cherty.
572	577	Cf	Limestone, light grey, medium crystalline, oolitic.
577	588	F	Fault. Cavity.
588	602	Cf	Limestone, dark brown, medium crystalline, oolitic, fossiliferous, slightly fractured, calcite stringers, slightly weathered in zones.
602	603	F	Limestone breccia with good shines of CaF_2.
603	613	Cf	Limestone, dark grey, medium crystalline, few scattered shines of CaF_2, some disseminated Zn.
613	635.5	Cf	Limestone, dark grey, medium to fine crystalline, styolitic, with black chert.
635.5	645	F	Fault. Limestone as above, fractured, with CaF_2 veinlet running with core, with trace of Pb, some disseiminated Zn, little calcite.
645	710	Csl	Limestone, dark grey, fine to medium crystalline, fossiliferous, very cherty with dark grey chert and few scattered calcite stringers.

Bottom 710

ASSAY VALUES FOR W-23

From	To	CaF_2	Pb	Zn
215.8	219.0	8.02	0.27	0.10
221.0	229.0	12.54	0.32	0.60
229.0	246.0	4.46	0.21	0.15
246.0	249.4	26.96	0.32	0.70
249.4	251.8	20.06	0.26	0.20
251.8	258.2	14.98	0.16	0.10
349.2	351.6	12.78	0.11	3.99
351.6	357.5	37.32	0.16	0.39
357.5	363.5	5.64	0.11	0.00

WATSON PROJECT
CRITTENDEN COUNTY, KY.



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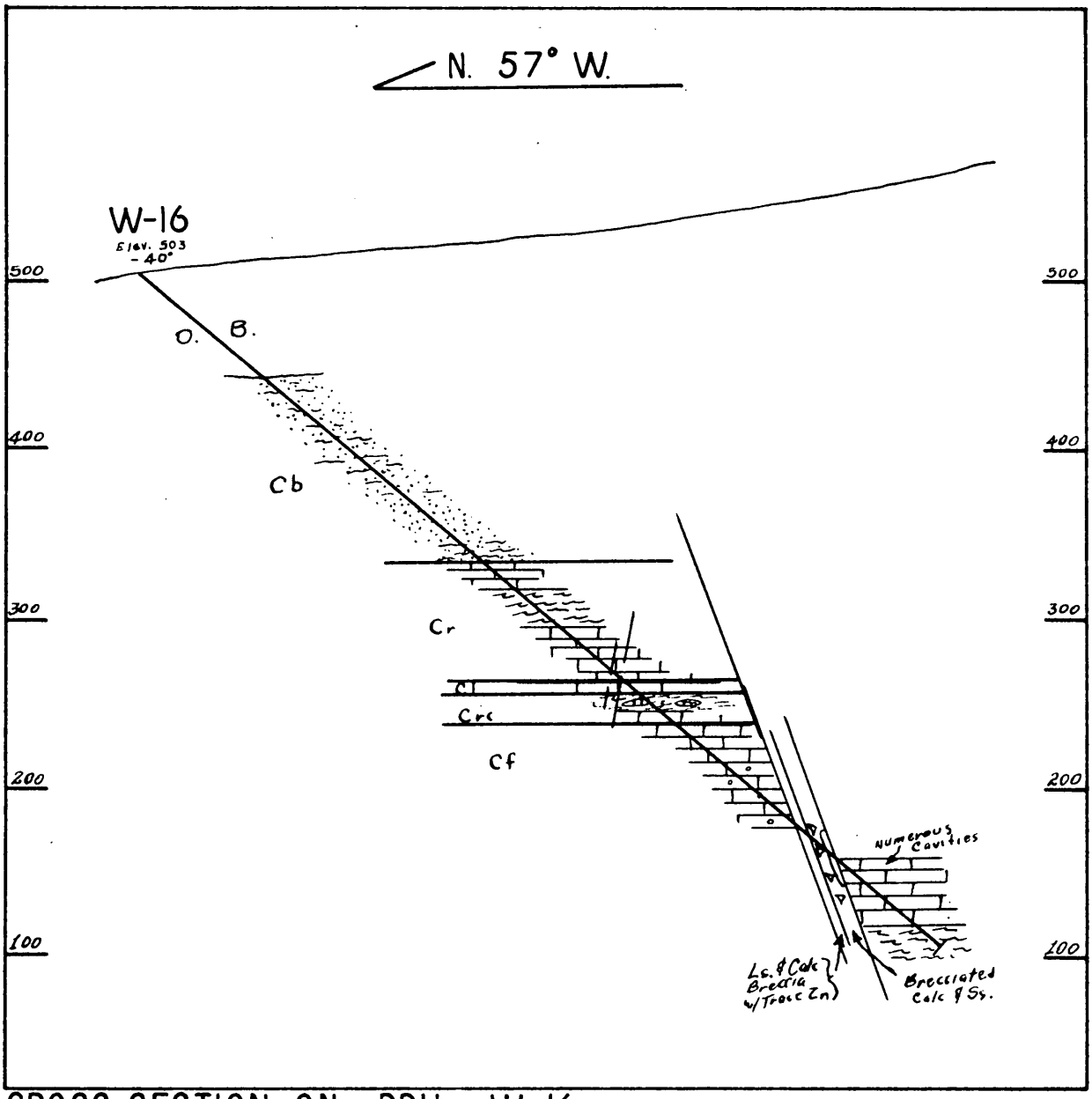


CROSS SECTION ON D.D.H. W-16

VERT. & HORZ. SCALES: 1" = 100'

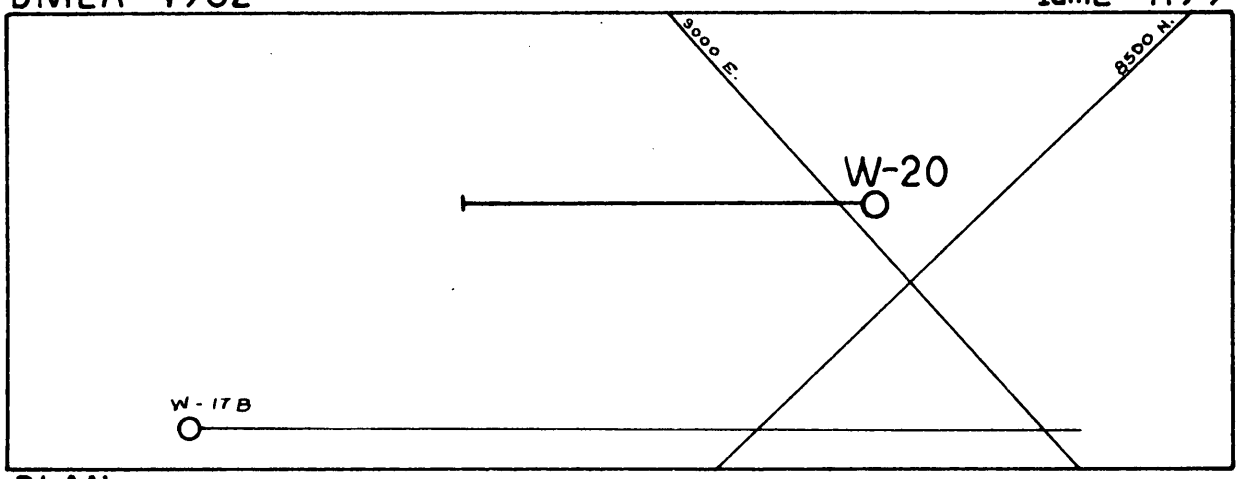
0 50 100 200 300 FT.

J.W.H.

Revised APRIL 1959

WATSON PROJECT
CRITTENDEN COUNTY, KY.

DMEA-4962 IdmE-1199



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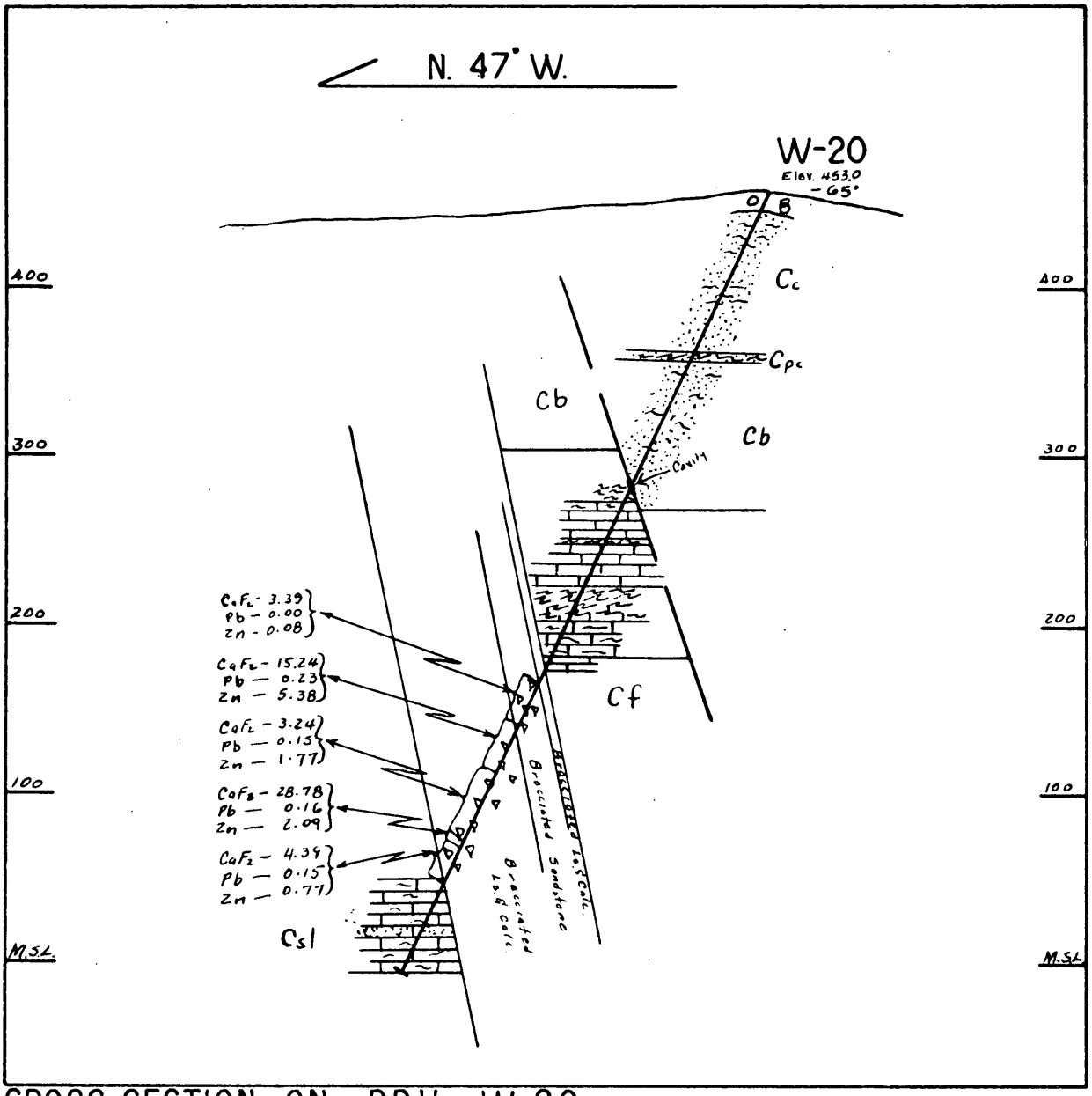


CROSS SECTION ON D.D.H. W-20

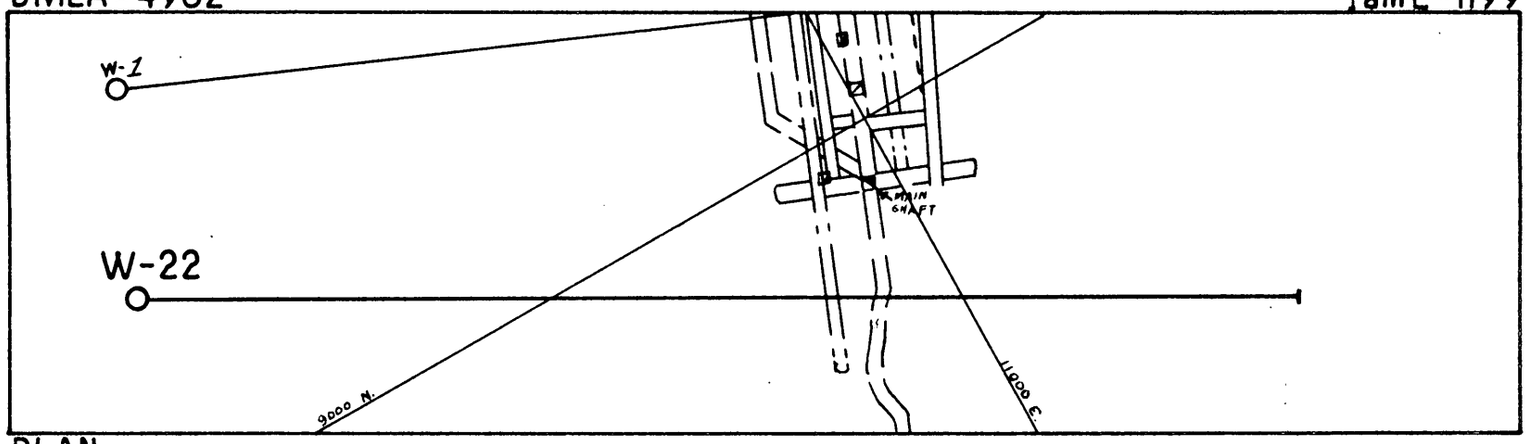
VERT. & HORZ. SCALES : 1" = 100'

0 50 100 200 300 FT.

JWH. APRIL 1959

WATSON PROJECT
CRITTENDEN COUNTY, KY.

DMEA-4962 IdmE-1199



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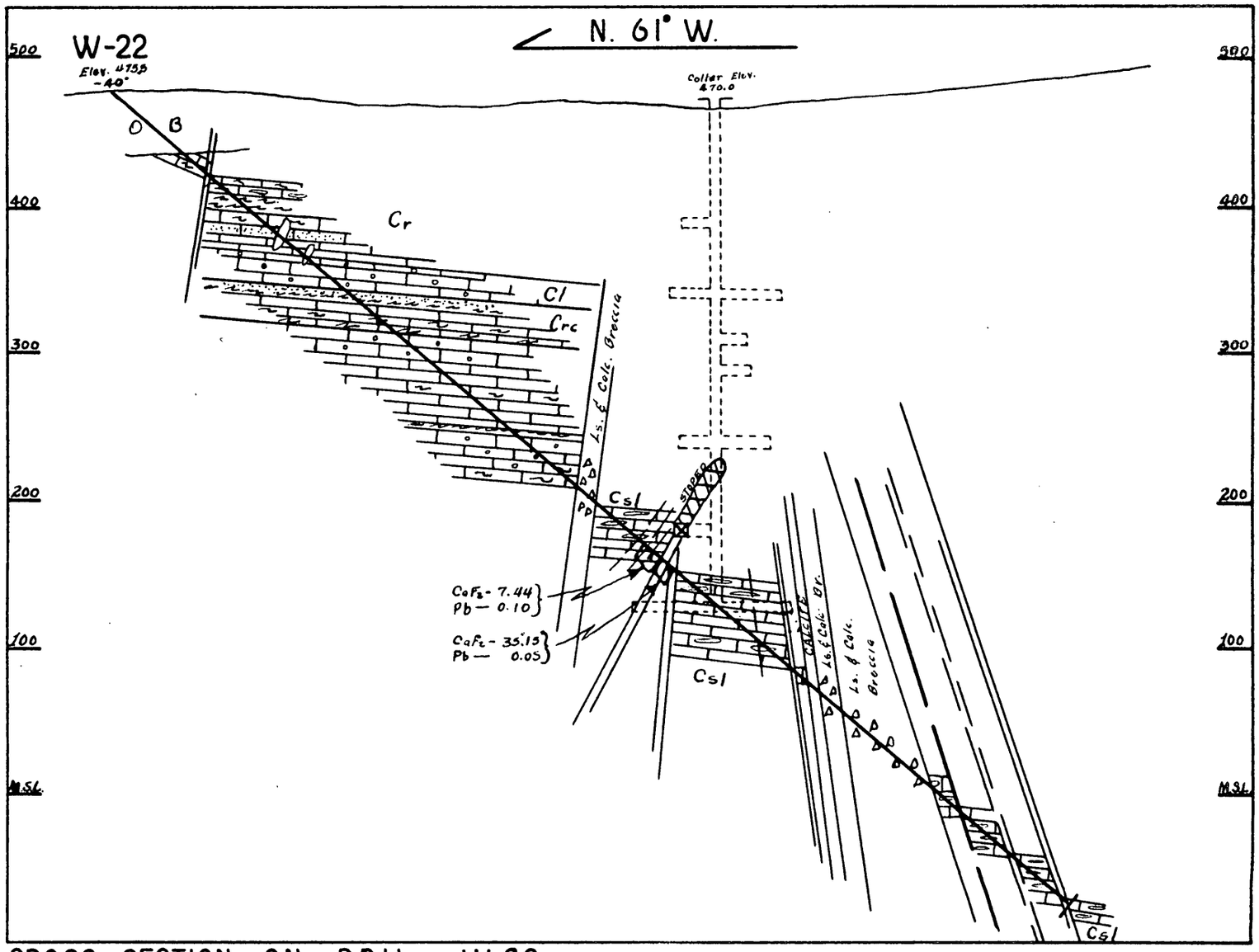


CROSS SECTION ON D.D.H. W-22

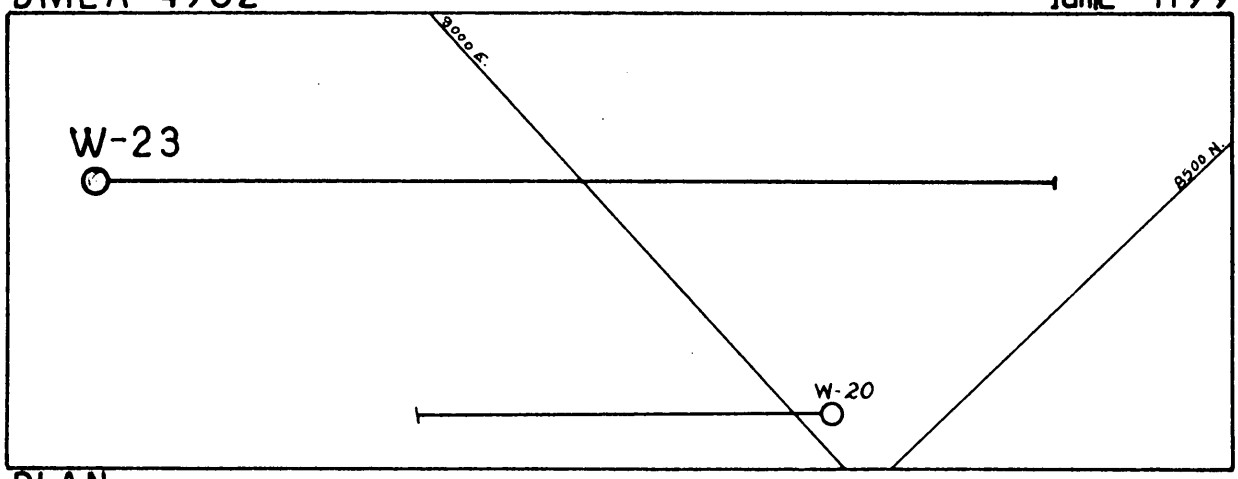
VERT. & HORZ. SCALES: 1" = 100'

0 50 100 200 300 FT.

J.W.H. APRIL 1959

WATSON PROJECT
CRITTENDEN COUNTY, KY.

DMEA-4962 IdmE-1199



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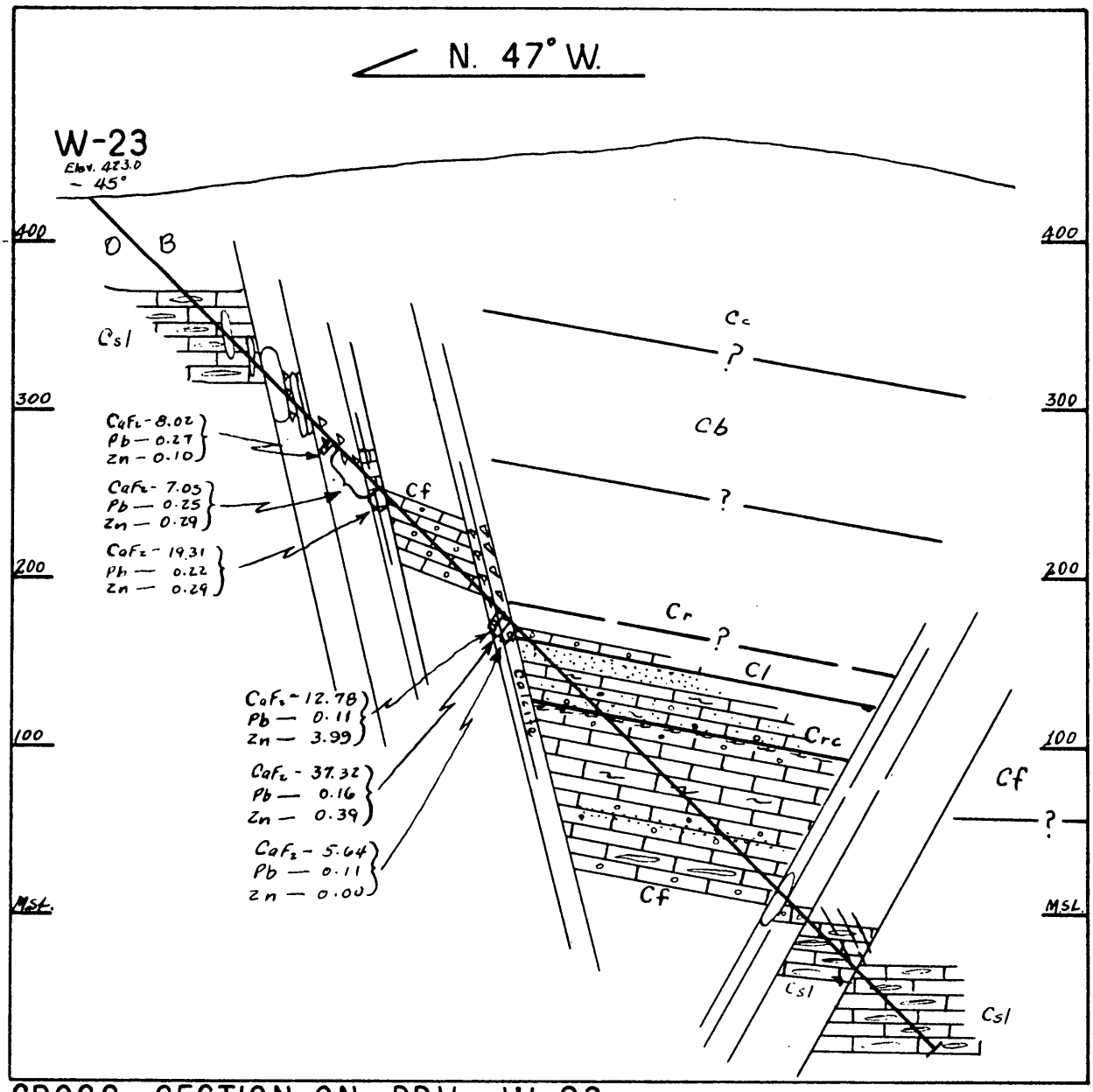

CROSS SECTION ON D.D.H. W-23

VERT. & HORZ. SCALES : 1" = 100

0 50 100 200 300 FT.

J.W.H. APRIL 1959

INTERIM REPORT
DMEA-4962 Idm-E1199

Operator: Reynolds Metals Company, Richmond, Virginia

Location: Watson-Hicks-Tyner properties, Crittenden County, Kentucky

A project inspection of the subject contract was conducted on April 25, 1959. Results obtained to date and future work were discussed with Messrs. John Hook and Thomas Winans, the Operator's geologists. Core recovered since the last project inspection was examined.

Drilling which has been completed under the contract is summarized as follows:

Total number of holes completed to date	22
Total footage in holes completed to date	12,667*
Number of holes completed since last inspection	3
Footage in holes completed since last inspection	1,772
Number of ore holes	9
Number of indicative holes	6
Number of shine holes	1
Number of trace holes	2
Number of barren holes	4

Of the three holes completed since the last project inspection, one (W-20) discovered ore-grade mineralization, one indicative amounts of fluorspar (W-23), and the other hole (W-21) was barren. Summary logs of these three holes are as follows:

Hole No.	Depth in Feet	Description
W-20	0-10	Overburden.
	10-103	Cypress sandstone.
	103-109	Paint Creek shale.
	109-189	Bethel sandstone.
	189-305½	Renault limestone and shale.
	305½-317½	Levias limestone.
	317½-319	Rosiclare sandstone.
	319-450	Fault zone; limestone and sandstone breccia with vein calcite and ore-grade fluorite and sphalerite.
	450-507	St. Louis limestone.
	507	Bottom.

Inclination -65°
Bearing N.47°W.

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O. M. E.
RECEIVED MAY 4 1959

DATE	INITIALS	CODE
5/4	a	220
5/5	FCJ	110
5/8	EOT	800
5/13	Hook	600

* Includes 5' in excess of Stage I measurement.
Talbot 5/5/59

W-21	0-24	Overburden.
	24-83	Golconda limestone and shale.
	83-181	Cypress sandstone.
	181-183	Paint Creek shale.
	183-192	Bethel sandstone.
	192-272	Bethel sandstone.
	272-377	Renault limestone and shale.
	377-387	Levias limestone.
	387-389½	Fault; vein calcite and limestone breccia.
	389½-486	Fredonia limestone.
	486-555	St. Louis limestone.
	555	Bottom.

Inclination -80°
Bearing S.47°E.

W-23	0-75	Overburden.
	75-180	St. Louis limestone.
	180-229	Fault zone; calcite and limestone breccia with shines of fluorite and sphalerite.
	229-245	Fredonia limestone.
	245-249	Fault zone; limestone and calcite breccia with shines of fluorite and galena.
	249-331	Fredonia limestone.
	331-358	Fault zone; heavy shines of fluorite and galena with traces of sphalerite.
	358-366	Levias limestone.
	366-430	Rosiclare sandstone.
	430-577	Fredonia limestone.
	577-588	Cavity; probable fault.
	588-602	Fredonia limestone.
	602-603	Fault; shines of fluorite.
	603-635½	Fredonia limestone.
	635½-645	Fault; shines of fluorite.
	645-710	St. Louis limestone.
	710	Bottom.

Inclination -45°
Bearing S.47°E.

Assay results of mineralization encountered in Hole W-20 are as follows:

Depth in Feet	%CaF_2	%Pb	%Zn
321.3-324.1	6.82	.00	.00
324.1-327.6	11.86	.00	.00
327.6- 349.3	0.94	.00	0.10
349.3-353.6	17.38	0.05	0.20
353.6-355.0	28.98	0.05	2.09
355.0-359.9	18.90	0.43	3.08

359.9-363.5	13.58	0.11	7.07
363.5-370.0	2.16	0.06	4.28
370.0-374.0	12.58	0.16	7.27
374.0-380.0	24.46	0.53	10.66
380.0-382.7	2.06	0.11	1.49
382.7-388.1	7.02	0.37	2.69
388.1-395.0	5.22	0.21	4.98
395.0-424.7	2.20	0.11	0.89
424.7-429.3	28.78	0.16	2.09
429.3-434.2	11.34	0.11	1.09
434.2-452.8	02.56	0.16	0.69

Two holes were in progress at the time of the inspection.

Summary logs of these incomplete holes are as follows:

Hole No.	Depth in Feet	Description
W-22	0-65	Overburden.
	65-174	Renault limestone and shale.
	174-207½	Fredonia limestone.
	207½-253	Rosiclare sandstone
	253-411	Fredonia limestone.
	411-428	Fault; limestone and calcite breccia with shines fluorite and sphalerite.
	428-491	St. Louis limestone; traces of fluorite.
	491-501	Fault; vein calcite with 2½-foot vein of fluorite.
	501-606	St. Louis limestone.
	606-608	Fault; shines of fluorite.
	608-621	St. Louis limestone.
	621-650	Fault; trace of fluorite.
	650-834	St. Louis limestone.
W-24	0-226	St. Louis limestone.

Dewey H. Amos, Geologist
U.S.Geological Survey

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF MINERALS EXPLORATION
ROOM 2-B POST OFFICE BLDG.
KNOXVILLE 2, TENN.

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O. M. E.
RECEIVED APR 22 1959

DATE	INITIALS	C...
4/22	a	220
4/22	[illegible]	800
		600

April 20, 1959

Mr. John W. Hook
Reynolds Metals Company
P.O. Box
Salem, Kentucky

Re: DMEA-4962, Idm-E1199
Watson-Hicks-Tyner Properties
Cittenden County, Ky.

Dear Mr. Hook:

This will confirm the oral approval given by Mr. Amos to drill a hole from a site which is 125 feet N47W from the collar of hole W-17B; to be drilled at approximately -54° inclination, approximate bearing S47°E, and estimated depth about 850 feet.

Sincerely yours,

Robert A. Laurence
Executive Officer, OME
Region V

RAL/zm
cc
Lynch
Opr. Com-2
Amos
Files

Form MF-104 (Rev.)
(April 1952)

APR 22 1959 O.M.E.

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION

Budget Bureau No. 42-R1036.5

PAID ON VOUCHER & SCHEDULE OF PAYMENTS K- 58

WATSON PROJECT
Stages I and II

OPERATOR'S MONTHLY REPORT AND VOUCHER

Month of March 1959 Docket No. DMEA 4962 Contract No. Idaho-1199
Operator's Name Reynolds Metals Company Minerals Fluorspar
Address Richmond, Virginia
Contract Amount, $ 59,710.00 Government Participation: 50 % Amount, $ 29,855.00

ITEMS OF COSTS	FOR OPERATOR'S USE: Monthly Total	Totals Previously Reported	Totals To Date	FOR GOVERNMENT USE ONLY: Approved Monthly Total	Approved Totals Previously Reported	Approved Totals To Date
(1) Independent Short Form Contracts:						
Drilling Core	11094.95	21030.55	32125.50			
Bulldozing Reaming	1596.00	3071.25	4667.25			
Hole Survey Crosscutting Cementing	------	184.00	184.00			
Drifting Lost BX Casing	151.20	280.80	432.00			
Lost AX Casing	17.00	17.00	34.00			
(2) Labor and Supervision:						
Labor						
Supervision						
Technical Services						
(3) Operating Mat'ls. and Supplies:						
Timber						
Explosives						
Pipe						
Track						
Core Boxes						
	------	225.00	225.00			
(4) Operating Equipment:						
Rental						
Purchase						
Depreciation						
(5) Initial Rehabilitation and Repairs						
(6) New Bldgs., Improvements, etc.						
(7) Miscellaneous:						
Repairs to Equipment						
Sampling and Analysis CaF_2	103.50	63.00	166.50			
Payroll Taxes CaF_2, Pb, Zn	162.50	162.50	325.00			
Liability Insurance						
Incidental Allow.	1053.08	1996.12	3049.20			
(8) Contingencies (specify):						
Totals	14178.23	27030.22	41208.45	14178.23	27,030.22	41,208.45

I certify that the above bill is correct and just and that payment therefor has not been received.

Date APR 13 1959 *Payee Reynolds Metals Company

Per H. E. McDaniel Title Accounting Official

*When a voucher is signed or receipted in the name of a company or corporation, the name of the person writing the company or corporate name, as well as the capacity in which he signs, must appear. For example: "John Doe Company, per John Smith, Secretary," or "Treasurer," as the case may be.

NOTE.—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.

(Instructions on reverse)

Pursuant to authority vested in me, I certify that this account is correct and proper for payment in the amount of:

$ 7089.11

Signature Helen R. Meller
(Authorized Certifying Officer)

Date APR 20 1959 Vou. No. 104
(See other side)

7089.12

(For Government use only)

CERTIFICATION BY GOVERNMENT REPRESENTATIVE:

I certify that to the best of my knowledge and belief the contractor submitting this voucher is operating a Defense Minerals Exploration Administration project under Contract No. E-1192 in accordance with the terms of the contract.

Signature W. A. Beale Title MINING ENGINEER U. S. BUREAU OF MINES Date APR 17 1959

APPROVAL BY DMEA EXECUTIVE OFFICER OR ALTERNATE:

Signature T. J. Lynch Title ACTING EXECUTIVE OFFICER DME - REGION V Date APR 17 1959

MONTHLY REPORT OF OPERATOR

The Operator (Contractor) of an exploration project is required to make a monthly report to the Government through the Regional Executive Officer. This report consists of three parts as follows:

(a) *Form MF-104—Operator's Monthly Report and Voucher.*—This form details expenditures and constitutes a voucher for reimbursing the Operator for the Government's share of costs;

(b) *Form MF-104A—Operator's Unit Cost and Progress Report.*—This is a statistical report of expenditures which shows costs for the various types of operation; and

(c) *Narrative.*—A concise narrative description of progress made, results accomplished, and any unusual difficulties encountered must be furnished as an attachment to this Report and Voucher. Wherever possible, the narrative is to be illustrated with maps or sketches showing formations penetrated and location and assays of samples taken as well as advances in workings. In the case of diamond drilling or churn drilling, the location and inclination of holes is to be shown on a map; logs and assays also are to be submitted.

The Monthly Report of Operator should be prepared in an original and four copies all of which must be sent to the Executive Officer of the Region not later than the 15th of the month following.

Preparation of Form MF-104—Operator's Monthly Report and Voucher.—All the applicable spaces in Form MF-104 should be filled in by the Operator, and the Operator or his agent should sign the certification in the lower left corner of the form.

The items of costs are arranged in the order they appear in Article 6 (a) of Form MF-200 (Revised February 1952), however, this form is readily adaptable for use in reporting activities under other contract forms.

Under Item (1) delete words "Short Form" if the contract is a sub-contract under Form MF-200; and delete word "Independent" if the contract reported is on Form MF-200 (A). Also, report work paid for on a unit basis under contract Form MF-200 as though it were performed under an independent contract.

Under Item (2) include labor, supervision and technical services incurred for the exploratory operations. Do not include labor, supervision and technical services used for work performed under items (5) and (6).

Under Item (3) include the costs of material and supplies used in the project other than that used under items (5) and (6).

Under Item (4) appear the three types of operating equipment expenditures, that is, rental, purchase and depreciation. The expenditures made for renting equipment belonging to a third party will be reported under "Rental". The amount paid or duly obligated for payment for the purchase of equipment will be reported under "Purchase". The amount of expenditures due the Operator to reimburse him for depreciation of equipment owned will be reported under "Depreciation".

Item (5) comprises costs of labor, supervision, technical services, materials, etc., which are used in the initial rehabilitation and repair of existing buildings, installations, fixtures, and equipment. These costs, therefore, should not be reported under items (2) and (3).

Item (6) includes the labor, supervision, technical services, materials, etc., used in the installation or construction of new buildings, fixed improvements, etc., necessary for the project. These costs, therefore, should not be reported under items (2) and (3).

Item (7) covers miscellaneous types of expenditure such as payroll taxes, liability insurance, workmen's compensation insurance, repairs to equipment and sampling and analysis. Only that part of payroll taxes, liability insurance and workmen's compensation which are paid by the operator should be reported under item (7). The share paid by the employee as a payroll deduction is to be included under item (2) as labor costs.

Item (8) includes any unforeseen costs not included in the other seven categories.

The original of Form MF-104 when submitted for reimbursable expenses incurred under contract Form MF-200 must be supported by original documentation or by certified copies of purchase orders, payrolls or transcripts of payrolls, unless such documentation has been waived by the Regional Executive Officer. This certification may be stated thus, "Certified True Copy (or Transcript)", followed by appropriate signature. If the Executive Officer of the Region determines that a contract under Form MF-200 should have an "on-site" audit, that is, a Government auditor should make an audit of the Operator's books and records of account, the Operator need not support his monthly voucher with original or certified documents except in cases of equipment purchases whose individual costs exceed $50.00. In these cases the original or a certified copy of the purchase order or invoice should be attached to the Monthly Voucher. N. B.—Only the *original* of Form MF-104 is required to be documented. The four copies of Form MF-104 are not to be thus supported.

Form MF-104 submitted for reimbursement under fixed price contracts on Form MF-200 (A), however, are not required to be supported by documentation of any kind. The Operator will submit his claim under item (1) of Form MF-104 by deleting as stated above the word "Independent" and by showing the number of feet or other units immediately after the appropriate descriptive word, such as, drilling, bulldozing, crosscutting, drifting, etc., and giving the "Monthly Total" amount due. "Totals Previously Reported", and "Totals to Date" columns should also be filled in.

Form MF-104A
(April 1952)

Budget Bureau No. 42-R1151.2

UNITED STATES
DEPARTMENT OF THE INTERIOR

DEFENSE MINERALS EXPLORATION ADMINISTRATION

Watson Project
Stage I

OPERATOR'S UNIT COST AND PROGRESS REPORT

Month of March 195 9 Docket No. DMEA 4962 Contract No. Idm-E1192
Operator's Name Reynolds Metals Company Minerals Fluorspar
Address Richmond, Virginia

OPERATION	Unit	Costs This Month	Units This Month	Costs to Date	Units to Date	Unit Costs to Date	Authorized by Contract: Units	Authorized by Contract: Unit Costs
Drifting								
Crosscutting								
Raising								
Shafts Core Boxes	1	-----	----	225.00	75		75	3.00
Winzes								
Drilling: Core Ft	ft.	1557.60	528	20355.00	6900		6900	2.95
Churn Reaming	ft.	-----	----	2299.50	1314		2000	1.75
Hole Survey Cementing	hr.	-----	----	184.00	23		80	8.00
Stripping Lost Bx Casing	ft.	-----	----	216.00	100		300	2.16
Trenching Lost Ax Casing	ft.	-----	----	17.00	10		300	1.70
Test Pits Assay CaF_2	1	-----	----	58.50	13		75	4.50
Roads and Trails CaF_2, Zn, Pb	1	-----	----	162.50	25		25	6.50
Incidental Allow.	ft.	147.84	528	1932.00	6900		6900	0.28
Total Distributed Costs								Total Costs Authorized by Contract
Operating Equipment Purchased								
Initial Rehabilitation and Repairs								
New Buildings, Improvements, etc.								
Total Costs		1705.44		25449.50				59710.00

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

Date APR 13 1959 Operator Reynolds Metals Company

Per H. E. McDaniel Title Accounting Official

Remarks: Costs are for hole W-15, the final Stage I hole. This hole bottomed at 534 feet, 6 feet over the maximum. Reynolds is absorbing this extra footage.

→ NOTE.—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.

(Instructions on reverse)

(For Government use only)

W. A. Beck
MINING ENGINEER
U. S. BUREAU OF MINES

INSTRUCTIONS

Preparation of Form MF-104A—Operator's Unit Cost and Progress Report.—Applicable places on Form 104A should be filled in by the Operator. The purpose of this form is twofold as follows: (1) to furnish the supervising engineers and other administrators with statistical information necessary to better determine the progress of the project; and (2) to furnish more permanent information on mining costs for future use. The more important phases of operation on which permanent information is desired have been outlined in the form. There are blank lines, however, for those unusual phases which may need to be reported for a particular project. It will be necessary for the Operator to distribute his costs among the applicable phases reported with the exception of three items the costs of which are not to be distributed by the Operator. These three items are: "Operating Equipment Purchased", "Initial Rehabilitation and Repairs", and "New Buildings, Improvements, etc." The reason for not distributing these items on a monthly basis is doubtless clear to the Operator, since such distribution might well overstate the cost for any one month or period short of the entire contract period.

Form MF-104A has been designed to tie in with Form MF-104 for both monthly and cumulative costs. The "Total Costs" on Form MF-104A for each month should equal the monthly "Total Costs" as reported on Form MF-104. This is also true of the "Total Costs To Date".

In preparing Form MF-104A, it will be necessary frequently to distribute certain costs over a number of items. For instance, supervisory and engineering costs may have to be distributed over several phases, such as, drifting, crosscutting, raising, etc., provided that these items were reported active for the month. Such distributions should be made on the basis of time spent on the various phases, on man days of labor charged to such phases, or on some other equitable basis. "Operating Equipment", "Initial Rehabilitation and Repairs", and "New Buildings Improvements, etc.", will be distributed to the several phases of the project by the Washington Office of DMEA at the close of the project if determined necessary. The last two columns headed "Authorized by Contract" will be filled in by the Operator if such information is found in the contract. This information is usually a part of Exhibit "A" of the contract. A space for remarks has been provided for the use of the Operator to call attention to any unusual circumstances causing excessive or disproportionate unit costs.

GPO 872894

Form MF-104A
(April 1952)

Budget Bureau No. 42-R1151.2

UNITED STATES
DEPARTMENT OF THE INTERIOR

Watson Project
Stage II

DEFENSE MINERALS EXPLORATION ADMINISTRATION

OPERATOR'S UNIT COST AND PROGRESS REPORT

Month of March 1959 Docket No. DMEA 4962 Contract No. Idm-K1199
Operator's Name Reynolds Metals Company Minerals Fluorspar
Address Richmond, Virginia

OPERATION	UNIT	COSTS THIS MONTH	UNITS THIS MONTH	COSTS TO DATE	UNITS TO DATE	UNIT COSTS TO DATE	AUTHORIZED BY CONTRACT Units	AUTHORIZED BY CONTRACT Unit Costs
Drifting								
Crosscutting								
Raising								
Shafts								
Winzes								
Drilling: Core	ft	9537.35	3233	11770.50	3990		8000	2.95
~~Chun~~ Reaming	ft	1596.00	912	2367.75	1353		2000	1.75
Hole ~~Surv~~ Cementing	hr	----	----	------	----		100	8.00
~~Stripping~~ Lost Bx Casing	ft	151.20	70	216.00	100		300	2.16
~~Trenching~~ Lost Ax Casing	ft	17.00	10	17.00 ✓	10		300	1.70
~~Test Pits~~ Assay CaF_2	1	103.50	23	108.00	24		75	4.50
~~Roads and Trails~~ CaF_2, Zn, Pb	1	162.50	25	162.50	25		25	6.50
Incidental Allow	ft	905.24	3233	1117.20	3990		8000	0.28
TOTAL DISTRIBUTED COSTS								TOTAL COSTS AUTHORIZED BY CONTRACT
Operating Equipment Purchased								
Initial Rehabilitation and Repairs								
New Buildings, Improvements, etc.								
TOTAL COSTS		12,472.79		15,758.95				59,710.00

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

Date APR 13 1959 Operator Reynolds Metals Company

Per H. E. McDaniel Title Accounting Official

REMARKS: Costs are for Stage II holes W-13, W-16, W-17B, W-18, and W-19. Overage on CaF_2, Zn, Pb assays are included in CaF_2 column with Reynolds absorbing the difference in the cost. Invoice for assays on hole W-13 were sent in last month.

NOTE.—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.

(Instructions on reverse)

(For Government use only)

W. A. Beck
MINING ENGINEER
U. S. BUREAU OF MINES

INSTRUCTIONS

Preparation of Form MF-104A—Operator's Unit Cost and Progress Report.—Applicable places on Form 104A should be filled in by the Operator. The purpose of this form is twofold as follows: (1) to furnish the supervising engineers and other administrators with statistical information necessary to better determine the progress of the project; and (2) to furnish more permanent information on mining costs for future use. The more important phases of operation on which permanent information is desired have been outlined in the form. There are blank lines, however, for those unusual phases which may need to be reported for a particular project. It will be necessary for the Operator to distribute his costs among the applicable phases reported with the exception of three items the costs of which are not to be distributed by the Operator. These three items are: "Operating Equipment Purchased", "Initial Rehabilitation and Repairs", and "New Buildings, Improvements, etc." The reason for not distributing these items on a monthly basis is doubtless clear to the Operator, since such distribution might well overstate the cost for any one month or period short of the entire contract period.

Form MF-104A has been designed to tie in with Form MF-104 for both monthly and cumulative costs. The "Total Costs" on Form MF-104A for each month should equal the monthly "Total Costs" as reported on Form MF-104. This is also true of the "Total Costs To Date".

In preparing Form MF-104A, it will be necessary frequently to distribute certain costs over a number of items. For instance, supervisory and engineering costs may have to be distributed over several phases, such as, drifting, crosscutting, raising, etc., provided that these items were reported active for the month. Such distributions should be made on the basis of time spent on the various phases, on man days of labor charged to such phases, or on some other equitable basis. "Operating Equipment", "Initial Rehabilitation and Repairs", and "New Buildings Improvements, etc.", will be distributed to the several phases of the project by the Washington Office of DMEA at the close of the project if determined necessary. The last two columns headed "Authorized by Contract" will be filled in by the Operator if such information is found in the contract. This information is usually a part of Exhibit "A" of the contract. A space for remarks has been provided for the use of the Operator to call attention to any unusual circumstances causing excessive or disproportionate unit costs.

GPO 872894

REYNOLDS METALS COMPANY
Monthly Report - March, 1959
Watson Project-DMEA 4962-I&m-E1199
Crittenden County, Kentucky

by
John W. Hook

Stage I

All of the Stage I work was completed in February and covered in the narrative for the February report. However, the completion date of W-15 was after the 2-25-59 Joy invoice and is charged to the March accounting forms.

As stated in last month's narrative, the total footage for Stage I is 6,906 feet, 6 feet over the maximum. The additional 6 feet are not charged to the accounting report.

The log for W-15 and a cross section showing holes W-15, W-8 and W-17B are enclosed.

REYNOLDS METALS COMPANY
Monthly Report - March, 1959
Watson Property-DMEA 4962 - Idm-M1199
Crittenden County, Kentucky

by
John W. Hook

Stage II

Holes W-13, W-16, W-17(lost), W-17B, W-18, W-19, and W-21 bottomed during March and W-20 and W-22 are in progress.

The holes are continuing to find massive zones of low grade breccias but the runs of ore grade mineralization are not very consistent from one hole to another. For the most part, the true vein structures contain calcite while the fluorspar, lead and zinc mineralization is in the brecciated limestone wall rock. The grade of these breccia zones vary greatly from one hole to another. An example of this may be seen in comparing the cross sections of holes W-17(lost) and W-17B which are only 25 feet apart.

Holes W-13, W-16, W-18, W-19 and W-22 are test along faults 3 and 12-B, southeast of the Watson mine.

W-13 cut the faults 100' northeast of and 75 feet higher than the W-3 penetration. The hole found five zones of strong mineralization in brecciated limestones (assays ranged from 5% to 30% CaF_2 - see log or cross section for details). In all, 162.9 feet of core from this hole were assayed.

W-16 was drilled 200 feet south west of W-7. This hole found very little structure and no mineralization along the projection of fault 12-B. Fault 3 had 230 feet displacement but only weak shine mineralization.

W-18 was drilled 115' north east of W-13 and on a 40° angle to cut the targets slightly higher. The hole cut similar structure but considerably less mineralization than W-13. There were 20 feet of 21.04% from 478.3 to 498.3 feet, including 7½ feet of 26.38% CaF_2 on fault 3 (vein A), but the higher structure had only traces of fluorspar. However, there were several large cavities on fault 12-B from which there was no recovery.

W-19 was drilled midway between W-7 and W-3. This hole found weak shines along the various breaks associated with fault 12-B and 17.4 feet of 13.52% CaF_2 on fault 3 (veinA). 3 feet of this assayed 32.98% CaF_2.

W-22 is being drilled 109 feet south west of W-1 and is designed to test the faults midway between holes W-1 and W-2. The hole was collared on the last day of the month.

Holes W-17, W-17B, and W-20 were tests along faults 1 and 1-A. W-17B was extended to intersect faults 10 and 10-A.

REYNOLDS METALS COMPANY

Stage II

W-17 found 24 feet of 21.03% CaF_2, 0.5% Pb and 0.51% Zn on fault 1, weak shines on fault 1-A and 3.5 feet of 30.78% CaF_2 on a new fault which we will designate as 1-B. The hole cut a large cavity on fault 10-A and was lost before fault 10 was reached.

W-17B was drilled 25 feet northeast of W-17 to replace the lost hole. This hole cut considerably heavier mineralization than W-17. The entire zone from fault 1 to 1-A was mineralized with 94.5 feet averaging 14.11% CaF_2, 0.82% Pb and 1.27% Zn from 205.3 to 299.8 feet. See log and cross section for details. Fault 1-B had calcite and only traces of fluorspar. Fault 10-A again was marked by a cavity and fault 10 was mainly calcite with shines of fluorspar in the calcite and in the brecciated footwall.

W-20 was in progress at 314' at the end of the month. This hole was drilled from the hanging wall side of faults 1 and 1-A, parallel to and 100 feet northeast of 17-B. At 314 feet it was just entering the fault zone. (This hole bottomed April 3 at 507 feet and found mineralization similar to W-17B). The log, cross section and assays will be sent with the April report.

W-21 cut fault 10 at the Rosiclare horizon, 150' feet southwest of W-11. It found a narrow vein of calcite with only traces of fluorspar.

Drilling Summary

Hole No.	Location North	Location East	Bearing	Angle	Depth	Started	Finished
W-13	9245	10585	S50E	-45	642	2-17-59	3-3-59
W-16	8652	9987	S57E	-40	619	2-23-59	3-6-59
W-17	8683	8660	S47E	-45	592*	2-17-59	3-13-59
W-17B	8702	8676	S47E	-45	661	3-14-59	3-24-59
W-18	9335	10660	S50E	-40	577	3-7-59	3-24-59
W-19	9036	10264	S50E	-40	734	3-10-59	3-20-59
W-20	8540	9015	N47W	-65	507	3-28-59	4-3-59
W-21	7746	8321	S47E	-80	555	3-24-59	4-1-59
W-22	9615	10593	S61E	-40		3-30-59	In progress.

*Hole W-17 was lost at this depth.

REYNOLDS METALS COMPANY

Diamond Drill Hole No. W-13; Angle-45°; Bearing S50E; Depth 642'
Coordinates N9245 E10585; Elevation 467.0'
Property, Watson; Area, SE Salem; County, Crittenden; State, Kentucky
Driller, E. J. Hayes - Foreman, E. J. Hayes
Started 2-17-59 - Finished 3-3-59

From	To	Fm	Description
0	40		Overburden
40	43	Cr	Limestone, brown, medium crystalline, fossiliferous, sandy (?), 3" oxidized zone at 42 feet with green shale.
43	53	Cr	Shale, greenish grey, with alternating limestone beds.
53	81	Cr	Black shale, weathers green, slicken sides along bedding, marcasite along bedding.
81	99	Cr	Limestone, brown, fine crystalline, very fossiliferous, numerous shale partings.
99	107	Cr	Hawthorn bit used, no recovery, shale in run.
107	115	Cr	Shale, dark brown grey, with limestone beds, thin and light grey, irregularly bedded, angle of bedding 45°, grades into limestone below.
115	137	Cr	Limestone, dark grey, medium crystalline, fossiliferous, alternating shaley zones, brown grey, fossiliferous. Angle of bedding 45°, small calcite veinlets normal to bedding, some oil shows in calcite.
137	141	Cr	Conglomeritic limestone, medium to fine crystalline and medium brown matrix. Dark grey sub-angular limestone conglomerate.
141	143.5		Cavity
143.5	157	Cf	Limestone, brown, lithographic, fossiliferous, broken core 158-160, cavity 151-156.5, broken core 156.5-170, cavity, 171-183, scattered traces of CaF2 183-184.5
157	188.9	Crc	Limestone, medium crystalline, dark grey, sandy.
188.9	198.7	Crc	Sandstone, medium grey, medium grained, calcareous, calcite stringer from 195.8-196.4, with traces of CaF2 at 195.8. Below 196.4 sandstone is brecciated with scattered shines of CaF2.

REYNOLDS METALS COMPANY

From	To	Fm	Description
198.7	207.2	Csg	Limestone, grey brown, fine to medium crystalline, oolitic, fossiliferous, with calcite veins up to 3" scattered along run. Oil impregnated calcite and stylolitic.
207.2	209.2	Fault	Calcite and limestone breccia with good shines of CaF_2 from 207.2-208.
209.2	219.3	Csg	Limestone, brown, fine crystalline, few fossils, few scattered shines of CaF_2 in run, shaley partings with increase in shale toward bottom.
219.3	220.3		Calcite vein running sub-parallel to core.
220.3	222.8	Csg	Limestone, brownish grey, medium crystalline, few oolites, good shines of CaF_2 from 220.3-221.3, 222.4-222.8.
222.8	232.1		Fault. 222.8-225.2 Vein calcite with limestone breccia in upper 6" with good shines of CaF_2. Zn in breccia. 225.2-228.3 Limestone and calcite breccia with good shines of CaF_2 and Zn with Trace of Pb. 228.3-230 Vein CaF_2 with shine of Pb and Zn, and with calcite in lower 6". 230 -232.1 Vein calcite with few limestone inclusions, disseminated zinc.
232.1	251.5	Cal	Limestone, medium brownish grey, fine to medium crystalline, fossiliferous with some large calcite veins (up to 6"). Disseminated Zn to 235'. Scattered but good shines of CaF_2 at 234 with decrease in shines toward bottom. Few scattered shines to 251.5 and some disseminated Zn.
251.5	274.2	Cal	Limestone, brown, fine to medium crystalline, fractured, with calcite veinlets, few shines of CaF_2, few shale partings.
274.2	305.9		Fault. 274.2 - 274.6 Brecciated limestone and calcite with good shines of Pb and Zn, vein is apparently vertical. 274.6 - 275.7 Vein CaF_2 with good shines of Pb and Zn, vein possibly vertical. 275.7 - 281 Limestone and calcite breccia with scattered shines of Pb.

REYNOLDS METALS COMPANY

From	To	Fm	Description
			281 - 289.5 Limestone breccia, less brecciated than above with few scattered CaF_2 shines. 289.5 - 293 Limestone and calcite breccia with disseminated zinc and good shines of CaF_2, trace of Pb. 293 - 297 Cavity, mud filled. 297 - 301 Limestone and calcite breccia with good shines of CaF_2, Zn and Pb. 301 - 305.9 Broken limestone, with scattered shines of CaF_2.
305.9	329.5	Csl	Limestone, medium crystalline, medium to dark brown, slightly fractured and broken with calcite stringers. Few scattered shines of CaF_2 in small stringers and scattered in calcite stringers. Some stringers weathered.
329.5	331		CaF_2 vein, with trace of Pb, running sub-parallel to core.
331	353	Csl	Limestone, medium crystalline, brown, cherty, few CaF_2 veinlets, few stringers of calcite.
353	354		Fault. Limestone, calcite and CaF_2 breccia.
354	366	Csl	Limestone, fine crystalline, brownish grey, weathers brown, slightly brecciated in upper 5'. Scattered shines CaF_2 in calcite veinlets, less fractured toward bottom with few CaF_2 shines.
366	443	Csl	Limestone, medium to fine crystalline, brown, fossiliferous, cherty, scattered shines of CaF_2 from 386-399, few scattered calcite veinlets, slightly brecciated 415-416, some weathered zones.
443	446.5		Fault. Limestone and calcite breccia, oil in calcite in upper 1.5'.
446.5	499.5	Csl	Limestone, medium to fine crystalline, grey brown, cherty, stylolitic, CaF_2 shines at 456.5, few calcite stringers, CaF_2 shines at 478.5, 480.5, 483.5, 484.5.
499.5	513.5		Fault. Limestone, calcite breccia, with scattered shines of CaF_2, some of the limestone is shaley, few oil shows in calcite.
513.5	523	Csl	Limestone, brown, coarse crystalline, slightly fractured with calcite stringers, few CaF_2 shines, localized marcasite concentrations.

REYNOLDS METALS COMPANY

From	To	Fm	Description
523	547.5		Fault. Limestone, calcite and chert breccia, with few scattered shines of CaF_2, less brecciated from 532.5-542.
547.5	595	Cal	Limestone, coarse crystalline, grey and greyish green, few scattered calcite veinlets, disseminated zinc and traces of CaF_2 in 3" zone at 568'.
595	596.5		Fault. Limestone and calcite breccia with good shines of CaF_2.
596.5	616	Cal	Limestone, medium grey, medium to coarse crystalline, slightly fractured, with good scattered shines of CaF_2.
616	635		Fault. Calcite vein, few scattered shines of CaF_2, (good), limestone and limestone breccia from 626.5 -628. Limestone and calcite breccia in lower 1.5'.
635	637	Cag	Limestone, grey brown, medium crystalline, oolitic, few calcite stringers, 2" shale bed at 637.
637	642	Cag	Silt, 2" core recovery, 1" limestone at base.

Bottom 642'

Assay Values for Diamond Drill Hole W-13

From	To	CaF_2	SiO_2	$CaCO_3$	Pb	Zn
207.3	209.0	21.56	14.84	61.04	0.37	0.20
209.0	222.0	3.58	12.88	80.92	0.16	0.10
222.0	226.3	3.28	9.88	85.82	0.11	0.30
226.3	228.2	4.38	16.08	73.42	0.21	2.99
228.2	230.0	81.67	1.66	14.95	1.28	0.39
230.0	232.0	6.56	11.78	80.04	0.21	0.79
232.0	235.0	6.68	25.28	65.22	0.16	0.20
235.0	244.5	4.72	32.22	60.54	0.22	0.49
275.0	276.9	52.36	13.04	30.06	0.75	1.49
276.9	280.0	10.04	19.78	66.84	0.27	1.59
280.0	287.9	4.94	23.94	57.54	0.43	0.59
287.9	293.0	19.16	27.02	48.04	0.43	2.68
297.0	300.5	6.56	15.84	75.22	0.16	0.89
329.0	331	24.74	31.52	41.86	0.32	
331	336.7	5.40	34.36	57.86	0.21	
336.7	363.7	4.38	27.54	65.48		
497.0	510.5	7.90	20.82	67.98		
510.5	517.5	12.92	10.68	72.76		
517.5	528.5	6.72	3.84	87.86		
589.0	594.8	2.98	28.56	63.98		
594.8	597.2	39.32	10.42	48.82		
597.2	608.6	8.22	5.14	85.22		
608.6	615.5	24.22	3.70	71.14		
615.5	627	9.92	1.88	87.42		

REYNOLDS METALS COMPANY

Diamond Drill Hole W-15; Angle -45°; Bearing S57E; Depth, 534'
Coordinates N7871 E9587 Elevation 484.5
Property, Watson; Area, SE Salem; County, Crittenden; State, Kentucky
Driller, Shouse; Foreman, Niles Minner
Contractor: Joy Manufacturing Company
Started 2/14/59; Finished 2/27/59

From	To	Fm	Description
0	20		Overburden
20	38	Cc	Sandstone, massive.
38	53	Cc	Sandstone, shale, green and thin bedded.
53	74	Cc	Sandstone, massive.
74	92	Cc	Coal
92	101	Cc	Siltstone, green-black.
101	102.5	Cc	Sandstone with black shale.
102.5	108	Cc	Shale or siltstone with sand.
108	112.5	Cc	Sandstone, mottled, with green silt, few brown limestone inclusions.
112.5	133	Cc	Sandstone, massive, except for scattered shale partings.
133	138	Cpc	Shale, black, 2' recovery.
138	157	Cb	Sandstone with black shale.
157	205.5	Cb	Sandstone, massive.
205.5	215	Cr	Black shale, angle of bedding 45° at 210.5.
215	217	Cr	Limestone, grey green, medium crystalline, fossiliferous and silty, numerous shale partings.
217	221.5	Cr	Limestone and shale, mostly limestone, coarse crystalline to medium crystalline; shale is green grey, fossiliferous.
221.5	228	Cr	Limestone, brown grey, coarse crystalline, fossiliferous, few shale partings.
228	242	Cr	Limestone, brown grey, fine to medium crystalline, fossiliferous, few shale partings, stylolitic, few calcite stringers.

REYNOLDS METALS COMPANY

From	To	Fm	Description
242	245	Cr	Green shale.
245	251	Cr	Limestone, brown, coarse crystalline, fossiliferous, styolitic, few shale partings and calcite veinlets.
251	252	Cr	Green shale.
252	261	Cr	Limestone, brown, medium crystalline, few shale partings, angle of bedding, 45° with core, few calcite stringers.
261	275	Cr	Limestone and shale, shale in upper foot with irregular limestone nodules, shaley limestone to 267', with heavy concentrations of marcasite along bedding, few calcite stringers, green shale to 269', limestone as above to 273', shaley limestone to 275'.
275	280	Cr	Calcareous shale, upper 6" good limestone, next foot conglomeritic limestone and shale, shale is green grey.
280	293	Cr	Dark grey green shale with scattered limestone lenses up to 3", calcite veinlets in shale and limestone at 291'.
293	300	Cr	Shale and limestone, mostly shale, dark grey, very fossiliferous, limestone is medium grey and silty, limestone increase in last four feet.
300	314	Cr	Limestone, brown, medium crystalline, few calcite stringers, slightly brecciated in lower foot.
314	315	Cr	Broken brown shale with calcite stringers.
315	323.5	Cr	Shale, dark grey green, slightly fossiliferous, few calcite stringers along bedding, limestone in upper 4".
323.5	333	Cr	Limestone, dark brown, fine to medium crystalline, sandy with shale partings.
333	356.5	Cl	Limestone, brown, fine to medium crystalline, fossiliferous, styolitic.
356.5	359	Crc	Weathered green shale.
359	362.5	Crc	Limestone, grey green colitic.
362.5	364	Crc	Limestone, brecciated, 2" recovery.

REYNOLDS METALS COMPANY

From	To	Fm	Description
364	372	F	Fault. 364-369 Shale and limestone breccia, bedding running parallel to sub-parallel to core. 369-369.5 Brecciated limestone and calcite. 369.5-372 Calcite vein, limestone and calcite breccia in last foot.
372	386	Csg	Limestone, brown grey, fine to medium crystalline, heavy styolites, few calcite stringers.
386	392	F	Fault. Shaley gouge with limestone.
392	396	Csg	Limestone, brown, medium crystalline, fossiliferous, slightly brecciated at bottom, few calcite stringers.
396	432	F	Fault. 396-414 Weathered limestone and calcite breccia. 414-419 Calcite vein with shines of CaF_2. 419-423 Limestone and calcite breccia.
432	474	Csg	Limestone, brown, medium to fine crystalline, slightly fractured, broken core 435-442. Good shines of CaF_2 in vein from 446-446.5. Increase in brecciation in lower 13' with scattered CaF_2 shines.
474	484	Csg	Limestone, grey brown, fine to medium crystalline, slightly fractured.
484	494.5	F	Fault. Limestone, calcite breccia, with scattered shines of CaF_2 and scattered traces of disseminated Zn.
494.5	499.5		Cavity, mud.
499.5	501.5	Csg	Siltstone.
501.5	531	Csg	Limestone, slightly sandy in upper 2', shale partings.
531	534	Csg	Shale with few limestone lenses, shale is black.

Bottom 534'.

REYNOLDS METALS COMPANY

Diamond Drill Hole No. W-16; Angle -40°; Bearing S57E; Depth 619'
Coordinates N8652 E9987; Elevation 503.0
Property, Watson; Area, SE Salem; County, Crittenden; State, Kentucky
Driller, Shoemaker; Foreman, Niles Minner; Contractor, Joy Mfg. Co.
Started 2/23/59; Finished 3/6/59

From	To	Fm	Description
0	100		Overburden
100	204	Cb	Sandstone and shale, predominately sandstone, laminated, bedding horizontal.
204	247	Cb	Massive sandstone.
247	250	Cb	Black shale.
250	254	Cb	Sandstone, massive.
254	262	Cr	Green shale and silty limestone.
262	268	Cr	Limestone, brown grey, coarse crystalline, fossiliferous, few small cavities.
268	269.5	Cr	Green shale with limestone lenses.
269.5	273	Cr	Limestone, brown, medium crystalline, fossiliferous, stylolitic, calcite veinlets.
273	274		Cavity.
274	277	Cr	Limestone, brown, medium crystalline, fossiliferous, calcite veinlet at 274 perpendicular to hole.
277	285	Cr	Limestone, brown, fine to medium crystalline, sandy, bedding horizontal, few calcite stringers.
285	290	Cr	Limestone, conglomeritic in upper foot, green shaley limestone at 285-286, slicken sides along bedding; limestone, greenish gray, fine crystalline, silty.
290	323	Cr	Shale, greenish grey to 311, dark grey and fossiliferous to 323, small limestone lenses at bottom.
323	329.5	Cr	Limestone, brown, fine crystalline.
329.5	333.5	Cr	Limestone, grey, coarse crystalline, fossiliferous, brown calcite replacing fossils, slightly stylolitic, few calcite stringers.

REYNOLDS METALS COMPANY

From	To	Fm	Description
333.5	339	Cr	Alternating limestone and shale, 6" shale at top of run, 1' shale at bottom of run, medium grey limestone, coarse crystalline, very fossiliferous, fossils replaced by black and brown calcite.
339	339.7		Limestone and calcite breccia, oil shows in small vugs in calcite.
339.7	346	Cr	Limestone, medium grey, medium crystalline, very sandy. Conglomeritic from 344.
346	347		Shale, calcite breccia.
347	353	Cr	Limestone, brown, medium crystalline, slightly fractured, calcite stringers, styolitic.
353	354		Shale and calcite breccia.
354	355	Cr	Shale, green.
355	374	Cr	Limestone, brown to grey, medium-coarse crystalline, few calcite fractures, styolitic, fossiliferous.
374	377	Cr	Limestone, medium grey, medium crystalline, sandy, with some green shale fragments.
377	379	Cl	Green shale with irregular limestone lenses.
379	387	Cl	Limestone, oolitic, medium grey, medium crystalline.
387	397.5	Crc	Green shale with irregular limestone lenses.
397.5	405	Crc	Limestone, brown grey, medium crystalline, fossiliferous, few calcite stringers.
405	410	Crc	Shale and limestone, alternating, shale has irregular limestone lenses; limestone, with shale partings.
410	438.5	Cf	Limestone, dark brown grey, coarse crystalline, fossiliferous, styolitic.
438.5	469	Cf	Limestone, light brown grey, medium to fine crystalline, fossiliferous, few calcite stringers.
469	511	Cf	Limestone, brown, fine crystalline, oolitic, styolitic, 1' cavity at 500 feet, 1' cavity at 508'.

REYNOLDS METALS COMPANY

From	To	Fm	Description
511	537.5		Fault. 511-516 Limestone and calcite breccia with trace of Zn. 516-528 Fractured Crc sandstone. 528-529 Brecciated limestone and calcite 529-537.5 Cavity.
537.5	538	Cr	Weathered brown limestone.
538	539.5		Cavity.
539.5	568	Cr	Limestone, medium grey, medium to coarse crystalline, cavities: 547-548; 550.5-551.5; 552-553; 554.5-555.5; 557-558; 558.5-560; 563.5-564.5.
568	584	Cr	Weathered limestone and shale, 5.5 feet recovery.
584	586	Cr	Shale, dark grey, some sand on top.
586	619	Cr	Green shale and medium grey limestone, predominately shale with limestone from 586-587, 605-607, 607-611, and one irregular 3" lense at 616.5.

Bottom 619'

REYNOLDS METALS COMPANY

Diamond Drill Hole No. W-17; Angle -45°; Bearing S47E; Depth 592'
Coordinates N8683 N8660; Elevation 425.0'
Property, Watson; Area, SE Salem; County, Crittenden; State, Kentucky
Contractor, Joy Manufacturing Company; Foreman, Minner.
Started 2/17/59; Finished (lost hole) 3/6/59

From	To	Fm	Description
0	90		Overburden, sand and chert.
90	139	Csl	Limestone, brown grey, medium grey, 5 ft recovery.
139	200	Csl	Limestone, brown, medium to fine crystalline, cherty, cavity 174-18 , 186-187.6.
200	205		Fault (?). Cavity.
205	220	Cr	Limestone, medium grey, fine crystalline, slightly fractured.
220	224		Cavity.
224	226	Cr	Limestone, slightly fractured, with CaF2 shines, 8" recovery.
226	248	Cr	Limestone, fractured with CaF2 shines throughout, good shines 240-245 with disseminated zinc.
248	264	Cr	Limestone, brown, coarse to medium crystalline, fossiliferous, slightly fractured with calcite stringers, some scattered CaF2 shines.
264	265	Cr	Dark grey green shale.
265	279	Cr	Limestone, brownish grey, medium to coarse crystalline, fossiliferous, good shines CaF2 from 266.5 -267, disseminated Zn from 265-268, scattered shines of CaF2 and Pb below, calcite veinlet with CaF2 shines 275-279, some disseminated zinc.
279	282	Cr	Limestone, grey green, with shale partings, calcite vein 30° with core at bottom.
282	294	Cr	Limestone, brown, fine crystalline, slightly fossiliferous, slightly fractured with calcite stringers and scattered shines of CaF2.
294	308.5	Cr	Limestone, brown and medium crystalline, slightly fractured with calcite stringers, few shines of CaF2.

REYNOLDS METALS COMPANY

From	To	Fm	Description
308.5	313	Cr	Limestone, grey, fine-medium crystalline, fossiliferous, slightly weathered, few calcite stringers.
313	316.5	Cr	Limestone, brown grey, fine crystalline, scattered CaF_2 and Zn shines in upper 1.5'.
316.5	318.5		Fault. Limestone and calcite breccia, partially weathered, good shines of Zn and CaF_2.
318.5	326.5	Cr	Limestone, medium grey, fine crystalline, slightly fractured with CaF_2 and Zn in fractures.
326.5	329		Fault. Limestone and calcite breccia with few shines of CaF_2 and Zinc.
329	340.5	Cr	Limestone, medium to dark brownish grey, fine to medium crystalline, slightly fossiliferous, styolitic, few calcite veinlets, shines of CaF_2.
340.5	349	Cr	Limestone, medium grey, fine crystalline, cherty, few calcite, fractures, styolitic, with trace of CaF_2 and Zn.
349	353	Cr	Green shale, 2' recovery.
353	373.5	Csg	Limestone, greenish grey, medium crystalline, sandy, oolitic, slightly shaley, angle of bedding 45° with core, slickensides along jointing, cavity at 364. Undifferentiated Levias and Rosielare.
373.5	396	Cf	Limestone, medium to light grey, medium to fine crystalline, oolitic, disseminated zinc in limestone, from 385-390.
396	407.5	Cf	Limestone, dark grey, fine crystalline, oolitic, few shale partings, few calcite veinlets.
407.5	409	Cf	Dark grey green fossiliferous shale.
409	456	Cf	Limestone, light brown grey, medium crystalline, fossiliferous, oolitic, few shale partings, scattered calcite stringers, fine crystalline limestone 446-452.5.
456	463.5	Cf	Limestone, brown, medium crystalline, fossiliferous, styolitic, few calcite fractures, oolitic.
463.5	465		Fault. Vein CaF_2. Assayed from 463-466.5

REYNOLDS METALS COMPANY

From	To	Fm	Description
465	482.5	Cf	Limestone, medium grey, fine to medium crystalline, oolitic, fossiliferous, few calcite stringers.
482.5	492.5	Cf	Limestone, dark grey, medium crystalline, oolitic, fossiliferous, few calcite stringers.
492.5	506	Cf	Limestone, medium grey, medium crystalline, oolitic, few calcite stringers.
506	509	Cf	Limestone, brown, medium to fine crystalline, slightly weathered.
509	516	Cf	Limestone, dark grey, coarse crystalline, fossiliferous, few styolites, lower foot weathered.
516	535	Cf	Limestone, brown, fine crystalline, slightly fractured, with calcite stringers, weathered. Trace of CaF_2.
535	549		Cavity. Limestone in cavity is oolitic, weathered, dark brown, in block not over 2". 14" cored in cavity.
549	585	Cf	Limestone, medium to coarse crystalline, very oolitic, large ools, light grey oxidized fractures. Salmon colored from 565-585.
585	592	Cf	Limestone, medium grey, medium crystalline, slightly oolitic, fractured, oxidation along fractures, little calcite.

Hole lost at 592'

Assay Values for Diamond Drill Hole W-17

From	To	CaF_2	SiO_2	$CaCO_3$	Pb	Zn
463	466.5	30.78	6.58	60.98		
224	228	27.88	14.34	53.22	1.49	0.80
228	240	19.52	15.10	60.62	0.16	0.55
240	248	19.88	8.44	69.56	0.53	0.30

REYNOLDS METALS COMPANY

Diamond Drill Hole No. W-17B; Angle, -45°; Bearing, S47E; Depth, 661'
Coordinates, N8702 E8676; Elevation, 425.0'
Property, Watson; Area, SE Salem; County, Crittenden; State, Kentucky
Contractor, Joy Manufacturing Company; Foreman, N. Minner.
Started, 3-14-59, Finished 3/24/59

From	To	Fm	Description
0	117		Overburden, sand and chert.
117	183	Csl	Limestone, medium to dark grey brown, medium to coarse crystalline, cherty, slightly weathered.
183	185.5	Csl	Limestone, and chert, limestone is fine crystalline, light to medium grey, slightly weathered with brown and grey chert.
185.5	189.5		Cavity.
189.5	205.3	Csl	Limestone, fine crystalline, light grey, few thin calcite fractures, weathered in places with little brecciated calcite at 202. Chert nodule at 204. No CaF_2.
205.3	212.0		Fault. 205.3 - 209.5 Limestone, medium grey, fine crystalline, and calcite breccia with some shines of CaF_2, few shines of Pb and Zn. 209.5 - 212 Limestone and CaF_2 breccia with some calcite, trace of Pb.
212	225.8	Cr	Limestone, medium grey, fine crystalline, with good scattered shines of CaF_2, slightly weathered, fractured.
225.8	236.5	Cr	Limestone, fine crystalline, medium grey, scattered shines of CaF_2, fractures filled with CaF_2, little calcite.
236.5	240.8	Cr	Limestone, slightly fractured with CaF_2 (ore grade) with 1' calcite vein at the bottom. Limestone is fine crystalline, medium grey.
240.8	243		Fault. Calcite with very light blue to white CaF_2. Same vein as bottom 1' in last run.
243	251	Cr	Limestone, with scattered CaF_2 shines. Limestone is coarse to medium crystalline, medium grey.
251	326		Fault. 251 - 269.0 Limestone, medium to fine crystalline, medium grey, and calcite breccia, with good scattered shines of CaF_2 and Zn, limestone is slightly oolitic.

REYNOLDS METALS COMPANY

From	To	Fm	Description
			269 - 279.2 Limestone, fine crystalline, medium grey, brecciated with calcite, good shines of CaF_2 and sinc. 279.2- 283.0 As above with increase in CaF_2. 283 - 288.4 CaF_2 and Pb and Zn with some brecciated limestone, vein running sub-parallel to core. 288.4- 291.0 Limestone and calcite breccia with CaF_2 shines, good disseminated Zn. 291 - 307 Limestone breccia as above with less CaF_2 and Zn. 307 - 318 Limestone, dark grey, medium crystalline, cherty, brecciated with calcite and shines of CaF_2 and Pb and Zn, very heavy calcite. 318 - 326 Brecciated shale, green and black, with fine crystalline brownish limestone, very heavy calcite, traces of CaF_2 and Zn.
326	348	Cr	Limestone, fine to medium crystalline, dark grey, few shaley partings, numerous calcite fractures.
348	369	Cr	Limestone, fine crystalline, medium grey, few calcite fractures.
369	374	Cr	Shale, greenish with very few thin limestone beds.
374	379	Cr	Limestone, medium grey, medium crystalline, few shaley partings, little sand.
379	393	Cl	Limestone, medium crystalline, greenish grey to brownish grey, scattered sand, locally very sandy and greenish (looks like Crc), few calcite fractures.
393	421	Crc	Limestone, medium crystalline, fairly dark grey, fine sand, few black shaley partings.
428	429	Crc	Limestone, medium grey, medium crystalline oolitic.
429	432	Crc	Shale, dark green to black, silty, fine crystalline and brown limestone.
432	450	Cf	Limestone, fine to medium crystalline, light to medium grey, locally oolitic.
450	452	Cf	Limestone, fine crystalline, brownish grey, very little shale, few calcite fractures.
457	459	Cf	Limestone, coarse crystalline, medium grey, oolitic, very heavy calcite fractures, broken core, some oxidation.

REYNOLDS METALS COMPANY

From	To	Fm	Description
459	470	Cf	Limestone, fine to medium crystalline, medium grey, slightly oolitic, fractures with calcite, heavy oxidation in fractures, broken core.
470	505.5	Cf	Limestone, mostly fine crystalline, light grey, slightly fossiliferous, oolitic in places, few calcite fractures, some weathering, cavities 487-488.5; 489-489.5.
505.5	511.5	Cf	Limestone, medium grey, medium crystalline, oolitic.
511.5	514.5		Cavity.
514.5	541	Cf	Limestone, fine crystalline, very light grey, few oolitics, little oxidation.
541	557	Cf	Limestone, very fine crystalline, dark grey, except where weathered, silty, weathered light brown along fractures, few thin calcite fractures, trace of CaF_2 at 557.
557	561		Cavity.
561	587	Cf	Limestone, medium crystalline, medium brownish grey, slightly oolitic and fossiliferous, few calcite fractures, core is badly broken, some weathering with cavities at 571-572; 581-583.
587	593	Cf	Limestone, coarse crystalline, light grey, very oolitic.
593	631		Fault. 593 - 602 Fault breccia, finely fractured, medium crystalline, medium grey limestone, with considerable calcite, some oxidation. 602 - 610 Limestone, very fine crystalline, medium grey, weathered brown, heavy calcite fractures. 610 - 613 Limestone, medium crystalline, medium grey with heavy calcite fractures. 613 - 616 Limestone, fine crystalline, medium grey, heavy calcite fractures, cherty at 614. 616 - 631 Brecciated limestone, fine crystalline, light grey, medium crystalline, heavy calcite, shines of CaF_2.
631	650	Cal	Limestone, medium crystalline, medium grey, scattered calcite fractures, cherty, shines of CaF_2, very good shines of CaF_2 at 646-647 with Zns and Pb.
650	661	Cal	Limestone, medium crystalline, medium grey, cherty.

Bottom 661'

Assay Values for Diamond Drill Hole W-17B

From	To	CaF_2	SiO_2	$CaCO_3$	Pb	Zn
205.3	209.5	43.32	24.44	30.32	0.43	0.89
209.5	212.0	5.74	9.28	83.74	0.53	0.10
212.0	225.8	8.16	17.72	71.70	0.21	0.20
225.8	236.5	14.42	26.74	55.62	0.05	0.69
236.5	240.8	40.12	10.58	47.84	0.11	0.00
240.8	243.0	23.74	2.36	73.34	0.11	0.00
243.0	251.0	2.15	10.60	86.24	0.05	0.10
251.0	269.0	9.22	9.04	79.22	0.27	1.09
269.0	279.2	11.24	6.18	80.88	0.16	1.19
279.2	283.0	8.08	7.96	81.56	0.11	0.59
283.0	288.4	39.58	10.82	25.08	11.29	6.97
288.4	291.0	14.68	21.66	56.66	0.21	3.18
291.0	299.8	7.36	24.82	61.10	0.16	2.89

REYNOLDS METALS COMPANY

Diamond Drill Hole W-18; Angle -40°; Bearing S50E; Depth 577'
Coordinates, N9335 E10660; Elevation, 457.0'
Property, Watson; Area, SE Salem; County, Crittenden; State, Kentucky
Contractor, Joy Manufacturing Company; Foreman, E. J. Hayes
Started 3/7/59 Finished 3/20/59

From	To	Fm	Description
0	35		Overburden
35	63	Cr	Shale, medium grey green.
63	81	Cr	Shale, grey green with irregular limestone lenses, numerous large fossils in both limestone and shale.
81	84.5		Cavity.
84.5	95	Cr	Limestone, medium to fine crystalline, brown, fossiliferous, few scattered calcite veinlets, oil shows in vugs in calcite, shale partings in lower 2', cavity from 91-93.
95	101.5	Cr	Shale, grey.
101.5	132	Cr	Shale, with irregular limestone lenses, limestone and shale is fossiliferous, weathered in zones up to 1.5' throughout run.
132	165	Cb	Sandstone, massive, broken core. Cavity, possible fault.
165	176	Cf	Limestone, light grey brown, fine crystalline, heavy stylolites, slightly fractured, few calcite stringers, cavity from 172-175.
176	193	Cf	Limestone, greenish grey (weathered) to grey, fossiliferous, calcite stringers, cavity from 181-187, brecciated 191.5-193 with few scattered shines of CaF_2.
193	205	Cf	Limestone, light grey brown, medium crystalline, oolitic, fossiliferous, scattered CaF_2 shines from 193-195.
205	232.5	Cf	Limestone, medium grey, fine to medium crystalline, numerous calcite veinlets, some oil shows in vugs in the calcite, few scattered traces of CaF_2, few shale partings from 205-215.
232.5	272.8		Fault. 232.5 - 235 Limestone and calcite breccia, limestone is brown, fine crystalline, stylolitic with few fossils. 235.0 - 240 Limestone and calcite breccia, oolitic, brown to light grey limestone.

REYNOLDS METALS COMPANY

From	To	Fm	Description
			240 - 261.5 Limestone and calcite breccia, limestone is fine crystalline, grey to light grey, slightly fossiliferous, stylolitic, slightly cherty. 261.5 - 272.8 Calcite vein with some limestone breccia. Calcite is weathered, few scattered traces of CaF2.
272.8	373	Csl	Limestone, medium to dark grey, slightly fractured with calcite stringers, fossiliferous, cherty. Cavity from 277-283; 284-305; calcite vein from 312-313.
373	387.5	Csl	Limestone, medium grey, medium crystalline, fossiliferous, cherty, few calcite stringers.
387.5	392		Fault. Limestone, brecciated with calcite vein from 390-391.
392	398.5	Csl	Limestone, dark brown grey, fossiliferous, slightly fractured, silty at bottom.
398.5	416	Csl	Limestone, brown, fine crystalline, few calcite veinlets, scattered shines of CaF2 from 304.5 -308.
416	432.5	Csl	Limestone, brown, medium to coarse crystalline, fossiliferous, slightly fractured with calcite stringers, cherty with black chert, increase in fractures from 430-432.5 with scattered shines of CaF2.
432.5	452.5	Csl	Limestone, dark grey, fine crystalline, cherty, weathers in zones, slightly fractured with calcite stringers. Good shines of CaF2 from 439-439.5; 442-442.5; 450-451.
452.5	459.5	Csl	Limestone, brown grey, fossiliferous, slightly fractured, with shines of CaF2 from 453-454; 455-455.5; 457.5-458.
459.5	478.3	Csl	Limestone, dark grey, fine crystalline, cherty with calcite stringers and scattered traces of CaF2.
478.3	485.5	Csl	Limestone, medium grey, fine crystalline, slightly brecciated, with good shines of CaF2.
485.5	501	Csl	Limestone, as above with increase in breccia and CaF2. Assayed from 478.3 - 498.3.

REYNOLDS METALS COMPANY

From	To	Fm	Description
501	521	Cal	Limestone, medium to fine crystalline, medium grey, styolitic, few scattered CaF_2 shines.
521	546.8		Fault. 521 - 523 Limestone and calcite breccia. 523 - 546.8 Calcite with some limestone breccia, gouge from 534-540, weathered throughout run.
546.8	577	Csg	Dark grey green shale with limestone lenses.

Bottom 577'

Assay Values for Diamond Drill Hole W-18

From	To	CaF_2	SiO_2	$CaCO_3$
478.3	487.1	13.24	20.04	62.86
487.1	494.2	36.38	16.74	42.92
494.2	498.3	11.28	23.58	60.76

REYNOLDS METALS COMPANY

Diamond Drill Hole W-19; Angle -40 ; Bearing S50E; Depth 734'
Coordinates N9036 E10264; Elevation, 485.0'
Property, Watson; Area, SE Salem; County, Crittenden; State, Kentucky
Contractor, Joy Manufacturing Company; Foreman, Niles Minner.
Started 3/10/59 Finished 3/20/59

From	To	Fm	Description
0	31		Overburden
31	84	Cb	Massive sandstone.
84	94	Cr	Weathered shale and limestone with 6" of conglomerate at 93'.
94	113	Cr	Limestone, brown, fine to medium crystalline, shale partings, fossiliferous.
113	116	Cr	Weathered shale, 1' recovery.
116	142	Cr	Limestone, brown grey, medium crystalline, fossiliferous, few calcite veinlets.
142	173	Cr	Dark grey green shale.
173	198	Cr	Shale with irregular limestone lenses, cavity from 186-189, 197-198.
198	206.5	Cr	Limestone, dark brown, medium crystalline, silty.
206.5	212	Cr	Grey green shale.
212	217	Cr	Limestone, dark brown, medium crystalline, with few calcite stringers.
217	221	Cr	Brown grey shale.
221	230		Cavity.
230	253	Cr	Limestone, medium brown grey, numerous cavities, weathered zones with mud and limestone fragments from 230-232; 239-240; cavity from 245-247; 249.5-251 with weathered shale and mud from 248-253.
253	262	Cr	Limestone, dark grey medium crystalline.
262	307		Cavity. Mud filled from 262 to 284, massive sandstone, weathered, broken from 284-307.
307	344		Fault. Broken limestone and mud.

REYNOLDS METALS COMPANY

From	To	Fm	Description
344	392		Fault. Limestone, calcite breccia.
392	490.5	Csl	Limestone, brown grey, fine to medium crystalline with black chert, slightly fractured with calcite stringers.
490.5	564		Fault (?(. Limestone, brown grey, fine to medium crystalline, brecciated, with calcite veinlets, shines of CaF_2 and En from 526-536, 538-539.
564	581	Csl	Limestone, dark grey, fine crystalline, few calcite stringers.
581	608		Fault. Limestone and calcite breccia with shines of CaF_2 from 588-589, scattered traces from 592-593, good shines from 606-608.
608	610.5		Fault. Vein calcite with little limestone breccia, oil shows in calcite.
610.5	638	Csl	Limestone, dark brown grey, medium crystalline, stylolitic, few scattered traces of CaF_2.
638	641		Fault. Limestone and calcite breccia with few scattered traces of CaF_2.
641	668	Csl	Slightly brecciated limestone and calcite and chert with shines of CaF_2 from 648-649; 653-655; 657-657.5, good breccia from 661-663, scattered shines of CaF_2 from 667-669.
668	678		Fault. Brecciated limestone and calcite with scattered shines of CaF_2.
678	712		Fault. Vein calcite with CaF_2 shines from 678-695.
712	734	Csg	Limestone, light grey, medium crystalline, with shale partings, fossiliferous and oolitic.

Bottom 734'

Assay Values for Diamond Drill Hole W-19

From	To	CaF_2	SiO_2	$CaCO_3$	Pb	Zn
676.8	684.7	5.28	1.72	92.44		
684.7	688.5	21.16	11.46	66.04		
688.5	691.5	32.90	1.84	64.34		
691.5	694.2	5.32	6.30	85.36		

REYNOLDS METALS COMPANY

Diamond Drill Hole W-21; Angle, -80°; Bearing S47E; Depth 555'
Coordinates N7746 E8321; Elevation, 480.0
Property, Watson; Area, SE Salem; County, Crittenden; State, Kentucky
Contractor, Joy Manufacturing Company; Foreman, Niles Minner
Started, 3-24-59 Finished 4-1-59

From	To	Fm	Description
0	24		Overburden
24	27	Cg	Limestone, coarse crystalline, dark grey to brown, fossiliferous, recovery 3'.
27	45	Cg	Shale, olive green, weathered, tan along bedding.
45	47	Cg	Limestone, coarse crystalline, dark grey brown, fossiliferous.
47	49	Cg	Shale, greenish with little limestone, fossiliferous.
49	83	Cg	Black shale with concentrations of heavy marcasite locally.
83	90	CC	Sandstone, massive, weathered brown.
90	92	Cc	Black shale with thin beds of sandstone.
92	101	Cc	Siltstone (and very fine grained sandstone) green shale, with few scattered, rounded pebbles of lighter colored siltstone. Has massive appearance, not banded.
101	102	Cc	Thin bedded sandstone and shale.
102	136	Cc	Sandstone, very light grey, massive.
136	155	Cc	Sandy shale, greenish near top and bottom, black with some coal from 147-150.
155	166	Cc	Sandstone, fairly thin bedded with considerable greenish grey shale.
166	181	Cc	Sandstone, grey, massive.
181	183	Cpc	Greenish grey shale and siltstone conglomerate.
183	192	Cb	Sandstone,massive, light grey, weathered tan.
192	272	Cb	Typical Bethel for this area. Irregular thin bedded black shale and light grey sandstone, bottom 3' is fairly massive sandstone with 3" conglomerate at base.

REYNOLDS METALS COMPANY

From	To	Fm	Description
272	283	Cr	Black shale.
283	290	Cr	Limestone, fine crystalline, silty with green shale and siltstone, fossiliferous, locally coarse crystalline in and around fossils.
290	304.5	Cr	Limestone, fine crystalline, medium grey, very few shale partings.
304.5	306	Cr	Shale, green, few fossils.
306	309	Cr	Limestone, fine crystalline, medium grey, few shale partings.
309	320	Cr	Limestone, medium crystalline, medium grey, sandy, 6" shale at top, shale is green.
320	329	Cr	Limestone, silty, greenish to dark grey, very fine crystalline, few calcite fractures, grades into siltstone in lower 6'.
329	331	Cr	Limestone, fine crystalline, fossiliferous, sub-angular conglomerate at base composed of green shale from lower bed. Pebbles are up to 1/2 inch in diameter.
331	337.5	Cr	Dark green shale.
337.5	341	Cr	Limestone, medium to coarse crystalline, medium grey brown, fossiliferous, numerous small crinoids look like oolite.
341	357	Cr	Alternating shale and silty limestone, fossiliferous, shale is dark green, limestone is medium grey.
357	368	Cr	Limestone, dark brown grey, fine to medium crystalline, fossiliferous, few small shale partings.
368	377	Cr	Limestone, dark brown, medium to coarse crystalline, fossiliferous, increase in shale partings, sandy, calcite and limestone and shale breccia in lower 2".
377	383	Cl	Limestone, medium grey, fine crystalline, slightly fractured, numerous styolites, few small calcite stringers. Heavy styolites and calcite fractures in lower 1'.

REYNOLDS METALS COMPANY

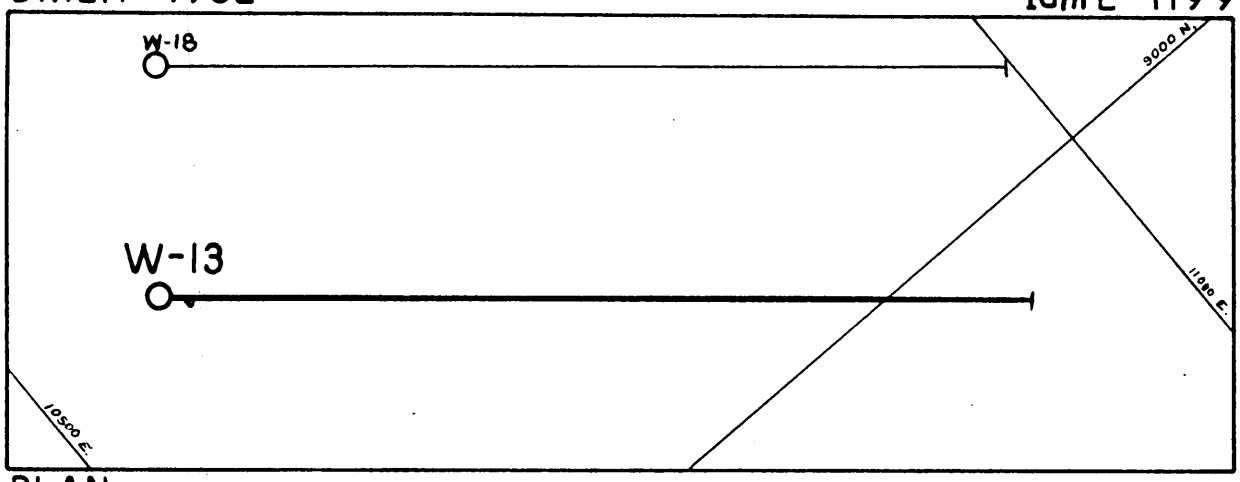
From	To	Fm	Description
383	387	Cl	Limestone, light grey, medium crystalline, oolitic, few calcite stringers, stycolitic.
387	389.5		Fault. Vein calcite and limestone breccia.
389.5	392.3	Cf	Limestone, fine crystalline, weathered light brown, slightly fractured, calcite vein and some breccia in lower 1'.
392.3	397	Cf	Limestone, medium to dark grey, brown, medium crystalline, ½' calcite vein at 396.
397	402	Cf	Limestone, medium to dark grey, coarse crystalline, fossiliferous, slightly oolitic, calcite vein with limestone breccia from 400 to 402.
402	404		Cavity.
404	406	Cf	Limestone, medium brown grey, medium crystalline, fractured, calcite stringers. Trace of Zn.
406	409	Cf	Limestone, medium brown grey, medium crystalline, fractured, slightly weathered.
409	426	Cf	Limestone, medium grey, medium crystalline, fossiliferous, slightly fractured with heavy cherts, cherts are brown grey from 420-422, weathered brown. 422-426 weathered brown, few fossils zones.
426	442	Cf	Limestone, dark grey, fine to medium crystalline, cherty, slightly fractured, few calcite veinlets, weathered in zones.
442	485	Cf	Limestone, medium grey, fine to medium crystalline, slightly silty, few shale partings, oolitic, few calcite stringers, widely scattered traces of CaF_2.
485	486		Cavity.
486	521	Csl	Limestone, medium to dark grey, medium to coarse crystalline, fossiliferous, slightly fractured with calcite veinlets, fossiliferous, cherty.
521	540	Csl	Fractured limestone and chert. Limestone is medium to dark grey, fossiliferous; chert is dark grey.
540	555	Csl	Limestone, medium to dark grey, medium to fine crystalline, with heavy black cherts, fewer calcite veinlets than in above run.

Bottom 555'

WATSON PROJECT
CRITTENDEN COUNTY, KY.

DMEA-4962

IdmE-1199



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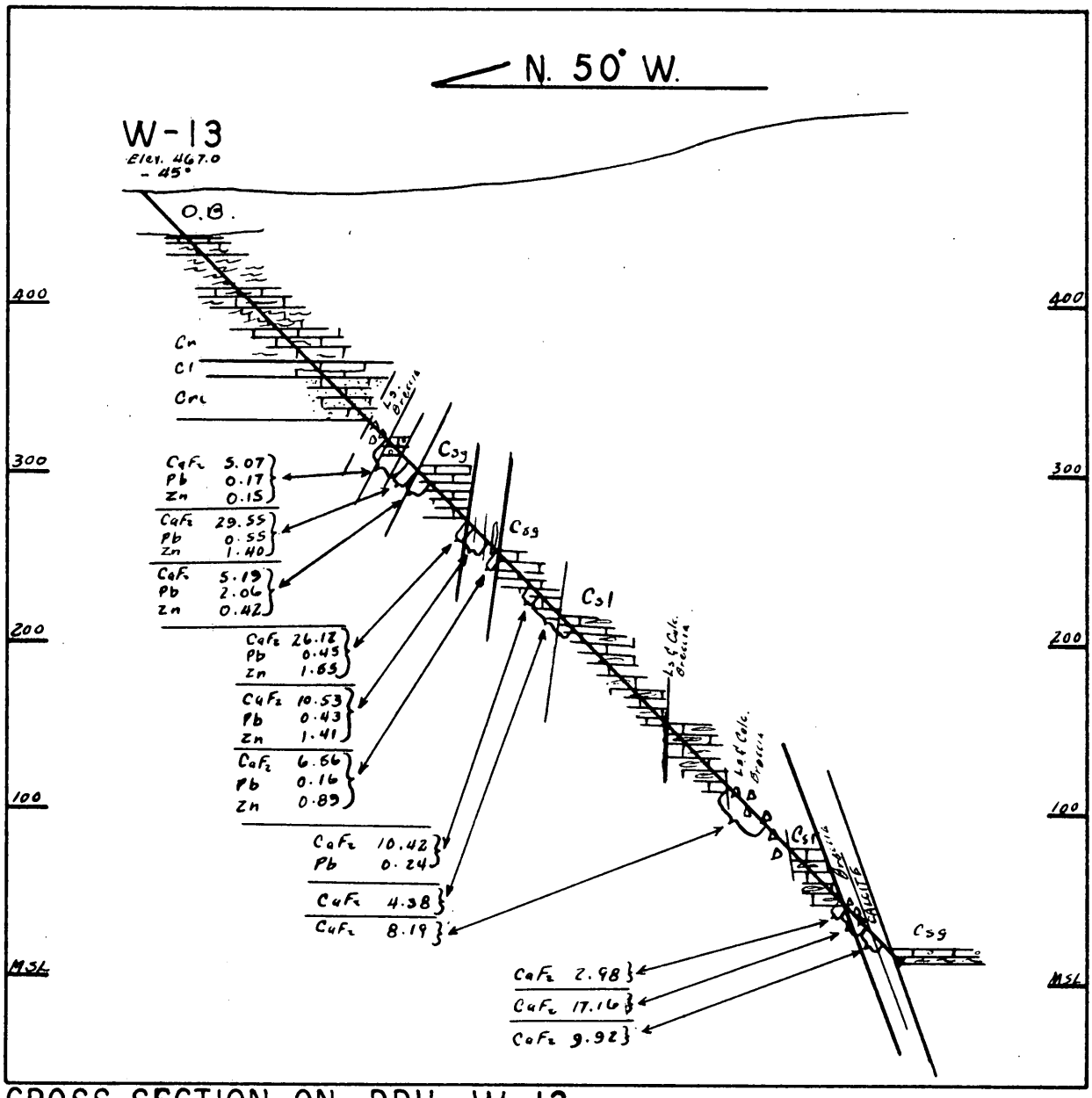


CROSS SECTION ON D.D.H. W-13

VERT. & HORZ. SCALES: 1"=100'

0 50 100 200 300 FT.

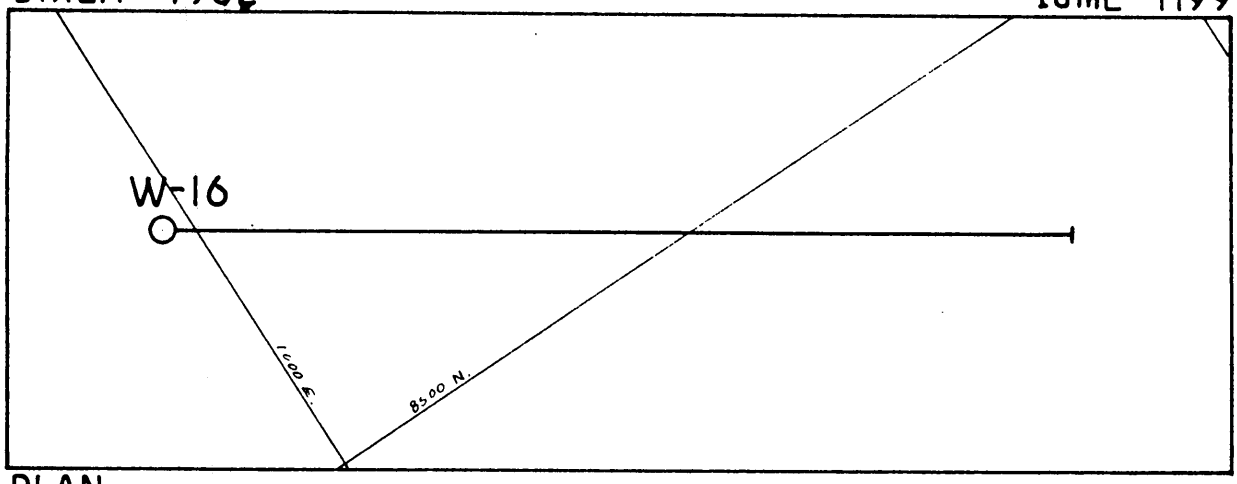
J.W.H.

MARCH 1969

WATSON PROJECT
CRITTENDEN COUNTY, KY.

DMEA - 4962

IdmE - 1199



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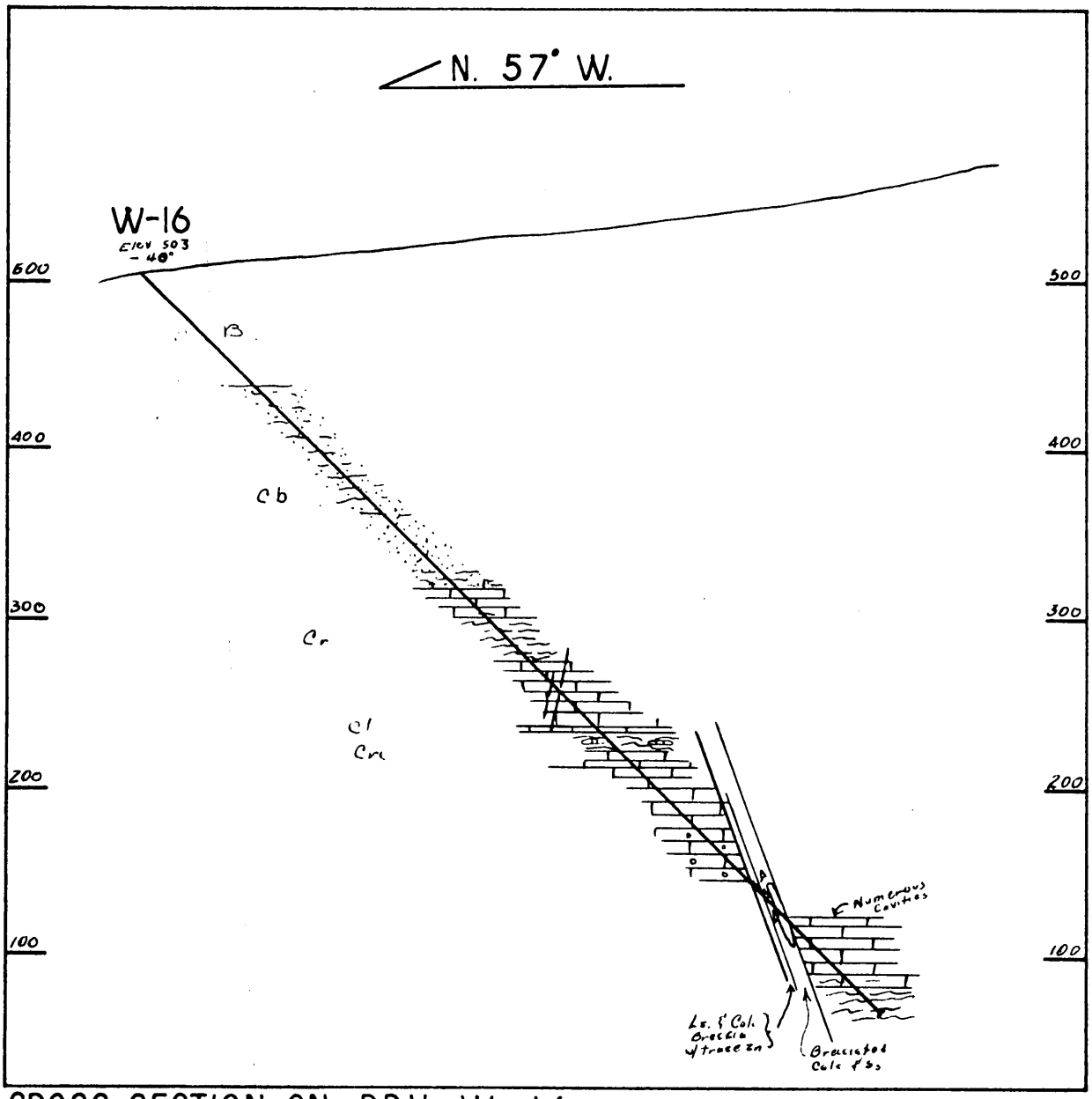


CROSS SECTION ON D.D.H. W-16

VERT. & HORZ. SCALES: 1" = 100'

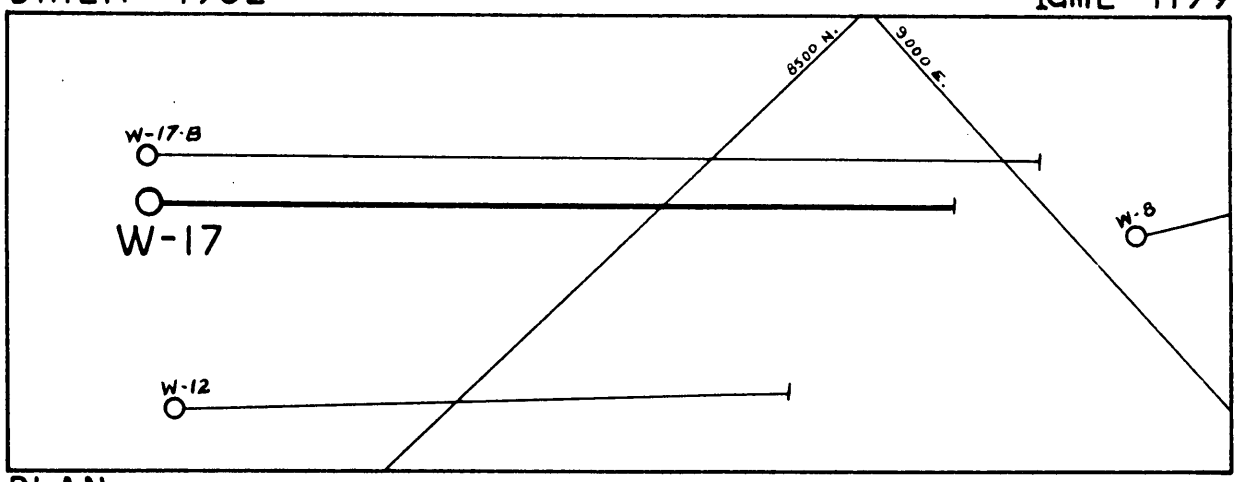
0 50 100 200 300 FT.

J.W.W.

MARCH 1959

WATSON PROJECT
CRITTENDEN COUNTY, KY.

DMEA - 4962 IdmE - 1199



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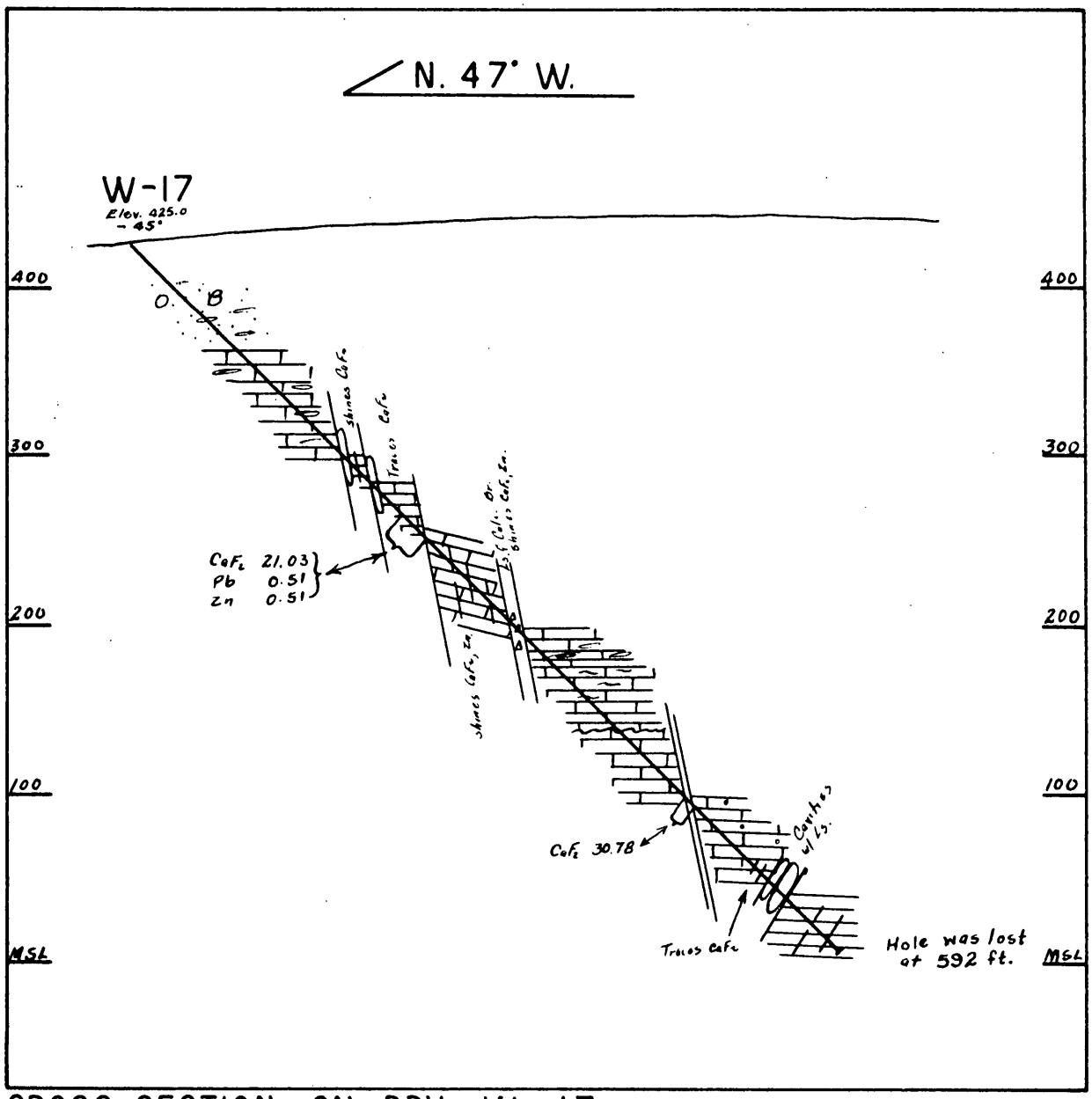


CROSS SECTION ON D.D.H. - W - 17

VERT. & HORZ. SCALES: 1" = 100'

0 50 100 200 300 FT.

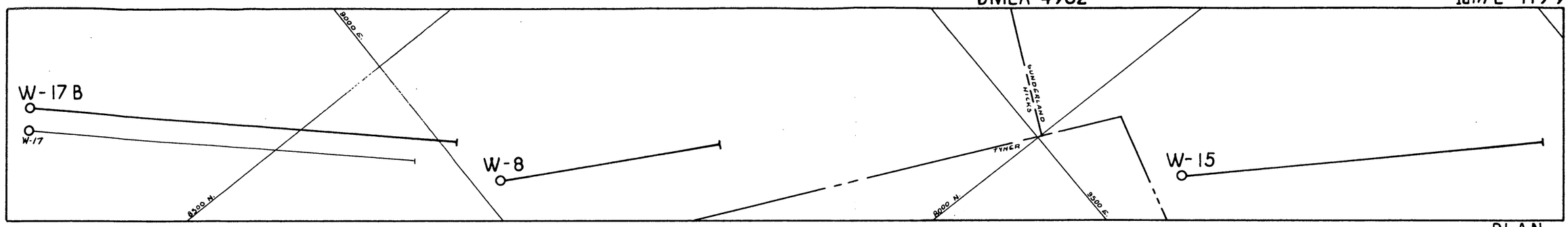
J.W.H. MARCH 1959

WATSON PROJECT
CRITTENDEN COUNTY, KY.

17B

DMEA-4962

Idm E-1199



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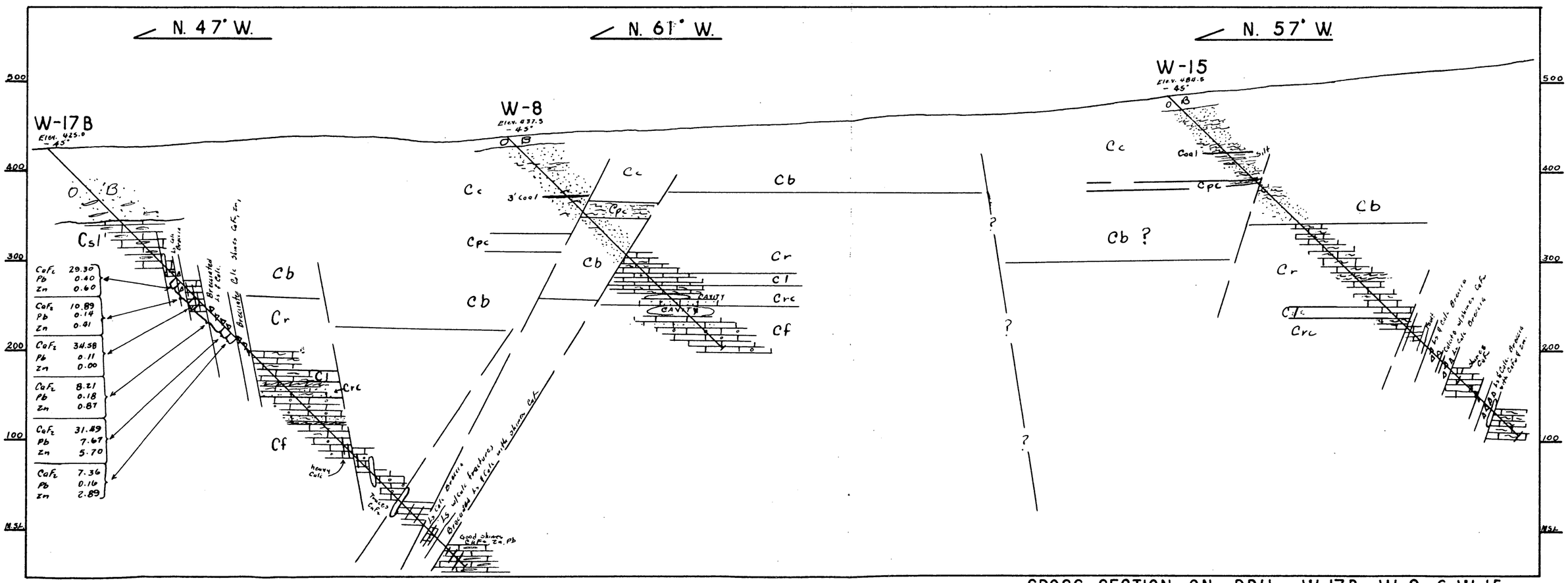


CROSS SECTION ON D.D.H. W-17B, W-8 & W-15

VERT. & HORZ. SCALES : 1"=100'

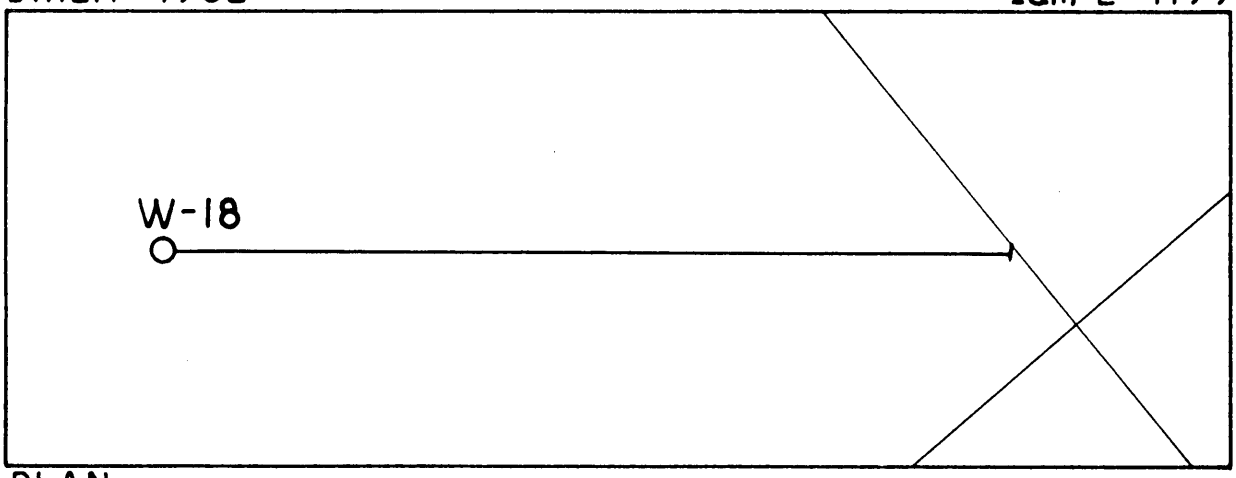
0 50 100 200 300 FT.

JWH MARCH 1959

WATSON PROJECT

CRITTENDEN COUNTY, KY.

DMEA-4962 Idm-E-1199



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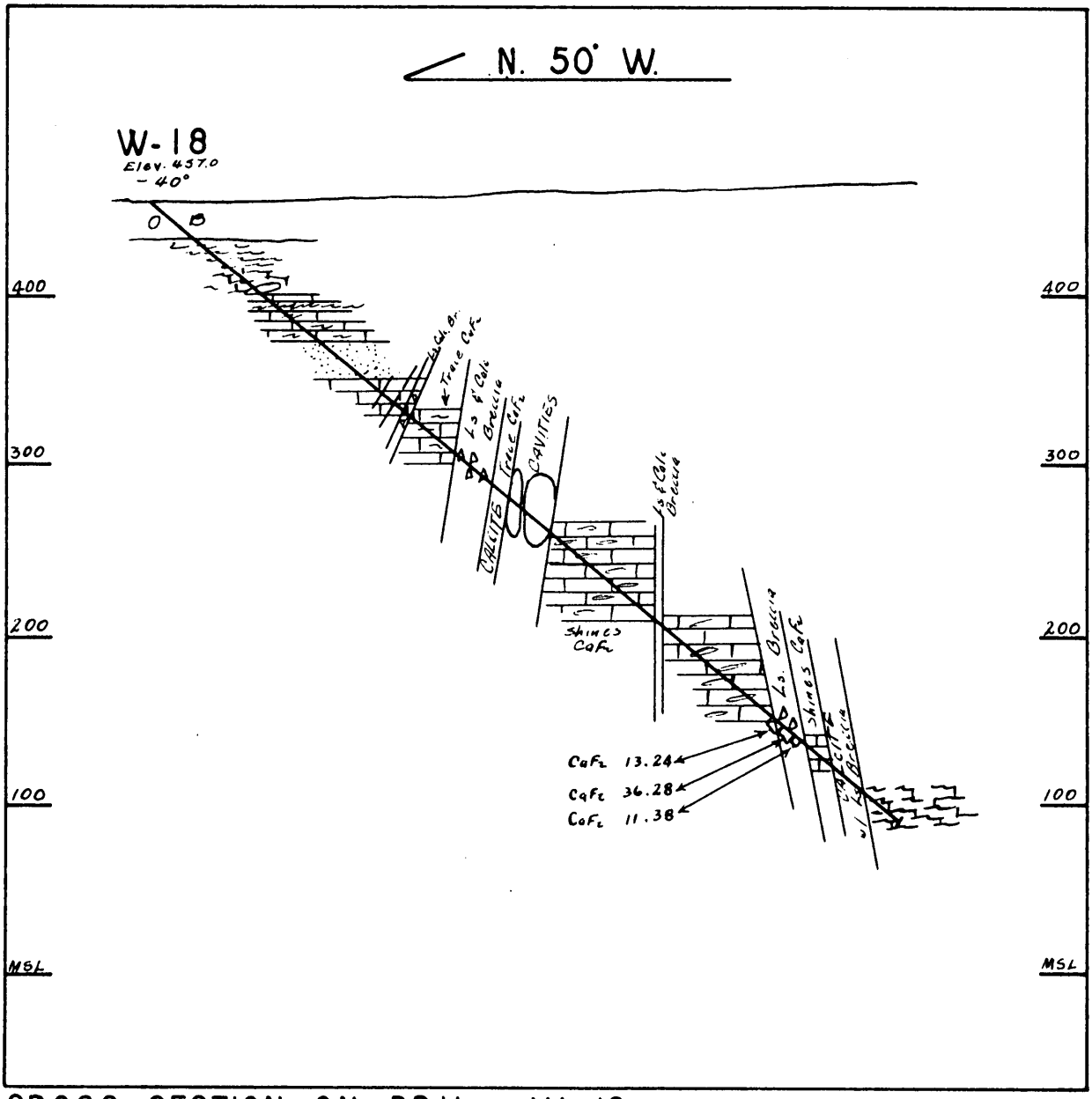


CROSS SECTION ON D.D.H. W-18

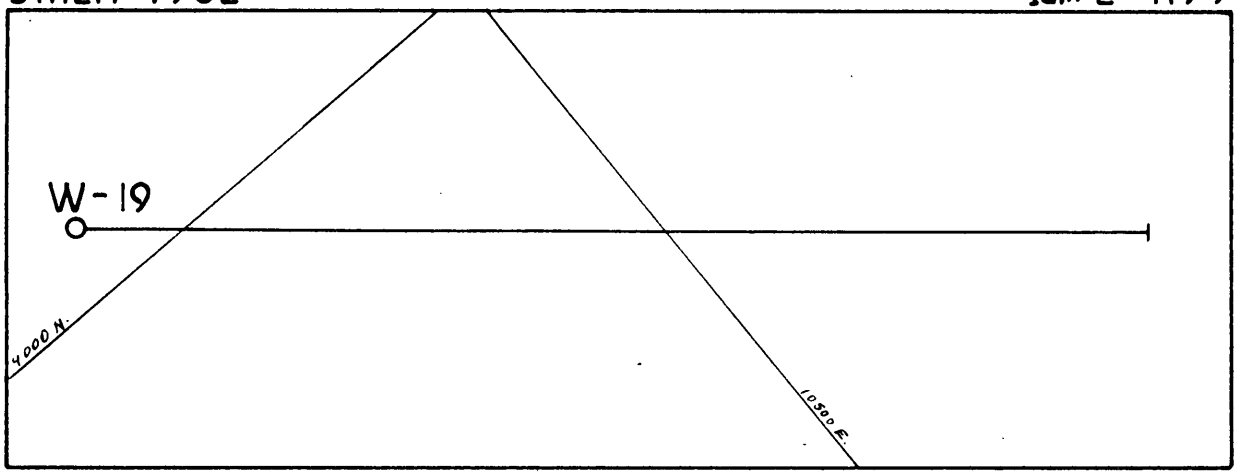
VERT. & HORZ. SCALES: 1" = 100'

0 50 100 200 300 FT.

JWH. March 1959

WATSON PROJECT
CRITTENDEN COUNTY, KY.

DMEA-4962 Idm-E-1199



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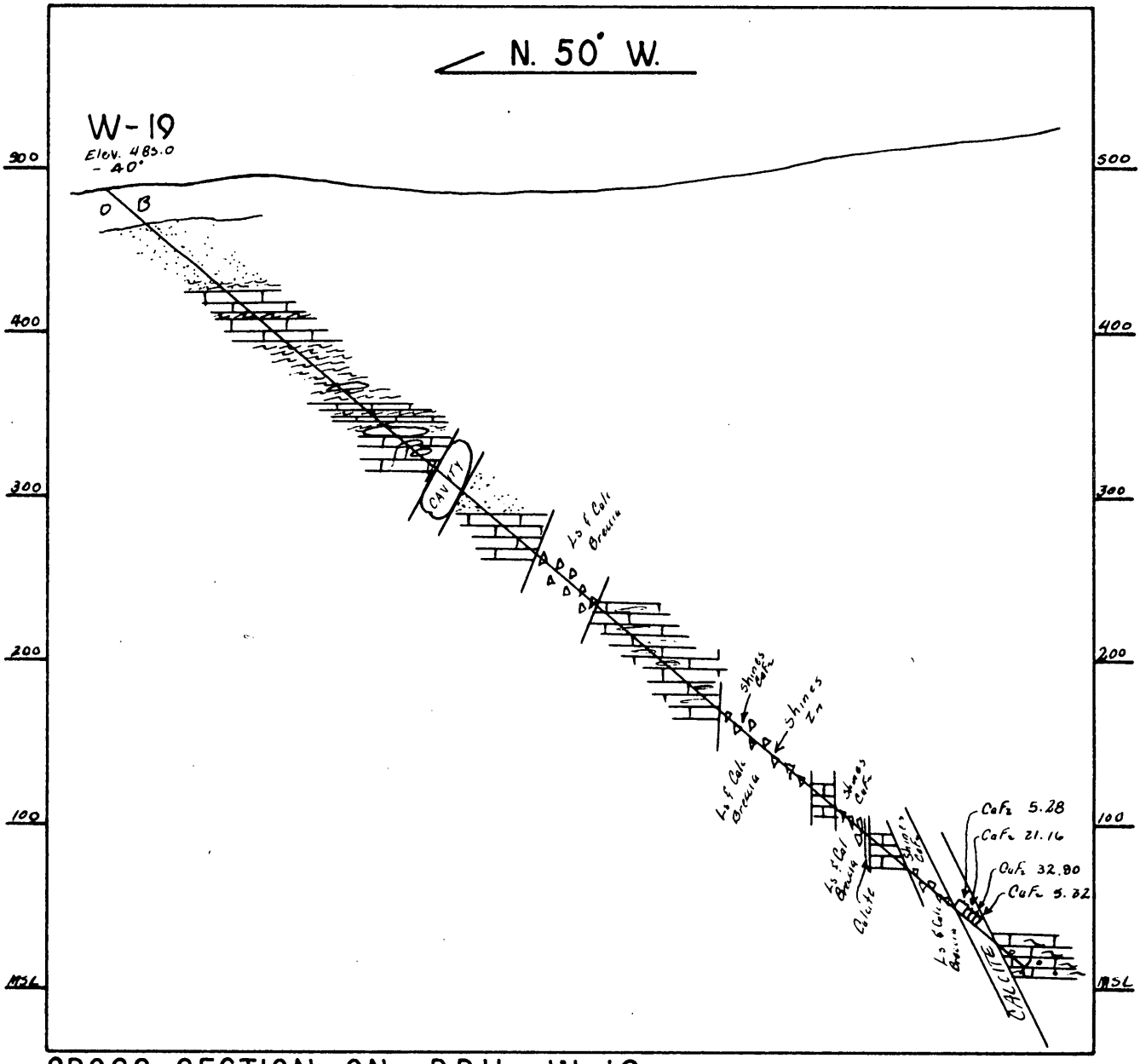


CROSS SECTION ON D.D.H. W-19

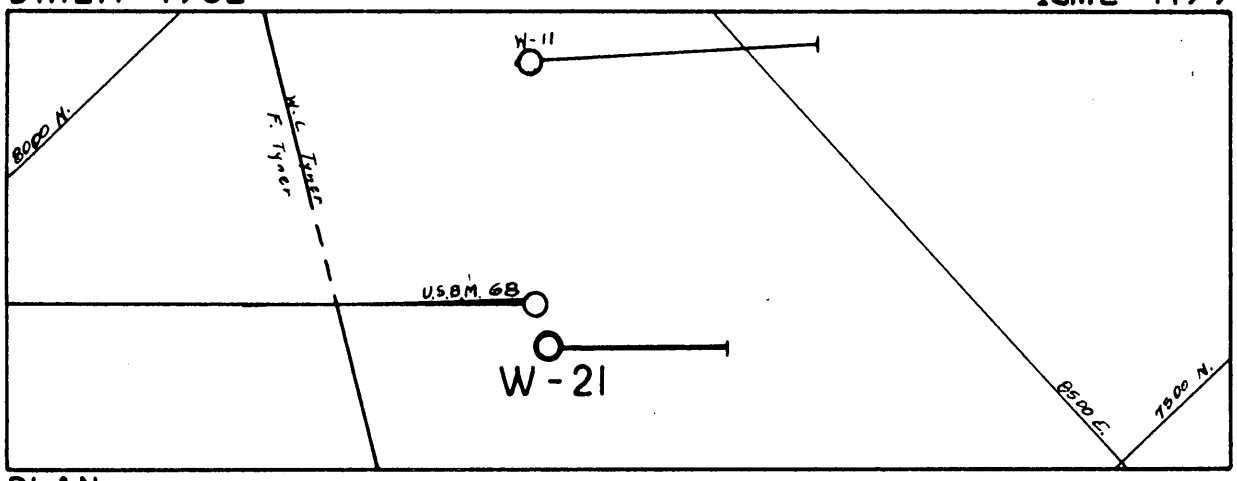
VERT. & HORZ. SCALES: 1" = 100'

0 50 100 200 300 FT.

JWH. MARCH 1969

WATSON PROJECT
CRITTENDEN COUNTY, KY.

DMEA-4962 IdmE-1199



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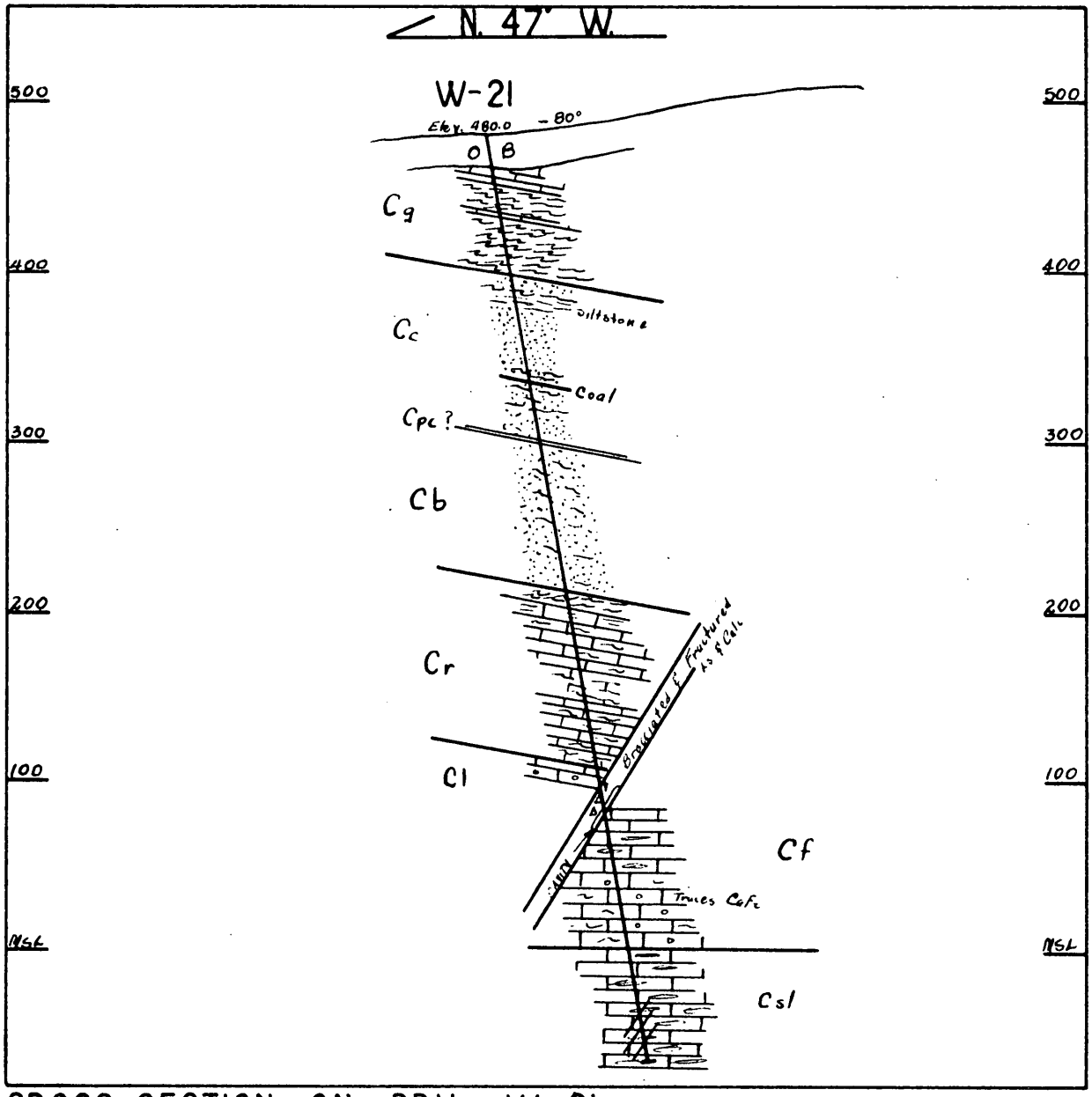

CROSS SECTION ON D.D.H. W-21

VERT. & HORZ. SCALES: 1" = 100'

0 50 100 200 300 FT.

J.W.H.

MARCH 1959

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INTERIM REPORT
DMEA-4962 Idm-1199

Operator: Reynolds Metals Company, Richmond, Virginia

Location: Watson-Hicks-Tyner properties, Crittenden County, Kentucky

A project inspection of the subject contract was conducted on March 30, 1959. Results obtained to date and future work were discussed with Messrs. John Hook and Thomas Winans, the Operator's geologists. Cores obtained since the last project inspection were examined.

Drilling completed under the contract is summarized as follows:

Total number of holes completed to date	19
Total footage in holes completed to date	10,895
Number of holes completed since last inspection	4
Footage in holes completed since last inspection	2,591
Number of ore holes	8
Number of indicative holes	5
Number of shine holes	1
Number of trace holes	2
Number of barren holes	3

Three of the holes (W-17B, W-18 and W-19) completed since the last project inspection encountered ore-grade mineralization and the other (W-16) was barren. Hole W-17, reported in progress in the last interim report, was lost due to caving ground. Another hole (designated W-17B by the Operator) was drilled at the same site to replace the lost hole. Summary logs of the four holes completed since the last inspection are as follows:

Hole No.	Depth in Feet	Description
W-16	0-100	Overburden.
	100-247	Bethel sandstone.
	247-379	Renault limestone and shale.
	379-387	Levias limestone.
	387-410	Rosiclare sandstone.
	410-511	Fredonia limestone.
	511-537½	Fault; limestone and calcite breccia; cavity at 529-537½
	537½-619	Renault limestone and shale.
	619	Bottom.
	Inclination -40°	
	Bearing S.57°E.	

W-17B	0-117	Overburden.
	117-205	St. Louis limestone.
	205-212	Fault; Limestone and calcite breccia; shines of fluorite, galena, and sphalerite.
	212-241	St. Louis limestone; scattered fluorite.
	241-243	Vein calcite with shines of fluorite.
	243-283	Fault; limestone and calcite breccia; shines fluorite, galena and sphalerite.
	283-288	Limestone breccia with fluorite, galena, and sphalerite (see assay below).
	288-326	Limestone and calcite breccia with shines of fluorite, galena and sphalerite.
	326-393	Renault limestone and shale.
	393-421	Levias limestone.
	421-432	Rosiclare sandstone.
	432-593	Fredonia limestone.
	593-602	Fault; limestone and calcite breccia.
	602-616	Limestone; probably Fredonia.
	616-631	Fault; shines of fluorite.
	631-661	St. Louis limestone; shines fluorite.
	661	Bottom.
	Inclination -45°	
	Bearing S.47°E.	
W-18	0-35	Overburden.
	35-132	Renault limestone and shale.
	132-165	Bethel sandstone; faults at 132 and 165 feet.
	165-232½	Fredonia limestone.
	232½-261½	Fault; limestone and calcite breccia.
	261½-273	Calcite vein.
	273-387½	St. Louis limestone.
	387½-392	Fault; limestone and calcite breccia.
	392-521	St. Louis limestone; scattered fluorite (see assay below).
	521-547	Fault; limestone and calcite breccia; scattered fluorite.
	547-577	Fredonia limestone.
	577	Bottom.
	Inclination -40°	
	Bearing S.50°E.	
W-19	0-31	Overburden.
	31-84	Bethel sandstone.
	84-262	Renault limestone and shale.
	262-284	Cavity; fault.
	284-307	Bethel sandstone.
	307-344	Cavity and limestone breccia; fault.
	344-392	Limestone and calcite breccia.

392-581	St. Louis limestone.
581-610½	Fault; limestone and calcite breccia; shines of fluorite; vein calcite at 608-610½ feet.
610½-638	St. Louis limestone.
638-641	Fault; limestone and calcite breccia; trace of fluorite.
641-668	St. Louis limestone; brecciated; shines of fluorite.
668-712	Fault; brecciated limestone and calcite with shines of fluorite at 668-678 feet; vein calcite with fluorite at 678-712 feet (see assay below)
712-734	Fredonia limestone.
734	Bottom.

Inclination -40°
Bearing S.50°E.

A summary log of the completed portion of lost hole W-17 is as follow:

Depth in Feet	Description
0-90	Overburden.
90-200	St. Louis limestone.
200-205	Cavity; fault.
205-329	Fault zone; limestone breccia with much vein calcite; good shines fluorite and sphalerite.
329-349	Levias limestone; trace of fluorite.
349-373½	Rosiclare sandstone and shale.
373½-463½	Fredonia limestone.
463½-465	Vein fluorite.
465-535	Fredonia limestone.
535-549	Cavity; possible fault.
549-592	Fredonia limestone.
592	Hole lost.

Assay results of recent drilling are as follows:

Hole No.	Depth in Feet	%CaF_2	%Pb	%Zn
W-17	224-228	27.88	1.49	0.30
	228-240	19.52	0.16	0.55
	240-248	19.88	0.53	0.30
	463-466.5	30.78	-	-
W-17B	205.3-209.5	43.32	0.43	0.89
	209.5-212	5.74	0.53	0.10
	212-225.8	8.16	0.21	0.20
	225.8-236.5	14.42	0.05	0.69
	236.5-240.8	40.12	0.11	0.00

W-17B (con't)	240.8-243.0	23.74	0.11	0.00
	243.0-251.0	2.16	0.05	0.10
	251.0-269.0	9.22	0.27	1.09
	269.0-279.2	11.24	0.16	1.19
	279.2-283.0	8.08	0.11	0.59
	283.0-288.4	39.58	11.29	6.97
	288.4-291.0	14.68	0.21	3.18
	291.0-299.8	7.36	0.16	2.89
W-18	478.3-487.1	13.24		
	487.1-494.2	36.28		
	494.2-498.3	11.38		
W-19	676.8-684.7	5.28		
	684.7-688.5	21.16		
	688.5-691.5	32.90		
	691.5-694.2	5.32		

A total of three holes were in progress at the time of the inspection. Summary logs of these incomplete holes are as follows:

Hole No.	Depth in Feet	Description
W-20	0-10	Overburden.
	10-109	Cypress sandstone.
W-21	0-24	Overburden.
	24-83	Golconda limestone and shale.
	83-181	Cypress sandstone.
	181-183	Paint Creek (?) shale.
	183-192	Bethel (?) sandstone.
	192-272	Bethel sandstone.
	272-361	Renault limestone and shale.
W-22	Setting up.	

Verbal approval was given to drill an additional Stage II hole. The hole will be designated W-23 and the collar will be located 250 feet in a N.36½°E. direction from the collar of W-17. The hole will be drilled at a -45° inclination on a bearing of S.47°E. The total depth is estimated to be about 660 feet.

Dewey H. Amos, Geologist
U.S.Geological Survey

OFFICIAL FILE COPY
RECEIVED APR 8 1959

4/8 C 220 600

April 6, 1959

Mr. John W. Hook
Reynolds Metals Company
P. O. Box 64
Salem, Kentucky

Re: Docket No. DMEA-4962 (Fluorspar)
Watson-Hicks-Tyner properties
Crittenden County, Kentucky
Contract No. Idm-E1199

Dear Mr. Hook:

This will confirm the oral approval given by Mr. Amos on March 30 to drill hole W-23 from a collar site 250 feet N. 36°30' E. from the collar of W-17. The hole will have a bearing of approximately S. 47° E., an inclination of approximately -45°, and an estimated depth of about 660 feet.

Sincerely yours,

Robert A. Laurence
Executive Officer
OME Field Team, Region V

RAL/mg
cc - Operating Committee (2)
Mr. Dewey H. Amos
Mr. V. J. Lynch
File

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
REGION V

ELECTROTECHNICAL
EXPERIMENT STATION

P. O. BOX 217
NORRIS, TENNESSEE

March 24, 1959

Memorandum

To: Jay L. Chambers, Office of Minerals Exploration, Interior Building, Washington 25, D. C.

From: Administrative Assistant, Norris, Tennessee

Subject: Monthly reports and vouchers

We are enclosing two copies of the following monthly report and voucher:

Idm-E1199 Reynolds Metals Company
Docket No. DMEA-4962
7th payment - month of February
Amount $5344.85

Helen Miller
Helen R. Miller

Attachments
/hbm
Copies to R. A. Laurence
V. J. Lynch
Norris files
Day files

OFFICIAL FILE COPY
O. M. E.
RECEIVED MAR 26 1959

DATE	INITIALS	CODE
3-26	C	220
"	FEJ	110
3/30	[illegible]	600

Form MF-104 (Rev.)
(April 1952)

Watson Project
Stage I & II

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION

Budget Bureau No. 42-R1036.5

PAID ON VOUCHER & SCHEDULE OF PAYMENTS K- 54

OPERATOR'S MONTHLY REPORT AND VOUCHER

Month 96 February 1959 Docket No. DMEA 4962 Contract No. Idm-E1199
Operator's Name Reynolds Metals Company Minerals Fluorspar
Address Richmond, Virginia
Contract Amount $ 59,710.00 Government Participation: 50 % Amount, $ 29,855.00

MAR 25 1959 O.M.E. RECEIVED

ITEMS OF COSTS	FOR OPERATOR'S USE: Monthly Total	Totals Previously Reported	Totals To Date	FOR GOVERNMENT USE ONLY: Approved Monthly Total	Approved Totals Previously Reported	Approved Totals To Date
(1) Independent Contracts:						
Short Form						
Drilling Core	8,460.60	12,569.95	21,030.55			
Bulldozing Reaming	1,230.25	1,841.00	3,071.25			
Hole Survey Cementing		184.00	184.00			
Crosscutting						
~~Drilling~~ Lost BX Casing	64.80	216.00	280.80			
Lost AX Casing	17.00		17.00			
(2) Labor and Supervision:						
Labor						
Supervision						
Technical Services						
(3) Operating Mat'ls. and Supplies:						
Timber						
Explosives						
Pipe						
Track						
Core Boxes		225.00	225.00			
(4) Operating Equipment:						
Rental						
Purchase						
Depreciation						
(5) Initial Rehabilitation and Repairs						
(6) New Bldgs., Improvements, etc.						
(7) Miscellaneous:						
Repairs to Equipment						
~~Sampling~~ Analysis CaF_2	36.00	27.00	63.00			
~~Payment~~ CaF_2, Zn, Pb	78.00	84.50	162.50			
Liability Insurance						
Incidental Allow.	803.04	1,193.08	1,996.12			
(8) Contingencies (specify):						
TOTALS	10,689.69	16,340.53	27,030.22	10689.69	16340.53	27,030.22

I certify that the above bill is correct and just and that payment therefor has not been received.

Date 3-11-59 *Payee Reynolds Metals Company

Per H. E. McDaniel Title Accounting Official

*When a voucher is signed or receipted in the name of a company or corporation, the name of the person writing the company or corporate name, as well as the capacity in which he signs, must appear. For example: "John Doe Company, per John Smith, Secretary," or "Treasurer," as the case may be.

NOTE.—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.

(Instructions on reverse)

Pursuant to authority vested in me, I certify that this account is correct and proper for payment in the amount of:

$ 5344.85

Signature Helen R. Miller
(Authorized Certifying Officer)

Date MAR 24 1959 Vou. No. 93
(See other side)

5344.84

(For Government use only)

CERTIFICATION BY GOVERNMENT REPRESENTATIVE:

I certify that to the best of my knowledge and belief the contractor submitting this voucher is operating a Defense Minerals Exploration Administration project under Contract No. E 1199 in accordance with the terms of the contract.

Signature [illegible] Title Mining Engr. Date 3/18/59

APPROVAL BY DMEA EXECUTIVE OFFICER OR ALTERNATE:

Signature [illegible] Title ACTING EXECUTIVE OFFICER DMEA - REGION V Date MAR 23 1959

MONTHLY REPORT OF OPERATOR

The Operator (Contractor) of an exploration project is required to make a monthly report to the Government through the Regional Executive Officer. This report consists of three parts as follows:

(a) *Form MF-104—Operator's Monthly Report and Voucher.*—This form details expenditures and constitutes a voucher for reimbursing the Operator for the Government's share of costs;

(b) *Form MF-104A—Operator's Unit Cost and Progress Report.*—This is a statistical report of expenditures which shows costs for the various types of operation; and

(c) *Narrative.*—A concise narrative description of progress made, results accomplished, and any unusual difficulties encountered must be furnished as an attachment to this Report and Voucher. Wherever possible, the narrative is to be illustrated with maps or sketches showing formations penetrated and location and assays of samples taken as well as advances in workings. In the case of diamond drilling or churn drilling, the location and inclination of holes is to be shown on a map; logs and assays also are to be submitted.

The Monthly Report of Operator should be prepared in an original and four copies all of which must be sent to the Executive Officer of the Region not later than the 15th of the month following.

Preparation of Form MF-104—Operator's Monthly Report and Voucher.—All the applicable spaces in Form MF-104 should be filled in by the Operator, and the Operator or his agent should sign the certification in the lower left corner of the form.

The items of costs are arranged in the order they appear in Article 6 (a) of Form MF-200 (Revised February 1952), however, this form is readily adaptable for use in reporting activities under other contract forms.

Under Item (1) delete words "Short Form" if the contract is a sub-contract under Form MF-200; and delete word "Independent" if the contract reported is on Form MF-200 (A). Also, report work paid for on a unit basis under contract Form MF-200 as though it were performed under an independent contract.

Under Item (2) include labor, supervision and technical services incurred for the exploratory operations. Do not include labor, supervision and technical services used for work performed under items (5) and (6).

Under Item (3) include the costs of material and supplies used in the project other than that used under items (5) and (6).

Under Item (4) appear the three types of operating equipment expenditures, that is, rental, purchase and depreciation. The expenditures made for renting equipment belonging to a third party will be reported under "Rental". The amount paid or duly obligated for payment for the purchase of equipment will be reported under "Purchase". The amount of expenditures due the Operator to reimburse him for depreciation of equipment owned will be reported under "Depreciation".

Item (5) comprises costs of labor, supervision, technical services, materials, etc., which are used in the initial rehabilitation and repair of existing buildings, installations, fixtures, and equipment. These costs, therefore, should not be reported under items (2) and (3).

Item (6) includes the labor, supervision, technical services, materials, etc., used in the installation or construction of new buildings, fixed improvements, etc., necessary for the project. These costs, therefore, should not be reported under items (2) and (3).

Item (7) covers miscellaneous types of expenditure such as payroll taxes, liability insurance, workmen's compensation insurance, repairs to equipment and sampling and analysis. Only that part of payroll taxes, liability insurance and workmen's compensation which are paid by the operator should be reported under item (7). The share paid by the employee as a payroll deduction is to be included under item (2) as labor costs.

Item (8) includes any unforeseen costs not included in the other seven categories.

The original of Form MF-104 when submitted for reimbursable expenses incurred under contract Form MF-200 must be supported by original documentation or by certified copies of purchase orders, payrolls or transcripts of payrolls, unless such documentation has been waived by the Regional Executive Officer. This certification may be stated thus, "Certified True Copy (or Transcript)", followed by appropriate signature. If the Executive Officer of the Region determines that a contract under Form MF-200 should have an "on-site" audit, that is, a Government auditor should make an audit of the Operator's books and records of account, the Operator need not support his monthly voucher with original or certified documents except in cases of equipment purchases whose individual costs exceed $50.00. In these cases the original or a certified copy of the purchase order or invoice should be attached to the Monthly Voucher. N. B.—Only the *original* of Form MF-104 is required to be documented. The four copies of Form MF-104 are not to be thus supported.

Form MF-104 submitted for reimbursement under fixed price contracts on Form MF-200 (A), however, are not required to be supported by documentation of any kind. The Operator will submit his claim under item (1) of Form MF-104 by deleting as stated above the word "Independent" and by showing the number of feet or other units immediately after the appropriate descriptive word, such as, drilling, bulldozing, crosscutting, drifting, etc., and giving the "Monthly Total" amount due. "Totals Previously Reported", and "Totals to Date" columns should also be filled in.

GPO 872893

Form MF-104A
(April 1952)

Budget Bureau No. 42-R1151.2

UNITED STATES
DEPARTMENT OF THE INTERIOR

DEFENSE MINERALS EXPLORATION ADMINISTRATION

Watson Project
Stage I

OPERATOR'S UNIT COST AND PROGRESS REPORT

Month of February 1959 Docket No. DMEA 4962 Contract No. Idm-E1199
Operator's Name Reynolds Metals Company Minerals Fluorspar
Address Richmond, Virginia

OPERATION	UNIT	COSTS THIS MONTH	UNITS THIS MONTH	COSTS TO DATE	UNITS TO DATE	UNIT COSTS TO DATE	AUTHORIZED BY CONTRACT Units	AUTHORIZED BY CONTRACT Unit Costs
Drifting								
Crosscutting								
Raising								
~~Shafts~~ ~~Core Boxes~~	~~1~~			~~225.00~~	~~75~~		~~75~~	~~3.00~~
Winzes								
Drilling: Core	~~Ft.~~	~~6,227.45~~	~~2,111~~	~~18,797.40~~	~~6,372~~		~~6,900~~	~~2.95~~
~~Chum~~ ~~Reaming~~	~~Ft.~~	~~458.50~~	~~262~~	~~2,299.50~~	~~1,314~~		~~2,000~~	~~1.75~~
~~Hole Survey~~ ~~Cementing~~	~~Hr.~~			~~184.00~~	~~23~~		~~80~~	~~8.00~~
~~Stripping~~ ~~Lost BX Casing~~	~~Ft.~~			~~216.00~~	~~100~~		~~300~~	~~2.16~~
~~Trenching~~ ~~Lost AX Casing~~	~~Ft.~~	~~17.00~~	~~10~~	~~17.00~~	~~10~~		~~300~~	~~1.70~~
~~Test Pits~~ ~~Assay CaF2~~	~~1~~	~~31.50~~	~~7~~	~~58.50~~	~~13~~		~~75~~	~~4.50~~
~~Roads and Trails~~ ~~CaF2,Zn,Pb~~	~~1~~	~~78.00~~	~~12~~	~~162.50~~	~~25~~		~~25~~	~~6.50~~
~~Incidental Allowance~~	~~1~~	~~591.08~~	~~2,111~~	~~1,784.16~~	~~6,372~~		~~6,900~~	~~0.28~~
TOTAL DISTRIBUTED COSTS								TOTAL COSTS AUTHORIZED BY CONTRACT
Operating Equipment Purchased								
Initial Rehabilitation and Repairs								
New Buildings, Improvements, etc.								
TOTAL COSTS		~~7,403.53~~		~~23,744.06~~				~~59,710.00~~ 28,310.00

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

REMARKS: ~~Costs are for holes number W-7, W-11, W-12, W-14.~~

Date 3-11-59 Operator Reynolds Metals Company

Per H. E. McDaniel Title Accounting Official

NOTE.—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.

(Instructions on reverse)

H. L. Burmeister 3/18/59 (For Government use only)

MINING ENGINEER
U. S. BUREAU OF MINES

INSTRUCTIONS

Preparation of Form MF-104A—Operator's Unit Cost and Progress Report.—Applicable places on Form 104A should be filled in by the Operator. The purpose of this form is twofold as follows: (1) to furnish the supervising engineers and other administrators with statistical information necessary to better determine the progress of the project; and (2) to furnish more permanent information on mining costs for future use. The more important phases of operation on which permanent information is desired have been outlined in the form. There are blank lines, however, for those unusual phases which may need to be reported for a particular project. It will be necessary for the Operator to distribute his costs among the applicable phases reported with the exception of three items the costs of which are not to be distributed by the Operator. These three items are: "Operating Equipment Purchased", "Initial Rehabilitation and Repairs", and "New Buildings, Improvements, etc." The reason for not distributing these items on a monthly basis is doubtless clear to the Operator, since such distribution might well overstate the cost for any one month or period short of the entire contract period.

Form MF-104A has been designed to tie in with Form MF-104 for both monthly and cumulative costs. The "Total Costs" on Form MF-104A for each month should equal the monthly "Total Costs" as reported on Form MF-104. This is also true of the "Total Costs To Date".

In preparing Form MF-104A, it will be necessary frequently to distribute certain costs over a number of items. For instance, supervisory and engineering costs may have to be distributed over several phases, such as, drifting, crosscutting, raising, etc., provided that these items were reported active for the month. Such distributions should be made on the basis of time spent on the various phases, on man days of labor charged to such phases, or on some other equitable basis. "Operating Equipment", "Initial Rehabilitation and Repairs", and "New Buildings Improvements, etc.", will be distributed to the several phases of the project by the Washington Office of DMEA at the close of the project if determined necessary. The last two columns headed "Authorized by Contract" will be filled in by the Operator if such information is found in the contract. This information is usually a part of Exhibit "A" of the contract. A space for remarks has been provided for the use of the Operator to call attention to any unusual circumstances causing excessive or disproportionate unit costs.

GPO 872894

Form MF-104A
(April 1962)

Budget Bureau No. 42-R1151.2

UNITED STATES
DEPARTMENT OF THE INTERIOR

DEFENSE MINERALS EXPLORATION ADMINISTRATION

Watson Project
Stage II

OPERATOR'S UNIT COST AND PROGRESS REPORT

Month of February 1959 Docket No. DMEA 4962 Contract No. Idm-E1199

Operator's Name Reynolds Metals Company Minerals Fluorspar

Address Richmond, Virginia

OPERATION	UNIT	COSTS THIS MONTH	UNITS THIS MONTH	COSTS TO DATE	UNITS TO DATE	UNIT COSTS TO DATE	AUTHORIZED BY CONTRACT Units	AUTHORIZED BY CONTRACT Unit Costs
Drifting								
Crosscutting								
Raising								
Shafts								
Winzes								
Drilling: Core	Ft.	2,233.15	757	2,233.15	757		8,000	2.95
~~Chum~~ ~~Auger~~ Reaming	Ft.	771.75	441	771.75	441		2,000	1.75
Hole Survey-Cementing	Hr.						100	8.00
~~Stripping~~ Lost BX Casing	Ft.	64.80	30	64.80	30		300	2.16
~~Trenching~~ Lost AX Casing	Ft.						300	1.70
~~Test Pits~~ Assay CaF2	1	4.50	1	4.50	1		75	4.50
~~Roads and Trails~~ CaF2,Zn,Pb	1						25	6.50
Incidental Allow.	Ft.	211.96	757	211.96	757		8,000	0.28
TOTAL DISTRIBUTED COSTS								TOTAL COSTS AUTHORIZED BY CONTRACT
Operating Equipment Purchased								
Initial Rehabilitation and Repairs								
New Buildings, Improvements, etc.								
TOTAL COSTS		3,286.16		3,286.16				~~59,710.00~~ 31,399.00

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

REMARKS: Costs are for W-9 only.

Date 3-11-59 Operator Reynolds Metals Company

Per H. E. McDaniel Title Accounting Official

NOTE.—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.

(Instructions on reverse)

W. A. Burmeister 3/18/59 (For Government use only)

MINING ENGINEER
U. S. BUREAU OF MINES

INSTRUCTIONS

Preparation of Form MF-104A—Operator's Unit Cost and Progress Report.—Applicable places on Form 104A should be filled in by the Operator. The purpose of this form is twofold as follows: (1) to furnish the supervising engineers and other administrators with statistical information necessary to better determine the progress of the project; and (2) to furnish more permanent information on mining costs for future use. The more important phases of operation on which permanent information is desired have been outlined in the form. There are blank lines, however, for those unusual phases which may need to be reported for a particular project. It will be necessary for the Operator to distribute his costs among the applicable phases reported with the exception of three items the costs of which are not to be distributed by the Operator. These three items are: "Operating Equipment Purchased", "Initial Rehabilitation and Repairs", and "New Buildings, Improvements, etc." The reason for not distributing these items on a monthly basis is doubtless clear to the Operator, since such distribution might well overstate the cost for any one month or period short of the entire contract period.

Form MF-104A has been designed to tie in with Form MF-104 for both monthly and cumulative costs. The "Total Costs" on Form MF-104A for each month should equal the monthly "Total Costs" as reported on Form MF-104. This is also true of the "Total Costs To Date".

In preparing Form MF-104A, it will be necessary frequently to distribute certain costs over a number of items. For instance, supervisory and engineering costs may have to be distributed over several phases, such as, drifting, crosscutting, raising, etc., provided that these items were reported active for the month. Such distributions should be made on the basis of time spent on the various phases, on man days of labor charged to such phases, or on some other equitable basis. "Operating Equipment", "Initial Rehabilitation and Repairs", and "New Buildings Improvements, etc.", will be distributed to the several phases of the project by the Washington Office of DMEA at the close of the project if determined necessary. The last two columns headed "Authorized by Contract" will be filled in by the Operator if such information is found in the contract. This information is usually a part of Exhibit "A" of the contract. A space for remarks has been provided for the use of the Operator to call attention to any unusual circumstances causing excessive or disproportionate unit costs.

GPO 872894

REYNOLDS METALS COMPANY
Monthly Report - February, 1959
Watson Project - DMEA 4962 - Idm-K1199
Crittenden County, Kentucky

by
John W. Hook

Stage I

All of the Stage I work has now been completed. With the completion of W-15, the total footage drilled was 6996, six feet over the contract maximum. The additional six feet will be absorbed by the operator. A total of 13 holes were drilled under Stage I, 6 of which were along Faults 3 and 12-B, 5 along Faults 10 and 10-A, and 2 along Faults 1 and 1-A. Two of the holes along Faults 3 and 12-B cut ore grade fluorspar and the other four cut very strong shine mineralization. Both holes on Faults 1 and 1-A cut very wide zones of good shines and one of the holes had two runs of ore. One of the holes along Faults 10 and 10-A cut 21.5 feet of 7.28% CaF_2, the other four had only traces or weak shines.

18 holes were originally planned for Stage I, but because locations were revised as more accurate geological data was obtained from previous holes, the allotted footage was used in 13 holes. The holes had to be drilled deeper than expected partly because of the deep weathering along the faults which made shallow tests impractical.

Holes W-7, W-12, W-14, and W-15 were completed during the month of February. The accounting report does not show W-15 which was bottomed after the 25th of the month and not complete on the Joy Invoice. For the same reason, W-11, which bottomed January 31, 1959, is on the accounting forms for this month.

W-7 (Revised Location No. 5) The January narrative covered the upper 540 feet of this hole. Below this depth the hole cut numerous shines of fluorspar, zinc and lead. Assays from 660.6 to 687.7 (red length 27.1 feet) averaged 11.35% CaF_2, 0.20% Pb, and 1.27% Zn. The main fault, Fault 3 (Vein A), however contained barren calcite. The dip of Fault 3 had flattened and the penetration was made at 841 to 850, rather than the estimated depth of 700 feet. The hole bottomed at 860 feet in Ste Genevieve limestone.

W-12 (Location No. 19) This footwall test of Faults 1 and 1-A found ore grade fluorspar on both faults, with good shines of fluorspar, lead and zinc in the broken formations between the two faults. Fault A had 29.84% CaF_2 from 189.5 to 197.1. (The average

assay from 189.5 to 215.1 was 13.63% CaF_2, 0.23% Pb, and 0.65% Zn.) Fault 1-A had 34.51% CaF_2, 2.58% Pb, and 1.23% Zn from 365.4 to 374.9. (The average assay from 345.2 to 384.6 was 15.03% CaF_2, 0.77% Pb, and 1.01% Zn.) The mineralization in this hole occurred as a breccia filling rather than in a true vein structure.

W-14 (Revised Location No. 13) This test cut Fault 10 400 feet southwest of the W-11 penetration. To keep the required distance from the property line, this hole was drilled on an 80° angle and cut the fault from 324 to 338 feet. The test was disappointing in that there was a 10 feet open cavity at the fault with only 1.5 feet of vein calcite with fluorspar shines on the footwall. The footwall formation was Ste Genevieve with traces of fluorspar.

W-15 (Revised Location No. 10) W-15 was drilled on the Sunderland property (added to the contract by Amendment No. 1) to test the projection of Fault 12-B 1,100 feet southwest of the W-7 penetration. Fault 12-B splits into numerous minor faults, the various components of which were cut from 364 to 500 feet. Faults were cut at 364-372, 386-392, 414-419, 446-446.5, and 484-499.5. Most of the intervening Ste Genevieve limestone was fractured and brecciated. There were scattered shines of fluorspar, lead and zinc from 414 to 494.5. The hole bottomed at 534 feet.

Assays for the above holes are included in the logs. There were a total of 29 assays for CaF_2, Pb and Zn. Since the Stage I allotment is 25, the four additional assays are charged on the accounting report as CaF_2 only, with Reynolds absorbing the additional cost for the Pb and Zn.

SUMMARY OF DRILLING

Hole	Location No.	Depth	Date Bottomed
W-7	5	860'	2-11-59
W-11	12	436	1-31-59 (not on last month's invoice)
W-12	19	453	2-14-59
W-14	13	362	2-10-59
W-15	10	534	2-27-59 (not on this month's invoice)
	Total for Month	2,645	
	Prev. Total	4,261	
	Grand Total	6,906	
	Stage I max.	6,900	
	Overage	6	

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Diamond Drill Hole W-7; Angle -45°; Bearing S50E; depth 860';
Coordinates N8832 E10,110 Elevation 495.5'
Property, Watson; Area SE Salem; County, Crittenden; State, Kentucky
Contractor, Joy Manufacturing Company
Driller, E. J. Hayes; Started, 1/8/59 Finished, 2/11/59

From	To	Fm	Description
0	40		Overburden
40	114	Cb	Sandstone, medium gray brown, weathers brown, massive, broken core. Angle of bedding 55° with core at 83 feet.
114	127	Cb	Mud, few sandstone, fragments, 2" recovery, cavity (?).
127	128	Cr	Limestone and shale, limestone is shaley, fossiliferous, shale is green, broken.
128	132	Cr	Limestone, brown, fine crystalline, slightly fossiliferous, fossils replaced by clear calcite, oxidized in lower 6".
132	135.5	Cr	Weathered shale and limestone, shale is green, weathered brown, limestone is very fossiliferous.
135.5	142	Cr	Limestone, brownish gray, medium to fine crystalline, slightly fossiliferous, fossils replaced by brown calcite, stylolitic, ½" calcite vein at 141.5.
142	144	Cr	Green shale, weathered, few bryozoa fans along bedding.
144	147	Cr	Limestone, fine crystalline, light gray.
147	149	Cr	Weathered shale.
149	152	Cr	Limestone, light gray, fine crystalline, oxidized, vuggy.
152	153	Cr	Green shale.
153	154.5	Cr	Limestone, medium gray, medium crystalline.
154.5	158.5	Cr	Green shale with little fine sand.
158	159	Cr	Limestone, fine crystalline, brown, oxidized, few oolites.
159	160.5	Cr	Limestone, dark greenish gray, very fine crystalline, fossiliferous, some fine sand near top.

From	To	Fm	Description
160.5	184	Cr	Limestone and siltstone, limestone is dark gray, where fresh, weatheres greenish brown, silty. Siltstone, blue gray, where fresh, greenish brown where weathered.
184	186	Cr	Limestone, coarse crystalline, slightly shaley, shale seams running 50° with core, weatheres greenish brown, fossiliferous.
186	192.5	Cr	Siltstone as above, greenish brown.
192.5	205	Cr	Shale, olive green.
205	214	Cr	No recovery, shale, blank bit used.
214	229	Cr	Shaley limestone, dark brown to black shale, dark brown limestone, bryozoan fans. Shetlerville member of Cr.
229	238	Cr	Limestone, dark brown, fine crystalline, few calcite filled fractures.
238	245	Cr	Silty limestone, with shale partings, weathered. Recovery from 238-47 is 3 feet.
245	264	Cr	Limestone, fine crystalline, gray brown, and dark brown, with shaley partings.
264	267		Cavity filled with "red mud".
267	271	Cf	Weathered shaley limestone.
271	271.5	Cf	Broken limestone.
271.5	277.5	Cf	Limestone, medium grey, sandy, few calcite stringers with shines of Caf2 at 277.5.
277.5	283.5	Cf	Limestone, fine crystalline, brown, green shale from 281.8 to 282.8.
283.5	286.5	Cf	Brecciated limestone and calcite with good shines of CaF2.
286.5	292	Crc	Greenish gray sandstone, with shale partings (typical Rosiclaire), scattered shines CaF2 from 287.5 - 288.5, weathered green in lower 2 ft.
292	309	Crc	Sandstone, with few scattered shines of CaF2 throughout run. Broken core 301 - 305.5.

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From	To	Fm	Description
309	312	F	Vein calcite, few shines of CaF_2 in upper 1", green shale weathered at both ends of core.
312	325	F	Limestone, slightly brecciated, with calcite, some oil showing in calcite, scattered shines of CaF_2 at 317-317.5. Vein calcite 320.5-321.5.
325	328	F	Vein calcite.
328	349.5	F	Brecciated limestone and calcite, scattered shines of CaF_2 throughout.
349.5	363	Csl	Limestone, brown, fine crystalline, slightly fractured, CaF_2 shines at 354-356.
363	394	Csl	Limestone, brown gray, coarse crystalline, fractured, numerous calcite veins, scattered traces CaF_2 in upper 1", traces CaF_2 and disseminated Zns from 388.5-393.5.
394	423	Csl	Limestone, brown, medium-fine crystalline, less fractured with CaF_2 in upper feet, slightly shaley at 396, oolitic, calcite veinlets 303-305 running with core, trace of CaF_2 at 415.5, 419.5-420.
423	447.5	Csl	Limestone, gray brown, coarse crystalline, less fractured than run above, fossiliferous, traces CaF_2, Zn and Pb for 4" at 428, scattered shines CaF_2 from 438-441.
447.5	479	Csl	Limestone, gray, fine crystalline, cherty, slightly fractured, few calcite stringers.
479	536.5	Csl	Limestone, gray brown, medium crystalline, fossiliferous, stylolitic, few oolitic zones, cherty, few calcite stringers.
536.5	541	Csl	Limestone as above, slightly brecciated, scattered shine of CaF_2 and Pb.
541	562	Csl	Limestone, medium gray, medium to fine crystalline, calcite veinlets, CaF_2 shines at 248.5, 252, 558.5, scattered shines from 561-562.
562	562.5	Csl	Calcite, vein, with good shines CaF_2.
562.5	572.5	Csl	Limestone, fine crystalline, medium gray, shines CaF_2 at 568, few calcite veinlets.
572.5	574.5	Csl	Vein calcite with scattered shines of CaF_2 and Pb.

From	To	Fm	Description
574.5	601	Csl	Limestone, medium gray, fine to medium crystalline, slightly fractured, calcite veinlets, some chert, shines of CaF_2 at 578.5, 582, 584.5, 587.5, 589.5 and a 4" calcite vein at 596, shines of CaF_2 at 598.
601	613	Csl	Limestone, brown gray, fine crystalline, fractured, calcite veinlets, scattered shines of CaF_2 from 601-612.
613	622	Csl	Limestone, dark brown, medium crystalline, slightly fractured but less than above, few calcite veins, scattered shine of CaF_2 from 618-622.
622	638.5	Csl	Limestone, fine crystalline, medium gray, slightly fractured. Scattered shines of CaF_2 at 632, calcite veinlets, stycolit es.
638.5	660	Csl	Limestone, medium gray, few shaley partings, large black chert, slightly fractured in upper 4', shines of CaF_2 and Pb from 642-643.5 and 651.5. Slightly more fractured with shines of CaF_2 and Pb.
660	673.5	F	Fault. Brecciated limestone and chert, with calcite, good shines CaF_2, disseminated Zn, and traces of Pb.
673.5	701	Csl	Limestone, dark gray, medium crystalline, slightly fractured with CaF_2 shine throughout run.
701	704.5	Csl	Limestone, fractured, chert with good shines CaF_2, calcite.
704.5	709	Csl	Limestone, brown, fine crystalline, slightly fractured, stycolitic.
709	711	Csl	Limestone and chert, fractured, good shines CaF_2 and Zn with calcite.
711	713	Csl	Limestone, slightly fractured, stycolitic, good shines CaF_2.
713	744	Csl	Limestone, brown, medium crystalline, slightly cherty, few shines CaF_2, heavy stycolites, few calcite stringers.
744	746	Csl	Brecciated limestone and calcite, scattered shines of disseminated zinc.

From	To	Fm	Description
746	774	Csl	Limestone, gray, fine crystalline, slightly fractured, slightly cherty.
774	778	Csl	Brecciated limestone and calcite.
778	789	Csl	Limestone, grey, fine crystalline, slightly fractured, several large calcite veins, stylolites.
789	811	F	Fault. Brecciated limestone in upper foot and lower 3', remainder is vein calcite.
811	830	F	Brecciated limestone, dark grey, fine crystalline, slightly weathered at 228'.
830	834	F	Limestone and calcite breccia.
834	841	F	Limestone, medium to dark gray, fine crystalline, slightly brecciated, many stylolites, oil showing in calcite.
841	850	F	Fault. Vein calcite with little limestone and calcite breccia at top and bottom.
850	860	Csg	Limestone, grey-green, medium crystalline, fossiliferous, slightly oolitic.

Bottom 860

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Assay values for Diamond Drill Hole W-7.

From	To	CaF_2	SiO_2	$CaCO_3$	Pb	Zn
660.6	665.7	5.76	29.52	57.54	0.32	3.28
665.7	673.1	18.38	38.62	37.84	0.27	1.59
673.1	681.4	7.42	12.50	78.26	0.11	0.10
681.4	687.7	12.76	10.26	73.22	0.13	0.80

Continuous sample from 660.6 to 687.7 feet, 27.1 feet, with average values; 11.35% CaF_2, 0.20% Pb, 1.27% Zn.

REYNOLDS METALS COMPANY

Diamond Drill Hole W-12, Angle -45°; Bearing, S49E; Depth 453'
Coordinates, N 8599 E 8599; Elevation 427.0'
Property, Watson; Area SE Salem; County, Crittenden; State, Kentucky
Contractor, Joy Manufacturing Company; Driller, Hughes.
Started 2/2/59 Finished 2/14/59

From	To	Fm	Description
0	126		Overburden, sand and chert fragments.
126	189	Csl	Limestone, grey brown, fossiliferous, cherty, few calcite stringers.
189	231	F	Fault. 189-194.1 Vein calcite with good shines of CaF_2. 194.1-197.1 CaF_2 with calcite, brecciated limestone fragments, trace of Pb. 197.1-203 Limestone, medium crystalline, medium grey, fractured, brecciated, with shine of CaF_2 and Zinc. 203-204 Calcite with fragments of Crc sandstone. 204-208.1 Crc sandstone, with calcite and good shines of CaF_2. 208.1-210.8 CaF_2, brecciated Crc sandstone and calcite with Pb and Zn. 210.8-216 Brecciated limestone, fine crystalline, light grey (probably Levias), Crc sandstone, heavy calcite, very godd shine of CaF_2 and Zn.
216	231	Crc	Sand, fractured and brecciated with calcite, good shines of CaF_2, Pb and Zn. Bedding dips at various angle from 45° to 70°.
231	255	Cf	Limestone, medium crystalline, light grey, oolitic, fractured throughout. Fractures filled with CaF_2 and little $CaCO_3$, and traces of Pb.
255	266.5	Cf	Limestone, medium crystalline, medium grey--green, sandy, few shale partings, fractures filled with $CaCO_3$ and little CaF_2.
266.5	269.5	Cf	Shale, green with silt size sand, little limestone at top.

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FROM	To	Fm	Description
269.5	274	Cf	Limestone, medium crystalline, light grey, oolitic, few calcite fractures.
274	296	Cf	Limestone breccia and calcite with shines of CaF_2 and Zn. 2/3 limestone, 1/3 calcite approximately. Solid calcite from 284-287.
296	317	Cf	Limestone, fine to medium crystalline, light to medium grey, scattered oolitic zones, heavy calcite fractures, shines of CaF_2, Zns. Very light grey, very oolitic from 311-314.
317	320	Cf	Limestone, very fine crystalline, dark brown, mottled with blue grey silt (?), Scattered calcite fractures with shines of CaF_2.
320	330	Cf	Limestone, coarse crystalline, light grey, oolitic, and fossiliferous. Very heavy calcite fractures (could be called a breccia) with good shines CaF_2 and traces Zns.
330	351		Limestone, brecciated, brownish grey, medium - fine crystalline, with good shines CaF_2, traces of Pb and Zinc. Calcite vein 339.5-340, 341.5-342.5, good shines CaF_2 from 345.5-351 in fractures in limestone.
351	357.5	F	Limestone, brown grey, coarse crystalline, fossiliferous, brecciated, good shines of CaF_2, Zn and Trace of Pb throughout run. CaF_2 fills fractures in limestone, and the Zn is disseminated.
357.5	365.3	F	Vein calcite with scattered limestone inclusions. Good shines CaF_2 and Pb from 359.5-360.5 with disseminated Zn.
365.3	366.4	F	Vein CaF_2 and Pb with good shines of Zn.
366.4	370.2	F	Brecciated limestone with disseminated CaF_2 and Zn and good shines of Pb. CaF_2 also fills fractures. Upper 1.3 ft. very good with CaF_2 matrix, little or no calcite.
370.2	391.6	F	Vein calcite with CaF_2. Ore from 370.2 to 374.9. Decrease in CaF_2 from 374.9 to bottom. Increase in limestone inclusions from 377.4 to 391.6. From 382.2-381.6 scattered shines of CaF_2.

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From	To	Fm	Description
391.6	398	Crc	Sandstone, greenish grey, fine grained, calcareous, good shines CaF_2 from 391.8-392.2. Few scattered shines below to bottom of run.
398	415	Crc	Limestone, grey brown, medium to coarse crystalline, fossiliferous, stylolitic, calcite fractures, scattered shines of CaF_2, trace of Pb at 414 in 1' calcite vein from 413.5-414.5.
415	424	Crc	Sandstone, grey, fine grained, calcareous, with few calcite fractures.
424	430	Crc	Shale, grey green, interbedded with medium grey limestone.
430	453	Cf	Limestone, light grey, medium crystalline, oolitic, slight shaley at 435. Angle of bedding 40° with core, cavity from 435-439. Slightly weathered shale at 448.

Bottom 453

REYNOLDS METALS COMPANY

Assay values from Diamond Drill Hole W-12.

From	To	CaF_2	SiO_2	$CaCO_3$	Pb	Zn
189.5	194.1	16.24	8.28	74.42		
194.1	197.1	50.68	14.56	31.82		
197.1	200.1	3.76	8.36	85.18	0.21	0.60
200.1	208.1	2.52	29.84	65.62	0.16	0.30
208.1	212.6	18.04	30.42	47.96	0.43	0.90
212.6	215.1	3.90	35.74	53.24	0.11	1.39

Continuous sample from 189.5 to 215.1 feet, 25.6; average values CaF_2, 13.63%; 18' of Pb, 0.23%; 18' of Zn 0.65%.

215.1	225	8.16	41.08	44.46	0.40	0.31
225	231.5	11.64	43.82	36.62	0.64	0.21

Continuous sample from 215.1 to 231.5, 16.5 feet of CaF_2, 9.53%; Pb, 0.28%; Zn, 0.10.

345.2	351	16.04	42.54	35.64	0.32	0.90
351	357.9	12.58	18.12	64.12	0.27	2.49
357.9	365.4	4.20	5.62	88.28	0.16	0.50
365.4	371.0	30.84	44.02	14.78	4.16	1.39
371.0	374.9	39.78	21.92	35.98	0.32	0.99
374.9	384.6	5.46	11.74	81.30	0.11	0.20

Continuous sample from 345.2 to 384.6, 39.4' average values of CaF_2, 15.03%; Pb, 0.77%; Zn 1.01%

REYNOLDS METALS COMPANY

Diamond Drill Hole W-14; Angle, -80°; Bearing S49E; Depth 362'
Coordinates N7511 E8201; Elevation 508'
Property, Watson; Area, SE Salem; County, Crittenden; State, Kentucky
Contractor, Joy Manufacturing Company
Foreman, Minner.
Started 2/4/59 Finished 2/10/59

From	To	Fm	Description
0	10		Overburden
10	136	Cg	Shale, dark grey, slightly weathered form 10-40 feet.
136	146	Cc	Sandstone, medium grained, brown; grey green shale partings, shaley in upper 2.5 feet.
146	148.5	Cc	Shale, laminated with thin sandstone beds.
148.5	162	Cc	Grey green silty sandstone, slightly conglomeritic in upper foot.
162	184	Cc	Sandstone, massive, medium grained, grey brown.
184	203	Cc	Black shale, predominately, with thin sandstone beds.
203	205	Cc	Black shale.
205	215	Cc	Sandy shale as above
215	226.5	Cpc	Black shale.
226.5	256	Cb	Sandstone, massive, grey brown, medium grey, shale partings in upper two feet. CaF2 shines in vein at 233'/
256	298.5	Cb	Predominately sandstone, irregularly bedded with black shale, scattered calcite veinlets. Sub angular conglomerate in lower foot.
298.5	303	Cr	Shale, black.
303	306	Cr	Limestone, silty, medium crystalline, dark grey with black shale partings.
306	324	Cr	Limestone, grey, fine to medium crystalline. Cavities at 307-309 Fractured 309-311 Cavities at 313-314 317-319 320-323

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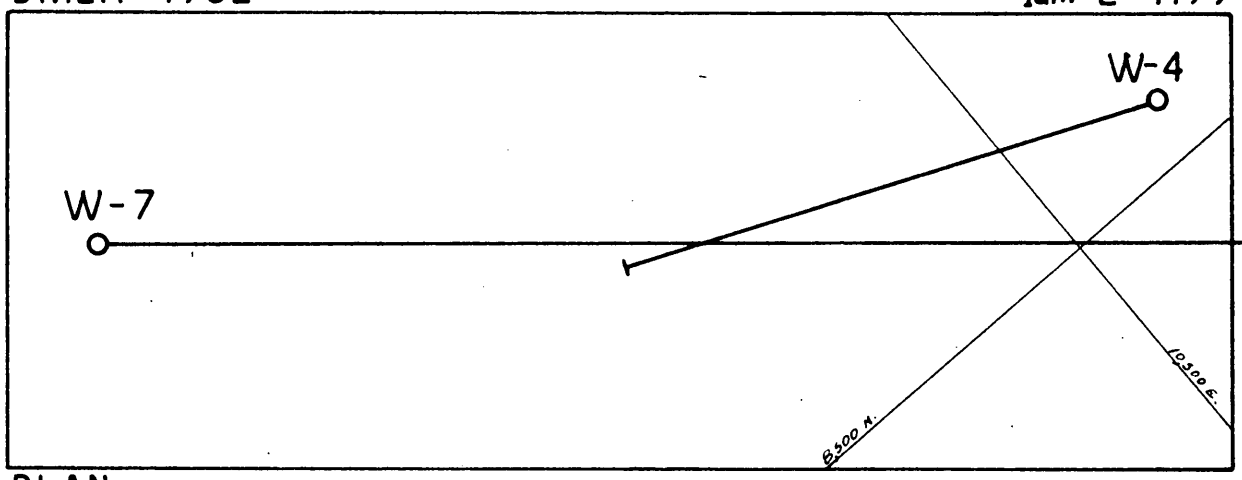
From	To	Fm	Description
324	334		Cavity, open. Fault (?).
334	334.5	Csg	Limestone, medium grey, medium crystalline.
334.5	338	F	Vein calcite with CaF_2 shines, 2' cavity 336-338.
338	362	Csg	Limestone, light grey, medium to coarse crystalline, micro fossils makes limestone look oolitic. 2' cavity342-344. Trace CaF_2 along small calcite veinlets.

Bottom 362'

WATSON PROJECT
CRITTENDEN COUNTY, KY.

DMEA-4962 Idm-E-1199



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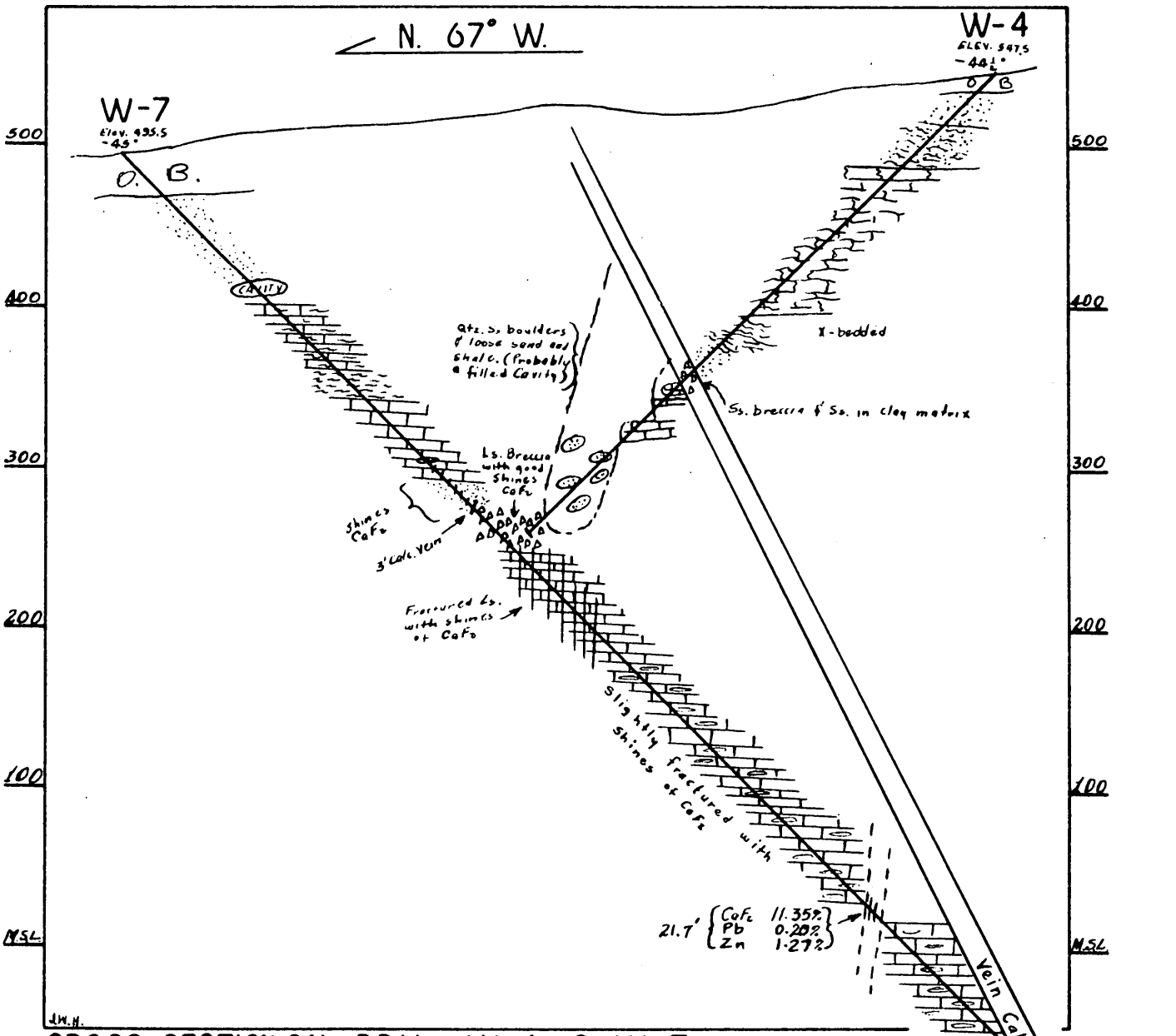


CROSS SECTION ON D.D.H. W-4 & W-7

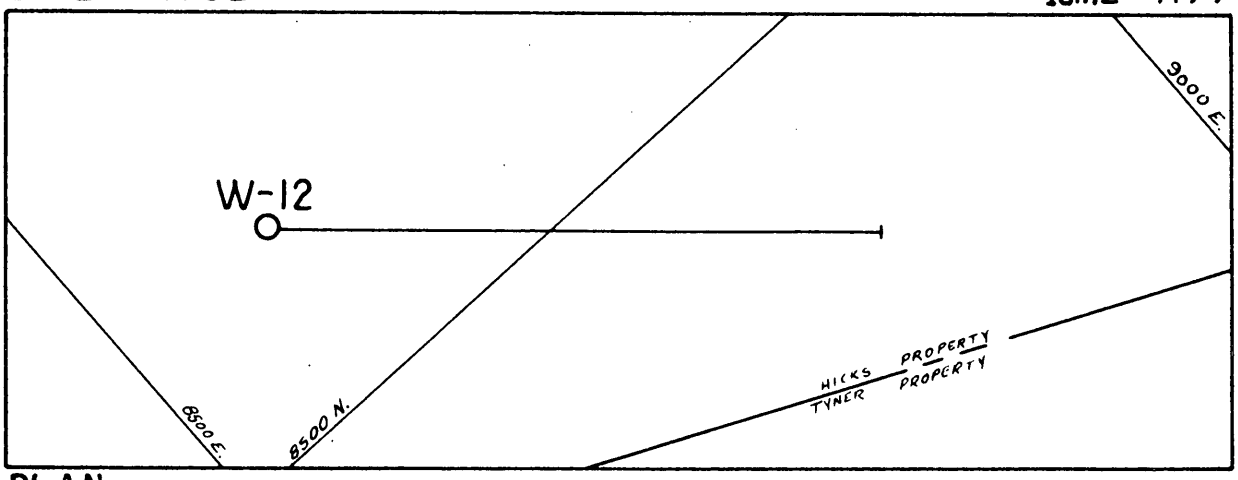
VERT. & HORZ. SCALES: 1" = 100'

0 50 100 200 300 FT.

No 4 - Dec. 1958
No 7 - Feb. 1959

WATSON PROJECT
CRITTENDEN COUNTY, KY.

DMEA-4962 IdmE-1199



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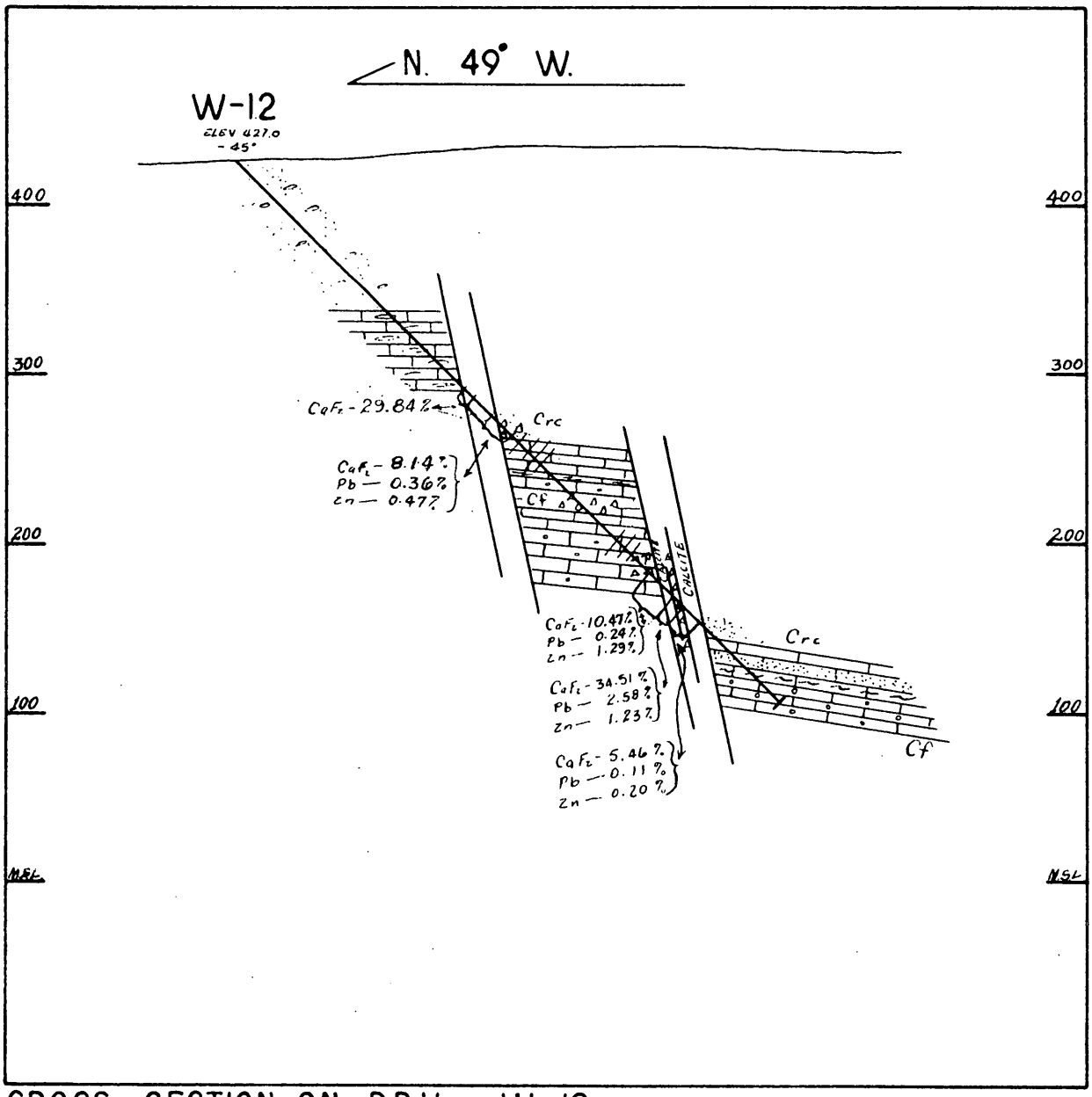


CROSS SECTION ON D.D.H. W-12

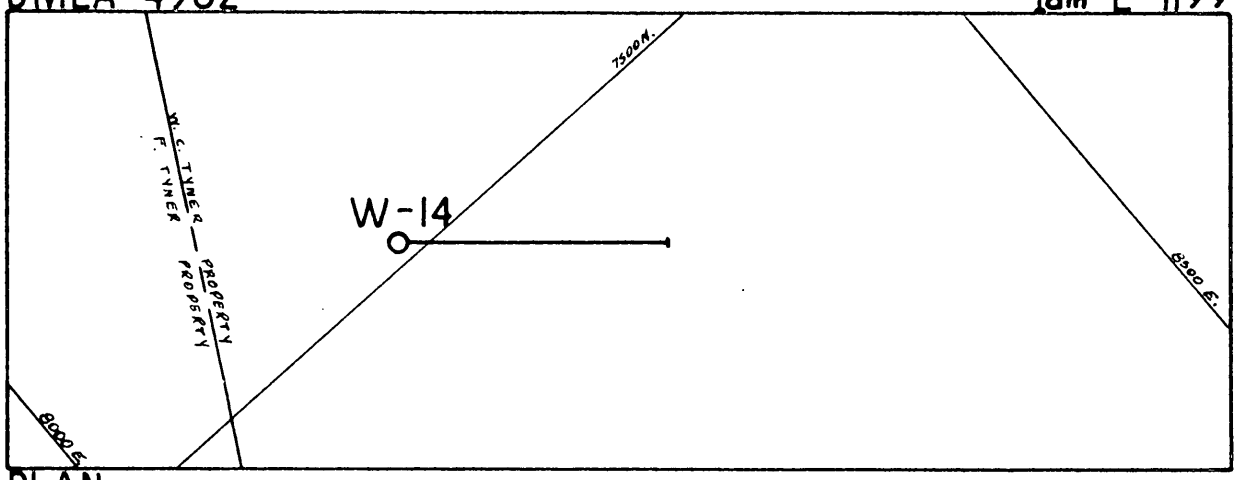
VERT. & HORZ. SCALES: 1"=100'

0 50 100 200 300 FT.

J.W.H. FEB. 1959

WATSON PROJECT
CRITTENDEN COUNTY, KY.

DMEA-4962 Idm-E-1199



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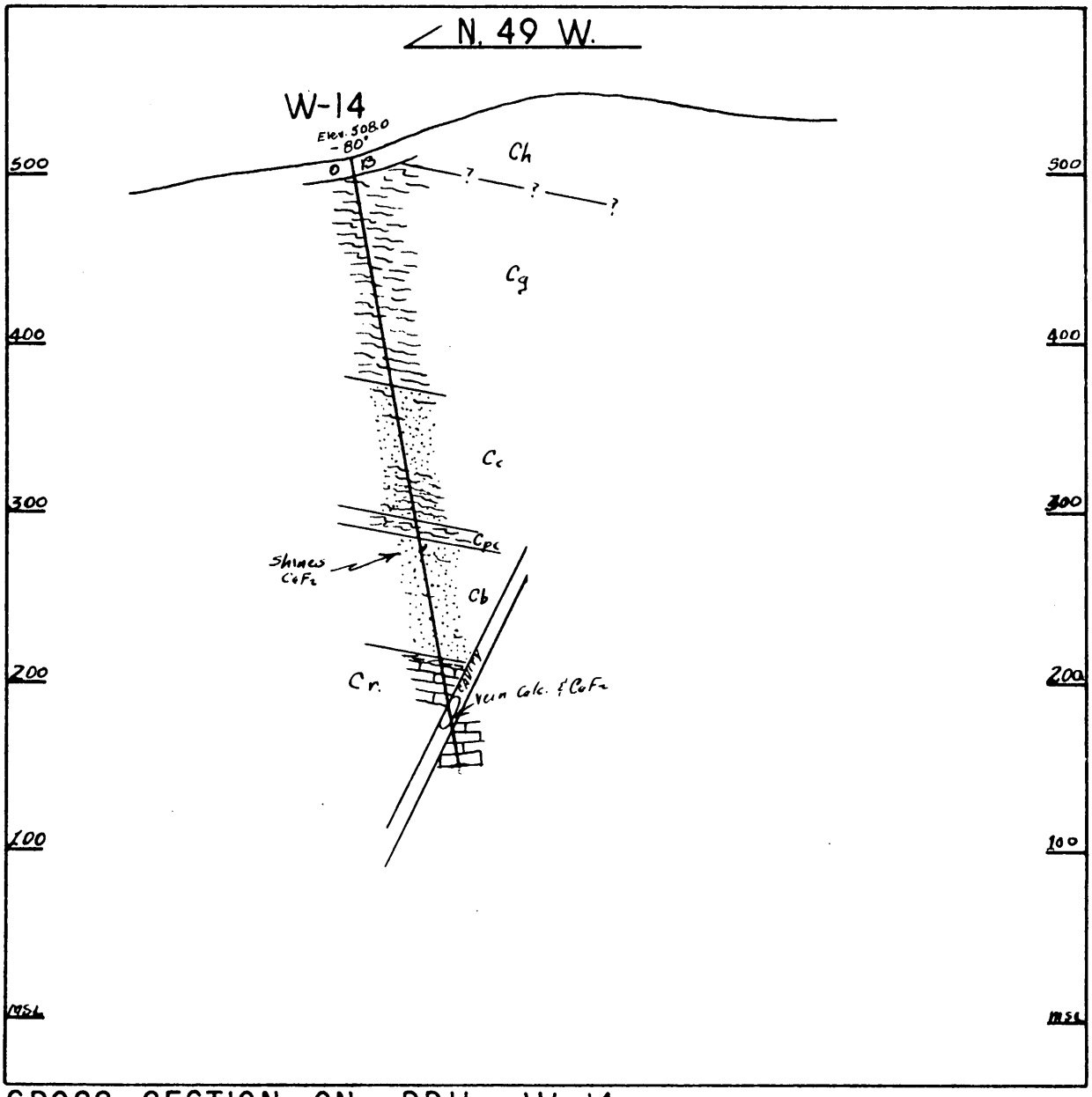

CROSS SECTION ON D.D.H. W-14

VERT. & HORZ. SCALES: 1" = 100'

0 50 100 200 300 FT.

JWH

FEB. 1952

REYNOLDS METALS COMPANY
Monthly Report - February, 1959
Watson Project - DMEA 4962 - Idm-1199
Crittenden County, Kentucky

by
John W. Hook

Stage II

Stage II holes W-9 and W-13 have been completed although W-13 was not bottomed on the 25th of January, the date the Jay invoices were submitted. The accounting report on Stage II drilling is for hole W-9 only. Holes W-16 and W-17 are presently in progress.

W-9 This hole was drilled opposite W-1 and cut vein "A" 300 feet higher and vein "C" 135 feet lower than W-1. Vein "A" had 12 inches of high grade (90.90%) CaF_2 and vein "C" had pinched to 4 inches of CaF_2 on the hanging wall of a calcite vein.

W-9 collared in Hardinsburg and cut a normal thickness of Golconda then crossed a major fault into the Ste. Genevieve. This fault was unexpected because in all previous holes the major displacement had been along vein "C". On the basis of present information we cannot be sure of this structure, but are suspicious of a cross fault. Except for this erratic block of Ste. Genevieve on the hanging wall side of vein "A", the structure matched the projection made on the cross section for W-1. Needless to say, the widths of the fluorspar veins were disappointing.

W-13 This Stage II test cut faults 12-B and 3 100 feet northeast of and 75 feet higher than W-3. This hole, like W-3 found very strong mineralization but it was not ore grade.

W-16 This hole was still in progress at a depth of 350 feet at the end of the month. The main target is expected at 550 feet. W-7, 200 feet to the northwest cut 21.7 feet (rod length) of 11.35% CaF_2, 1.59% Zn and 0.25% Pb. The W-16 penetration will also be 100 feet higher than the W-7 cut. This target maybe vein "C" but there are several faults and fractures diverging with northwest dips from the south east dipping fault 3 (vein "A"), and definite correlation cannot be made at this time.

W-17 Faults 1 and 1-A had ore grade fluorspar in Stage I and hole W-12. W-17 was drilled 100 feet to the northeast to test the extent of this ore. The hole found good shine mineralization but it was not ore grade. This hole is still in progress and is expected to cut faults 10 and 10-A and bottom at about 600 feet.

SUMMARY OF DRILLING

Stage II

Hole No.	Depth	Date Bottomed
W-9	757 feet	2-13-59
W-13	350	Present Depth
W-16	247	Present Depth
W-17	253	Present Depth

REYNOLDS METALS COMPANY

STAGE II

Diamond Drill Hole W-9; Angle -60°; Bearing N64W; Depth, 757'
Coordinates, N9435 E 11299; Elevation, 564.0
Property, Watson; Area, SE Salem; County, Crittenden; State, Kentucky
Contractor, Joy Manufacturing Company. Driller, Watson, Shoemaker.
Started, 1/3/59 Finished 2/13/59

From	To	Fm	Description
0	8		Overburden
8	15	Ch	Sandstone, medium grey, medium grained, massive, slightly weathered, weathers brown, broken core, cross bedded.
15	23	Ch	Sandstone, grey, medium grained, thin bedded, cross bedded, shaley, weathered green.
23	78	Ch	Sandstone, grey, medium grained, weathered at 28-29 40-42 ft., massive, weathers green and brown.
78	100	Ch	Sandstone, grey, medium grained, shaley partings, increase in shale toward bottom.
100	115.5	Cg	Shale, black green, weathered, with marcasite, laminated.
115.5	148	Cg	Limestone, brown, coarse crystalline, fossiliferous, few shale partings, soft weathered shale from 135-140 (1' recovery, loss in run here).
148	203	Cg	Shale, mainly black, weathered green from 155-165, cavity 167-173, limestone from 170-173, with shale partings. Marcasite along bedding. Few lenses dolomite.
203	228	Cg	Limestone, shale. Predominately limestone, black, medium crystalline, silty, alternating with black fossiliferous shale. Angle of bedding 63° with core.
228	250	F	Fault. Limestone and shale. 3' recovery, 2" sandstone at 238 ft.
250	297	Csg	Limestone, brown-grey, ~~medium~~ crystalline, weathered and fractured, numerous intersecting calcite veinlets. Scattered shines CaF2 267-270 Good shine of CaF2 274, 281 Scattered shines CaF2 and Pb 283-284.

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From	To	Fm	Description
297	307	Csg	Sandstone, green grey, fine grained, fractured with calcite veinlets. Weathered at 297.
307	349.5	Csg	Limestone, medium to dark grey, and brown in zones, medium to coarse crystalline, fossiliferous, fractured, numerous calcite veinlets. Cavity 309-314.5 Trace CaF_2 at 318.5 Cavity 319-321 Broken core from 321-324.5 (6" recovery).
349.5	355	Csg	Calcite vein with few scattered small limestone inclusions. Shines of CaF_2 at 353 and 354.5 to 355.
355	427.5	Csg	Limestone, brown, fine crystalline, cherty, slightly fractured with calcite veinlets. Cavities from 402 to 410, 410.5-411, 411.5-412, 1" broken calcite with trace of CaF_2; cavity from 412.5-413.5, 413.5-414 is broken calcite and limestone fragments. Cavity from 416-417, good shines CaF_2 from 417-417.5, from 418-420 good CaF_2 shines, calcite veinlets running with core.
427.5	428.5		Vein calcite.
428.5	430.5	Csg	Limestone, brown, fine crystalline, fractured with increase toward bottom, heavy styolites, 6" calcite vein at 429.5.
430.5	431		Calcite and limestone breccia.
431	438	Csg	Limestone, grey brown, fine crystalline, fractured with increase toward bottom, slightly oxidized in lower foot, slightly shaley, heavy styolites, calcite stringers.
438	447	F	Fault. 438-441 Brecciated limestone and calcite breccia with some chert, few shines of CaF_2 at 441. 441-443 Cavity. 443-444 Vein calcite. 444-445 Fluorspar with few shines of Pb. 445-446 Brecciated limestone and chert. 446-447 Vein calcite with few shines of CaF_2.
447	461	Csg	Limestone, brown, medium crystalline, slightly fossiliferous, with few shale partings, calcite veinlets running sub-parallel to core. Shine of CaF_2 and Pb in calcite - vein running with core from 456-457.5

REYNOLDS METALS COMPANY

From	To	Fm	Description
461	473	Csg	Limestone, brown, medium to coarse crystalline, fossiliferous, stylolitic, calcite vein running with core from 467-468.5 with traces of CaF_2 in calcite.
473	515	Csg	Limestone, fine to medium crystalline, fossiliferous, brown grey chert, chert heavy from 473-488. Light fracturing throughout, traces of CaF_2 in fractures. Vein of blue CaF_2, calcite and limestone breccia with shines of Zn from 501-503, estimated20% $CaCO_3$, running with core. Actual vein width, about 2". Good shines either side of vein (500-505).
515	580	Csg	Limestone, fine crystalline, dark grey, few very dark grey chert nodules, good shine CaF_2 from 518-519. 531-533, trace of CaF_2 at 567.
580	600	Csg	Limestone and chert as above except weathered various shades of brown.
600	637	Csg	Limestone, mostly fine crystalline, little medium crystalline, dark grey, scattered blue-brown cherts, scattered fractured calcite with CaF_2, Pb and Zn, nearly parallel to core. CaF_2 shines at 605-608, 628-630.
637	654	Csl	Limestone, medium crystalline, medium grey, good shines of CaF_2 at 639.5, ½ vein running at a steep angle to core.
654	700.5	Csl	Limestone, fine crystalline, very dark grey, except where weathered, very few calcite fractured, running with core, fossiliferous in places, horn corals at 604-606. Little black shale in lower 4'. Slightly cherty.
700.5	703.5	F	Fault. Vein calcite, 4" nearly solid brownish purple CaF_2 with shines of Pb, Zn. Identical to vein "D", hole No. 1. Shines of CaF_2 and Pb in calcite.
703.5	715	Csl	Limestone, fine crystalline, very dark grey, thin black shale partings.
715	738	Csl	Limestone, medium crystalline, dark grey, few black shale partings, fossiliferous. Coarse crystalline, light grey, limestone replacing fossils. Horn coral at 722', colony of horn corals from 732-733.

REYNOLDS METALS COMPANY

From	To	Fm	Description
738	757	Csl	Limestone, fine crystalline, dark grey, scattered corals, calcite fractures (very few), black chert near base, shale partings 747-751.
			Bottom 757
			WEDGE CUT TAKEN FROM 429-449'
429	436.5		Limestone, brown, fine crystalline, stylolitic, fractured with calcite veinlets, more fractured at base.
436.5	446.5		Fault 436.5-440 Vein calcite with scattered shines of CaF_2 and traces of Pb. Limestone breccia from 436-440. 440-441 Cavity. 441-446.5 Vein calcite with good shines of CaF_2, especially in lower foot.
446.5	449		Limestone, brown, fine crystalline, shaley partings scattered along run, calcite stringers running sub-parallel to core.

REYNOLDS METALS COMPANY

STAGE II

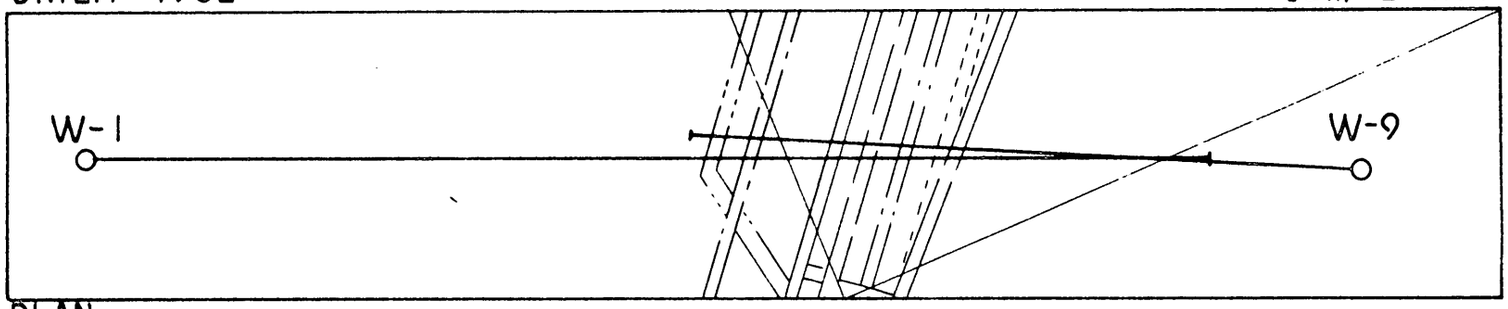
Assay Values for Diamond Drill Hole W-9

From	To	CaF_2	SiO_2	$CaCO_3$	P6	Zn
444	445	90.90	1.01	7.39		

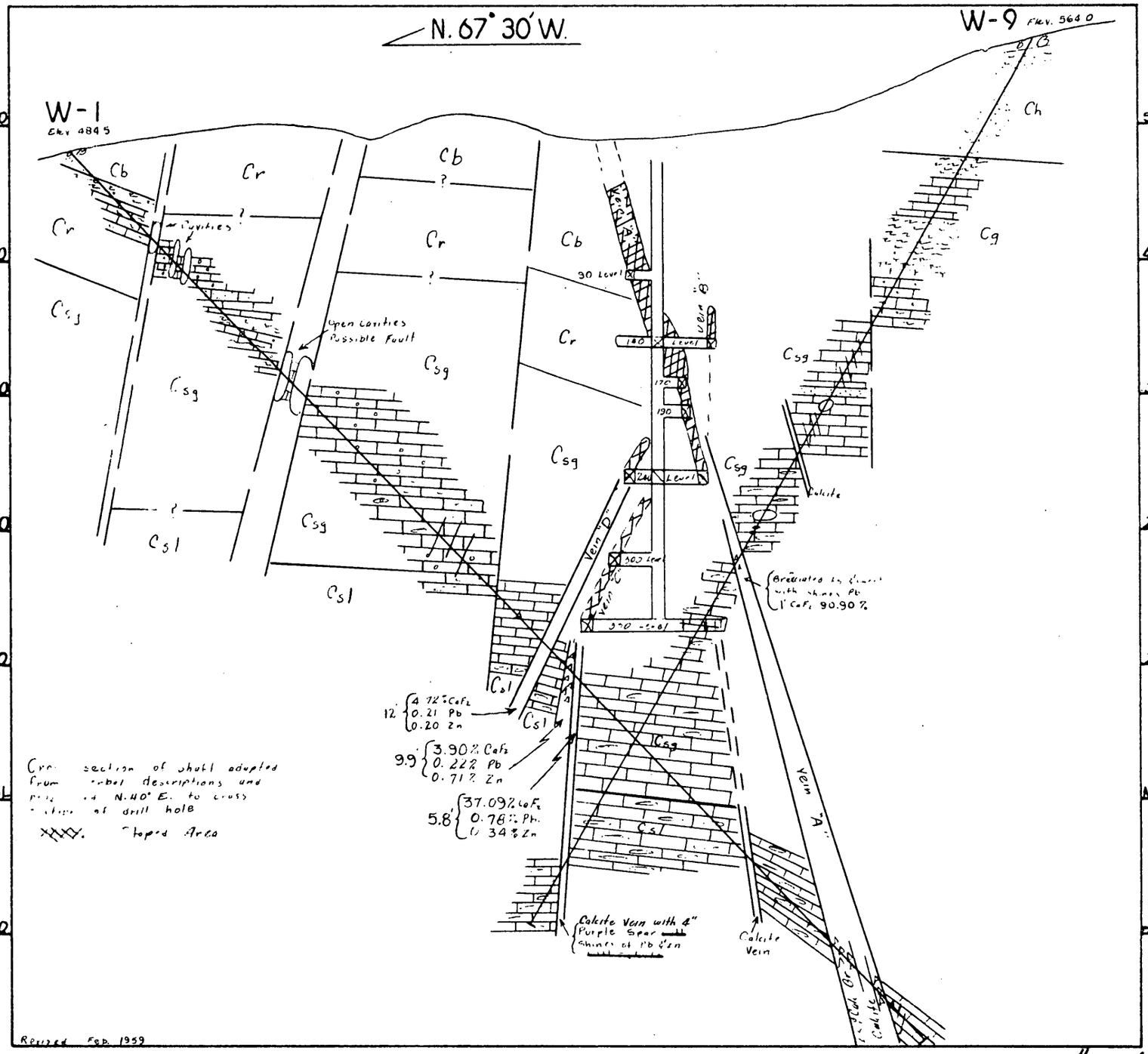
WATSON PROJECT
CRITTENDEN COUNTY, KY.

DMEA-4962

Idm-E-1199



PLAN



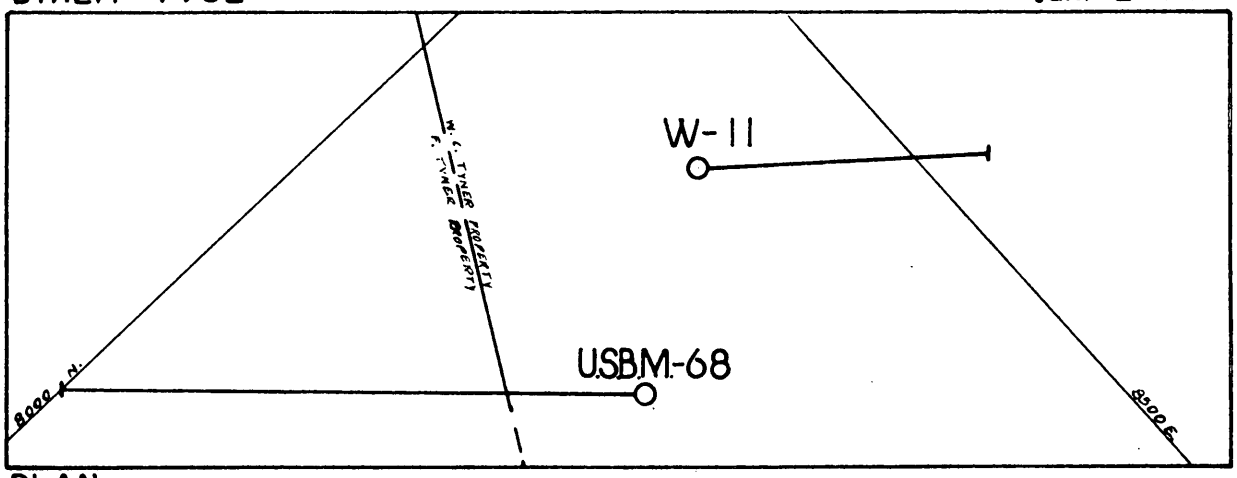
CROSS SECTION ON D.D.H. W-1 & W-9 VERT. & HORZ. SCALES: 1"=100'

0 50 100 200 300 FT.

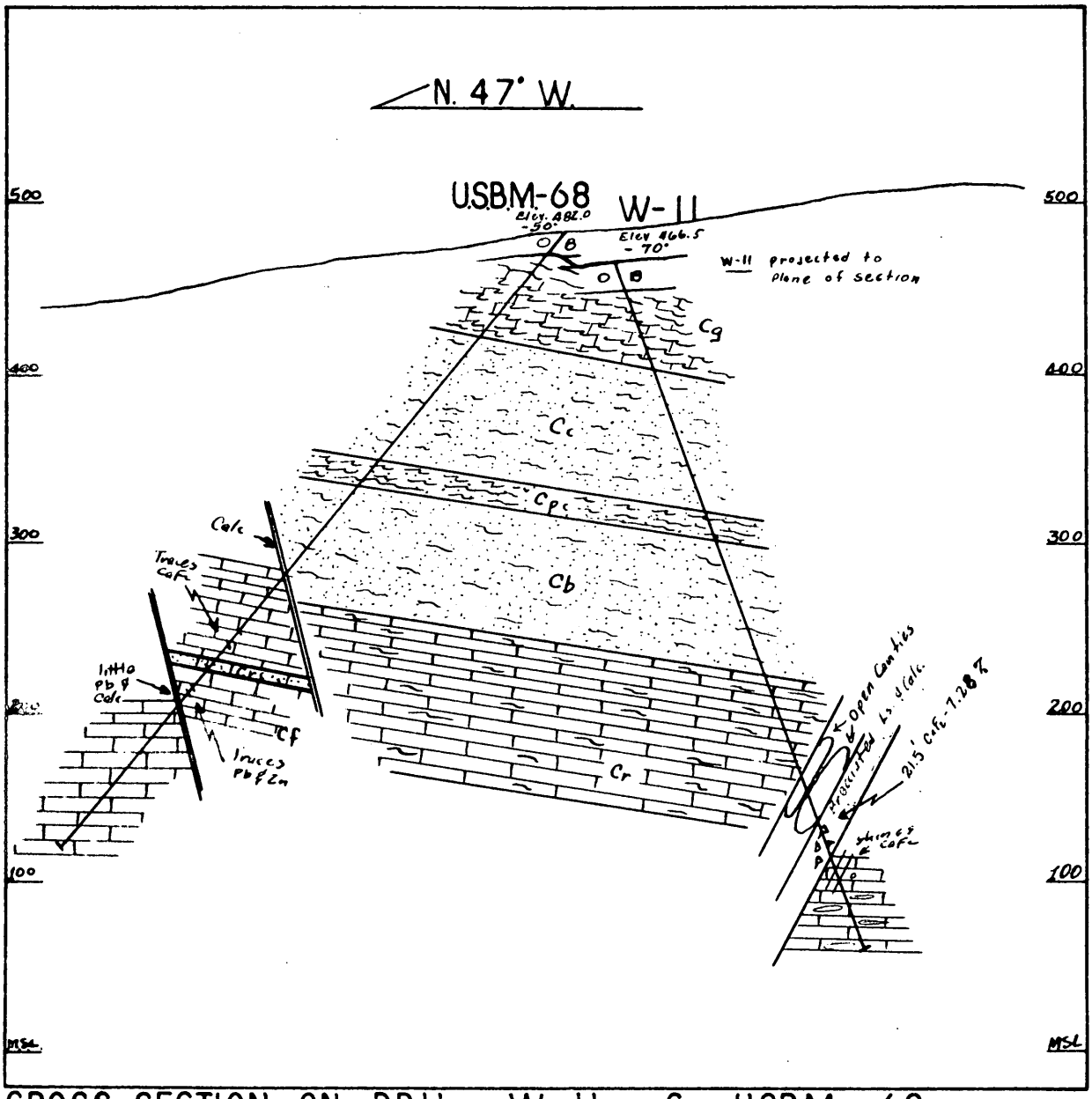
JAN. 1959

WATSON PROJECT
CRITTENDEN COUNTY, KY.

DMEA-4962 Idm-E-1199



PLAN



CROSS SECTION ON D.D.H. W-11 & U.S.B.M.-68

VERT & HORZ. SCALES 1" = 100'

0 50 100 200 300 FT.

Feb. 1959

REYNOLDS METALS COMPANY

(A DELAWARE CORPORATION)

GENERAL OFFICES: RICHMOND, VIRGINIA

PLEASE MAIL ALL REMITTANCES TO:
REYNOLDS METALS COMPANY
REYNOLDS METALS BUILDING,
RICHMOND 18, VIRGINIA

COPY OF INVOICE

MO. SCHEDULE WK.	SHIPPING POINT	CABLE ADDRESS:	CODES USED:
	Geological Division	"FOILWAX"	WESTERN UNION—A. B. C. AND LIEBLERS

REYNOLDS ORDER NO.	TERMS (FROM DATE OF INVOICE)	DATE	INVOICE NO.
	NET 30 DAYS	3-11-59	49-3-1

CUSTOMER ORDER NO.	CUST. ORDER DATE	USE CODE	CONTRACT NO.	BILL OF LADING NO.	CHECK IF ORDER COMPLETE	TALLY NO.

CUSTOMER CODE	TAX	SALES CREDIT	ITEMS SHIPPED COMPLETE	ITEMS SHIPPED PARTIAL

SOLD TO:
Department of the Interior
Defense Minerals Exploration Admin.
Attention: H. L. Burmeister
U. S. Bureau of Mines
College Park, Maryland

SHIP TO (SAME AS SOLD TO UNLESS INDICATED.)

ROUTE

QUANTITY SYMBOLS
#—POUNDS
P—PIECES, EACH
W—THOUSAND PIECES
S—SETS
T—THOUSAND SETS
F—FEET
C—HUNDRED FEET
K—THOUSAND FEET
E—SQUARE FEET
L—LINEAL YARDS
Y—SQUARE YARDS
R—REAMS
G—GALLONS

ITEM	DESCRIPTION	PRODUCT CODE	PRICE	CASES	GROSS WGT.	NET WGT.	QUANTITY (IF OTHER THAN #)	AMOUNT
	To bill you with 50% of February, 1959 items of costs per the Operator's Monthly Report and Voucher for Docket No. DMEA 4962, Contract No. Idm-E 1199.		$					
	Monthly Total		$10,689.69					
	Less 50%		5,344.84					
								$5,344.85

HEM/

TRANSPORTATION CLAUSE APPLICABLE (SEE ACKNOWLEDGMENT BACK)

PPD OR COL: P

VIA: AS DIRECTED BY REYNOLDS' TRAFFIC DEPARTMENT

Dr. A-03-1
Cr. A-03-18

R - 142 - 56 (REV. 6 - 57)

SELLER REPRESENTS THAT WITH RESPECT TO THE PRODUCTION OF THE MATERIAL AND/OR THE PERFORMANCE OF THE SERVICES COVERED BY THIS INVOICE. IT HAS FULLY COMPLIED WITH THE REQUIREMENTS OF THE FAIR LABOR STANDARDS ACT OF 1938 AS AMENDED. OUR RESPONSIBILITY FOR SAFE DELIVERY OF GOODS CEASES WHEN WE OBTAIN CLEAR BILL OF LADING FROM CARRIER

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF MINERALS EXPLORATION
ROOM 2-B POST OFFICE BLDG.
KNOXVILLE 2, TENN.

March 23, 1959

3/25
3/28
Fauch 220
600

Mr. John W. Hook
Reynolds Metals Company
P.O. Box 64
Salem, Kentucky

Re: DMEA-4962, Idm-E1199(Fluorspar)
Reynolds Metals Co.
Watson Property
Crittenden County, Kentucky

Dear Mr. Hook:

This will confirm the verbal approval given by Mr. Amos to drill the following diamond drill holes under State II of the subject contract:

(1) D.D. Hole No.21-W. The collar to be 150 feet S.38°W from the collar of D.D. Hole No. W-11. The hole is to be inclined -80°, bearing S55°E. The total estimated depth is 500 feet.

(2) D.D.Hole No. W-22 to be collared 109 feet in a S.25°W direction from the collar of D.D. Hole No. W-1. The hole is to be inclined -40°, bearing S26½°E. Estimated total depth of the hole is 730 feet.

V. J. Lynch
Acting Executive Officer,
OME Field Team, Region V

VJL/zm

vc
Opr. Com.-2
Burmeister
Amos
Files

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF MINERALS EXPLORATION
ROOM 2-B POST OFFICE BLDG.
KNOXVILLE 2, TENN.

3/19 C 220 600

March 17, 1959

Mr. John Hook, Geologist
Reynolds Metals Company
P.O. Box 64
Salem, Kentucky

Re: DMEA-4962, Idm-E1199-CaF2
Watson-Hicks-Tyner properties
Crittenden County, Ky.
Reynolds Metals Company

Dear Mr. Hook:

In our letter of March 16, confirming verbal approval given by Mr. Amos to drill holes Nos. 18, 19 and 20, we incorrectly referred to Contract No. Idm-E1200, DMEA-4963, the S. R. Grimes property. Actually we intended to refer to contract Idm-E1199, DMEA-4962, the Watson-Hicks-Tyner properties. Please correct this error on your copy.

Robert A. Laurence
Executive Officer, OME
Field Team, Region V

VJL/zm.
cc
Burmeister
Dewey
Operating Committee-2
Lynch
Files

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF MINERALS EXPLORATION
ROOM 2-B POST OFFICE BLDG.
KNOXVILLE 2, TENN.

March 16, 1959

3/18 C 220 600

Mr. John Hook
Reynolds Metals Company
P.O. Box 64
Salem, Kentucky

Re: DMEA-~~4963~~ 4962 (fluorspar)
Watson ~~S. R. Grimes~~ Property
Crittenden ~~Livingston~~ County, Ky.
Contract Idm-~~E1200~~ 1199

?

Dear Mr. Hook:

This will confirm the verbal approval given by Mr. Amos to drill three additional diamond drill holes under Stage II of the subject contract. The holes are to be drilled as follows:

Assigned Hole No.	Location	Inclination	Bearing	Estimated Depth
W-18	115 ft. N40°E. of collar of W-13.	-40°	S.50°E	580 ft.
W-19	260 Ft. N38°E. of collar of W-7	-40°	S.50°E	750 ft.
W-20	250 ft. S40°W of collar of W-5	-65°	N47°W	450 ft.

Robert A. Laurence

VJL/sm
cc
Lynch
Dempsey
Files
Burmeister
Opr. Com-2

OFFICIAL FILE COPY
O. M. E.
RECEIVED MAR 16 1959
DATE | INITIALS | CODE
3/16 | | 220
3/16 | | 110
| | 800
| | 600

INTERIM REPORT
DMEA-4962 Idm-E1199 (fluorspar)

Operator: Reynolds Metals Company, Richmond, Virginia

Location: Watson-Hicks-Tyner properties, Crittenden County, Kentucky

A project inspection of the subject contract was completed on March 5, 1959. Results obtained to date and future work were discussed with Messrs. John Hook and Thomas Winans, the Operator's geologists. Cores obtained since the last project inspection were examined.

Drilling completed under the contract is summarized as follows:

Total number of holes completed to date	15
Total footage in holes completed to date	8,304
Number of holes completed since last inspection	4
Footage in holes completed since last inspection	2,386
Number of ore holes	5
Number of indicative holes	5
Number of shine holes	1
Number of trace holes	2
Number of barren holes	2

Two of the holes (W-12 and W-13) completed since the last project inspection encountered ore-grade mineralization and the other two (W-9 and W-15), indicative mineralization. Summary logs of these four holes are as follows:

Hole No.	Depth in Feet	Description
W-9 (Stage II)	0-8	Overburden.
	8-100	Hardinsburg sandstone.
	100-349½	Golconda limestone and shale.
	349½-355	Calcite vein; shines of fluorite.
	355-438	Fredonia limestone.
	438-447	Fault; calcite vein and limestone breccia; strong shines of fluorite.
	447-637	Fredonia limestone.
	637-700	St. Louis limestone.
	700-703	Calcite vein with shines of fluorite and traces of galena.
	703-757	St. Louis limestone.
	757	Bottom
	Inclination -60°	
	Bearing N.64°W.	

W-12 (Contract Location No. 19)	0-126	Overburden.
	126-189	St. Louis limestone.
	189-216	Fault; calcite vein with ore-grade fluorite (see assay below) and traces of galena and sphalerite.
	216-231	Rosiclare sandstone; shines of galena, sphalerite and fluorite.
	231-351	Fredonia limestone with traces of galena, sphalerite and fluorite.
	351-391	Fault; vein calcite and limestone breccia and vein fluorite; shines of galena and sphalerite.
	391-430	Rosiclare sandstone; traces fluorite and galena.
	430-453	Fredonia limestone.
	453	Bottom.
	Inclination -45°	
	Bearing S.49°E.	
W-13(Stage II)	0-40	Overburden.
	40-141	Renault limestone and shale.
	141-157	Levias limestone.
	157-189	Rosiclare sandstone with good shines of fluorite.
	189-190	Fault.
	190-199	Rosiclare sandstone with scattered shines of fluorite.
	199-207	Fredonia limestone.
	207-209	Calcite breccia with good shines of fluorite
	209-223	Fredonia limestone with good shines of fluorite.
	223-232	Fault; vein calcite and limestone breccia and vein fluorite with shines of galena, sphalerite.
	232-274	Fredonia limestone with disseminated sphalerite; scattered shines of fluorite at 232-235 feet.
	274-306	Fault; vein calcite, limestone breccia and vein fluorite; cavity 293-297 ft.
	306-330	Fredonia limestone with scattered shines of fluorite.
	330-331	Vein calcite with traces of galena.
	331-353	St. Louis limestone with scattered traces of fluorite.
	353-354	Fault; traces of fluorite.
	354-499½	St. Louis limestone.
	499½-513	Fault; limestone and calcite breccia with scattered shines of fluorite.

	513-523	St. Louis limestone.
	523-547½	Fault; limestone, calcite and chert breccia; scattered shines of fluorite.
	547½-616	St. Louis limestone; scattered shines of fluorite and sphalerite.
	616-635	Calcite vein; scattered shines of fluorite.
	635-642	Ste. Genevieve limestone.
	642	Bottom.

Inclination -45°
Bearing S.50°E.

W-15 (Contract Location No. 10)	0-20	Overburden.
	20-133	Cypress sandstone.
	133-138	Paint Creek shale.
	138-205½	Bethel sandstone.
	205½-333	Renault limestone and shale.
	333-356½	Levias limestone.
	356½-364	Rosiclare sandstone.
	364-372	Fault; limestone and calcite breccia.
	372-386	Ste. Genevieve limestone.
	386-432	Fault; limestone and calcite breccia.
	432-484	Ste. Genevieve limestone with good shines of fluorite.
	484-494½	Fault; limestone and calcite breccia with scattered shines fluorite and traces of sphalerite.
	494½-499½	Cavity.
	499½-534	Ste. Genevieve limestone.
	534	Bottom.

Inclination -45°
Bearing S.57°E.

Assay results of recently completed holes are as follows:

Hole No.	Depth in Feet	%CaF_2	%Pb	%Zn
W-9	444-445	90.90	-	-
W-12	189.5-194.1	16.24	-	-
	194.1-197.1	50.68	-	-
	197.1-200.1	3.76	0.21	0.60
	200.1-208.1	2.52	0.16	0.30
	208.1-212.6	18.04	0.43	0.90
	212.6-215.1	3.90	0.11	1.39
	215.1-225.0	8.16	0.40	0.31
	225.0-231.8	11.64	0.64	0.21

	345.2-351.0	16.04	0.32	0.90
	351.0-357.9	12.58	0.27	2.49
	357.9-365.4	4.20	0.16	0.50
	365.4-371.0	30.84	4.16	1.39
	371.0-374.9	39.78	0.32	0.99
	374.9-384.6	5.46	0.11	0.20
W-13	207.3-209.0	21.56	0.37	0.20
	209.0-222.0	3.58	0.16	0.10
	222.0-226.3	3.28	0.11	0.30
	226.3-228.2	4.38	0.21	2.99
	228.2-230.0	81.67	1.28	0.39
	230.0-232.0	6.56	0.21	0.79
	232.0-235.0	6.68	0.16	0.20
	235.0-244.5	4.72	0.22	0.49
	275.0-276.9	52.36	0.75	1.49
	276.9-280.0	10.04	0.27	1.59
	280.0-287.9	4.94	0.43	0.59
	287.9-293.0	19.16	0.43	2.68
	297.0-300.5	6.56	0.16	0.89

A total of three holes were in progress at the time of the inspection. Summary logs of these incomplete holes are as follows:

Hole No.	Depth in Feet	Description
W-16	0-100	Overburden.
	100-247	Bethel sandstone.
	247-323	Renault limestone and shale.
	323-339	Renault limestone and shale.
W-17	0-90	Overburden.
	90-200	St. Louis limestone.
	200-205	Cavity; fault.
	205-329	Fault zone; limestone breccia with much vein calcite; good shines fluorite and sphalerite.
	329-349	Levias limestone; trace of fluorite.
	349-373½	Rosiclare sandstone and shale.
	373½-549	Fredonia limestone.
W-18	Setting up.	

Verbal approval was given by the field examiner to drill three additional Stage II holes. All three locations are designed to explore the strike extent of ore or indicative mineralization discovered in completed holes. The locations are as follows:

Assigned Hole No.	Location	Inclination	Bearing	Estimated Depth
W-18	115 ft. N.40°E. of collar of W-13	-40°	S.50°E.	580 ft.
W-19	260 ft. N.38°E. of collar of W-7	-40°	S.50°E.	750 ft.
W-20	250 ft. S.40°W. of collar of W-5	-65°	N.47°W.	450 ft.

Dewey H. Amos
Geologist
U. S. Geological Survey

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
REGION V

ELECTROTECHNICAL
EXPERIMENT STATION

P. O. BOX 217
NORRIS, TENNESSEE

March 4, 1959

Memorandum

To: Jay L. Chambers, Office of Minerals Exploration, Interior Building, Washington 25, D. C.

From: Administrative Assistant, Norris, Tennessee

Subject: Monthly reports and vouchers

We are enclosing two copies each of the following monthly reports and vouchers:

Idm-E1199 Reynolds Metals Company
Docket No. DMEA-4962
6th payment - month of January
Amount $3420.50

Idm-E1224 Roland F. Beers, Inc.
Rocket No. DMEA-4947
January Report
Amount: Deficit of $248.14

Helen R. Miller
Helen R. Miller

Attachments
/hbm
Copies to R. A. Laurence
V. J. Lynch
Norris files
Day files

OFFICIAL FILE COPY
O. M. E.
RECEIVED MAR 6 1959

DATE	INITIALS	CODE
3/6	C	220
"	FJ	110
3/1	Fish	600

Form MF-104 (Rev.) (April 1952)

MAR 6 1959 Watson Project Stage I O.M.E.

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION

Budget Bureau No. 42-R1036.5

PAID ON VOUCHER & SCHEDULE OF PAYMENTS K- 50

OPERATOR'S MONTHLY REPORT AND VOUCHER

Month of January, 1959 Docket No. DMEA 4962 Contract No. Idm-E1199

Operator's Name Reynolds Metals Company Minerals Fluorspar

Address Richmond, Virginia

Contract Amount, $ 28,310.00 Government Participation: 50 % Amount, $ 14,155.00

ITEMS OF COSTS	FOR OPERATOR'S USE: Monthly Total	Totals Previously Reported	Totals To Date	FOR GOVERNMENT USE ONLY: Approved Monthly Total	Approved Totals Previously Reported	Approved Totals To Date
(1) Independent Short Form Contracts:						
Drilling Core	5787.90	6782.05	12,569.95			
~~Bulldozing~~ Reaming	481.25	1359.75	1841.00			
Hole Survey and Cementing	—	184.00	184.00			
~~Drifting~~ Lost BX Casing	—	216.00	216.00			
Lost AX Casing	—	—	—			
(2) Labor and Supervision:						
Labor						
Supervision						
Technical Services						
(3) Operating Mat'ls. and Supplies:						
Timber						
Explosives						
Pipe						
Track						
Core Boxes		225.00	225.00			
(4) Operating Equipment:						
Rental						
Purchase						
Depreciation						
(5) Initial Rehabilitation and Repairs						
(6) New Bldgs., Improvements, etc.						
(7) Miscellaneous:						
Repairs to Equipment						
~~Sampling and~~ Analysis CaF2	22.50	4.50	27.00			
~~Payroll Taxes~~ CaF2, Zn, Pb	—	84.50	84.50			
Liability Insurance						
Incidental Allowance	549.36	643.72	1193.08			
(8) Contingencies (specify):						
TOTALS	6841.01	9499.52	16340.53	6841.01	9499.52	16340.53

I certify that the above bill is correct and just and that payment therefor has not been received.

Date FEB 12 1959 *Payee REYNOLDS METALS COMPANY GEOLOGICAL DIVISION

Per H. E. McDaniel Title Accounting Official

*When a voucher is signed or receipted in the name of a company or corporation, the name of the person writing the company or corporate name, as well as the capacity in which he signs, must appear. For example: "John Doe Company, per John Smith, Secretary," or "Treasurer," as the case may be.

NOTE.—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.

(Instructions on reverse)

Pursuant to authority vested in me, I certify that this account is correct and proper for payment in the amount of:

$ 3420.50

Signature Helen R. Miller (Authorized Certifying Officer)

Date MAR 4 1959 Vou. No. 91

(See other side)

3420.50

(For Government use only)

CERTIFICATION BY GOVERNMENT REPRESENTATIVE:

I certify that to the best of my knowledge and belief the contractor submitting this voucher is operating a Defense Minerals Exploration Administration project under Contract No. E 1199 in accordance with the terms of the contract.

Signature [illegible] Title Mining Engr. Date 2/19/59

APPROVAL BY DMEA EXECUTIVE OFFICER OR ALTERNATE:

Signature Robert A. Lawrence Title EXECUTIVE OFFICER OME FIELD TEAM REGION V Date FEB 24 1959

MONTHLY REPORT OF OPERATOR

The Operator (Contractor) of an exploration project is required to make a monthly report to the Government through the Regional Executive Officer. This report consists of three parts as follows:

(a) *Form MF-104—Operator's Monthly Report and Voucher.*—This form details expenditures and constitutes a voucher for reimbursing the Operator for the Government's share of costs;

(b) *Form MF-104A—Operator's Unit Cost and Progress Report.*—This is a statistical report of expenditures which shows costs for the various types of operation; and

(c) *Narrative.*—A concise narrative description of progress made, results accomplished, and any unusual difficulties encountered must be furnished as an attachment to this Report and Voucher. Wherever possible, the narrative is to be illustrated with maps or sketches showing formations penetrated and location and assays of samples taken as well as advances in workings. In the case of diamond drilling or churn drilling, the location and inclination of holes is to be shown on a map; logs and assays also are to be submitted.

The Monthly Report of Operator should be prepared in an original and four copies all of which must be sent to the Executive Officer of the Region not later than the 15th of the month following.

Preparation of Form MF-104—Operator's Monthly Report and Voucher.—All the applicable spaces in Form MF-104 should be filled in by the Operator, and the Operator or his agent should sign the certification in the lower left corner of the form.

The items of costs are arranged in the order they appear in Article 6 (a) of Form MF-200 (Revised February 1952), however, this form is readily adaptable for use in reporting activities under other contract forms.

Under Item (1) delete words "Short Form" if the contract is a sub-contract under Form MF-200; and delete word "Independent" if the contract reported is on Form MF-200 (A). Also, report work paid for on a unit basis under contract Form MF-200 as though it were performed under an independent contract.

Under Item (2) include labor, supervision and technical services incurred for the exploratory operations. Do not include labor, supervision and technical services used for work performed under items (5) and (6).

Under Item (3) include the costs of material and supplies used in the project other than that used under items (5) and (6).

Under Item (4) appear the three types of operating equipment expenditures, that is, rental, purchase and depreciation. The expenditures made for renting equipment belonging to a third party will be reported under "Rental". The amount paid or duly obligated for payment for the purchase of equipment will be reported under "Purchase". The amount of expenditures due the Operator to reimburse him for depreciation of equipment owned will be reported under "Depreciation".

Item (5) comprises costs of labor, supervision, technical services, materials, etc., which are used in the initial rehabilitation and repair of existing buildings, installations, fixtures, and equipment. These costs, therefore, should not be reported under items (2) and (3).

Item (6) includes the labor, supervision, technical services, materials, etc., used in the installation or construction of new buildings, fixed improvements, etc., necessary for the project. These costs, therefore, should not be reported under items (2) and (3).

Item (7) covers miscellaneous types of expenditure such as payroll taxes, liability insurance, workmen's compensation insurance, repairs to equipment and sampling and analysis. Only that part of payroll taxes, liability insurance and workmen's compensation which are paid by the operator should be reported under item (7). The share paid by the employee as a payroll deduction is to be included under item (2) as labor costs.

Item (8) includes any unforeseen costs not included in the other seven categories.

The original of Form MF-104 when submitted for reimbursable expenses incurred under contract Form MF-200 must be supported by original documentation or by certified copies of purchase orders, payrolls or transcripts of payrolls, unless such documentation has been waived by the Regional Executive Officer. This certification may be stated thus, "Certified True Copy (or Transcript)", followed by appropriate signature. If the Executive Officer of the Region determines that a contract under Form MF-200 should have an "on-site" audit, that is, a Government auditor should make an audit of the Operator's books and records of account, the Operator need not support his monthly voucher with original or certified documents except in cases of equipment purchases whose individual costs exceed $50.00. In these cases the original or a certified copy of the purchase order or invoice should be attached to the Monthly Voucher. N. B.—Only the *original* of Form MF-104 is required to be documented. The four copies of Form MF-104 are not to be thus supported.

Form MF-104 submitted for reimbursement under fixed price contracts on Form MF-200 (A), however, are not required to be supported by documentation of any kind. The Operator will submit his claim under item (1) of Form MF-104 by deleting as stated above the word "Independent" and by showing the number of feet or other units immediately after the appropriate descriptive word, such as, drilling, bulldozing, crosscutting, drifting, etc., and giving the "Monthly Total" amount due. "Totals Previously Reported", and "Totals to Date" columns should also be filled in.

Form MF-104A
(April 1952)

Budget Bureau No. 42-R1151.2

Watson Project
Stage I

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION

OPERATOR'S UNIT COST AND PROGRESS REPORT

Month of January 1959 Docket No. DMEA 1962 Contract No. IDM-31199
Operator's Name Reynolds Metals Company Minerals Fluorspar
Address Richmond, Virginia

OPERATION	UNIT	COSTS THIS MONTH	UNITS THIS MONTH	COSTS TO DATE	UNITS TO DATE	UNIT COSTS TO DATE	AUTHORIZED BY CONTRACT Units	AUTHORIZED BY CONTRACT Unit Costs
Drifting								
Crosscutting								
Raising								
~~Shafts~~ Core Boxes	1			225.00	75		75	3.00
Winzes								
Drilling: Core	ft	5707.90	1962	12,569.95	4261		6900	2.95
~~Chem~~ Reaming	ft	402.25	275	1,012.00	1052		2000	1.75
Hole Surveys ~~Stripping~~ Cementing	hr			184.00	23		80	8.00
~~Stripping~~ Lost BX Casing	ft			216.00	100		300	2.16
~~Trenching~~ Lost AX Casing	ft						300	1.70
~~Test Pits~~ Assay CaF2	1	22.50	5	27.00	6		75	4.50
~~Roads and Trails~~ CaF2,Pb,Zn	1			81.50	13		25	6.50
Incidental Allowance	ft	509.36	1962	1,193.00	4261		6900	0.28
TOTAL DISTRIBUTED COSTS								TOTAL COSTS AUTHORIZED BY CONTRACT
Operating Equipment Purchased								
Initial Rehabilitation and Repairs								
New Buildings, Improvements, etc.								
TOTAL COSTS		6841.01		16210.53				68,310.00

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

REMARKS: Costs are for holes U-4, U-5, U-8, U-6, and U-10

Date FEB 12 1959 Operator REYNOLDS METALS COMPANY GEOLOGICAL DIVISION

Per H. E. McDaniel Title Accounting Official

NOTE.—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.

(Instructions on reverse)

W. F. Burmeister 2/19/59 (For Government use only)

MINING ENGINEER
U. S. BUREAU OF MINES

INSTRUCTIONS

Preparation of Form MF-104A—Operator's Unit Cost and Progress Report.—Applicable places on Form 104A should be filled in by the Operator. The purpose of this form is twofold as follows: (1) to furnish the supervising engineers and other administrators with statistical information necessary to better determine the progress of the project; and (2) to furnish more permanent information on mining costs for future use. The more important phases of operation on which permanent information is desired have been outlined in the form. There are blank lines, however, for those unusual phases which may need to be reported for a particular project. It will be necessary for the Operator to distribute his costs among the applicable phases reported with the exception of three items the costs of which are not to be distributed by the Operator. These three items are: "Operating Equipment Purchased", "Initial Rehabilitation and Repairs", and "New Buildings, Improvements, etc." The reason for not distributing these items on a monthly basis is doubtless clear to the Operator, since such distribution might well overstate the cost for any one month or period short of the entire contract period.

Form MF-104A has been designed to tie in with Form MF-104 for both monthly and cumulative costs. The "Total Costs" on Form MF-104A for each month should equal the monthly "Total Costs" as reported on Form MF-104. This is also true of the "Total Costs To Date".

In preparing Form MF-104A, it will be necessary frequently to distribute certain costs over a number of items. For instance, supervisory and engineering costs may have to be distributed over several phases, such as, drifting, crosscutting, raising, etc., provided that these items were reported active for the month. Such distributions should be made on the basis of time spent on the various phases, on man days of labor charged to such phases, or on some other equitable basis. "Operating Equipment", "Initial Rehabilitation and Repairs", and "New Buildings Improvements, etc.", will be distributed to the several phases of the project by the Washington Office of DMEA at the close of the project if determined necessary. The last two columns headed "Authorized by Contract" will be filled in by the Operator if such information is found in the contract. This information is usually a part of Exhibit "A" of the contract. A space for remarks has been provided for the use of the Operator to call attention to any unusual circumstances causing excessive or disproportionate unit costs.

GPO 872894

REYNOLDS METALS COMPANY
Monthly Report - January, 1959
Watson Project - DMA 1662 - Ida-1109
Crittenden County, Kentucky
by
John W. Hook

STAGE I

Severe winter weather hampered the drilling operations in January. Freezing water lines have prevented the night shifts from drilling during the very cold weather and rains and thawing ground made moving difficult. Flooding streams have also caused lost time. As a result, we are behind schedule and may not be able to complete all of the desired work by March 30th.

Two rigs were used on Stage I drilling this month. A third rig worked on Stage II and a fourth rig has been moved in.

Holes W-4, W-5, and W-6 were covered in last month's narrative, but were not included on the accounting forms because they bottomed after the 25th of the month.

W-7 (revised location No. 5) This hole was designed to explore Fault 12-B and the mineralized zones in the footwall of Fault 3, the main known fault. It was expected to bottom when it cut the large cavity found in W-4 which cut Fault 3 from the hanging wall side. W-7 has now passed beneath this cavity in solid formations with good showing of fluorspar. In a recent meeting, Denny Ames and I decided to continue this hole and cut Fault 3 from the footwall side. The hole was 540 feet deep at the end of the month and is expected to cut the fault at about 750 feet.

W-8 (revised location No. 9) W-6 found that Fault 10 had split into two subparallel, both of which were northwest of the projected location. W-8 was moved back (northwest) 100' from the proposed location but still cut the faults too high in the stratigraphic section. The first fault, which we will designate 10-A, had about 40 feet of displacement and had Cypress against Fulton Creek. The second, Fault 10, had about 120 feet of displacement with Bethel against Ponsonit. The hole was continued to a depth of 335 feet to check for additional faults along the projected strike but none were found. The elevation of the Fankinite sandstone in the footwall checked with the general dip of the block between Fault 10 and 12-B. Contrary to previous mapping, it now appears that Fault 10 is nearly parallel to Fault 1 and Fault 12-B is parallel to Fault 3. The large intervening block is relatively undisturbed.

W-9 See Stage II Report.

W-10 (revised location No. 11) Based on the results of W-8 and W-6, this location was revised 350 feet to the northwest and drilled on a 45° angle. Fault 10-A was cut with Bethel against Ponsonit and Fault 10 with Ponsonit against Fredonia. There was a cavity on Fault 10-A and Fault 10 was filled with shale gouge with a few shiners of fluorspar in the footwall.

Well (original location 12) The location of this hole was also changed about 300 feet to the northeast and was drilled on a 70° angle to keep the collar over 100 feet (actually 135 feet) from the property line. Fault 16-A apparently converges with Fault 10 at this point. There were two large open cavities on the hanging wall side of the fault (or faults) and 20 feet of very good shales on the footwall. The hanging wall formation above the cavities was Rencrek and the footwall was Pendleton.

Well (location No. 19) A fourth drill has been added to this project and is setting up on location No. 19 to make a footwall test of Fault 1.

Well See Stage II Report.

Hole (original location No. 11) This hole is designed to cut Fault 10 at the Rencrek horizon on the hanging wall (Pendleton footwall), 400 feet southwest of the 4-21 penetration. The hole will be drilled on an 80° angle to keep the required distance from the property line. The rig is presently being set up on this location.

All revisions of hole locations and angles are being made with written permission of the DMEA field team.

Drilling Summary

Hole	Location No.	Depth	Date Completed
4-4	4	4130*	12-31-58
4-5	18	350*	12-29-58
4-6	8	350*	1-5-59
4-7	5	540	
4-8	9	335*	2-13-59
4-9 (Stage II)			
4-10	11	510*	1-23-59
4-11	12	436	1-31-59
4-12	19	0	
4-13 (Stage II)			
4-14	13	0	

* Bottom depth shown on Joy invoice for 1-25-59. Costs for these holes only are shown on the accounting forms for this month.

REYNOLDS METALS COMPANY

Diamond Drill Hole W-8; Angle 45° Bearing S51E Depth 335'
Coordinates: N-8321 E-9085 Elevation: 437.5
Property Watson; Area SE Salem; County Crittenden; State Kentucky
Contractor: Job Manufacturing Company; Foreman: Minner
Started 1/7/59 Finished 1/23/59

From	To	Fm	Description
0	15		Overburden
15	35	Co	Sandstone, massive, oxidized.
35	54	Co	Shale, greenish gray.
54	88	Co	Sandstone, massive, oxidized.
88	91	Co	Shale, greenish, soft, with marcasite.
91	94	Co	Coal.
94	102	Co	Shale, greenish gray.
102	123	Co&P	Loose sand and sandy shale, greenish, oxidized, poor recovery. Fault probably at base.
123	129	Cpc	Shale, black.
129	186	Cb&P	Sandstone, gray with black shale. Typical Bethel for this area. Fault at base.
186	192	Cr	Limestone, dark gray, medium crystalline, fractured. 3' recovery.
192	197	Cr	Limestone, medium to dark gray, medium crystalline, massive.
197	198	Cr	Limestone, coarse crystalline, brownish gray, with crinoid stems.
198	213	Cr	Limestone, medium crystalline, dark gray, massive, sandy. Very sandy at top and bottom, little shale @ 206.5.
213	224	Cl	Limestone, oolitic, medium crystalline, brownish gray.
224	235	Cl	Limestone, very fine crystalline, medium brownish gray.
235	236	Cre	Shale, green
236	240	Cre	Limestone, fine crystalline, brownish gray, with few green shale partings. Cavity 237.5-239.5.
240	245	Cre	Shale, green with little brown limestone.

From	To	Fm	Description
245 -	247	Cre	Limestone, fine crystalline, brownish gray.
247	266	Cre	Limestone, sandy, greenish, thin shaley partings. Open cavity at 249-254, oxidized at cavity, otherwise fresh.
266	266.5	Cre	Shale, green, oxidized.
266.5	281		Cavity, no recovery.
281	283	Cf	Limestone, medium crystalline, light gray, few shale partings.
283	291	Cf	Limestone, fine crystalline, lightl gray, few shale partings.
291	298	Cf	Limestone, fine crystalline, light gray, few shale partings.
298	303	Cf	Limestone, medium crystalline, medium gray, oolitic, fossiliferous. Green shale with fossiliferous is at 301-303.
303	318	Cf	Limestone, green to gray brown, medium crystalline.
318	330	Cf	Limestone, light gray medium to fine crystalline, oolitic, shale partings from 323-330.
330	335	Cf	Limestone, green silty, fossiliferous, few shale partings, increase in shale from 333-335.

Bottom 335'

NEVADA METALS COMPANY

Diamond Drill Hole W-10; Angle -45°; Bearing S52½E; Depth 514'
Coordinates N2487 E2487; Elevation 439.5'
Area, SE Quincy Property, Plumas County, California; State, Nevada
Started 1/22/59 Finished 1/31/59
Contractor, Joy Manufacturing Company
Foreman, Mike Tomsic.

From	To	Fm	Description
0	21		Overburden
21	75	Cs	Sandstone, massive, gray, medium grained, shaley to 41', oxidized from 65 - 75 feet.
75	79	Cs	Shale, bedded with sand.
79	116	Cs	Massive sandstone, medium gray, medium grained, 1' recovery from 108-110', 10mm(probably shale).- Laminated sandstone and shale 115-117'. Rubble run oxidized.
116	162	Cpm	Shale
162	165	Cb	Predominately black shale with sandstone pebbles, Cgl.
165	254	Cb	Predominately gray sandstone, irregularly bedded with with black shale. 3' recovery from 169'-173', fragments in sandstone from 232 to bottom of run.
254	264	Cb	Shale, black, few thin, irregular sandstone, beds
264	273	Cb	Predominately sandstone, few irregular shale partings, few calcite stringers, slightly conglomeritic in lower two feet.
273	286	Cb	Shale, black, angle of bedding 30° with core, recrystallized along bedding.
286	293		Mud cavity, shale.
293	316	Cr	Limestone, brown, medium crystalline, fossiliferous, weathered from 293-297.
316	321	Cr	Limestone, medium gray, medium crystalline, fossiliferous, green shale from 318-320.
321	327	Cr	Limestone, medium gray, medium crystalline, fossiliferous, stylolitic, few calcite stringers, weathered 6" from bottom, chert at 323'.
327	329	Cr	Shale, green, few limestone stringers, weathered, from 328' to 329'.
329	334	Cr	Limestone, brown gray, medium crystalline, stylolitic, few shale partings, fossiliferous.

From	To	Fm	Description
334	352	Cr	Shaley limestone, green, fossiliferous, few small calcite stringers.
352	353.5	Cr	Limestone, brown, fine crystalline, slightly bituminous, calcite vein running with core in upper foot, slightly broken in lowermost".
353.5	356		Fault, filled with green shaley gouge.
356	358.5	Cf	Limestone, brown, fine crystalline, bituminous, <u>shows of CO2 pumped through run.</u>
358.5	360	Cf	Limestone, brown, medium crystalline, calcite stringers, <u>CO2 shows at 360'</u>, slightly cherty, <u>pumped [illegible] 358-72.</u>
360	458	Cf	Limestone, light gray, medium crystalline, calcite, fossiliferous, few small calcite stringers. 5" sandy limestone at 401' Cavity at 437-439.
458	482	Cf	Limestone, brown, fine to medium crystalline, slightly fossiliferous, few calcite stringers, cavities from 460-461, 466.5-468.5.
482	490	Cf	Limestone, medium gray, medium crystalline, fossiliferous, few calcite stringers.
490	502	Cal	Limestone, brown gray, medium crystalline, fossiliferous few small shale partings, heavy black chert.
502	514	Cal	Limestone, fine crystalline, brownish, few calcite stringers, trace of oil at 506', chert. 17" cavity at 508.5.

<u>Bottom 514'.</u>

REYNOLDS METALS COMPANY

Diamond Drill Hole W-11; Angle 70°; Bearing S50½E; Depth 436'
Coordinates N7859 E8414; Elevation 466.5'
Property, Watson; Area, SE Salem; County, Crittenden; State, Kentucky
Contractor, Joy Manufacturing Company; Foreman, Miles Minner
Started 1/27/59 Finished 1/31/59

From	To	Fm	Description
0	18		Overburden
18	66	Cg	Shale, dark grey, few slickensides, some marcasite, weathered at top, weathered brown and very dark a 56' to bottom of run.
66	76	Cc	Sandstone, grey to brown, massive, laminated sandstone and shale in upper 4".
76	77.5	Cc	Shale, dark grey with thin sandstone laminations in upper foot, weathered grey green and slightly sandy shale at bottom.
77.5	88	Cc	Sandstone, grey green, silty, sub-angular conglomerate in upper 6", grades into a sandy shale toward bottom of run, marcasite along bedding.
88	123	Cc	Sandstone, medium grained, grey, weathered brown red, quartzitic, recovery 30'.
123	134	Cc	Shale, dark grey, sandy to 125, dark grey shale with few sandy zones to about 132, 132-134 is sludge, sand and shale fragments.
134	136		Cavity
136	153	Cc	Sandstone, fine grained, weathered green and brown, shaley.
153	156	Cc	Sandstone, massive, brown, medium grained.
156	175	Cpc	Shale, dark grey, weathered in upper 2'.
175	249	Cb	Predominately light grey sandstone, irregular bedding, dark grey shale, conglomeritic in upper 5'. (Cgl is sub-angular shale fragments in sandstone). Increase in sand from 182 to bottom of run.
249	253	Cb	Shale, black, 3' sandstone at 351, slightly sandy from 351 to bottom.
253	262	Cb	Sandstone, light grey as above.
262	264	Cb	Sandstone, light grey, medium grained, with sub-angular cgl., black shale fragments.
264	276	Cr	Shale, dark grey.
276	283	Cr	Limestone, dark grey, medium crystalline, fossiliferous, shaley, increase in shale from 279-282.
283	298	Cr	Limestone, brown, medium crystalline, fossiliferous, few calcite stringers.

REYNOLDS METALS COMPANY

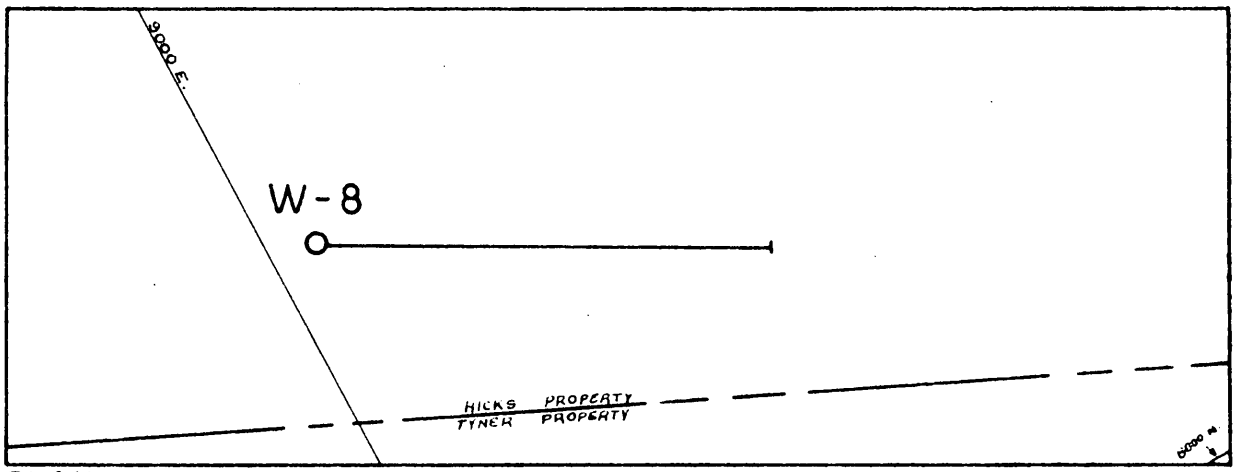
page 2

From	To	FM	Description
298	300	Cr	Green shale.
300	306	Cr	Limestone, brown, fine crystalline, fossiliferous, styolitic
306	307	Cr	Grey green shale.
307	314	Cr	Limestone, brown, medium to coarse crystalline.
314	323	Cr	Silty limestone and shale, grey green, weathered in lower foot.
323	330		Cavity
330	331	Cr	Limestone, weathered, medium crystalline, weathers brown, 4" recovery, sand sludge.
331	332	Cr	Limestone, grey green, weathered brown, sand sludge.
332	351.5		Cavity, open.
351.5	352	Cr	Limestone, medium grey, medium crystalline.
352	373.5		Fault. 352-354.5 Fractured limestone with good CaF2 shines in calcite veinlets. 354.5-355 Vein calcite and good shines of CaF2. 355-356.6 Brecciated limestone and [illegible]. 356.6-361 Open cavity. 361-370 Limestone, light grey, medium crystalline, oolitic, fractured, good shines CaF2. 370-373.5 Limestone as above with good scattered shines of CaF2 and disseminated zinc.
373.5	386	Cf	Limestone, medium grey, fine crystalline, slightly cherty. CaF2 shines at 376.370. Calcite vein (3") at 386.
386	390.5	Cf	Limestone, dark grey, medium crystalline, oolitic, slightly fractured with calcite veinlets, styolitic.
390.5	396.5	Cf	Limestone as above but with chert.
396.5	398.5		Vein calcite.
398.5	436	(?Cs17)	Limestone, brown, fine crystalline, with few calcite stringers.

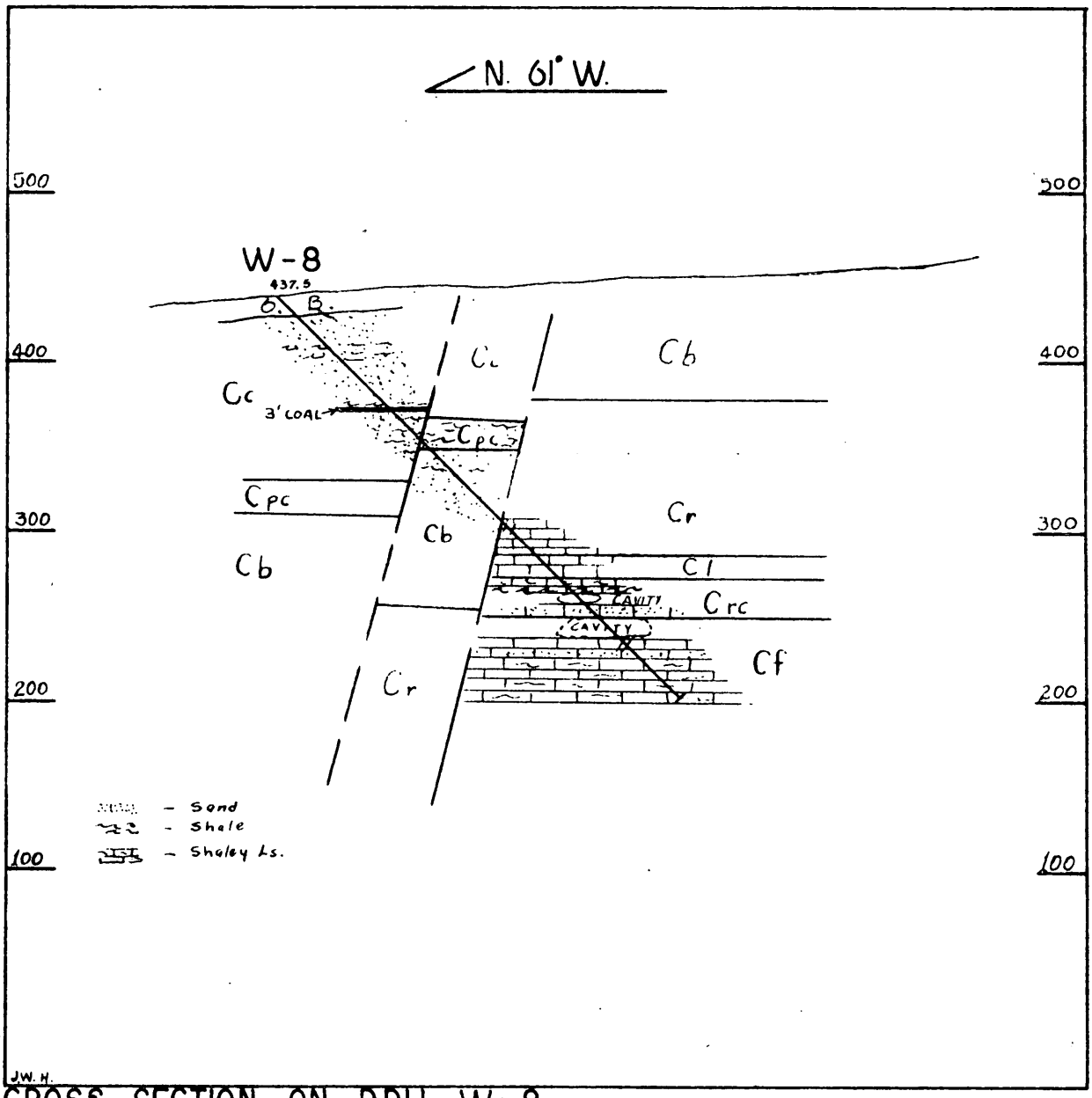
BOTTOM 436

WATSON PROJECT
CRITTENDEN COUNTY, KY.

DMEA-4962 Idm-E-1199



PLAN



CROSS SECTION ON D.D.H. W-8

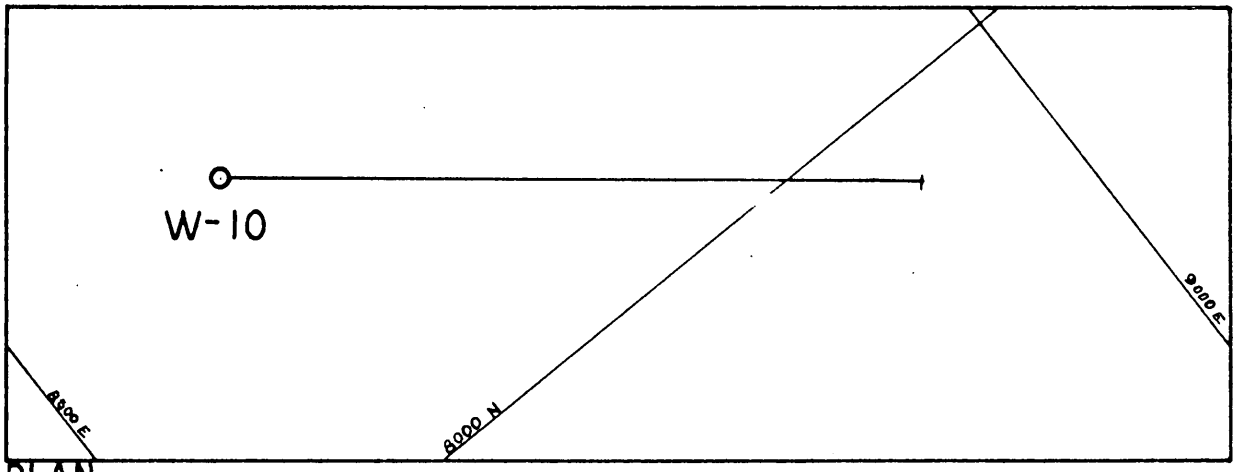
VERT. & HORZ. SCALES: 1" = 100'

0 50 100 200 300

JAN. 1959

WATSON PROJECT
CRITTENDEN COUNTY, KY.

DMEA-4962 Idm-E-1199



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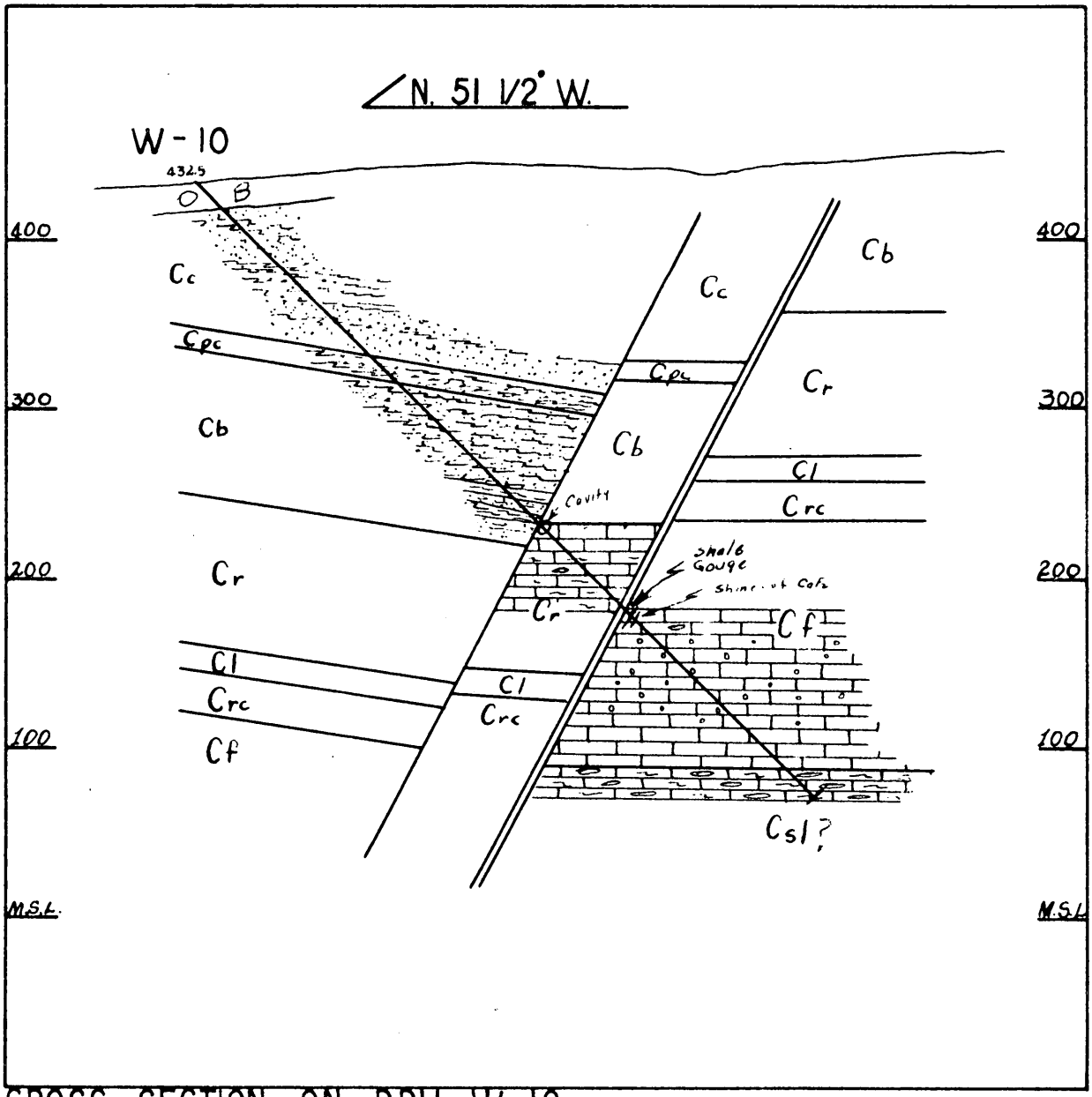


CROSS SECTION ON D.D.H. W-10

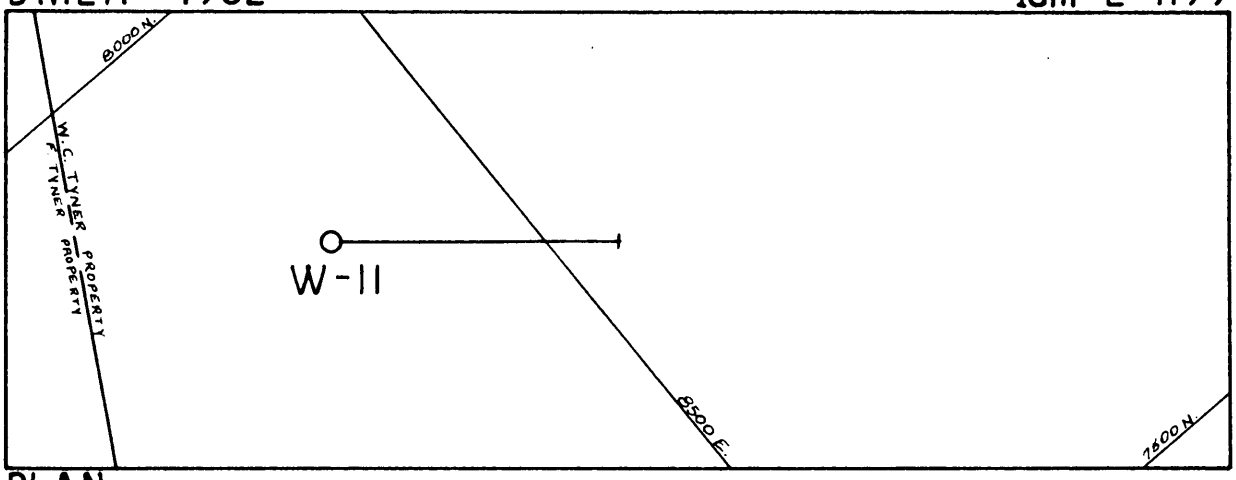
VERT. & HORZ. SCALES: 1"=100'

0 50 100 200 300 FT.

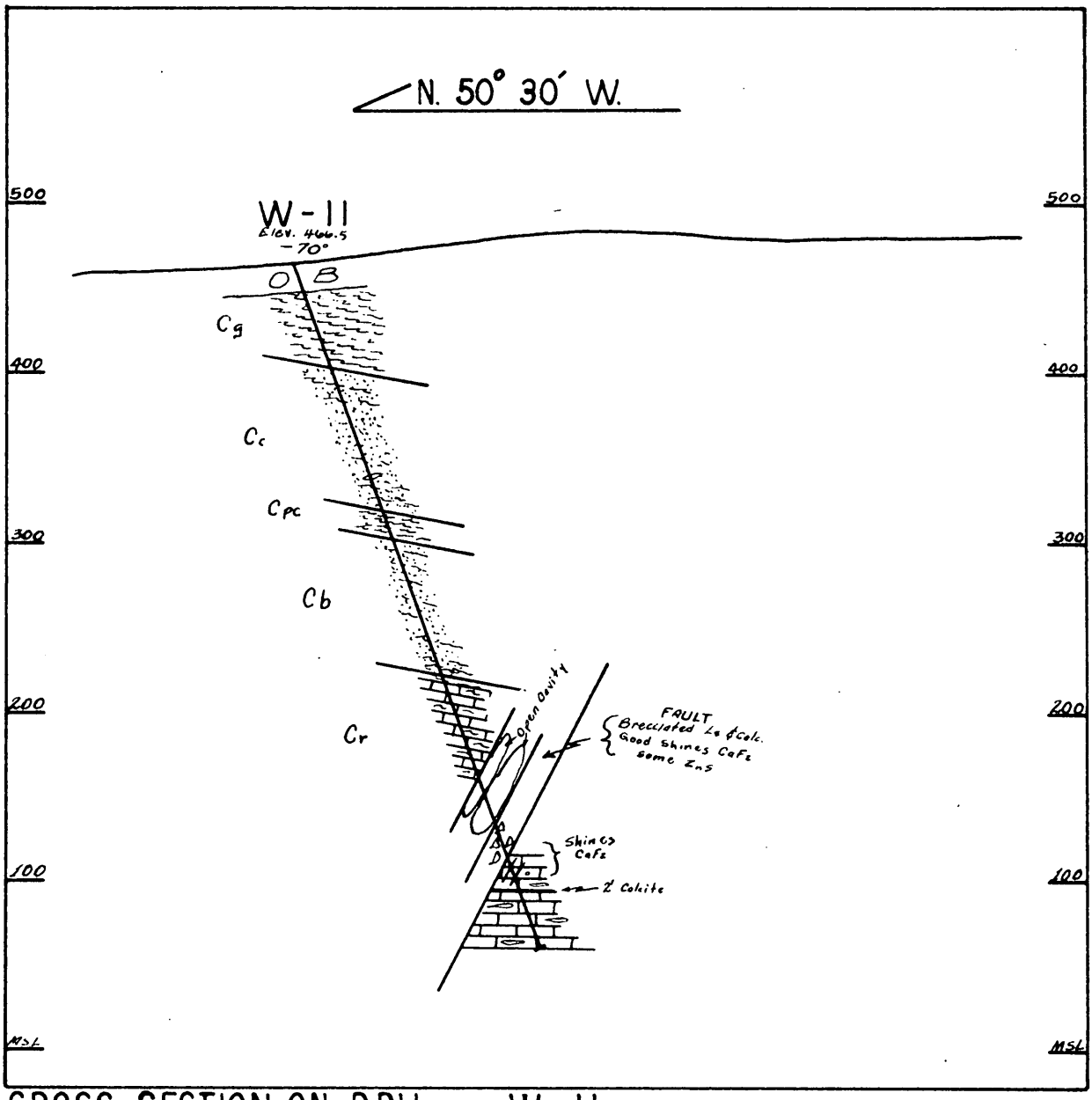
J.W.H. JAN. 1959

WATSON PROJECT
CRITTENDEN COUNTY, KY.

DMEA - 4962 Idm-E-1199



PLAN



CROSS SECTION ON D.D.H. - W-11

VERT. & HORZ. SCALES: 1" = 100′

0 50 100 200 300 FT.

J.W.H. JAN. 1959

Form ME-104 (Rev.)
(April 1952)

Budget Bureau No. 42-R1036.5

Watson Project
Stage II

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
OPERATOR'S MONTHLY REPORT AND VOUCHER

Month of January, 195 9 Docket No. DMEA 1962 Contract No. Idm-E1199

Operator's Address Reynolds Metals Company, Richmond, Virginia Minerals Fluorspar

Contract Amount 31,399.00 Government Participation: 50 % Amount, $ 15,699.50

ITEMS OF COSTS	FOR OPERATOR'S USE: Monthly Total	Totals Previously Reported	Totals To Date	FOR GOVERNMENT USE ONLY: Approved Monthly Total	Approved Totals Previously Reported	Approved Totals To Date
(1) Independent / Short Form Contracts:						
Drilling						
Bulldozing Core	—	—	—			
~~Grouting~~ Reaming	—	—	—			
Hole Surveying and Cementing	—	—	—			
~~Lost~~ Lost BX Casing	—	—	—			
(2) Labor and Supervision Lost NX Casing	—	—	—			
Labor						
Supervision						
Technical Services						
(3) Operating Mat'ls. and Supplies:						
Timber						
Explosives						
Pipe						
Track						
(4) Operating Equipment:						
Rental						
Purchase						
Depreciation						
(5) Initial Rehabilitation and Repairs						
(6) New Bldgs., Improvements, etc.						
(7) Miscellaneous:						
Repairs to Equipment						
Sampling and Analysis						
~~Payroll Taxes~~ CaF_2	—	—	—			
~~Liability Insc.~~ CaF_2, Zn, Pb	—	—	—			
Incidental Allow.	—	—	—			
(8) Contingencies (specify):						
TOTALS						

I certify that the above bill is correct and just and that payment therefor has not been received.

Date FEB 12 1959 *Payee REYNOLDS METALS COMPANY GEOLOGICAL DIVISION

Per H. E. McDaniel Title Accounting Official

*When a voucher is signed or receipted in the name of a company or corporation, the name of the person writing the company or corporate name, as well as the capacity in which he signs, must appear. For example: "John Doe Company, per John Smith, Secretary," or "Treasurer," as the case may be.

NOTE.—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.

(Instructions on reverse)

Pursuant to authority vested in me, I certify that this account is correct and proper for payment in the amount of:

$

Signature
(Authorized Certifying Officer)

Date Vou. No.
(See other side)

(For Government use only)

Uranium Project
Stage II

CERTIFICATION BY GOVERNMENT REPRESENTATIVE:

I certify that to the best of my knowledge and belief the contractor submitting this voucher is operating a Defense Minerals Exploration Administration project under Contract No. ..... in accordance with the terms of the contract.

Signature ..... Title ..... Date .....

APPROVAL BY DMEA EXECUTIVE OFFICER OR ALTERNATE:

Signature ..... Title ..... Date .....

MONTHLY REPORT OF OPERATOR

The Operator (Contractor) of an exploration project is required to make a monthly report to the Government through the Regional Executive Officer. This report consists of three parts as follows:

(a) *Form MF-104—Operator's Monthly Report and Voucher.*—This form details expenditures and constitutes a voucher for reimbursing the Operator for the Government's share of costs;

(b) *Form MF-104A—Operator's Unit Cost and Progress Report.*—This is a statistical report of expenditures which shows costs for the various types of operation; and

(c) *Narrative.*—A concise narrative description of progress made, results accomplished, and any unusual difficulties encountered must be furnished as an attachment to this Report and Voucher. Wherever possible, the narrative is to be illustrated with maps or sketches showing formations penetrated and location and assays of samples taken as well as advances in workings. In the case of diamond drilling or churn drilling, the location and inclination of holes is to be shown on a map; logs and assays also are to be submitted.

The Monthly Report of Operator should be prepared in an original and four copies all of which must be sent to the Executive Officer of the Region not later than the 15th of the month following.

Preparation of Form MF-104—Operator's Monthly Report and Voucher.—All the applicable spaces in Form MF-104 should be filled in by the Operator, and the Operator or his agent should sign the certification in the lower left corner of the form.

The items of costs are arranged in the order they appear in Article 6 (a) of Form MF-200 (Revised February 1952), however, this form is readily adaptable for use in reporting activities under other contract forms.

Under Item (1) delete words "Short Form" if the contract is a sub-contract under Form MF-200; and delete word "Independent" if the contract reported is on Form MF-200 (A). Also, report work paid for on a unit basis under contract Form MF-200 as though it were performed under an independent contract.

Under Item (2) include labor, supervision and technical services incurred for the exploratory operations. Do not include labor, supervision and technical services used for work performed under items (5) and (6).

Under Item (3) include the costs of material and supplies used in the project other than that used under items (5) and (6).

Under Item (4) appear the three types of operating equipment expenditures, that is, rental, purchase and depreciation. The expenditures made for renting equipment belonging to a third party will be reported under "Rental". The amount paid or duly obligated for payment for the purchase of equipment will be reported under "Purchase". The amount of expenditures due the Operator to reimburse him for depreciation of equipment owned will be reported under "Depreciation".

Item (5) comprises costs of labor, supervision, technical services, materials, etc., which are used in the initial rehabilitation and repair of existing buildings, installations, fixtures, and equipment. These costs, therefore, should not be reported under items (2) and (3).

Item (6) includes the labor, supervision, technical services, materials, etc., used in the installation or construction of new buildings, fixed improvements, etc., necessary for the project. These costs, therefore, should not be reported under items (2) and (3).

Item (7) covers miscellaneous types of expenditure such as payroll taxes, liability insurance, workmen's compensation insurance, repairs to equipment and sampling and analysis. Only that part of payroll taxes, liability insurance and workmen's compensation which are paid by the operator should be reported under item (7). The share paid by the employee as a payroll deduction is to be included under item (2) as labor costs.

Item (8) includes any unforeseen costs not included in the other seven categories.

The original of Form MF-104 when submitted for reimbursable expenses incurred under contract Form MF-200 must be supported by original documentation or by certified copies of purchase orders, payrolls or transcripts of payrolls, unless such documentation has been waived by the Regional Executive Officer. This certification may be stated thus, "Certified True Copy (or Transcript)", followed by appropriate signature. If the Executive Officer of the Region determines that a contract under Form MF-200 should have an "on-site" audit, that is, a Government auditor should make an audit of the Operator's books and records of account, the Operator need not support his monthly voucher with original or certified documents except in cases of equipment purchases whose individual costs exceed $50.00. In these cases the original or a certified copy of the purchase order or invoice should be attached to the Monthly Voucher. N. B.—Only the *original* of Form MF-104 is required to be documented. The four copies of Form MF-104 are not to be thus supported.

Form MF-104 submitted for reimbursement under fixed price contracts on Form MF-200 (A), however, are not required to be supported by documentation of any kind. The Operator will submit his claim under item (1) of Form MF-104 by deleting as stated above the word "Independent" and by showing the number of feet or other units immediately after the appropriate descriptive word, such as, drilling, bulldozing, crosscutting, drifting, etc., and giving the "Monthly Total" amount due. "Totals Previously Reported", and "Totals to Date" columns should also be filled in.

GPO 872893

Form MF-104A
(April 1952)

Budget Bureau No. 42-R1151.2

UNITED STATES
DEPARTMENT OF THE INTERIOR

DEFENSE MINERALS EXPLORATION ADMINISTRATION

Watson Project
Stage II

OPERATOR'S UNIT COST AND PROGRESS REPORT

Month of January 1959 Docket No. DMEA 1962 Contract No. Idm-E1199
Operator's Name Reynolds Metals Company Minerals Fluorspar
Address Richmond, Virginia

OPERATION	UNIT	COSTS THIS MONTH	UNITS THIS MONTH	COSTS TO DATE	UNITS TO DATE	UNIT COSTS TO DATE	AUTHORIZED BY CONTRACT Units	AUTHORIZED BY CONTRACT Unit Costs
Drifting								
Crosscutting								
Raising								
Shafts								
Winzes								
Drilling: Core	Ft	0	0	0	0		8,000	2.95
Reaming	Ft	0	0	0	0		2,000	1.75
Cementing	Hr	0	0	0	0		100	8.00
Lost BX Casing	Ft	0	0	0	0		300	2.16
Lost AX Casing	FT	0	0	0	0		300	1.70
Assay CaF2	1	0	0	0	0		75	4.50
CaF2, Zn, Pb	1	0	0	0	0		25	6.50
Incidental Allowance	Ft	0	0	0	0		8,000	0.28
TOTAL DISTRIBUTED COSTS								TOTAL COSTS AUTHORIZED BY CONTRACT
Operating Equipment Purchased								
Initial Rehabilitation and Repairs								
New Buildings, Improvements, etc.								
TOTAL COSTS		0		0				31399.00

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

REMARKS: Hole W-9, the first Stage II hole, was started in January but is not complete.

REYNOLDS METALS COMPANY
GEOLOGICAL DIVISION

Date FEB 12 1959 Operator

Per H. E. McDaniel Title Accounting Official

NOTE.—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.

(Instructions on reverse)

(For Government use only)

INSTRUCTIONS

Preparation of Form MF-104A—Operator's Unit Cost and Progress Report.—Applicable places on Form 104A should be filled in by the Operator. The purpose of this form is twofold as follows: (1) to furnish the supervising engineers and other administrators with statistical information necessary to better determine the progress of the project; and (2) to furnish more permanent information on mining costs for future use. The more important phases of operation on which permanent information is desired have been outlined in the form. There are blank lines, however, for those unusual phases which may need to be reported for a particular project. It will be necessary for the Operator to distribute his costs among the applicable phases reported with the exception of three items the costs of which are not to be distributed by the Operator. These three items are: "Operating Equipment Purchased", "Initial Rehabilitation and Repairs", and "New Buildings, Improvements, etc." The reason for not distributing these items on a monthly basis is doubtless clear to the Operator, since such distribution might well overstate the cost for any one month or period short of the entire contract period.

Form MF-104A has been designed to tie in with Form MF-104 for both monthly and cumulative costs. The "Total Costs" on Form MF-104A for each month should equal the monthly "Total Costs" as reported on Form MF-104. This is also true of the "Total Costs To Date".

In preparing Form MF-104A, it will be necessary frequently to distribute certain costs over a number of items. For instance, supervisory and engineering costs may have to be distributed over several phases, such as, drifting, crosscutting, raising, etc., provided that these items were reported active for the month. Such distributions should be made on the basis of time spent on the various phases, on man days of labor charged to such phases, or on some other equitable basis. "Operating Equipment", "Initial Rehabilitation and Repairs", and "New Buildings Improvements, etc.", will be distributed to the several phases of the project by the Washington Office of DMEA at the close of the project if determined necessary. The last two columns headed "Authorized by Contract" will be filled in by the Operator if such information is found in the contract. This information is usually a part of Exhibit "A" of the contract. A space for remarks has been provided for the use of the Operator to call attention to any unusual circumstances causing excessive or disproportionate unit costs.

GPO 872894

REYNOLDS METALS COMPANY
Monthly Report - January, 1959
Watson Project - DMEA 1968 -Inc-E1199
Crittenden County, Kentucky
by
John W. Hook

STAGE II

W-9 The first stage II hole collared January 13th at coordinates N-9431 E-11286 at an elevation of 558.0 feet. The hole is being drilled N64W on a 60° angle. It is designed to test vein "A" 300 feet above the W-1 penetration and vein "C" 150 feet below the W-1 penetration. W-9 should cut vein "A" from 420 to 450 feet and vein "C" from 700 to 750 feet. The hole collared in Hardinsburg sandstone and cut the top of the Golconda at 100 feet. The Hardinsburg was broken and quartzitic which made drilling difficult, and cavities in the Golconda made reaming and casing necessary. The present depth is 864 feet.

W-13 The second stage II hole, W-13 will be collared 160 feet N65E of hole W-3. It will be drilled S50E on a 45° angle and penetrate the veins 75 feet higher and 100 feet northeast of the W-3 hole.

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O. M. E.
RECEIVED FEB 20 1959

DATE	INITIALS	CODE
2/20	C	220
"	[illegible]	110
		800
[illegible]	[illegible]	600

INTERIM REPORT
DMEA-4962 Idm-E1199(fluorspar)

Operator: Reynolds Metals Company, Richmond, Virginia

Location: Watson-Hicks-Tyner properties, Crittenden County, Kentucky

A project inspection of the subject contract was conducted on February 12, 1959. Results obtained to date and future work were discussed with Messrs. John Hook and Thomas Winans, the Operator's geologists. Cores obtained since the last project inspection were examined.

Drilling completed under the contract is summarized as follows:

Total number of holes completed to date	11
Total footage in holes completed to date	5,918
Number of holes completed since last inspection . .	3
Footage in holes completed since last inspection. .	1,658
Number of ore holes	3
Number of indicative holes.	3
Number of shine holes	1
Number of trace holes	2
Number of barren holes.	2

One of the holes (W-7) completed since the last project inspection encountered ore-grade mineralization and another (W-11), indicative mineralization. The third holeswhich was completed in this interval discovered shines of fluorspar. Summary logs of these three holes are as follows:

Hole No.	Depth in Feet	Description
W-7 (Contract Location No. 5)	0-40	Overburden.
	40-114	Bethel sandstone.
	114-264	Renault limestone and shale.
	264-267	Cavity; possible fault.
	267-286½	Levias limestone.
	286½-309	Rosiclare sandstone.
	309-349½	Breccia zone with calcite and shines of fluorite.
	349½-423	Fredonia limestone; fractured.
	423-447½	Fredonia limestone.

	447½-572½	St. Louis limestone.
	572½-574½	Calcite vein with shines of galena and fluorite.
	574½-660	St. Louis limestone.
	660-688	Calcite vein with strong fluorite and sphalerite mineralization and with traces of galena (see assay below).
	688-789	St. Louis limestone.
	789-846	Calcite vein.
	846-860	Fredonia limestone.
	860	Bottom.
	Inclination -45°	
	Bearing S.50°E.	
W-11 (Contract Location No. 12)	0-18	Overburden.
	18-66	Golconda shale.
	66-156	Cypress sandstone.
	156-175	Paint Creek shale.
	175-264	Bethel sandstone.
	264-352	Renault limestone and shale.
	352-373½	Vein calcite and fractured limestone with indicative fluorite mineralization (see assay below)
	373½-396½	Fredonia limestone.
	396½-398½	Calcite vein.
	398½-436	St. Louis (?) limestone.
	436	Bottom.
	Inclination -70°	
	Bearing S.50½°E.	
W-14 (Contract Location No. 13)	0-10	Overburden.
	10-136	Golconda shale and limestone.
	136-215	Cypress sandstone.
	215-226½	Paint Creek shale.
	226½-298½	Bethel sandstone with shines of fluorite at 233 ft.
	298½-324	Renault limestone and shale.
	324-334	Cavity; fault.
	334-362	Ste. Genevieve limestone with shines of fluorite at 334½-338.
	362	Bottom.
	Inclination -80°	
	Bearing S.49°E.	

Assay results of recently completed holes are as follows:

Hole No.	Depth in Feet	%CaF_2	%Pb	%Zn
W-7	660.6-665.7	5.76	0.32	3.28
	665.7-673.1	18.38	0.27	1.59
	673.1-681.4	7.42	0.11	0.10
	681.4-687.7	12.76	0.13	0.80
W-11	352-373.5	7.28	-	-

A total of four holes were in progress at the time of the inspection. Summary logs of these incomplete holes are as follows:

Hole No.	Depth in Feet	Description
W-9 (Stage II)	0-8	Overburden.
	8-100	Hardinsburg sandstone.
	100-349½	Golconda limestone and shale.
	349½-355	Calcite vein; shines of fluorite.
	355-438	Fredonia limestone.
	438-447	Fault; calcite vein and limestone; possible ore-grade fluorite.
	447-700	St. Louis (?) limestone.
	700-703	Calcite vein with traces of galena.
	703-723	St. Louis limestone.
W-12 (Contract Location No. 19)	0-126	Overburden.
	126-189	St. Louis limestone.
	189-216	Fault; calcite vein with ore-grade mineralization (see assays below).
	216-229	Rosiclare sandstone; shines of galena, sphalerite and fluorite.
W-15 (Contract Location No. 10)	Setting up.	
W-13 (Stage II)	Setting up.	

Assay results of the ore-grade mineralization encountered in incomplete hole W-12 are as follows:

Hole No.	Depth in Feet	%CaF_2	%Pb	%Zn
W-12	189.5-191.1	8.28	-	-
	194.1-197.1	14.56	-	-
	197.1-200.1	8.36	0.21	0.60
	200.1-208.1	29.84	0.16	0.30
	208.1-212.6	30.42	0.43	0.90
	212.6-216.1	35.74	0.11	1.39

Verbal approval was given by the field examiner to drill two additional Stage II holes. One hole which is to be designated W-16 by the Operator is located to explore the strike extent of the ore discovered in Hole W-7. The collar of this hole is to be 245 feet S.25½°W. of the collar of W-7. It will be inclined at -40° and will have an estimated total depth of about 600 feet. The second hole which is to be designated W-17 by the Operator is located to explore the strike extent of the ore discovered in Holes W-5 and W-12 and to intersect Fault 10 down the dip from Hole W-8 at a favorable stratigraphic horizon. The collar of Hole W-17 is to be about 110 feet N.42°E. of the collar of W-12. It will be inclined -45° and will have an estimated total depth of about 700 feet.

Between Contract Locations Nos. 6 and 17 both Fault 3 and Fault 12B are about 300 feet southeast of the positions shown on the contract map. Verbal approval was given by the field examiner to change the position of Contract Location No. 10. The collar of this hole which is to be designated W-15 by the Operator is to be moved about 715 feet in a S.5°W. direction from the collar location shown on the contract map. The estimated total depth will be about 350 feet. The inclination and the geologic target remain the same.

In the vicinity of Contract Locations 15, 16 and 17 Fault 3 is about 300 feet southeast of the position shown on the contract map and thus, is largely outside the contract area. Verbal permission was given by the field examiner to omit drilling under Stage I at these three locations.

Dewey H. Amos
Geologist
U.S.Geological Survey

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF MINERALS EXPLORATION
ROOM 2-B POST OFFICE BLDG.
KNOXVILLE 2, TENN.

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O. M. E.
RECEIVED FEB 20 1959

DATE	INITIALS	CODE
2-20	C	220
2/20	[illegible]	600

February 18, 1959

Mr. John W. Hook, Geologist
Reynolds Metals Company
P.O. Box 64
Salem, Kentucky

Re: Docket No. DMEA-4962-fluorspar
Watson-Hicks-Tyner properties
Crittenden County, Kentucky
Contract Idm-E1199

Dear Mr. Hook:

This will confirm the verbal approval given by Mr. Dewey Amos to make the following changes in drill hole locations in the subject contract:

1 - To drill two additional holes under Stage II of the contract. The first hole, to be designated W-16, will be located 245 feet S25½°W of the collar of Hole W-7. The second hole to be designated W-17, will be located 110 feet N42°E of the collar of hole No.W-12.

2- To move contract hole No. 10, 715 feet S5°W of the location shown on contract map. This hole will be designated W-15.

3 - To omit drilling holes Nos. 15, 16 and 17 under Stage I of the contract.

V. J. Lynch, Acting
Executive Officer, OME
Field Team, Region V

VJL/sm
cc
Opr. Com-2
Dewey
Burmeister
Lynch
Files

Form MF-104 (Rev.)
(April 1952)

Watson - Stage I

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION

Budget Bureau No. 42-R1036.5

PAID ON VOUCHER & SCHEDULE OF PAYMENTS K-

FEB 1959 OMEE

OPERATOR'S MONTHLY REPORT AND VOUCHER

Month of December, 195 8 Docket No. DMEA 4962 Contract No. Idm E-1199
Operator's Name Reynolds Metals Company Minerals Fluorspar
Address Richmond, Virginia
Contract Amount, $20,310.00 Government Participation: 50 % Amount, $14,155.00

ITEMS OF COSTS	FOR OPERATOR'S USE			FOR GOVERNMENT USE ONLY		
	Monthly Total	Totals Previously Reported	Totals To Date	Approved Monthly Total	Approved Totals Previously Reported	Approved Totals To Date
(1) Independent / Short Form Contracts:						
Drilling core	2448.50	4333.55	6782.05			
~~Building~~ reaming	649.25	710.50	1359.75			
Hole survey & ~~Crosscutting~~ cementing	-	184.00	184.00			
~~Drifting~~ lost BX casing	216.00	-	216.00			
Lost AX casing	-	-	-			
(2) Labor and Supervision:						
Labor						
Supervision						
Technical Services						
(3) Operating Mat'ls. and Supplies:						
Timber						
Explosives						
Pipe						
Track						
Core boxes	-	225.00	225.00			
(4) Operating Equipment:						
Rental						
Purchase						
Depreciation						
(5) Initial Rehabilitation and Repairs						
(6) New Bldgs., Improvements, etc.						
(7) Miscellaneous:						
Repairs to Equipment						
~~Sampling and~~ Analysis CaF_2	4.50	-	4.50			
Payroll Taxes CaF_2, Zn, Pb	-	84.50	84.50			
Liability Insurance						
Incidental allow.	232.40	411.32	643.72			
(8) Contingencies (specify):						
TOTALS	3550.65	5948.87	9499.52	3550.65	5948.87	9499.52

I certify that the above bill is correct and just and that payment therefor has not been received.

Date JAN 16 1959 *Payee Reynolds Metals Company

Per H. E. McDaniel Title Accounting Official

*When a voucher is signed or receipted in the name of a company or corporation, the name of the person writing the company or corporate name, as well as the capacity in which he signs, must appear. For example: "John Doe Company, per John Smith, Secretary," or "Treasurer," as the case may be.

NOTE.—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.

(Instructions on reverse)

Pursuant to authority vested in me, I certify that this account is correct and proper for payment in the amount of:

$ 1775.33

Signature Helen R. Miller
(Authorized Certifying Officer)

Date FEB 2 1959 Vou. No. 84
(See other side)

1775.32

(For Government use only)

CERTIFICATION BY GOVERNMENT REPRESENTATIVE:

I certify that to the best of my knowledge and belief the contractor submitting this voucher is operating a Defense Minerals Exploration Administration project under Contract No. E 1199 in accordance with the terms of the contract.

Signature W. L. Burmeister Title Mining Engr. Date 1/27/59

APPROVAL BY DMEA EXECUTIVE OFFICER OR ALTERNATE:

Signature N. J. Lynch Title ACTING EXECUTIVE OFFICER OME REGION V Date JAN 29 1959

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(c) *Narrative.*—A concise narrative description of progress made, results accomplished, and any unusual difficulties encountered must be furnished as an attachment to this Report and Voucher. Wherever possible, the narrative is to be illustrated with maps or sketches showing formations penetrated and location and assays of samples taken as well as advances in workings. In the case of diamond drilling or churn drilling, the location and inclination of holes is to be shown on a map; logs and assays also are to be submitted.

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Preparation of Form MF-104—Operator's Monthly Report and Voucher.—All the applicable spaces in Form MF-104 should be filled in by the Operator, and the Operator or his agent should sign the certification in the lower left corner of the form.

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Under Item (4) appear the three types of operating equipment expenditures, that is, rental, purchase and depreciation. The expenditures made for renting equipment belonging to a third party will be reported under "Rental". The amount paid or duly obligated for payment for the purchase of equipment will be reported under "Purchase". The amount of expenditures due the Operator to reimburse him for depreciation of equipment owned will be reported under "Depreciation".

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Item (6) includes the labor, supervision, technical services, materials, etc., used in the installation or construction of new buildings, fixed improvements, etc., necessary for the project. These costs, therefore, should not be reported under items (2) and (3).

Item (7) covers miscellaneous types of expenditure such as payroll taxes, liability insurance, workmen's compensation insurance, repairs to equipment and sampling and analysis. Only that part of payroll taxes, liability insurance and workmen's compensation which are paid by the operator should be reported under item (7). The share paid by the employee as a payroll deduction is to be included under item (2) as labor costs.

Item (8) includes any unforeseen costs not included in the other seven categories.

The original of Form MF-104 when submitted for reimbursable expenses incurred under contract Form MF-200 must be supported by original documentation or by certified copies of purchase orders, payrolls or transcripts of payrolls, unless such documentation has been waived by the Regional Executive Officer. This certification may be stated thus, "Certified True Copy (or Transcript)", followed by appropriate signature. If the Executive Officer of the Region determines that a contract under Form MF-200 should have an "on-site" audit, that is, a Government auditor should make an audit of the Operator's books and records of account, the Operator need not support his monthly voucher with original or certified documents except in cases of equipment purchases whose individual costs exceed $50.00. In these cases the original or a certified copy of the purchase order or invoice should be attached to the Monthly Voucher. N. B.—Only the *original* of Form MF-104 is required to be documented. The four copies of Form MF-104 are not to be thus supported.

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Form MF-104A
(April 1952)

Budget Bureau No. 42-R1151.2

UNITED STATES
DEPARTMENT OF THE INTERIOR

DEFENSE MINERALS EXPLORATION ADMINISTRATION

Watson Project
Stage I

OPERATOR'S UNIT COST AND PROGRESS REPORT

JAN 4 1959 O.M.E.

Month of December 1958 Docket No. DMEA 4962 Contract No. Idm E-1199
Operator's Name Reynolds Metals Company Minerals Fluorspar
Address Richmond, Virginia

OPERATION	UNIT	COSTS THIS MONTH	UNITS THIS MONTH	COSTS TO DATE	UNITS TO DATE	UNIT COSTS TO DATE	AUTHORIZED BY CONTRACT Units	AUTHORIZED BY CONTRACT Unit Costs
Drifting								
Crosscutting								
Raising								
~~Shafts~~ Core boxes	1	-	-	225.00	75		75	3.00
Winzes								
Drilling: Core	Ft	2448.50	830	6782.05	2299		6900	2.95
~~churn~~ reaming	Ft.	649.25	371	1359.75	777		2000	1.75
Hole survey & ~~Auger~~ cementing	Hr.	-	-	184.00	23		80	8.00
~~Stripping~~ Lost BX casing	Ft.	216.00	100	216.00	100		300	2.16
~~Trenching~~ Lost AX casing	Ft.	-	-	-	-		300	1.70
~~Test Pit~~ Assay CaF_2	1	4.50	1	4.50	1		75	4.50
~~Roads and Trails~~ CaF_2, Zn, Pb	1	-	-	84.50	13		25	6.50
Incidental allow.	Ft.	232.40	830	643.72	2299		6900	.28
TOTAL DISTRIBUTED COSTS								TOTAL COSTS AUTHORIZED BY CONTRACT
Operating Equipment Purchased								
Initial Rehabilitation and Repairs								
New Buildings, Improvements, etc.								
TOTAL COSTS		3550.65		9499.52				28,310.00

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

Date JAN 16 1959 Operator Reynolds Metals Company

Per H. E. McDaniel Title Accounting Official

REMARKS: Costs this month are for Hole W-3 only. Holes W-4, W-5, and W-6 were not finished in time to be included with the December Joy Invoice.

→ NOTE.—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.

(Instructions on reverse)

(For Government use only)

INSTRUCTIONS

Preparation of Form MF-104A—Operator's Unit Cost and Progress Report.—Applicable places on Form 104A should be filled in by the Operator. The purpose of this form is twofold as follows: (1) to furnish the supervising engineers and other administrators with statistical information necessary to better determine the progress of the project; and (2) to furnish more permanent information on mining costs for future use. The more important phases of operation on which permanent information is desired have been outlined in the form. There are blank lines, however, for those unusual phases which may need to be reported for a particular project. It will be necessary for the Operator to distribute his costs among the applicable phases reported with the exception of three items the costs of which are not to be distributed by the Operator. These three items are: "Operating Equipment Purchased", "Initial Rehabilitation and Repairs", and "New Buildings, Improvements, etc." The reason for not distributing these items on a monthly basis is doubtless clear to the Operator, since such distribution might well overstate the cost for any one month or period short of the entire contract period.

Form MF-104A has been designed to tie in with Form MF-104 for both monthly and cumulative costs. The "Total Costs" on Form MF-104A for each month should equal the monthly "Total Costs" as reported on Form MF-104. This is also true of the "Total Costs To Date".

In preparing Form MF-104A, it will be necessary frequently to distribute certain costs over a number of items. For instance, supervisory and engineering costs may have to be distributed over several phases, such as, drifting, crosscutting, raising, etc., provided that these items were reported active for the month. Such distributions should be made on the basis of time spent on the various phases, on man days of labor charged to such phases, or on some other equitable basis. "Operating Equipment", "Initial Rehabilitation and Repairs", and "New Buildings Improvements, etc.", will be distributed to the several phases of the project by the Washington Office of DMEA at the close of the project if determined necessary. The last two columns headed "Authorized by Contract" will be filled in by the Operator if such information is found in the contract. This information is usually a part of Exhibit "A" of the contract. A space for remarks has been provided for the use of the Operator to call attention to any unusual circumstances causing excessive or disproportionate unit costs.

GPO 872894

REYNOLDS METALS COMPANY
Monthly Report - December, 1958
Watson Property - DMEA 4962 - I&m E-1199

Crittenden County, Kentucky

By
John W. Hook, Geologist

Stage I

A second rig was added to the Watson project during December and a third (for stage II work) will be added in January. One of the rigs is working on a two shift basis and the other is running three shifts. With this increased effort we expect to complete the project by the March 10th deadline.

As presently planned, the original rig will continue to follow fault 3, the main Watson structure, and the second rig will follow fault 10, a big producer in the Davenport mine. The third rig will start the stage II drilling in an attempt to expand the ore discovered in W-1. A fourth rig will be added if needed to complete the stage II work.

The holes are being numbered in the sequence in which they are drilled: W-4 was drilled at location No. 4, W-5 at location No. 18, and W-6 at location No. 8. W-7 will be drilled at location No. 5 (revised) and W-8 will be drilled at location No. 9 (revised). Permission to drill holes out of sequence and at revised locations is being granted by the DMEA field team.

W-4 cut fault 3 from the hanging wall (SE) side and bottomed in Ste. Genevieve limestone at a depth of 411. The hole collared in Hardinsburg, cut a full section of Golconda and the upper part of the Cypress sandstone in the hanging wall. The main fault was at 267 to 279 feet and consisted of brecciated sandstone fragments in a clay matrix. This was difficult material to sample and recovery was poor, but there was no evidence of CaF_2 mineralization. Ste. Genevieve limestone was cut from 79 to 323. From 323 to 398 the hole found quartzitic sandstone boulders in a matrix of loose sand and clay. Only the boulders could be recovered as core, the clay and sand were recovered in sludge samples.

This zone probably represents a very large cavity in the Ste. Genevieve filled with debris from the overlying sandstone formations rather than a graben. No fluorspar was found in this zone. Below 398' the hole went back into brecciated Ste. Genevieve with good shines of fluorspar. The hole was bottomed in shines at 411. The next hole along this system, W-7 (location No. 5) is designed to test parallel structures from the northwest side and intersect the bottom of W-4.

The second rig was moved to W-5 (proposed hole No. 12) on December 23. This hole collared in Cypress sandstone, passed through the Paint Creek shale, and cut most of the Bethel sandstone before entering a fault at 222. From 222 to 322

it found good shines of CaF_2 and Zns in a fractured and brecciated fault block of Ste. Genevieve limestone. This entire section was assayed because the low grade mineralization in high calcic limestone may be of future importance. Many of the fractures were parallel of sub-parallel to the core, indicating that the hole was possibly following a fractured zone within the block of Ste. Genevieve. It is likely, however, that this block of Ste. Genevieve in the main Moore Hill Fault (fault 1), is fractured throughout. In general, the fluorspar mineralization was best near the hanging wall and the best concentration of sphalerite was at the footwall of this block. Below the fault at 322, the hole found St. Louis limestone with a few minor fractures. The hole bottomed at 351.

W-6 was drilled at location No. 8, about 100' in back of, and in the opposite direction from W-5. Both holes are shown on the same cross sections. The various zones of the Cypress were correlated between the holes but the Paint Creek and Bethel formations were too weathered to core. Sludge samples were taken but no fluorspar, lead or zinc were found. At 250' cores of the Rosiclare sandstone were recovered, underlain by Fredonia, indicating that fault 10 had been cut in the weathered zone. The hole was continued in Fredonia to a depth of 351' but other than cavities, there was no further evidence of faulting.

Invoices are submitted by Joy on the 25th of each month. Only holes which bottom before this date are shown on the accounting forms.

Assays

Hole	Assay No.	From	To	CaF_2	Pb	Zn
W-2	A-44992	333.9	340.2	4.56	0.32	0.30
W-2	A-44993	340.2	241.5	92.38	3.84	0.00
W-2	A-44994	341.5	344.8	4.80	0.21	0.30
W-2	A-44995	301.6	303.0	86.56	2.13	0.69
W-2	A-44996	303.0	303.9	15.36	0.21	5.18
W-2	A-44997	327.0	340.2	8.76	0.27	0.80
W-3	A-57234	639	643	17.72		
W-5	A-44998	226	235	6.58		0.80
W-5	A-44999	235	256	0.88		0.10
W-5	A-45000	256	285	3.80		0.20
W-5	A-57235	285	313	5.46		1.99
W-5	A-57236	313	321.5	1.46		4.68

Drilling Summary

Hole	Location No.	Depth	Date Bottomed
W-3	3	829'	11-26-58
W-4	4	411'	12-31-58
W-5	18	351'	12-29-58
W-6	8	351'	1-5-59

REYNOLDS METALS COMPANY

Diamond Drill Hole: W-4 Angle: -44.5° Bearing: N67W Depth: 411'
Coordinates: N-8532, E-10579 Elevation: 547.5'
Property: Watson Area: SE Salem County: Crittenden State: Kentucky
Contractor: Joy Mfg. Company Started: 12-10-58 Finished: 12-31-58
Foreman: Hayes

From	To	Fm.	Description
0	14		Overburden
14	44	Ch	Sandstone, fine grained, light grey, massive.
44	53	Ch	Shale and thin bedded sandstone, mica along bedding, recovery 2'.
53	65	Ch	Ditto. Recovery 1'.
65	82	Ch	Ditto. Recovery 1'.
82	102	Cg	Limestone, dark grey, medium crystalline, ground mass with coarse crystalline, brown calcite replacing fossils, fossiliferous small crinoids give appearance of oolite, slightly shaley, angle of bedding at 86', to 87' and 94', 50°, av. for run. 96-97 fine crystalline limestone.
102	145	Cg	Shale, dark grey, calcareous, with reddish cast in shale from 112 to 113. Limestone from 106.5 - 109.5, angle of bedding 45°, av. for run.
145	165.5	Cg	Shale, dark grey, very slightly calcareous, slightly sandy in zones of irregular nodules.
165.5	170	Cg	Limestone, dark grey, medium crystalline, brown calcite replacing fossils, moderately fossiliferous, heavy fossiliferous zones, green shale partings and more fossiliferous in upper 1.5'.
170	182	Cg	Silty limestone, dark grey, fine grained, scattered fossils, replaced by brown calcite, alternates between limestone and calcareous shale.
182	189	Cg	Shale, dark grey fossiliferous, numerous bryozoan fans along bedding, fossils replaced by brown calcite, Archimedes at 189'.
189	219	Cg	Alternating limestone and shale, dark grey shale and dark, brownish grey, fine to medium crystalline clean limestone, shales are sandy from 207 - 219. Numerous bryozoan in limestone, apparently larger fossils in run, less crinoids, slightly brecciated at 206'. Angle of bedding at 215', 45°.
219	233	Cc	Sandstone, fairly massive, with few shale partings, cross bedded.

From	To	Fm.	Description
233	250	Cc	Shale, dark grey, slightly calcareous, angle of bedding 60°.
250	267	Cc	Sandstone with some shale partings, angle of bedding at 252, 60°.
267	279		Fault Sandstone breccia and fragments of sandstone in clay matrix. Recovery 4'. (Fine gravel was recovered, no evidence of CaF_2 mineralization.)
279	285	Csg	Limestone, lithographic, light brown, few fossils, recovery 6'.
285	290	Csg	Green shale in upper part, slay with fragments of weathered limestone in lower part.
290	295	Csg	Limestone, fine crystalline, greenish to brown, weathered, fossiliferous, with little shale, appears slightly sandy, recovery 1'.
295	313.5		Cavity, filled with sand and shale fragments.
313.5	323		Limestone, fine to medium crystalline, light grey, scattered micro fossils.
323	331		No recovery.
331	366		Sand filled cavity with quartz boulders. Recovered little quartz core, sludge contained sand and green shale, considerable marcasite.
366	398		No core, samples with gravel barrel in cavity. Sand and green shale fragments.
398	411		Brecciated limestone, calcite with shines of CaF_2. Limestone is fine crystalline, light brownish grey.

From 323 to 398 - probably a sand and quartzite filled cavity.

Bottom 411'

REYNOLDS METALS COMPANY

Diamond Drill Hole: W-5 Angle: -45° Bearing: N50W Depth: 351'
Coordinates: N-8717, E-9172 Elevation: 459.5'
Property: Watson (Hicks) Area: SE Salem County: Crittenden State: Kentucky
Contractor: Joy Mfg. Company Started: 12-23-58 Finished: 12-29-58
Foreman: Minner

From	To	Fm.	Description
0	15		Overburden
15	30	Ceb	Sandstone, light grey to brown, weathers brown, fine grained, massive, weathered along bedding, angle of bedding 50°, ave. for run.
30	55	Ceb	Shale, grey, weathers green and brown, weathered at upper contact, slightly sandy with pyrites along bedding. 6" sandstone at 52'.
55	60	Ceb	Sandstone, light grey weathered brown, recovered small boulders, 3" sandy shale at 55'. Angle of bedding in shale 50°. Recovery between 57 - 60, 6".
60	85	Ceb	Sandstone, shale, laminated in upper part, heavy concentrations of marcasite, weathered in bottom of run, angle of bedding 50°, ave. for run. 4' recovery.
85	115	Ceb	Sandstone, light grey, fine grained, massive, weathers brown, weathered to a mottled dark brown in lower 4'.
115	121	Ceb	Weathered shale and shale fragments.
121	146	Ceb	Shale, black, slightly elacareous, angle of bedding 50° for run.
146	205	Ceb	Shale, black alternating with thin iregular bedded and small lenses of grey sandstone, slightly calcareous, mica along bedding with some marcasite, angle of bedding approx. 60° for run.
205	214.5	Ceb	Sandstone, medium grey, fine grained, shaley, this run is similar to the one above but with more sandstone.
214.5	222	Ceb	Shale, black calcareous, some marcasite, sandy, from 220'. Very weathered in lower foot. Angle of bedding 65° for run.
222	233	Ceb	Fault. 222 - 225 Cavity, mud filled. 225 - 233 Limestone and calcite breccia with shines of CaF_2 at 228.6 - 233. 3.5' recovery from 225 - 233. Assay: 226 - 235. 6.58% CaF_2, 0.08% Zn.
233	245	Cag	Limestone, medium grey, coarse crystalline, slightly fossiliferous, very slightly oolitic, 3" fine crystalline ls. at 238, more fractured in upper 2', numerous stylolites. Shines CaF_2 233-235 (scattered) " " 237.8 Assay: 235-256. 0.88% CaF_2, 0.10% Zn/

From	To	Fm.	Description
245	256	Cag	Limestone, medium grey, medium crystalline, oolitic, fossiliferous, few stylolites. Shines CaF_2 at 246.5 248 - 248.8 Increase in fracturing at base.
256	258.3	Cag	Limestone, medium grey, coarse crystalline, slightly fractured with numerous calcite veinlets, heavy stylolites, shines of Zn and CaF_2 scattered through the run.
258.3	262	Cag	Limestone, medium grey, shaley, very fossiliferous, weathered near base. Trace of CaF_2 at top, angle of bedding 65°, av. for run.
262	281	Cag	Limestone, dark brown grey, fine crystalline, slightly fossiliferous, heavy concentration of fossils in zones with few shale partings, calcite stringer running with core from 269 - 270 with good shine of Zn and CaF_2, trace of Pb. Slightly fractured from 274.5 - 281. Shines of CaF_2, Zn from 274.5 - 277 277.7 279.3 - 280.
281	285	Cag	Limestone, light grey, medium crystalline, oolitic, slightly fractured. Assay: 256-285. 3.80% CaF_2, 0.20% Zn.
285	292	Cag	Limestone as above with disseminated Zn through entire run, calcite veins running with core showing shines of CaF_2 and Zn at 281.4 - 288.2 289.3 - 289.9 290.5 - 292
292	297.3	Cag	Limestone, medium to dark grey, fossiliferous, moderately fractured, numerous small calcite veinlets with shines of Zn and CaF_2 in veinlets, some Zn disseminated in limestone. Shines of CaF_2 and Zn 292.5 - 293 (good shines) 293 - 293.3 293.7 - 297.3 (good shines)
297.3	302	Cag	Limestone, medium grey, medium crystalline, fossiliferous, broken core, trace of CaF_2 at 301.
302	306.3	Cag	Limestone, as above with calcite stringers running with core with good shines of Zn and CaF_2, but scattered in lower 1.5'.
306.3	313	Cag	Limestone as above, slightly less fractured, good shines of CaF_2 307.5 - 308.5. Scattered shine CaF_2 and Zn, Trace of Zn 310-312 (poor recovery on run.) Scattered shines of Zn and CaF_2 from 312-313. Assay: 285 - 313. 5.46% CaF_2, 1.99% Zn.

From	To	Fm.	Description
313	321.5		Fault. Brecciated limestone, chert and calcite with CaF_2 shines, and Zn disseminated in limestone and calcite. Assay: 313-321.5. 1.46% CaF_2, 4.68% Zn.
321.5	351	Cal	Limestone, medium grey to brown, medium to fine crystalline, brecciated near top, cherty, few small calcite veinlets. Angle of bedding 50° approx. ave. for run.

Bottom 351'

REYNOLDS METALS COMPANY

Diamond Drill Hole No: W-6 Angle: -45° Bearing: N50W Depth: 351'
Coordinates: N-8650, E-9263 Elevation: 450.0
Contractor: Joy Mfg. Company Started: 12-29-58 Finished: 1-5-59
Foreman: Minner

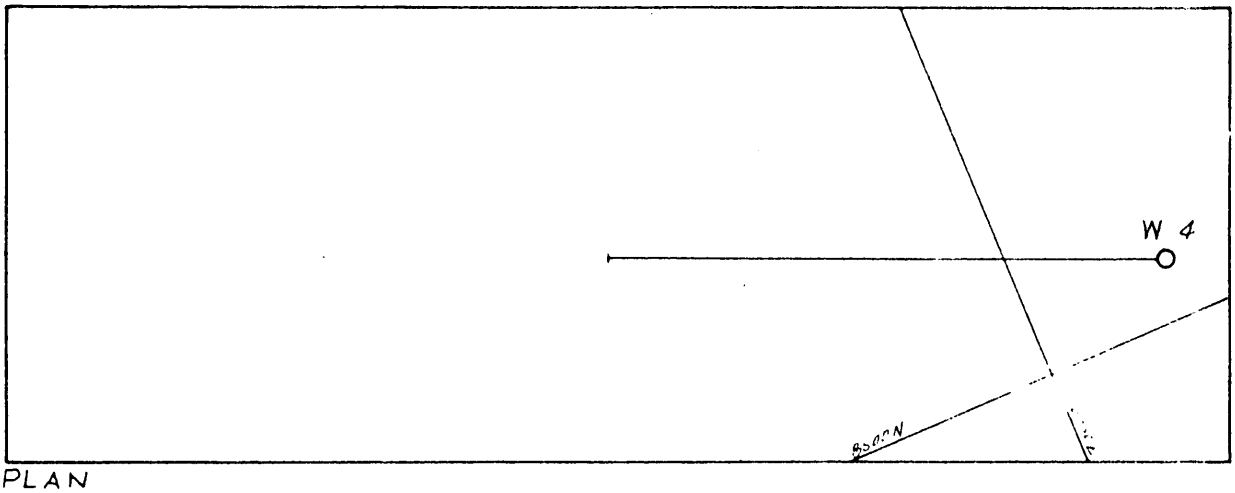
From	To	Fm.	Description
0	19		Overburden
19	45	Ccb	Sandstone
45	64	Ccb	Shale, medium grey, weathers grey green, weathered in upper three feet. Sandy. Angle of bedding, 30°.
64	85	Ccb	Sandstone, fine grained, white, weathers green and brown, mainly broken core below 65'. Very poor recovery.
85	135	Ccb	Sandstone and shale, laminated, medium to dark grey, with some clean sandstone from 110-121, badly weathered near bottom. Angle of bedding 33°, average for run.
135	250		No core, sludge sample. Mostly sand, no mineralization found. Probable fault near bottom of run.
250	265	Crc	Sandstone, medium grained, green grey, calcareous, mostly weathered and broken core, poor recovery.
265	278		Limestone, brown, fine crystalline, slightly fossiliferous, slightly oolitic, weathered in upper part.
278	291		No core, sludge sample.
291	351		Limestone, medium grey to brown, medium crystalline, slightly oolitic, fossiliferous, weathered in zone. Cavities at 291-295 (mud filled) 297-305 (mud filled) 308-312 (mud filled) 323-328 329-331 332-342 342.5-344.5

WATSON PROJECT

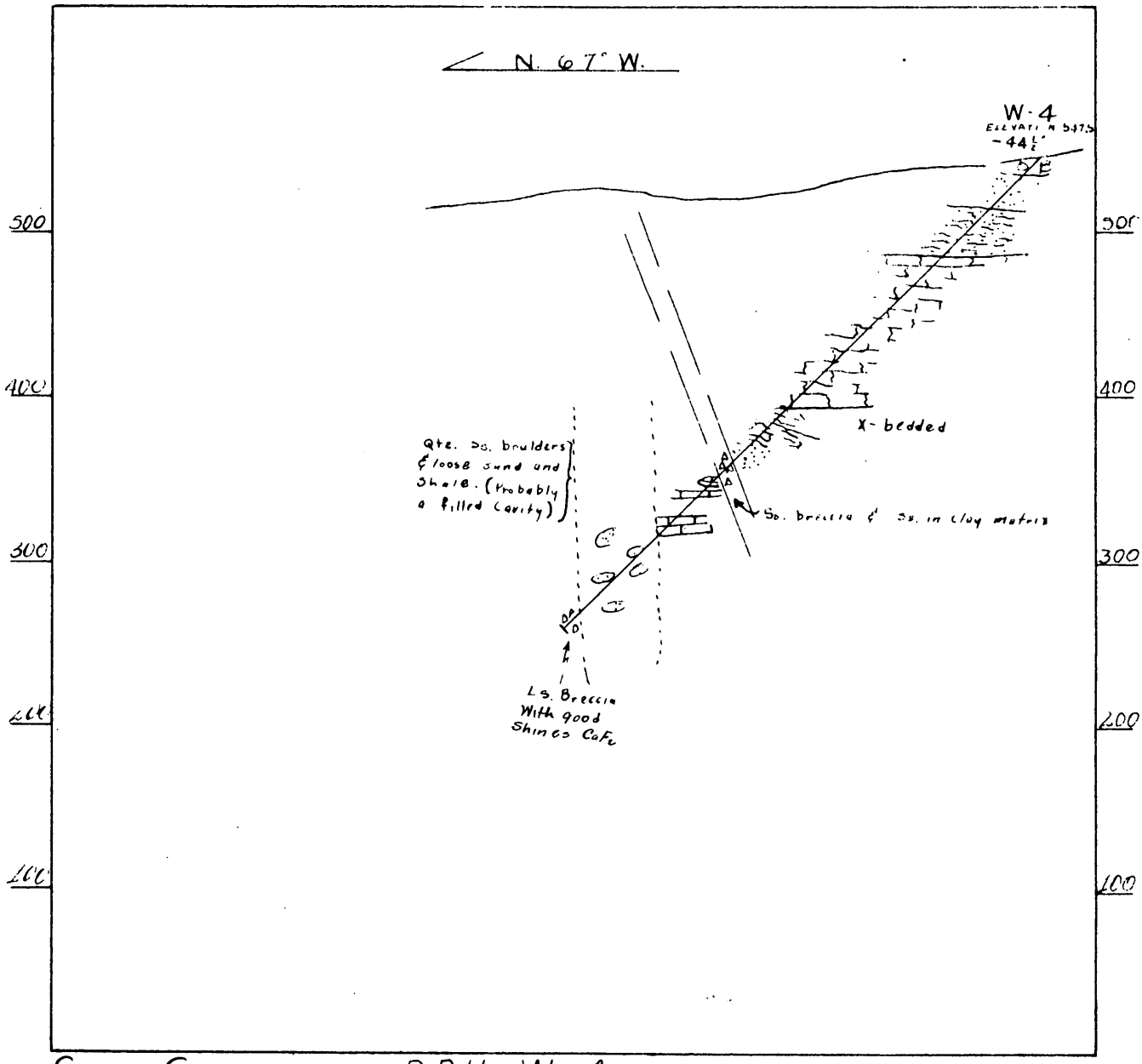
CRITTENDEN COUNTY, KENTUCKY

DMEA - 4962

Idm-E 1199



PLAN



Cross Section on D.D.H. W-4

VERT. & HORZ. SCALES : 1" = 100'

0 50 100 200 300 FT.

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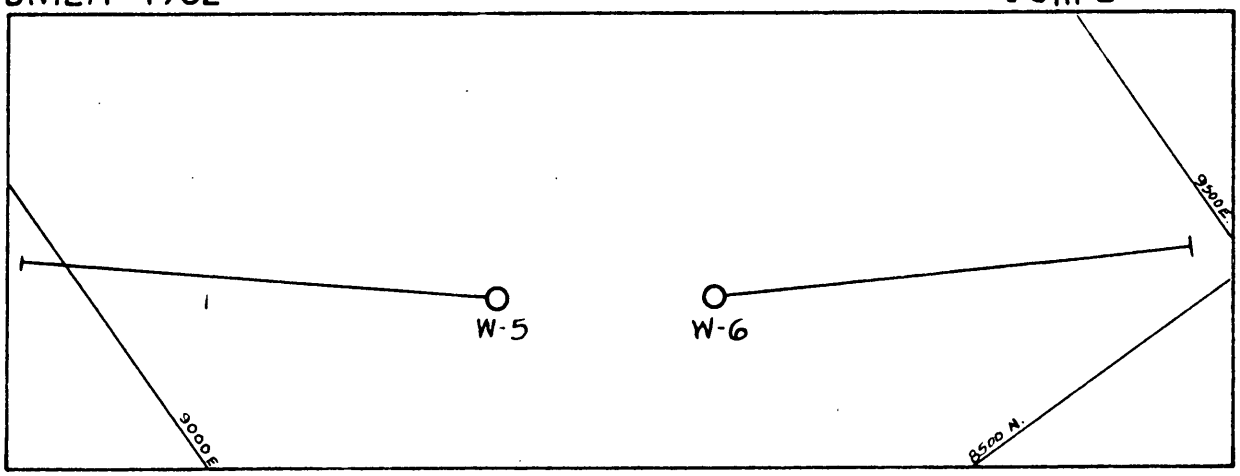
DATE	INITIALS	CODE

WATSON PROJECT
CRITTENDEN COUNTY, KY.

DMEA-4962 Idm-E -1199



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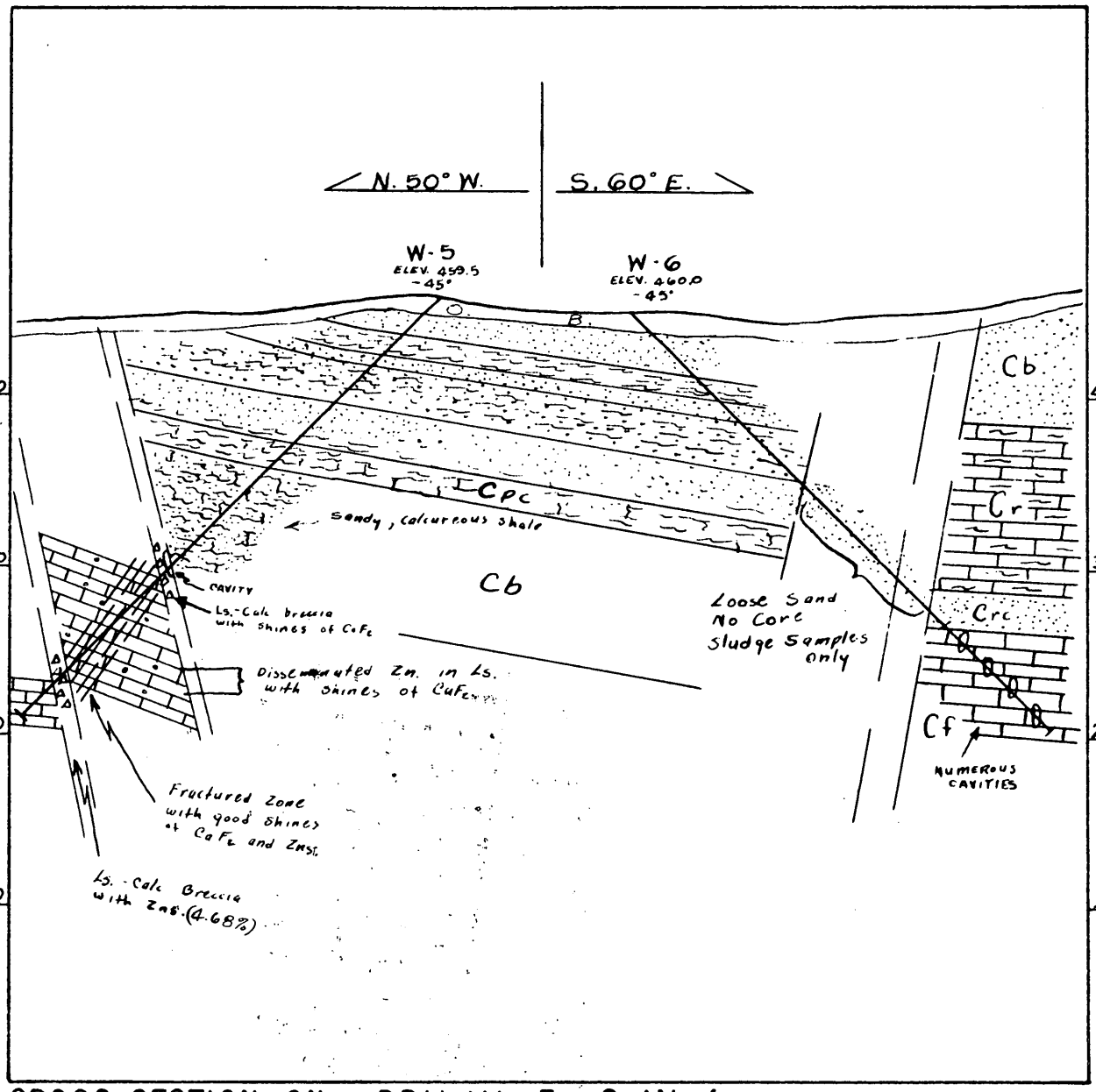

CROSS SECTION ON D.D.H. W-5 & W-6

VERT. & HORZ. SCALES: 1" = 100'

0 50 100 200 300 FT.

DEC. 1958

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DATE	INITIALS	CODE

REYNOLDS METALS COMPANY

(A DELAWARE CORPORATION)

GENERAL OFFICES: RICHMOND, VIRGINIA

PLEASE MAIL ALL REMITTANCES TO:
REYNOLDS METALS COMPANY
REYNOLDS METALS BUILDING,
RICHMOND 18, VIRGINIA

ORIGINAL

MO. SCHEDULE WK.	SHIPPING POINT	CABLE ADDRESS:	CODES USED:
	Geological Div.	"FOILWAX"	WESTERN UNION—A. B. C. AND LIEBLERS

REYNOLDS ORDER NO.	TERMS (FROM DATE OF INVOICE)	DATE	INVOICE NO.
	NET 30 DAYS	1-16-59	49-1-1

CUSTOMER ORDER NO.	CUST. ORDER DATE	USE CODE	CONTRACT NO.	BILL OF LADING NO.	CHECK IF ORDER COMPLETE	TALLY NO.

CUSTOMER CODE	TAX	SALES CREDIT	ITEMS SHIPPED COMPLETE	ITEMS SHIPPED PARTIAL

SOLD TO
Department of the Interior
Defense Minerals Exploration Admin.
Attention: E. L. Burmeister
U. S. Bureau of Mines
College Park, Maryland

SHIP TO (SAME AS SOLD TO UNLESS INDICATED.)

ROUTE

QUANTITY SYMBOLS
#—POUNDS
P—PIECES, EACH
W—THOUSAND PIECES
S—SETS
T—THOUSAND SETS
F—FEET
C—HUNDRED FEET
K—THOUSAND FEET
E—SQUARE FEET
L—LINEAL YARDS
Y—SQUARE YARDS
R—REAMS
G—GALLONS

ITEM	DESCRIPTION	PRODUCT CODE	PRICE	CASES	GROSS WGT.	NET WGT.	QUANTITY (IF OTHER THAN #)	AMOUNT
	To bill you with 50% of December, 1958 items of costs per the Operators Monthly Reports and Vouchers for the following:		$					
	Docket No.'s DMEA 4962 DMEA 4963							
	Contract No.'s Idm-E-1199 Idm-E-1200							
	Monthly Totals 3,550.65 1,038.51							
	Less 50% 1,775.33 519.26							
	1,775.32 519.25							$2,294.57

TRANSPORTATION CLAUSE APPLICABLE (SEE ACKNOWLEDGMENT BACK)

PPD OR COL	VIA:
P	AS DIRECTED BY REYNOLDS' TRAFFIC DEPARTMENT

A-03-18 2,292.32
D-921-98-1 2.25

R - 142 - 52 (REV. 6 - 57)

SELLER REPRESENTS THAT WITH RESPECT TO THE PRODUCTION OF THE MATERIAL AND/OR THE PERFORMANCE OF THE SERVICES COVERED BY THIS INVOICE. IT HAS FULLY COMPLIED WITH THE REQUIREMENTS OF THE FAIR LABOR STANDARDS ACT OF 1938 AS AMENDED. OUR RESPONSIBILITY FOR SAFE DELIVERY OF GOODS CEASES WHEN WE OBTAIN CLEAR BILL OF LADING FROM CARRIER

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DATE	INITIALS	CODE
2/9	C	220
"	[illegible]	110
2/9	[illegible]	800
2/10	Hook	600

INTERIM REPORT
DMEA-4962, Idm-E1199(fluorspar)

Operator: Reynolds Metals Company, Richmond, Virginia

Location: Watson-Hicks-Tyner Properties, Crittenden County, Kentucky

A project inspection of the subject contract was made on January 28, 1959. Results obtained to date and comtemplated future work were discussed with Messrs. John Hook and Thomas Winans, the Operator's geologists. Cores obtained since the last project inspection were examined.

Drilling completed under the contract is summarized as follows:

Total number of holes completed to date.	8
Total footage in holes completed to date	4,260
Number of holes completed since last inspection. . .	2
Footage in holes completed since last inspection . .	849
Number of ore holes	2
Number of indicative holes	2
Number of trace holes.	2
Number of barren holes	2

Of the two holes completed since the last project inspection, one (W-10) encountered traces of fluorspar and the other (W-8) was barren. Summary logs of these holes are as follows:

Hole No.	Depth in Feet	Description
W-8 (Contract Location No. 9)	0-15	Overburden.
	15-120	Cypress sandstone.
	120-123	Fault.
	123-129	Paint Creek shale.
	129-186	Bethel sandstone.
	186-192	Fault.
	192-213	Renault limestone and shale.
	213-235	Levias limestone.
	235-265½	Rosiclare sandstone.
	265½-335	Fredonia limestone.
	335	Bottom.

Inclination -45°
Bearing S.61°E.

W-10 (Contract Location No. 11)	0-21	Overburden.
	21-145	Cypress sandstone.
	145-162	Paint Creek shale.
	162-286	Bethel sandstone.
	286-293	Fault.
	293-353½	Renault limestone and shale.
	353½-356	Fault; shale gouge.
	356-490	Fredonia limestone; shines of fluorite at 356-379 feet.
	490-514	St. Louis limestone.
	514	Bottom.

Inclination -45°
Bearing S.51½°E.

Drilling was in progress at three hole locations at the time of the inspection. Summary logs of these incomplete holes are as follows:

Hole No.	Depth in Feet	Description
W-7 (Contract Location No. 5)	0-40	Overburden.
	40-114	Bethel sandstone.
	114-264	Renault limestone and shale.
	264-267	Cavity; possible fault.
	267-395	Ste. Genevieve limestone; indicative fluorite-galena-sphalerite mineralization.
W-9 (Stage II)	0-8	Overburden.
	8-100	Hardinsburg sandstone.
	100-262	Golconda limestone and shale.
W-11 (Contract Location No. 12)	0-60	Overburden and weathered Golconda limestone.
	60-163	Cypress sandstone.

A fourth diamond core drill rig is to be used on the project beginning in early February. Verbal permission was given by the field examiner to locate this rig at Contract Location No. 19 (hole to be designated W-12 by the Operator). It is necessary to drill this hole out of numerical sequence because the exact location of all the other holes remaining to be drilled under Stage I depend on results of the drilling which is now in progress.

Permission was given by the field examiner to drill a second Stage II hole. The collar of this hole is to be located 160 feet N.85°E. of the collar of Hole No. W-3. The hole will be drilled at a -45° inclination in a S.50°E. direction; estimated total depth is about 650 feet. This hole will be designated W-13.

Verbal permission was also given to reverse the bearing of ~~contract~~ the hole to be drilled at Contract Location No. 6. This hole is located to explore the main fault which is along the southeast margin of the project area. The fault dips very steeply to the southeast. All of the completed holes which entered the structure from the hanging wall side (holes inclined in a northwest direction) failed to obtain as good a core recovery near and in the fault as those which entered from the footwall side. This is characteristic of many of the faults in the district and is caused by the more shattered nature of the hanging wall adjacent to the faults. In order to penetrate the structure from the footwall side the collar location of this hole is to be moved 525 feet in a N.59°W. direction from the position shown on the contract map and the bearing is to be changed to a S.50°E. direction. The inclination and the geologic target remain the same.

Dewey H. Amos
Geologist
U.S. Geological Survey

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF MINERALS EXPLORATION
ROOM 2-B POST OFFICE BLDG.
KNOXVILLE 2, TENN.

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DATE	INITIALS	CODE
2/9	C	220
		600

February 6, 1959

Mr. John W. Hook
Reynolds Metals Company
P.O. Box 64
Salem, Kentucky

Re: EMEA-4962, (fluorspar)
Reynolds Metals Company
Watson-Hicks-Tyner properties
Crittenden County, Ky.
Contract Idm-E1199

Dear Mr. Hook:

This will confirm the verbal approval given by Mr. Amos to change the location of the hole at contract location no.13. The collar of the hole, to be designated as W-14, will be 315 feet in a N55°W direction from the position shown on the map. The bearing will be approximately S49°E, the inclination -80°, and the estimated depth 350 feet.

Sincerely yours,

Robert A. Laurence
Executive Officer, OME
Region V

RAL/mm
cc
Opr. Com-2
Amos
Burmeister
Lynch
Files
Finance

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DATE	INITIALS	CODE
2-9	C	220
		600

February 5, 1959

Mr. John K. Hook
Reynolds Metals Company
P.O. Box 64
Salem, Kentucky

Re: [illegible]A-4962, Idm-[illegible]199, Fluorspar
Watson-Hicks-Tyner properties
Crittenden County, Kentucky

Dear Mr. Hook:

This will confirm the verbal approval given by Mr. Amos to drill location 19 out of sequence, to drill a second hole under Stage II (to be designated as W-13), and to reverse the direction of the hole to be drilled at location No.6. The collar of this hole is to be located 925 feet in a N59°W direction from the map location, and the bearing will be S50°E.

Mr. Amos has advised me that the Stage II drilling cannot be completed by March 10, the present expiration date of the contract. Therefore, I will prepare and forward to your Richmond office for signature Amendment No.2, extending that date until June 10, 1959, a total extension of three months.

Sincerely yours,

Robert A. Laurence
Executive Officer, OE
Field Team, Region V

RAL/[illegible]
cc
Amos
Surveister
Spr. Com-2
Lynch
Files

OFFICIAL FILE COPY
O. M. E.
RECEIVED FEB 2 1959

DATE	INITIALS	CODE
2/2	C	220
		600

January 30, 1959

Mr. John S. Hook
Reynolds Metals Company
P. O. Box 64
Salem, Kentucky

Re: Docket No. DMSA-1962 (Fluorspar)
Nateson, Hicks and Tymar Properties
Crittenden County, Kentucky
Contract No. Idm-61199

Dear Mr. Hook:

This will confirm the verbal approval given by Mr. Amos to change the location of contract drill hole No. 12 (your No. 4-11) to a collar location 315 feet N. 55½° W. from the point shown on the map, the hole to be drilled S. 50½° E. at a -70° angle.

Sincerely yours,

Robert A. Laurence
Executive Officer
OME Field Team, Region V

RAL/mg
cc - Operating Committee (2)
Mr. V. J. Lynch
Mr. H. L. Burmeister
Mr. Denny H. Amos
Finance Office
File

Operating Committee

OFFICIAL FILE COPY
O. M. E.
RECEIVED JAN 26 1959

DATE	INITIALS	CODE
1/26		220
1/26		800
1/26		600

January 23, 1959

Mr. John W. Hook
Reynolds Metals Company
P. O. Box 64
Salem, Kentucky

Re: Docket No. DMEA-4962 (Fluorspar)
Watson, Hicks and Tyner Properties
Crittenden County, Kentucky
Contract No. Idm-E1199

Dear Mr. Hook:

As requested in your telephone call yesterday, I enclose six copies of our Form MF-205, Consent to Lien and Subordination Agreement, to be executed by the person or firm holding the mortgage on the property which you wish to add to the contract. These forms should be completed and signed in the same manner as the MF-205 which was signed by the landowner. The original and four copies should be returned to me to be affixed to the amendment, and the sixth copy given to the signer.

Sincerely yours,

Robert A. Laurence
Executive Officer
OME Field Team, Region V

Enclosures 6
RAL/mg

cc - Mr. J. T. Kilpatrick, Richmond, Va.
Operating Committee (2)
Mr. Lynch
Mr. Amos
Mr. Burmeister
File

Operating Committee

OFFICIAL FILE COPY O. M. E. RECEIVED JAN 26 1959		
DATE	INITIALS	CODE
1/26	C	220
		600

January 22, 1959

Mr. John W. Hook
Reynolds Metals Company
P. O. Box 64
Salem, Kentucky

Re: Rocket No. DSA-1962 - Fluorspar
Reynolds Metals Company
Watson, Hicks and Tyner Properties
Crittenden County, Kentucky
Contract No. IOM-K1199

Dear Mr. Hook:

This will confirm the verbal approval given by Mr. Amos to relocate contract hole No. 11 (your number W-10), approximately 350 feet N. 51° W. from the location shown on the contract map. This change is based on results obtained from contract holes 8 and 9 (your numbers W-6 and W-8).

Sincerely yours,

Robert A. Laurence
Executive Officer
OME Field Team, Region V

RAL/mg
cc - Operating Committee (2)
Mr. Lynch
Mr. Burmeister
Mr. Amos
File

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF MINERALS EXPLORATION
ROOM 2-B POST OFFICE BLDG.
KNOXVILLE 2, TENN.

OFFICIAL FILE COPY
O. M. E.
RECEIVED JAN 15 1959

DATE	INITIALS	CODE
1-15	C	220
1/15		600

January 13, 1959

Memorandum

To: Operating Committee, OME - Washington

From: Executive Officer, OME - Region V - Knoxville, Tenn.

Subject: DMEA-4962, Idm-E1199 (fluorspar) Reynolds Metal Co., Richmond, Virginia. Watson, Hicks and Tyner properties, Crittenden County, Kentucky.

Reference is made to your letter of January 5 to Mr. Lynch, who is out of town this week.

Approval was given to start Stage II in the vicinity of the first three holes, upon Mr. Amos' recommendation, because information received from Stage I holes in that area indicates the desirability of drilling Stage II holes there regardless of the outcome of Stage I holes on other parts of the property. Holes W-1 was an ore hole and both W-2 and W-3 encountered strong indicative mineralization, and further drilling in that area may well outline an ore shoot.

In order to increase the drilling progress so as to meet the March 10 completion date, the Operator now has three drill rigs on this project. If all three were concentrated on Stage I drilling, it would result in simultaneous drilling of holes which should be drilled consecutively and some footage would be wasted. Therefore, Mr. Lynch agreed with Mr. Amos' recommendation, and I strongly support his position. Stage II holes in other parts of the project area will not be approved, until Stage I results in those areas indicate justification; it could turn out that Stage II holes in the vicinity of W-1, 2 and 3 would be the only Stage II holes approved.

We have just learned from Mr. Amos that the Stage I hole at location 18 is an ore hole.

Robert A. Laurence

Robert A. Laurence

OFFICIAL FILE COPY
O. M. E.
RECEIVED JAN 15 1959

DATE	INITIALS	CODE
1-15	C	220
"		110
1/15		800
		600

INTERIM REPORT

DMEA-4962, Idm-E1199 (fluorspar)

Operator: Reynolds Metals Company, Richmond, Virginia

Location: Watson-Hicks-Tyner Properties, Crittenden County, Kentucky

A project inspection of the subject contract was conducted on January 8, 1959. Results obtained to date and contemplated future work were discussed with Messrs. John Hook and Thomas Winans, the Operator's geologists. Drill core obtained since the last project inspection was examined.

Drilling completed under the contract is summarized as follows:

Total number of holes completed to date	6
Total footage in holes completed to date	3,411
Number of holes completed since last inspection . .	3
Footage in holes completed since last inspection .	1,113
Number of ore holes	2
Number of indicative holes	2
Number of trace holes	1
Number of barren holes	1

Of the three holes completed since the last interim inspection, one (W-5) encountered ore-grade mineralization, one (W-4) revealed strong traces and the other hole was barren. The ore grade mineralization was discovered along the main Moore Hill fault at Contract Location No. 18. Summary logs of the holes are as follows:

Hole No.	Depth in Feet	Lithology
W-4 (Contract Location No. 4)	0-14	Overburden.
	14-82	Hardinsburg sandstone.
	82-219	Golconda limestone and shale.
	219-267	Cypress sandstone.
	267-279	Fault.
	279-323	Ste. Genevieve limestone.
	323-398	Cavity; sand-filled.
	398-411	Ste. Genevieve limestone; good shines of fluorite.
	411	Bottom.

Inclination -45°
Bearing N.67°W.

W-5 (Contract Location No. 18)	0-15	Overburden.
	15-121	Cypress sandstone.
	121-146	Paint Creek shale.
	146-222	Bethel sandstone.
	222-225	Cavity.
	225-233	Fault; limestone-calcite breccia with shines of fluorite.
	233-313	Ste. Genevieve limestone; shines of fluorite.
	313-321½	Fault; with ore-grade sphalerite and shines of fluorite.
	321½-351	St. Louis limestone.
	351	Bottom.

Inclination -45°
Bearing S N.49°W.

W-6 (Contract Location No. 8)	0-19	Overburden.
	19-135	Cypress sandstone.
	135-250	Sand; probable fault near bottom.
	250-265	Rosiclare sandstone.
	265-351	Fredonia limestone.
	351	Bottom.

Inclination -45°
Bearing S.60°E.

Assay results of recently completed Hole No. W-5 is as follows:

Depth in Feet	Per cent CaF_2	Per cent Zn
226-235	6.58	0.80
235-256	0.88	0.10
256-285	3.80	0.20
285-313	5.46	1.99
313-321½	1.46	4.68

Diamond core drill rigs were being set up at two hole locations at the time of the inspection; contract location 5 (W-7) and contract location 9 (W-8). Verbal approval was given by the examiner to change somewhat the locations of both holes as shown on the contract map. The collar location of Contract Hole No. 5 (W-7) is to be shifted 120 feet in a S.25°W. direction from the position shown on the contract map and the bearing is to be S.50°E. The collar of Contract Hole No. 9 (W-8) is to be moved 100 feet in a N.70°W. direction from the location shown on the contract map and the bearing of the

hole is to be changed to S.61°E. Approval was also given to drill contract location 9 (W-8) out of numerical sequence. These changes are necessitated by results of completed drilling in order to intersect the favorable structures at the best stratigraphic positions.

Dewey H. Amos
Geologist
U. S. Geological Survey

Form MF-104 (Rev.)
(April 1952)

Budget Bureau No. 42-R1036.5

JAN 15 1959

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION

Watson - Stage I

OPERATOR'S MONTHLY REPORT AND VOUCHER

Month of November, 1958 Docket No. DMEA 4962 Contract No. Idm E-1199

Operator's Name Reynolds Metals Company Minerals fluorspar

Address Richmond, Virginia

Contract Amount, $ 28,310.00 Government Participation: 50 % Amount, $ 14,155.00

ITEMS OF COSTS	FOR OPERATOR'S USE			FOR GOVERNMENT USE ONLY		
	Monthly Total	Totals Previously Reported	Totals To Date	Approved Monthly Total	Approved Totals Previously Reported	Approved Totals To Date
(1) Independent Short Form Contracts:						
Drilling core	-	4333.55	4333.55			
~~Surveying~~ reaming	-	710.50	710.50			
Hole survey & ~~Crosscutting~~ cementing	-	184.00	184.00			
~~Drifting~~ lost BX casing	-	-	-			
Lost Ax casing	-	-	-			
(2) Labor and Supervision:						
Labor						
Supervision						
Technical Services						
(3) Operating Mat'ls. and Supplies:						
Timber						
Explosives						
Pipe						
Track						
Core boxes	-	225.00	225.00			
(4) Operating Equipment:						
Rental						
Purchase						
Depreciation						
(5) Initial Rehabilitation and Repairs						
(6) New Bldgs., Improvements, etc.						
(7) Miscellaneous:						
Repairs to Equipment						
~~Sampling and~~ Analysis CaF_2	-	-	-			
~~Payroll Taxes~~ CaF_2, Zn, Pb.	39.00	45.50	84.50			
Liability Insurance						
Incidental allow.	-	411.32	411.32			
(8) Contingencies (specify):						
TOTALS	39.00	5909.87	5948.87	39.00	5909.87	5948.87

I certify that the above bill is correct and just and that payment therefor has not been received.

Date DEC 16 1958 *Payee REYNOLDS METALS COMPANY GEOLOGICAL DIVISION

Per W. E. McDaniel Title Accounting Official

*When a voucher is signed or receipted in the name of a company or corporation, the name of the person writing the company or corporate name, as well as the capacity in which he signs, must appear. For example: "John Doe Company, per John Smith, Secretary," or "Treasurer," as the case may be.

NOTE.—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.

(Instructions on reverse)

Pursuant to authority vested in me, I certify that this account is correct and proper for payment in the amount of:

$ 19.50

Signature Helen R. Mullin (Authorized Certifying Officer)

Date JAN 13 1959 Vou. No. 75

(See other side)

1950

(For Government use only)

CERTIFICATION BY GOVERNMENT REPRESENTATIVE:

I certify that to the best of my knowledge and belief the contractor submitting this voucher is operating a Defense Minerals Exploration Administration project under Contract No. E 1199 in accordance with the terms of the contract.

Signature R. L. Burmeister Title Mining Engr. Date 12/22/58

APPROVAL BY DMEA EXECUTIVE OFFICER OR ALTERNATE:

Signature W. J. Lynch Title ACTING EXECUTIVE OFFICER OME REGION V Date DEC 24 1958

MONTHLY REPORT OF OPERATOR

The Operator (Contractor) of an exploration project is required to make a monthly report to the Government through the Regional Executive Officer. This report consists of three parts as follows:

(a) *Form MF-104—Operator's Monthly Report and Voucher.*—This form details expenditures and constitutes a voucher for reimbursing the Operator for the Government's share of costs;

(b) *Form MF-104A—Operator's Unit Cost and Progress Report.*—This is a statistical report of expenditures which shows costs for the various types of operation; and

(c) *Narrative.*—A concise narrative description of progress made, results accomplished, and any unusual difficulties encountered must be furnished as an attachment to this Report and Voucher. Wherever possible, the narrative is to be illustrated with maps or sketches showing formations penetrated and location and assays of samples taken as well as advances in workings. In the case of diamond drilling or churn drilling, the location and inclination of holes is to be shown on a map; logs and assays also are to be submitted.

The Monthly Report of Operator should be prepared in an original and four copies all of which must be sent to the Executive Officer of the Region not later than the 15th of the month following.

Preparation of Form MF-104—Operator's Monthly Report and Voucher.—All the applicable spaces in Form MF-104 should be filled in by the Operator, and the Operator or his agent should sign the certification in the lower left corner of the form.

The items of costs are arranged in the order they appear in Article 6 (a) of Form MF-200 (Revised February 1952), however, this form is readily adaptable for use in reporting activities under other contract forms.

Under Item (1) delete words "Short Form" if the contract is a sub-contract under Form MF-200; and delete word "Independent" if the contract reported is on Form MF-200 (A). Also, report work paid for on a unit basis under contract Form MF-200 as though it were performed under an independent contract.

Under Item (2) include labor, supervision and technical services incurred for the exploratory operations. Do not include labor, supervision and technical services used for work performed under items (5) and (6).

Under Item (3) include the costs of material and supplies used in the project other than that used under items (5) and (6).

Under Item (4) appear the three types of operating equipment expenditures, that is, rental, purchase and depreciation. The expenditures made for renting equipment belonging to a third party will be reported under "Rental". The amount paid or duly obligated for payment for the purchase of equipment will be reported under "Purchase". The amount of expenditures due the Operator to reimburse him for depreciation of equipment owned will be reported under "Depreciation".

Item (5) comprises costs of labor, supervision, technical services, materials, etc., which are used in the initial rehabilitation and repair of existing buildings, installations, fixtures, and equipment. These costs, therefore, should not be reported under items (2) and (3).

Item (6) includes the labor, supervision, technical services, materials, etc., used in the installation or construction of new buildings, fixed improvements, etc., necessary for the project. These costs, therefore, should not be reported under items (2) and (3).

Item (7) covers miscellaneous types of expenditure such as payroll taxes, liability insurance, workmen's compensation insurance, repairs to equipment and sampling and analysis. Only that part of payroll taxes, liability insurance and workmen's compensation which are paid by the operator should be reported under item (7). The share paid by the employee as a payroll deduction is to be included under item (2) as labor costs.

Item (8) includes any unforeseen costs not included in the other seven categories.

The original of Form MF-104 when submitted for reimbursable expenses incurred under contract Form MF-200 must be supported by original documentation or by certified copies of purchase orders, payrolls or transcripts of payrolls, unless such documentation has been waived by the Regional Executive Officer. This certification may be stated thus, "Certified True Copy (or Transcript)", followed by appropriate signature. If the Executive Officer of the Region determines that a contract under Form MF-200 should have an "on-site" audit, that is, a Government auditor should make an audit of the Operator's books and records of account, the Operator need not support his monthly voucher with original or certified documents except in cases of equipment purchases whose individual costs exceed $50.00. In these cases the original or a certified copy of the purchase order or invoice should be attached to the Monthly Voucher. N. B.—Only the *original* of Form MF-104 is required to be documented. The four copies of Form MF-104 are not to be thus supported.

Form MF-104 submitted for reimbursement under fixed price contracts on Form MF-200 (A), however, are not required to be supported by documentation of any kind. The Operator will submit his claim under item (1) of Form MF-104 by deleting as stated above the word "Independent" and by showing the number of feet or other units immediately after the appropriate descriptive word, such as, drilling, bulldozing, crosscutting, drifting, etc., and giving the "Monthly Total" amount due. "Totals Previously Reported", and "Totals to Date" columns should also be filled in.

Form MF-104A
(April 1952)

Budget Bureau No. 42-R1151.2

UNITED STATES
DEPARTMENT OF THE INTERIOR

DEFENSE MINERALS EXPLORATION ADMINISTRATION

Watson Project
Stage I

OPERATOR'S UNIT COST AND PROGRESS REPORT

JAN 15 1959
O.M.E.

Month of November 195 8 Docket No. DMEA 4962 Contract No. Idm E-1199
Operator's Name Reynolds Metals Company Minerals fluorspar
Address Richmond, Virginia

OPERATION	UNIT	COSTS THIS MONTH	UNITS THIS MONTH	COSTS TO DATE	UNITS TO DATE	UNIT COSTS TO DATE	AUTHORIZED BY CONTRACT Units	AUTHORIZED BY CONTRACT Unit Costs
Drifting								
Crosscutting								
Raising								
~~Shafts~~ core boxes	1	-	-	225.00	75		75	3.00
Winzes								
Drilling: Core	Ft.	-	-	4333.55	1469		6900	2.95
~~Churn~~ reaming	Ft.	-	-	710.50	406		2000	1.75
Hole survey & cementing	Hr.			184.00	23		80	8.00
~~Stripping~~ lost BX casing	Ft.						300	2.16
~~Trenching~~ lost AX casing	Ft.						300	1.70
~~Test Pits~~ Assay CaF_2	1						75	4.50
~~Roads and Trails~~ CaF_2, Zn, Pb	1	39.00	6	84.50	13		25	6.50
Incidental allow.	Ft.	-	-	411.32	1469		6900	.28
TOTAL DISTRIBUTED COSTS								TOTAL COSTS AUTHORIZED BY CONTRACT
Operating Equipment Purchased								
Initial Rehabilitation and Repairs								
New Buildings, Improvements, etc.								
TOTAL COSTS		39.00		5948.87				28,310.00

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

REMARKS: Hole W-3 has not been completed and is not included in this report.

Date DEC 16 1958 Operator REYNOLDS METALS COMPANY GEOLOGICAL DIVISION

Per W. E. McDaniel Title Accounting Official

NOTE.—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.

(Instructions on reverse)

N. S. Zurmeister 12/22/58 (For Government use only)
MINING ENGINEER
U. S. BUREAU OF MINES

INSTRUCTIONS

Preparation of Form MF-104A—Operator's Unit Cost and Progress Report.—Applicable places on Form 104A should be filled in by the Operator. The purpose of this form is twofold as follows: (1) to furnish the supervising engineers and other administrators with statistical information necessary to better determine the progress of the project; and (2) to furnish more permanent information on mining costs for future use. The more important phases of operation on which permanent information is desired have been outlined in the form. There are blank lines, however, for those unusual phases which may need to be reported for a particular project. It will be necessary for the Operator to distribute his costs among the applicable phases reported with the exception of three items the costs of which are not to be distributed by the Operator. These three items are: "Operating Equipment Purchased", "Initial Rehabilitation and Repairs", and "New Buildings, Improvements, etc." The reason for not distributing these items on a monthly basis is doubtless clear to the Operator, since such distribution might well overstate the cost for any one month or period short of the entire contract period.

Form MF-104A has been designed to tie in with Form MF-104 for both monthly and cumulative costs. The "Total Costs" on Form MF-104A for each month should equal the monthly "Total Costs" as reported on Form MF-104. This is also true of the "Total Costs To Date".

In preparing Form MF-104A, it will be necessary frequently to distribute certain costs over a number of items. For instance, supervisory and engineering costs may have to be distributed over several phases, such as, drifting, crosscutting, raising, etc., provided that these items were reported active for the month. Such distributions should be made on the basis of time spent on the various phases, on man days of labor charged to such phases, or on some other equitable basis. "Operating Equipment", "Initial Rehabilitation and Repairs", and "New Buildings Improvements, etc.", will be distributed to the several phases of the project by the Washington Office of DMEA at the close of the project if determined necessary. The last two columns headed "Authorized by Contract" will be filled in by the Operator if such information is found in the contract. This information is usually a part of Exhibit "A" of the contract. A space for remarks has been provided for the use of the Operator to call attention to any unusual circumstances causing excessive or disproportionate unit costs.

GPO 872894

Reynolds Metals Company
Monthly Report - November, 1958
Watson Project - DMMA 4962 - Idm E-1199
Crittenden County, Kentucky
By
T. R. Winans, Assistant Geologist

Stage I

Since the October report, hole W-3 has been drilled from 368' to the bottom depth of 829 feet. The costs of this hole are not included in this report since the hole was not complete at the time the Joy invoice was submitted.

Vein "D" had been cut by the end of October showing shines of CaF_2 and traces of Pb and Zn. St. Louis limestone was cut on the footwall side with shines of CaF_2 in scattered calcite veinlets.

A faulted zone, marked vein "F" in the enclosed cross section and consisting of limestone breccia and vein clacite with shines of CaF_2, was cut from 461' to 489.5'. Its relationship to vein "D" is similar to that of veins "C" in hole W-1 and W-2. Because of the lack of mineralization, its width, and the type of material in the vein, it is more comparable, however, to vein "F". It is considered, therefore, that vein "C" was not cut by this hole and has either pinched out or converged with veins "D" or "F". Beyond this zone to 547.8 feet slightly fractured St. Louis limestone was drilled.

From 547.8 to 782 feet, limestone breccia, vein calcite and scattered shines of CaF_2 were cut. This zone contained 2' of very good shines at 640'.

Other than the vein calcite from 741 to 782 feet, marked vein "A" in the cross section, there is very little difference in the brecciated material to define any more than a single fault. Subsequent drilling will possibly clarify the present problems concerning the structure. Undisturbed Fredonia limestone was cut from the hanging wall side of vein "A" to the bottom depth of 829 feet.

The detailed log and cross section of hole W-3 are included in this report. The Bureau of Mines hole number 7, drilled on the Watson property, is on the cross section to show the general structure of the immediate area.

Drilling Summary:

Hole No.	Started	Finished	Bottom Depth	November Footage
W-3	10-15-58			442' (total)*

* Footage figure taken from the Joy Invoice.

Reynolds Metals Company

Diamond Drill Hole: W-3 Angle: -45° Bearing: S50E Depth: 829'
Coordinates: N-9234, E-10,435 Elevation: 460'
Property: Watson Area: SE Salem County: Crittenden State: Kentucky
Contractor: Joy Mfg. Company Started: 10-15-58 Finished: 11-26-58
Driller: Hayes

W-3

From	To	Fm.	Description
0	3		Overburden
3	12	Cb	Sandstone, blocky
12	30	Cr	Shale (rock bit used from 3-30')
30	32.5		Shale, weathered brown, some green fragments, 1" weathered limestone at top.
32.5	42.5		Limestone, medium grey, fine crystalline, fossiliferous, slightly stylolitic, few small calcite stringers, weathered in zones, small cavities, shaley partings from 41.5-42. Angle of bedding at 41.5, 53°.
42.5	45.5		Shale, grey green, calcareous, fossiliferous. Angle of bedding at 43', 55°.
45.5	48.5		Limestone, dark grey, medium crystalline, fossiliferous, weathered and silicified in zones, cavities, shaley partings in lower 1.5'. Angle of bedding at 47', 55°.
48.5	49		Shale, grey green, calcareous, fossiliferous, angle of bedding at 49', 55°.
49	60		Limestone and shale, interbedded, weathered brown fossiliferous, few calcite veinlets, silty, unweathered limestone from 57-59'.
60	72.5		Shale, dark grey, calcareous, fossiliferous. Angle of bedding at 62', 50°. " " " " 68', 50°. " " " " 70', 45°. " " " " 72', 40°.
72.5	90		Limestone, dark grey, medium crystalline, fossiliferous, silty, grades into shaley limestone and calcareous shales, alternating, contacts transitional. Angle of bedding at 73', 40°. " " " " 74.5', 40°. " " " " 83', 40°.
90	98		Limestone, dark grey, medium crystalline, fossiliferous, silicified along bedding at 93.5', angle of bedding at 93.5', 45°.
98	102		Shale, grey, calcareous, fossiliferous, more in lower 1.5'.

From	To	Fm.	Description
102	110.5		Limestone, brown grey, coarse crystalline, "fossil hash", fossils replaced by brown calcite, shaley parting at 109-109.5, angle of bedding at 109.5, 45°, silty in lower foot.
110.5	115.5		Alternating shale and limestone, shale, dark grey, calcareous, slightly fossiliferous, limestone, dark grey, fine crystalline, weathered at top, angle of bedding at 114', 40°.
115.5	126.5		Limestone in upper foot, light grey, medium crystalline, fossiliferous, sandy shale partings.
126.5	132		Limestone, dark grey, medium to coarse crystalline, fossiliferous, sandy, shale partings.
132	140	Cr	Limestone, conglomeritic (interformational) angular and sub-angular blocks of limestone, calcareous, silty matrix.
140	141.2	Cl	Limestone, brown, medium to fine crystalline, oolitic, fossiliferous.
141.2	145.2		Limestone, brown, fine crystalline, stylolitic, few small calcite veinlets, slightly fossiliferous.
145.2	153.5	⅊	Limestone and green shale, alternating grading from one to another. First 2" is a green shale with small limestone lenses at top. Limestone in run is grey, medium crystalline, fossiliferous, silty, interbedded with green, calcareous shale, mostly limestone to 145'. Mostly shale from 148-153.5. Limestone lenses in this lower shale. Angle of bedding at 146', 45°. " " " " 149', 45°.
153.5	154.5		Limestone, medium grey, coarse crystalline, oolitic, fossiliferous, with few shale partings. 1/2" of silty, bedded limestone at base.
154.5	155.5		Limestone, brown, fine crystalline, fossiliferous, with shale partings, increasing at base.
155.5	155.7		Limestone, brown, medium crystalline, fossiliferous, shale zone at lower contact.
155.7	163	Crc	Limestone, grey to brown, fine crystalline, fossiliferous, slightly sandy, shale partings. Angle of bedding at 160', 45°.
163	164.5		Limestone, medium grey, coarse crystalline, oolitic, fossiliferous, few shale partings.
164.5	175		Sandstone, medium to dark grey, fine grained, calcareous, shale partings, limestone, fossiliferous and oolitic zone from 166.5-173.
226	237.5		Limestone, dark grey, very shaley, fossiliferous. Less shaley from 234'.

From	To	Fm.	Description
237.5	245	Cf	Limestone, light grey, medium to fine crystalline, oolitic, fossiliferous, stylolitic, few shale partings.
245	248.5		Limestone, dark grey, fine crystalline, shaley (less shaley in lower foot), fossiliferous.
248.5	256		Limestone, brown, coarse crystalline, fossiliferous, few shaley partings, stylolitic, calcite veinlets running with core. Petroleum odor, slickensides along fracture 40° with core.
256	260		Limestone, medium grey, medium crystalline, fossiliferous, slightly stylolitic, 1" calcite veinlet at base.
260	268		Limestone, brown, fine to medium crystalline, fossiliferous, stylolitic.
268	277		Limestone, medium grey, coarse to medium crystalline, oolitic, fossiliferous, few small calcite stringers.
277	290		Limestone, brown, sub lithographic, few fossils, few fossiliferous zones in lower 3'.
290	308.5		Limestone, brown, medium crystalline, fossiliferous, stylolitic, few calcite stringers, few shaley partings.
308.5	319		Limestone, medium to dark grey, medium crystalline, oolitic, fossiliferous, weathered, slightly fractured and calcite veinlets in lower 5'.
319	327.8	Fault	319 - 327.3 limestone and calcite breccia. 327.3 - 327.8 calcite and CaF_2 breccia with ZnS and PbS shines.
327.8	345	Cal	Limestone, medium grey, medium crystalline, stylolitic, with numbersus calcite veinlets. Shines CaF_2 328 - 328.4 Trace CaF_2 328.7 329 329.7 330.2 Shines CaF_2 331.1 (trace Zn) 331.8 Trace CaF_2 332.6 Shines Zn 336 (trace CaF_2) Trace CaF2 336.2 - 337.5 Shines CaF2 337.7 338 338.5 - 338.8 338.9 - 339.5 339.7 - 340.5 (trace Zn, Pb.) Trace Pb 340.6 - 340.8

From	To	Fm.	Description
345	373		Limestone, medium grey, medium crystalline, cherty, silty in zones, fossiliferous, slickensides along fractures, numerous fractures, calcite veinlets, stylolites slightly weathered in more fractured zones. Shines CaF_2 350.6 351 Trace CaF_2 353 Good shines CaF_2-356 - 357.8 Cavity 358 - 363.8 Trace CaF_2 363.8 - 371.1
373	374.6		Mud- filled cavity with broken weathered core.
374.6	400.5		Limestone, medium to dark grey, medium crystalline, fossiliferous, vuggy, few fractures and stylolites, cherty, slickensides along fractures. Shines CaF_2 - Pb 381.4 - 381.6 391.6 - 392 392.6 - 382.9 Weathered chert at 400.5
400.5	461.2		Limestone, dark grey, medium crystalline, fossiliferous, cherty, weathered, at top, SS; and chert pebbles rounded in cavity at 403. Shines Zn 401 Weathered broken core from 430.6 - 435, with increase in calcite veinlets in this zone. Shines Zn 431.9 Weathered at 445.3 Increasingly more fractured with depth, from445.3 - 461.2
461.2	468		Fault 461.2 - 468 Vein calcite, with limestone and chert breccia at top Shines CaF_2 465.8 Limestone and chert breccia in lower foot.
468	475.6		Limestone, dark grey, medium crystalline, slightly fractured and stylolitic.
475.6	489.5		Fault 475.6- 480.5 vein calcite with limestone and chert breccia in lower and upper 6". Shines of CaF_2 in upper 2". 480.5 - 485 calcite, chert and limestone breccia. Shines of CaF_2 484.3 485 - 487.2 vein calcite 487.2 - 489.5 limestone and calcite breccia with scattered CaF_2 shines.
489.5	541		Limestone, grey brown, medium crystalline, fractured, fossiliferous, becomes less fractured with depth. Cherty. Shines CaF_2 490.5 491

From	To	Fm.	Description
			Shines of CaF_2 492.4 492.8 493.5 - 494.5 496.5 497.5 499 Shines Zn in Ls. 490 - 507.5 Shines CaF_2 507 - 509 (scattered) 512 520.7 - 523 (scattered) 525.6 531.5 - 532.3 533 535.9 - 536.2 537.5 538 - 538.5 540.7
541	560		Limestone, as above, with chert, fractured, calcite stringers and styolites. Shines of Zn 541.3 Shines of CaF_2 546.5 547.6 Calcite vein 547.8 - 549.1 Shines CaF_2 551.7 552 553.2 Good shines 555.5 - 555 " " 556.7 - 557 " " 557.5 - 558 559
560	583.5		Limestone, brown, medium crystalline, fossiliferous, cherty, styolitic, with less fractures than above, shines CaF_2 - 573.5 From 574 - 583.5, brecciated chert, with many small calcite veinlets
583.5	637.8		Limestone, dark grey, medium crystalline, cherty brecciated, heavy petroleum odor. Weathered calcite at 594.
637.8	642.1		Brecciated limestone and calcite. Shines CaF_2 637.1 637.6 639.2 639.5 641.1 - 642.1 - very good shines
642.1	667.5		Limestone, medium grey, medium crystalline, brecciated, styolitic, numerous calcite veinlets, many pyrite concentrations. Calcite vein at 662.8 - 663.8 Good shines CaF_2 666.9 - 667.5

From	To	Fm.	Description
667.5	695.5		Limestone, dark grey, medium crystalline, brecciated, few vuggy calcite stringers with some show of petroleum. Shines of CaF_2 675.9 681.8 690.2 690.4 690.6 - 690.7 692.9 693.2 - 694.5 695.5
695.5	698.6		Limestone breccia with shines of CaF_2 from 695.7 - 695.9, 698.6
698.6	713.5		Limestone, medium grey, medium crystalline, slightly fractured, stylolitic, few calcite stringers. Shines of CaF_2 699.8 - 699.9 701.2 703.5 705.5 710.5 711.1
713.5	741		Brecciated limestone and chert and calcite. Shines CaF_2 715.6 - 716 736.5
741	782		Generally vein calcite with some brecciated limestone and chert and shines of CaF_2 at 768.1.
782	829	Csg	Limestone, medium grey, medium crystalline, very oolitic, fossiliferous, slightly broken in upper foot. Very few fractures below.

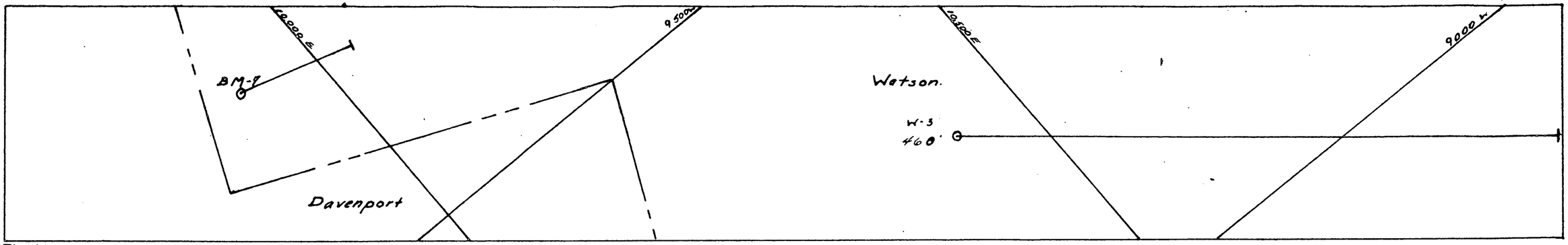
Bottom 829'

WATSON PROJECT

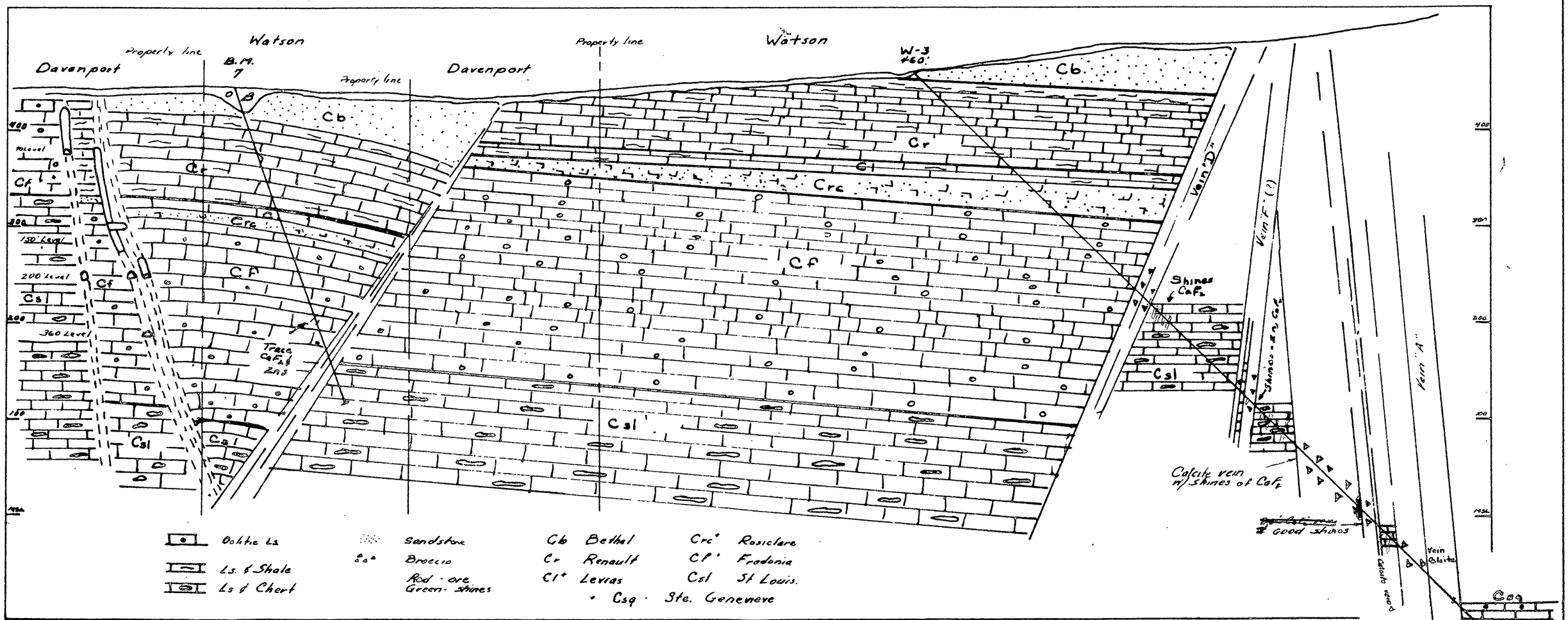
CRITTENDEN COUNTY, KENTUCKY

DME A - 4962

Idm-E 1199



PLAN



Cross Section on D.D.H. W-3 & Bureau of Mines No. 7

VERT. & HORZ. SCALES: 1" = 100'

0 50 100 200 300 FT.

OFFICIAL FILE COPY
O. M. E.
RECEIVED JAN 15 1959

DATE	INITIALS	CODE

Operating Committee

OFFICIAL FILE COPY
O. M. E.
RECEIVED JAN 12 1959

DATE	INITIALS	CODE
1/12	C	220
1/14	Hook	600

January 9, 1959

Mr. John W. Hook
Reynolds Metals Company
P. O. Box 64
Salem, Kentucky

Re: DMSA-1962 (Fluorspar)
Watson, Hicks and Tyner properties
Crittenden County, Kentucky
Contract No. Idm-E1199

Dear Mr. Hook:

This will confirm the verbal approval given by Mr. Amos to drill hole no. 5 at a position approximately 140 feet S. 17° W. from the collar location shown on the contract map.

Sincerely yours,

Robert A. Lawrence
Executive Officer
OME Field Team, Region V

RAL/mg
cc - Operating Committee (2)
Finance Office
Mr. Dewey H. Amos
Mr. H. L. Burmeister
Mr. V. J. Lynch
File

DMEA Form 7
(12-56)

OFFICIAL FILE COPY

Date	Surname	Code
12/30	Houk	600
1/2	Martin	130
	On leave	110
1/5	Selfridge	100
1/5		220
		600

600

JAN 5 1959

Mr. V. J. Lynch
Acting Executive Officer
OME Field Team, Region V
Room 2-B, Post Office Bldg.
Knoxville 2, Tennessee

Re: Docket No. DMEA-4962-Fluorspar
Reynolds Metals Company
Watson, Hicks and Tyner Properties
Crittenden County, Kentucky
Contract No. Idm-E1199

Dear Mr. Lynch:

Reference is made to your letter of December 24, 1958, to Mr. John W. Hook, confirming verbal approval given by Mr. Dewey H. Amos to start work on Stage II.

Inasmuch as only three holes have been completed for a total footage of 2,298 feet, and only one hole shows good ore value, we are at a loss to understand why starting Stage II is necessary at this time. You will note that there were 18 diamond drill holes for an aggregate of not more than 6,900 feet set up in Stage I. We would appreciate receiving Mr. Amos' justification for starting Stage II, and your comments.

Sincerely yours,

W. S. Martin
ACTING Chairman, Operating Committee (JHB)

Approved:

G. T. BAROCH (JHB)
Member, Bureau of Mines

N. E. Nelson (JHB)
Member, Geological Survey

LGHouk:gad 12/30/58
Copy to: Dir. R. File
Operating Committee
Mr. Kiilsgaard, USGS
Mr. McDougal, USBM
Mr. Houk

8623

OFFICIAL FILE COPY
O. M. E.
RECEIVED JAN 2 1959

DATE	INITIALS	CODE
2	C	22C
		600

December 31, 1958

Mr. John W. Hook
Reynolds Metals Company
P. O. Box 64
Salem, Kentucky

Re: Docket No. DMEA-4962 - Fluorspar
Reynolds Metals Company
Watson, Hicks and Tyner Properties
Crittenden County, Kentucky
Contract No. Idm-K1199

Dear Mr. Hook:

This will confirm the verbal approval given by Mr. Dewey H. Amos to drill DD holes numbers 8 and 18 out of sequence.

Sincerely yours,

V. J. Lynch
Acting Executive Officer
OME Field Team, Region V

VJL/mg
cc - Operating Committee (2)
Finance Office
Mr. H. L. Burmeister
Mr. Dewey H. Amos
Mr. V. J. Lynch
Files

RECEIVED DEC 30 1958		
DATE	INITIALS	CODE
12/30	J.G.	225
		600

December 24, 1958

Mr. John W. Hook
Reynolds Metals Company
P. O. Box 64
Salem, Kentucky

Re: Docket No. DTEA-4962 - Fluorspar
Reynolds Metals Company
Watson, Hicks and Tyner Properties
Crittenden County, Kentucky
Contract No. Idm-E1199

Dear Mr. Hook:

This will confirm the verbal approval given by Mr. Dewey H. Amos to start work on Stage II of the above referenced contract.

Very truly yours,

V. J. Lynch
Acting Executive Officer
OME, Region V

VJL/mg
cc - Operating Committee (2)
Finance Office
Mr. H. L. Burmeister
Mr. Dewey H. Amos
Mr. V. J. Lynch
Files

OFFICIAL FILE COPY
O. M. E.
RECEIVED DEC 18 1958

DATE	INITIALS	CODE
12/18	N. G.	225
"	[illegible]	110
12/19	[illegible]	800
12/29	[illegible]	600

INTERIM REPORT

DMEA-4962, Idm-E1199 (fluorspar)

Operator: Reynolds Metals Company, Richmond, Virginia

Location: Watson-Hicks-Tyner Properties, Crittenden County, Kentucky

A project inspection of the subject contract was conducted on December 11, 1958. Results obtained to date and contemplated future work were discussed with Messrs. John Hook and Thomas Winas, the Operator's geologists. Drill core obtained since the last project inspection was examined.

Drilling completed under the contract is summarized as follows:

Total number of holes completed to date	3
Total footage in holes completed to date	2,298
Number of ore holes	1
Number of indicative holes	2
Number of trace holes	0
Number of trace holes	0

The hole (W-3) completed since the last project inspection encountered strong indicative mineralization. This mineralization occupies the same structural and stratigraphic position as the mineralization encountered in Holes W-1 and W-2. A summary log of Hole W-3 is as follows:

Depth in Feet	Remarks
0-3	Overburden.
3-12	Bethel sandstone.
12-140	Renault limestone and shale.
140-155½	Levias limestone and shale.
155½-175	Rosiclare sandstone, limestone and shale.
175-319	Fredonia limestone and shale.
319-328	Fault. Limestone breccia with calcite filling; scattered shines of fluorspar.

328-468	St. Louis limestone. Scattered shines of fluorspar.
(461-468)	Fault. Limestone breccia with vein calcite; shines of fluorspar.
468-475½	St. Louis limestone; brecciated.
475½-744	St. Louis limestone; brecciated with crystalline calcite; scattered shines of fluorspar.
744-782	Vein calcite.
782-829	Fredonia limestone.
829	Bottom.

Drilling was just started at Contract location number 4 at the time of the project inspection. The Operator plans to add additional drill rigs in the near future in order to increase the progress of drilling.

Dewey H. Amos
Geologist
U.S. Geological Survey

OFFICIAL FILE COPY
O. M. E.
RECEIVED DEC 3 1958

DATE	INITIALS	CODE
12/3	C	220
12/3	[illegible]	110
	[illegible]	600

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
REGION V

ELECTROTECHNICAL
EXPERIMENT STATION

P. O. BOX 217
NORRIS, TENNESSEE

December 1, 1958

~~Memorandum~~
2-1044 1040 00

To: Jay L. Chambers, Office of Minerals Exploration, Interior Building, Washington 25, D. C.

From: Administrative Assistant, Norris, Tennessee

Subject: Monthly reports and vouchers

We are enclosing two copies each of the following monthly reports and vouchers:

Idm-E1199 — Reynolds Metals Company
Docket No. DMEA-4962
3rd payment - month of October
Amount $1040.09

Idm-E1200 — Reynolds Metals Company
Docket No. DMEA-4963
2nd payment - month of October
Amount $584.39

Helen Miller
Helen R. Miller

Attachments
/hbm
Copies to R. A. Laurence
V. J. Lynch
Norris files
Day files

Form MF-104 (Rev.)
(April 1952)

Budget Bureau No. 42-R1036.5

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION

Watson Project
Stage I

OPERATOR'S MONTHLY REPORT AND VOUCHER

RECEIVED 4 1958 O.M.E.
INDEX VOUCHER & SCHEDULE
FOR PAYMENTS K- 31

Month of October, 1958 Docket No. DMEA 4962 Contract No. Idm E-1199
Operator's Name Reynolds Metals Company Minerals fluorspar
Address Richmond, Virginia
Contract Amount, $28,310.00 Government Participation: 50 % Amount, $ 14,155.00

ITEMS OF COSTS	FOR OPERATOR'S USE: Monthly Total	Totals Previously Reported	Totals To Date	FOR GOVERNMENT USE ONLY: Approved Monthly Total	Approved Totals Previously Reported	Approved Totals To Date
(1) Independent Short Form Contracts:						
Drilling Core	1631.35	2702.02	4333.55			
~~Bulldozing~~ reaming	294.00	416.50	710.50			
Hole survey & ~~Crosscutting~~ cementing		184.00	184.00			
~~Drifting~~ lost BX casing						
Lost AX casing						
(2) Labor and Supervision:						
Labor						
Supervision						
Technical Services						
(3) Operating Mat'ls. and Supplies:						
Timber						
Explosives						
Pipe						
Track						
Core boxes		225.00	225.00			
(4) Operating Equipment:						
Rental						
Purchase						
Depreciation						
(5) Initial Rehabilitation and Repairs						
(6) New Bldgs., Improvements, etc.						
(7) Miscellaneous:						
Repairs to Equipment						
~~Sampling and~~ Analysis CaF_2						
~~Payroll Taxes~~ CaF_2, Pb, Zn		45.50	45.50			
Liability Insurance						
Incidental allow.	154.84	256.48	411.32			
(8) Contingencies (specify):						
TOTALS	2080.19	3829.68	5909.87	2080.19	3829.68	5909.87

I certify that the above bill is correct and just and that payment therefor has not been received.

Date NOV 13 1958 *Payee REYNOLDS METALS COMPANY
GEOLOGICAL DIVISION

Per H. E. McDaniel Title Accounting Official

*When a voucher is signed or receipted in the name of a company or corporation, the name of the person writing the company or corporate name, as well as the capacity in which he signs, must appear. For example: "John Doe Company, per John Smith, Secretary," or "Treasurer," as the case may be.

NOTE.—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.

(Instructions on reverse)

Pursuant to authority vested in me, I certify that this account is correct and proper for payment in the amount of:

$ 1040.09

Signature Helen R. Miller
(Authorized Certifying Officer)

Date DEC 1 1958 Vou. No. 63

(See other side)

1040.10

(For Government use only)

CERTIFICATION BY GOVERNMENT REPRESENTATIVE:

I certify that to the best of my knowledge and belief the contractor submitting this voucher is operating a Defense Minerals Exploration Administration project under Contract No. E 1199 in accordance with the terms of the contract.

Signature W. W. Burmeister Title Mining Engr. Date 11/20/58

APPROVAL BY DMEA EXECUTIVE OFFICER OR ALTERNATE:

Signature Robert A. Lemmon Title EXECUTIVE OFFICER OME FIELD TEAM REGION V Date NOV 25 1958

MONTHLY REPORT OF OPERATOR

The Operator (Contractor) of an exploration project is required to make a monthly report to the Government through the Regional Executive Officer. This report consists of three parts as follows:

(a) *Form MF-104—Operator's Monthly Report and Voucher.*—This form details expenditures and constitutes a voucher for reimbursing the Operator for the Government's share of costs;

(b) *Form MF-104A—Operator's Unit Cost and Progress Report.*—This is a statistical report of expenditures which shows costs for the various types of operation; and

(c) *Narrative.*—A concise narrative description of progress made, results accomplished, and any unusual difficulties encountered must be furnished as an attachment to this Report and Voucher. Wherever possible, the narrative is to be illustrated with maps or sketches showing formations penetrated and location and assays of samples taken as well as advances in workings. In the case of diamond drilling or churn drilling, the location and inclination of holes is to be shown on a map; logs and assays also are to be submitted.

The Monthly Report of Operator should be prepared in an original and four copies all of which must be sent to the Executive Officer of the Region not later than the 15th of the month following.

Preparation of Form MF-104—Operator's Monthly Report and Voucher.—All the applicable spaces in Form MF-104 should be filled in by the Operator, and the Operator or his agent should sign the certification in the lower left corner of the form.

The items of costs are arranged in the order they appear in Article 6 (a) of Form MF-200 (Revised February 1952), however, this form is readily adaptable for use in reporting activities under other contract forms.

Under Item (1) delete words "Short Form" if the contract is a sub-contract under Form MF-200; and delete word "Independent" if the contract reported is on Form MF-200 (A). Also, report work paid for on a unit basis under contract Form MF-200 as though it were performed under an independent contract.

Under Item (2) include labor, supervision and technical services incurred for the exploratory operations. Do not include labor, supervision and technical services used for work performed under items (5) and (6).

Under Item (3) include the costs of material and supplies used in the project other than that used under items (5) and (6).

Under Item (4) appear the three types of operating equipment expenditures, that is, rental, purchase and depreciation. The expenditures made for renting equipment belonging to a third party will be reported under "Rental". The amount paid or duly obligated for payment for the purchase of equipment will be reported under "Purchase". The amount of expenditures due the Operator to reimburse him for depreciation of equipment owned will be reported under "Depreciation".

Item (5) comprises costs of labor, supervision, technical services, materials, etc., which are used in the initial rehabilitation and repair of existing buildings, installations, fixtures, and equipment. These costs, therefore, should not be reported under items (2) and (3).

Item (6) includes the labor, supervision, technical services, materials, etc., used in the installation or construction of new buildings, fixed improvements, etc., necessary for the project. These costs, therefore, should not be reported under items (2) and (3).

Item (7) covers miscellaneous types of expenditure such as payroll taxes, liability insurance, workmen's compensation insurance, repairs to equipment and sampling and analysis. Only that part of payroll taxes, liability insurance and workmen's compensation which are paid by the operator should be reported under item (7). The share paid by the employee as a payroll deduction is to be included under item (2) as labor costs.

Item (8) includes any unforeseen costs not included in the other seven categories.

The original of Form MF-104 when submitted for reimbursable expenses incurred under contract Form MF-200 must be supported by original documentation or by certified copies of purchase orders, payrolls or transcripts of payrolls, unless such documentation has been waived by the Regional Executive Officer. This certification may be stated thus, "Certified True Copy (or Transcript)", followed by appropriate signature. If the Executive Officer of the Region determines that a contract under Form MF-200 should have an "on-site" audit, that is, a Government auditor should make an audit of the Operator's books and records of account, the Operator need not support his monthly voucher with original or certified documents except in cases of equipment purchases whose individual costs exceed $50.00. In these cases the original or a certified copy of the purchase order or invoice should be attached to the Monthly Voucher. N. B.—Only the *original* of Form MF-104 is required to be documented. The four copies of Form MF-104 are not to be thus supported.

Form MF-104 submitted for reimbursement under fixed price contracts on Form MF-200 (A), however, are not required to be supported by documentation of any kind. The Operator will submit his claim under item (1) of Form MF-104 by deleting as stated above the word "Independent" and by showing the number of feet or other units immediately after the appropriate descriptive word, such as, drilling, bulldozing, crosscutting, drifting, etc., and giving the "Monthly Total" amount due. "Totals Previously Reported", and "Totals to Date" columns should also be filled in.

Form MF-104A
(April 1952)

Budget Bureau No. 42-R1151.2

UNITED STATES
DEPARTMENT OF THE INTERIOR

Watson Project
Stage I

DEFENSE MINERALS EXPLORATION ADMINISTRATION

OPERATOR'S UNIT COST AND PROGRESS REPORT

RECEIVED DEC 3 1958 O.M.E.

Month of October 1958 Docket No. DMEA 4962 Contract No. Tom E-1199
Operator's Name Reynolds Metals Company Minerals Fluorspar
Address Richmond, Virginia

OPERATION	Unit	Costs This Month	Units This Month	Costs to Date	Units to Date	Unit Costs to Date	Authorized by Contract: Units	Authorized by Contract: Unit Costs
Drifting								
Crosscutting								
Raising								
Shafts Core boxes	1	0	0	225.00	75		75	3.00
Winzes								
Drilling: Core	Ft.	1631.35	553	4333.55	1469		6900	2.95
~~Churn~~ reaming	Ft.	294.00	168	710.50	406		2000	1.75
Hole survey, ~~Auger~~ reaming	Hr.	0	0	184.00	23		80	8.00
~~Stripping~~ lost BX casing	Ft.	0	0				300	2.16
~~Trenching~~ lost AX casing	Ft.	0	0				300	1.70
~~Test Pits~~ Assay CaF_2	1	0	0				75	4.50
~~Roads and Trails~~ CaF_2, Zn, Pb	1	0	0	45.50	7		25	6.50
Incidental allow.	Ft.	154.84	553	411.32	1469		6900	.28
Total Distributed Costs								Total Costs Authorized by Contract
Operating Equipment Purchased								
Initial Rehabilitation and Repairs								
New Buildings, Improvements, etc.								
Total Costs		2080.19		5909.87				28,310.00

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

Remarks: Hole W-3 has not been completed and is, therefore, not included in this report.

Date NOV 13 1958 Operator REYNOLDS METALS COMPANY
GEOLOGICAL DIVISION
Per H. E. McDaniel Title Accounting Officer

NOTE.—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.

(Instructions on reverse)

(For Government use only)

W. S. Burmeister 11/20/58

MINING ENGINEER
U. S. BUREAU OF MINES

INSTRUCTIONS

Preparation of Form MF–104A—Operator's Unit Cost and Progress Report.—Applicable places on Form 104A should be filled in by the Operator. The purpose of this form is twofold as follows: (1) to furnish the supervising engineers and other administrators with statistical information necessary to better determine the progress of the project; and (2) to furnish more permanent information on mining costs for future use. The more important phases of operation on which permanent information is desired have been outlined in the form. There are blank lines, however, for those unusual phases which may need to be reported for a particular project. It will be necessary for the Operator to distribute his costs among the applicable phases reported with the exception of three items the costs of which are not to be distributed by the Operator. These three items are: "Operating Equipment Purchased", "Initial Rehabilitation and Repairs", and "New Buildings, Improvements, etc." The reason for not distributing these items on a monthly basis is doubtless clear to the Operator, since such distribution might well overstate the cost for any one month or period short of the entire contract period.

Form MF–104A has been designed to tie in with Form MF–104 for both monthly and cumulative costs. The "Total Costs" on Form MF–104A for each month should equal the monthly "Total Costs" as reported on Form MF–104. This is also true of the "Total Costs To Date".

In preparing Form MF–104A, it will be necessary frequently to distribute certain costs over a number of items. For instance, supervisory and engineering costs may have to be distributed over several phases, such as, drifting, crosscutting, raising, etc., provided that these items were reported active for the month. Such distributions should be made on the basis of time spent on the various phases, on man days of labor charged to such phases, or on some other equitable basis. "Operating Equipment", "Initial Rehabilitation and Repairs", and "New Buildings Improvements, etc.", will be distributed to the several phases of the project by the Washington Office of DMEA at the close of the project if determined necessary. The last two columns headed "Authorized by Contract" will be filled in by the Operator if such information is found in the contract. This information is usually a part of Exhibit "A" of the contract. A space for remarks has been provided for the use of the Operator to call attention to any unusual circumstances causing excessive or disproportionate unit costs.

GPO 872894

Reynolds Metals Company
Monthly Report - October, 1958
Watson Project - BMMA 4962 - Zn - E-1199
Livingston County, Kentucky
By
John W. Meek, Geologist

Stage I

Hole W-2 was drilled from 250' to 553' (bottom) during October. A summary log from 0' to 250' was included in the September report. Vein "A" was cut at 235.5' to 236.6', consisting mainly of brecciated sandstone and shale.

Vein "F" was cut from 280.8' to 303.7'. The vein consisted of brecciated limestone and chert in calcite. From 288.5' to 303.7' there was shine mineralization of CaF_2, Zn and Pb with a 1.5' of CaF_2 at 301.5' to 303'.

CaF_2 was cut in vein "G" from 340.1' to 341.5'. This vein was very high-grade CaF_2 with shines of Pb and Zn.

Vein "H" was penetrated from 520' to 524'. The vein material was limestone and calcite breccia with shines of CaF_2 at 520'.

From 252' to 524', excluding the main faults, there were numerous shows of mineralization in calcite stringers and veinlets, though these shows were too scattered or too small to be considered ore.

A detailed log and cross section of W-2 are included with this report.

Hole W-3 is now being drilled. The present depth is 368'. At 319' vein "F" was cut, showing very good shines of CaF_2 and traces of Pb and Zn in brecciated limestone and calcite. A summary log of hole W-3 to its present depth is included below.

From information gathered from holes W-1, W-2, and part of W-3, the various veins (at least vein "F") seem to converge toward the surface, flare with depth, and run parallel with the main vein, vein "A". The divergence of strike indicated on the geologic map is therefore in error.

Summary Log W-3

From	To	Fm.	Description
0	3		Overburden.
3	12	Ob	Sandstone.
12	140	Gr	Limestone and shale, sandy limestone and basal Cgl.
140	155.7	Gl	Limestone and shale.
155.7	208	Gre	Calcareous sand, limestone and sandy limestone.
208	319	Gf	Limestone and shale.
319			Fault, vein "D". Limestone and calcite breccia, good shines of CaF_2 and traces of Zn and Pb.

Drilling Summary - October

Hole No.	Started	Finished	Bottom Depth	Out. Footage
W-2	9/15/58	10/10/58	553'	303' (250-553)
W-3	10/15/58			368' (present depth)
			Total October footage -	671'

Reynolds Metals Company

Diamond Drill Hole: W-2 Angle: -46° Bearing: N54°30W Depth: 553'
Coordinates: N-9186, E-11061 Elevation: 472'
Property: Watson Area: NE Salem County: Crittenden State: Kentucky
Contractor: Jay Manufacturing Company Started: 9/15/58 Finished: 10/10/58
Driller: E. J. Hayes

From	To	Fm.	Description
0	30		Overburden. 1' sandstone near base (boulder) possibly Hardinsburg.
30	33	Cg	Limestone, dark grey, some brown, fine crystalline, fossiliferous, few calcite stringers.
33	40	Cg	Shale, grey, weathers green, fossiliferous, slightly calcareous.
40	41	Cg	Limestone, medium grey, fine to medium crystalline, slightly fossiliferous. Weathered in upper 3".
41	43	Cg	Limestone, grey green, medium crystalline, silty, with shale partings, fossiliferous. Angle of bedding at 42 and 43 feet is 45°. 0.5' mud at base.
43	103	Cg	Shale, grey green to grey, fossiliferous, calcareous. Broken core. Angle of bedding is 53' to 45°. 1" weathered limestone at 83'. 93-103, 6" of shale fragments.
102	118	Cg	Limestone, medium grey, medium crystalline, fossiliferous, silty, shale partings, weathered. Angle of bedding at 103', 30°. Core broken, possibly alternating limestone and shale between 103-113. 113-118, limestone as above, more weathered in lower foot.
118	163.5	Cg	Shale, grey, calcareous, fossiliferous. Angle of bedding from 118 to 162 is 0° - 10° with hole. 3" mud and shale fragments at 162'. 2" sandstone core at 162.5.
163.5	175	Co	Sandstone, light grey, weathered brown, fine grained blocky.
175	205	Co	Shale, grey, weathered. Angle of bedding apparently with hole. 189-190, broken sandstone core.
205	214		Fault. Shale fragments in mud and some sandstone buttons.
214	227.5	Ceb	Sandstone, light grey, weathered brown, fine grained, quartzitic, 3" limestone at 227.5' (possibly a driller's mistake in putting core in box).
227.5	236.6		Fault. Sandstone, light grey, weathered brown, fine grained blocky. 1.8' recovery in 9.1'. Angle of bedding at 236 (?) 25°. 230-235, gravel barrel sample. Sand, quartzite fragments, limestone fragments.

From	To	Fm.	Description
236.6	252.9	Cag(?)	Limestone, medium grey, medium crystalline, fossiliferous, slightly fractured with calcite veinlet. Cavity 238-248, possible fault. Sand and sandstone fragments recovered in gravel barrel sample from 238-248. Trace CaF_2 at 252.6.
252.9	264	Cal	Limestone, medium grey, fine crystalline, cherty, slightly fractured, small calcite veinlets. 1" veinlet running with core from 255.3 to 256.9. Shines CaF_2 from 263.2 - 264.3.
264	265.8		Fault. Vein calcite with little limestone breccia. 0.3' fractured limestone at base.
265.8	280.8	Cal	Limestone, dark grey, fine crystalline, cherty. Slightly fractured, calcite veinlets. 0.2" cavity filled with sand at top. Shines of CaF_2 268.8 - 269 (1/2" vein running with core) 273.6 - 274 (1" vein running with core) Trace of CaF_2 278 - 279.6 (in calcite vein) Angle of bedding 60° at 275.
280.8	303.7		Fault 280.8 - 281 Calcite and limestone breccia 281 - 283 Cavity 283 - 285.7 Limestone and calcite breccia 285.7 - 288.5 Limestone, medium grey, fine crystalline, cherty, shale partings, slightly fractured. 288.5 - 303.7 Limestone, chert and calcite breccia and shines CaF_2 293 - 293.5 294 - 294.4 trace CaF_2 297.5 Between 301.5 and 303.7 recovery was 1.1'. From 301.5 to 301.9 (?) CaF_2, with trace of Zn and Pb. 303 to 303.7 is vein calcite. Grinding in the CaF_2 vein is evident, possibly accounting for the missing 1.1'.
303.7	328.3	Cal	Limestone, medium grey, medium crystalline, slightly fractured, small calcite veinlets, cherty. Shine CaF_2 at 318.3 Trace CaF_2 and Zn 320.6 - 321.5 Shines CaF_2 and Trace Zn 321.5 - 323.5 Trace of CaF_2 at 324 Trace Zn at 327
328.3	340.1	Cal	Limestone, medium grey, fine crystalline, cherty, few shale partings. Calcite veinlets, slightly fractured. Angle of bedding at 330.8 is 50°. Trace of CaF_2 at 330.1 Shines of CaF_2 331.3 - 332.8

			Trace Pb 333.3 Shine CaF_2, trace Pb and Zn 333.8 - 334.8 Shines CaF_2 at 335.5 Trace CaF_2 335.8 - 336, 337.2 Shines CaF_2, Zn, trace Pb 338.5 - 339.5
340.1	341.5		Fault Vein CaF_2 with Pb and Zn shines Angle of vein to core 40°
341.5	412.6	Cal	Limestone, medium grey, fine crystalline, fossiliferous, cherty, calcite veinlets, slightly fractured. Shines CaF_2 at 342. Shines CaF_2, Pb and Zn 344.4 - 345.2 Trace CaF_2 352.8 353 - 353.6 Angle of bedding at 356.5 is 35°. Shines CaF_2 370 - 370.4 371 - 371.3 Cavity 375 - 375.5 Shines CaF_2 392.8 - 393.1 396 - 398 calcite veinlets with oil shows. Trace CaF_2 400.6 Shines CaF_2 404.2 - 404.9 Trace CaF_2 408.6
412.6	415.5	Cal	Limestone, dark grey, fine crystalline, slightly silty and cherty. Angle of bedding 60° at 412.8 feet. Trace CaF_2 at 413. 414.2
415.5	429	Cal	Limestone, brown grey, fine crystalline, cherty, few calcite stringers, fossiliferous.
429	520	Cal	Limestone, medium grey, medium to fine crystalline, fossiliferous and cherty. Shines CaF_2 431.5 Broken zone between 432.5 and 437.5 Trace Pb at 432.9 Shines of CaF_2 434 - 434.1 434.3 - 434.5 435.4 - 435.7 436.5 - 437 (CaF_2 in cavity) 438 439.8 Trace CaF_2 441.6 Shines of CaF_2, trace Zn 442.2 - 443.6. Fractured zone with 2-1" calcite veins running with core at an angle of 18° to the core.

Shines CaF_2 444.6 - 444.8
Oil impregnated calcite vein from 445.5 - 446.
Trace Pb at 446.2
Trace CaF_2 at 447
459 in calcite veinlets
Cavity at 461.6 with heavy oil shows
Shines CaF_2 469 - 469.2
470.6 - 470.8
Trace CaF_2 471 - 471.3
471.5
Trace CaF_2 474.8 - 475.2
484.7
Shines CaF_2 485.6 - 485.9
486.5
489.3 - 489.4
512 - 512.3 with trace Pb and Zn

524	553	Cal	Limestone, medium grey, fine crystalline, cherty, calcite stringers, stylolitic. Some oil shows in calcite.

Bottom Depth 553

Cross Section on D.D.H. W-2
VERT. & HORZ. SCALES 1"=100'
0
50
100
200
300 FT.

EXTRA COPY
O. M. E.
RECEIVED DEC 1958

DATE	INITIALS	CODE

OFFICIAL FILE COPY
O. M. E.
RECEIVED NOV 26 1958

DATE	INITIALS	CODE
11-26	C	220
"	FJ	410
		800
		600

INTERIM REPORT

DMEA-4962, Idm-E1199 (fluorspar)

Operator: Reynolds Metals Company, Richmond, Virginia

Location: Watson-Hicks-Lyner Properties, Crittenden County, ~~Kentucky~~

A project inspection of the subject contract was conducted on October 30, 1958. Results obtained to date and contemplated future ~~work were~~ discussed with Mr. John Hook, the Operator's geologist. Drill core obtained since the last project was examined.

Drilling completed under the contract is summarized as follows:

Total number of holes completed to date	2
Total footage in holes completed to date	1,469
Number of ore holes	1
Number of indicative holes	1
Number of trace holes	0
Number of barren holes	0

The hole (W-2) completed since the last project inspection encountered strong indicative mineralization. This mineralization occupied the same structural and stratigraphic positions as the ore-grade mineralization encountered in Hole W-1. Results obtained from the two holes completed under the contract indicates that the fault designated as 12B on the contract map is about parallel to Fault 3 and that the two faults do not diverge in a southwestward direction, as is shown on the contract map. A summary log of Hole W-2 is as follows:

Depth in Feet	Remarks
0-30 ft.	Overburden.
30-163½ ft.	Golconda limestone and shale.
163½-205 ft.	Cypress sandstone.
205-214 ft.	Fault.
214-227½ ft.	Cypress-Bethel sandstone.
227½-236½ ft.	Fault.

contract 6900 ft. completed 1469 ft.

Depth in Feet	Remarks
236½-253 ft.	Ste. Genevieve limestone; possible fault at 238-248 ft.
253-264 ft.	St. Louis limestone; shines of fluorspar at 263-264 ft.
264-266 ft.	Fault; vein calcite.
266-281 ft.	St. Louis limestone; shines of fluorspar at 269, 274, 277, 279 ft.
281-304 ft.	Fault; strong shines of fluorspar and traces of sphalerite and galena at 293, 294, 297, and 302 ft.
304-340 ft.	St. Louis limestone; shines of fluorspar and traces of galena and sphalerite.
340-341 ft.	Fault; shines of fluorspar and traces of galena and sphalerite.
341-416 ft.	St Louis limestone; shines of fluorspar and traces of galena and sphalerite.
416-429 ft.	St. Louis limestone.
429-520 ft.	St. Louis limestone; shines of fluorspar and traces of galena and sphalerite.
520-524 ft.	Fault; shines of fluorspar.
524-553 ft.	St. Louis limestone.
553-ft.	Bottom.

Drilling is in progress in a contract hole (W-3) at location 3.

A summary log of this hole is as follows:

Depth	Remarks
0-3 ft.	Overburden.
3-12 ft.	Bethel sandstone.
12-132 ft.	Renault limestone and shale.
132-145½ ft.	Levias limestone member.
145½-209 ft.	Rosiclare sandstone member.
209-316 ft.	St. Louis limestone.
316-341 ft.	Fault; heavy shines of fluorspar, galena and sphalerite.

Dewey H. Amos

Geologist

U. S. Geological Survey

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
REGION V

ELECTROTECHNICAL
EXPERIMENT STATION

P. O. BOX 217
NORRIS, TENNESSEE

October 23, 1958

Memorandum

To: Jay L. Chambers, Office of Mineral Exploration, Interior Building, Washington 25, D. C.

From: Administrative Assistant, Norris, Tennessee

Subject: Monthly reports and vouchers

We are enclosing two copies each of the following monthly reports and vouchers:

Idm-E1199 Reynolds Metals Company
Docket No. DMEA-4962
2nd payment - month of September
Amount $1892.09

Idm-E1200 Reynolds Metals Company
Docket No. DMEA-4963
1st payment - month of September
Amount $1056.56

Helen Miller
Helen R. Miller

Attachments
/hbm
Copies to R. A. Laurence
V. J. Lynch
Norris files
Day files

OFFICIAL FILE COPY
O. M. E.
RECEIVED OCT 27 1958

DATE	INITIALS	CODE
10 27	C	220
	HJ	110
		600

2-164 & 164 as

Form MF-104 (Rev.)
(April 1952)

Budget Bureau No. 42-R1036.5

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION

PAID ON VOUCHER & SCHEDULE OF PAYMENTS K- 24

Watson Project
Stage I

OPERATOR'S MONTHLY REPORT AND VOUCHER

Month of September, 1958 Docket No. DMEA 4962 Contract No. Idm-E 1199
Operator's Name Reynolds Metals Company Minerals Fluorspar
Address Richmond, Virginia
Contract Amount, $ 28,310.00 Government Participation: 50% Amount, $ 14,155.00

RECEIVED OCT 28 1958 O.M.E.

ITEMS OF COSTS	FOR OPERATOR'S USE			FOR GOVERNMENT USE ONLY		
	Monthly Total	Totals Previously Reported	Totals To Date	Approved Monthly Total	Approved Totals Previously Reported	Approved Totals To Date
(1) Independent Contracts:						
Short Form						
Drilling: Core	2702.20	0.00	2702.20			
~~Shaft sinking~~ reaming	416.50	0.00	416.50			
~~Crosscutting~~ Hole survey and cementing	184.00	0.00	184.00			
~~Drifting~~ lost BX casing	-	-	-			
lost AX casing	-	-	-			
(2) Labor and Supervision:						
Labor						
Supervision						
Technical Services						
(3) Operating Mat'ls. and Supplies:						
Timber						
Explosives						
Pipe						
Track						
Core boxes	225.00	0.00	225.00			
(4) Operating Equipment:						
Rental						
Purchase						
Depreciation						
(5) Initial Rehabilitation and Repairs						
(6) New Bldgs., Improvements, etc.						
(7) Miscellaneous:						
Repairs to Equipment						
~~Sampling and~~ Analysis CaF2						
~~Payroll taxes~~ Zn and Pb	-	45.50	45.50			
Liability Insurance						
Incidental allowance	256.48		256.48			
(8) Contingencies (specify):						
TOTALS	3784.18	45.50	3829.68	3784.18	45.50	3829.68

I certify that the above bill is correct and just and that payment therefor has not been received.
Date 10-14-58 *Payee Reynolds Metals Company
Per H. H. McDaniel Title Accounting Official

*When a voucher is signed or receipted in the name of a company or corporation, the name of the person writing the company or corporate name, as well as the capacity in which he signs, must appear. For example: "John Doe Company, per John Smith, Secretary," or "Treasurer," as the case may be.

NOTE.—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.

(Instructions on reverse)

Pursuant to authority vested in me, I certify that this account is correct and proper for payment in the amount of:
$ 1892.09
Signature Helen R. Miller
(Authorized Certifying Officer)
Date OCT 23 1958 Vou. No. 51
(See other side)

Gud

1892.09

(For Government use only)

CERTIFICATION BY GOVERNMENT REPRESENTATIVE:

I certify that to the best of my knowledge and belief the contractor submitting this voucher is operating a Defense Minerals Exploration Administration project under Contract No. E 1199 in accordance with the terms of the contract.

Signature H. Burmeister Title Mining Engr. Date 10/17/58

APPROVAL BY DMEA EXECUTIVE OFFICER OR ALTERNATE:

Signature Robert A. Laurence Title EXECUTIVE OFFICER OME FIELD TEAM REGION V Date OCT 22 1958

MONTHLY REPORT OF OPERATOR

The Operator (Contractor) of an exploration project is required to make a monthly report to the Government through the Regional Executive Officer. This report consists of three parts as follows:

(a) *Form MF-104—Operator's Monthly Report and Voucher.*—This form details expenditures and constitutes a voucher for reimbursing the Operator for the Government's share of costs;

(b) *Form MF-104A—Operator's Unit Cost and Progress Report.*—This is a statistical report of expenditures which shows costs for the various types of operation; and

(c) *Narrative.*—A concise narrative description of progress made, results accomplished, and any unusual difficulties encountered must be furnished as an attachment to this Report and Voucher. Wherever possible, the narrative is to be illustrated with maps or sketches showing formations penetrated and location and assays of samples taken as well as advances in workings. In the case of diamond drilling or churn drilling, the location and inclination of holes is to be shown on a map; logs and assays also are to be submitted.

The Monthly Report of Operator should be prepared in an original and four copies all of which must be sent to the Executive Officer of the Region not later than the 15th of the month following.

Preparation of Form MF-104—Operator's Monthly Report and Voucher.—All the applicable spaces in Form MF-104 should be filled in by the Operator, and the Operator or his agent should sign the certification in the lower left corner of the form.

The items of costs are arranged in the order they appear in Article 6 (a) of Form MF-200 (Revised February 1952), however, this form is readily adaptable for use in reporting activities under other contract forms.

Under Item (1) delete words "Short Form" if the contract is a sub-contract under Form MF-200; and delete word "Independent" if the contract reported is on Form MF-200 (A). Also, report work paid for on a unit basis under contract Form MF-200 as though it were performed under an independent contract.

Under Item (2) include labor, supervision and technical services incurred for the exploratory operations. Do not include labor, supervision and technical services used for work performed under items (5) and (6).

Under Item (3) include the costs of material and supplies used in the project other than that used under items (5) and (6).

Under Item (4) appear the three types of operating equipment expenditures, that is, rental, purchase and depreciation. The expenditures made for renting equipment belonging to a third party will be reported under "Rental". The amount paid or duly obligated for payment for the purchase of equipment will be reported under "Purchase". The amount of expenditures due the Operator to reimburse him for depreciation of equipment owned will be reported under "Depreciation".

Item (5) comprises costs of labor, supervision, technical services, materials, etc., which are used in the initial rehabilitation and repair of existing buildings, installations, fixtures, and equipment. These costs, therefore, should not be reported under items (2) and (3).

Item (6) includes the labor, supervision, technical services, materials, etc., used in the installation or construction of new buildings, fixed improvements, etc., necessary for the project. These costs, therefore, should not be reported under items (2) and (3).

Item (7) covers miscellaneous types of expenditure such as payroll taxes, liability insurance, workmen's compensation insurance, repairs to equipment and sampling and analysis. Only that part of payroll taxes, liability insurance and workmen's compensation which are paid by the operator should be reported under item (7). The share paid by the employee as a payroll deduction is to be included under item (2) as labor costs.

Item (8) includes any unforeseen costs not included in the other seven categories.

The original of Form MF-104 when submitted for reimbursable expenses incurred under contract Form MF-200 must be supported by original documentation or by certified copies of purchase orders, payrolls or transcripts of payrolls, unless such documentation has been waived by the Regional Executive Officer. This certification may be stated thus, "Certified True Copy (or Transcript)", followed by appropriate signature. If the Executive Officer of the Region determines that a contract under Form MF-200 should have an "on-site" audit, that is, a Government auditor should make an audit of the Operator's books and records of account, the Operator need not support his monthly voucher with original or certified documents except in cases of equipment purchases whose individual costs exceed $50.00. In these cases the original or a certified copy of the purchase order or invoice should be attached to the Monthly Voucher. N. B.—Only the *original* of Form MF-104 is required to be documented. The four copies of Form MF-104 are not to be thus supported.

Form MF-104 submitted for reimbursement under fixed price contracts on Form MF-200 (A), however, are not required to be supported by documentation of any kind. The Operator will submit his claim under item (1) of Form MF-104 by deleting as stated above the word "Independent" and by showing the number of feet or other units immediately after the appropriate descriptive word, such as, drilling, bulldozing, crosscutting, drifting, etc., and giving the "Monthly Total" amount due. "Totals Previously Reported", and "Totals to Date" columns should also be filled in.

Form MF-104A
(April 1962)

Budget Bureau No. 42-R1151.2

UNITED STATES
DEPARTMENT OF THE INTERIOR

Watson Project
Stage I

DEFENSE MINERALS EXPLORATION ADMINISTRATION

OPERATOR'S UNIT COST AND PROGRESS REPORT

Month of September 1959 Docket No. DMEA 4962 Contract No. Idm-E 1199
Operator's Name Reynolds Metals Company Minerals fluorspar
Address Richmond, Virginia

OPERATION	UNIT	COSTS THIS MONTH	UNITS THIS MONTH	COSTS TO DATE	UNITS TO DATE	UNIT COSTS TO DATE	AUTHORIZED BY CONTRACT Units	AUTHORIZED BY CONTRACT Unit Costs
Drifting								
Crosscutting								
Raising								
~~Shafts~~ core boxes	1	225.00	75	225.00	75		75	3.00
Winzes								
Drilling: Core	Ft.	2702.20	916	2702.20	916		6900	2.95
~~Core~~ reaming	Ft.	416.50	238	416.50	238		2000	1.75
hole survey & ~~Auger~~ cementing	Hr.	184.00	23	184.00	23		80	8.00
~~Stripping~~ lost BX casing	Ft.						300	2.16
~~Trenching~~ " AX "	Ft.						300	1.70
~~Test Pits~~ assay CaF_2	1						75	4.50
~~Roads and Trails~~ CaF_2, Zn, Pb	1			45.50	7		25	6.50
Incidental allow.	Ft.	256.48	916	256.48	916		6900	.28
TOTAL DISTRIBUTED COSTS								TOTAL COSTS AUTHORIZED BY CONTRACT
Operating Equipment Purchased								
Initial Rehabilitation and Repairs								
New Buildings, Improvements, etc.								
TOTAL COSTS		3784.18		3829.68				28,310.00

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

Date 10-14-59 Operator Reynolds Metals Company

Per W. E. McDaniel Title Accounting Official

REMARKS: The Joy invoice covers the Grimes and Watson Projects. All items on the invoice pertaining to this contract are marked "Watson." Joy will be instructed to make separate invoices in the future.

NOTE.—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.

(Instructions on reverse)

(For Government use only)

Subject to Joy Mfg. Co. invoice #97368 for Aug. showing 23 hrs. for cementing and 1st of reaming
Correction O.K. H.B.
H. L. Burmeister 10/27/58

INSTRUCTIONS

Preparation of Form MF-104A—Operator's Unit Cost and Progress Report.—Applicable places on Form 104A should be filled in by the Operator. The purpose of this form is twofold as follows: (1) to furnish the supervising engineers and other administrators with statistical information necessary to better determine the progress of the project; and (2) to furnish more permanent information on mining costs for future use. The more important phases of operation on which permanent information is desired have been outlined in the form. There are blank lines, however, for those unusual phases which may need to be reported for a particular project. It will be necessary for the Operator to distribute his costs among the applicable phases reported with the exception of three items the costs of which are not to be distributed by the Operator. These three items are: "Operating Equipment Purchased", "Initial Rehabilitation and Repairs", and "New Buildings, Improvements, etc." The reason for not distributing these items on a monthly basis is doubtless clear to the Operator, since such distribution might well overstate the cost for any one month or period short of the entire contract period.

Form MF-104A has been designed to tie in with Form MF-104 for both monthly and cumulative costs. The "Total Costs" on Form MF-104A for each month should equal the monthly "Total Costs" as reported on Form MF-104. This is also true of the "Total Costs To Date".

In preparing Form MF-104A, it will be necessary frequently to distribute certain costs over a number of items. For instance, supervisory and engineering costs may have to be distributed over several phases, such as, drifting, crosscutting, raising, etc., provided that these items were reported active for the month. Such distributions should be made on the basis of time spent on the various phases, on man days of labor charged to such phases, or on some other equitable basis. "Operating Equipment", "Initial Rehabilitation and Repairs", and "New Buildings Improvements, etc.", will be distributed to the several phases of the project by the Washington Office of DMEA at the close of the project if determined necessary. The last two columns headed "Authorized by Contract" will be filled in by the Operator if such information is found in the contract. This information is usually a part of Exhibit "A" of the contract. A space for remarks has been provided for the use of the Operator to call attention to any unusual circumstances causing excessive or disproportionate unit costs.

GPO 872894

Reynolds Metals Company
Monthly Report - September, 1958
Watson Project - RMEA 4962 - IAm-N 1199
Livingston County, Kentucky
By

John W. Hook, Geologist

Stage I

Hole W-1 was drilled from 836' to 916' (bottom) during the month of September. The August report discussed the upper part of the hole and mentioned that vein "A" was penetrated at 805'. The hole continued in vein "A" (black calcite) to a depth of 870.5' at which point it entered the brecciated hanging wall formations. The only fluorspar mineralization found below 836' was a shine in the hanging wall at 903.5'. Bedding at the bottom of the hole was dipping nearly parallel to the core.

Enclosed are the detailed log and the completed cross section. As discussed in the August Report, the mine workings shown on the cross section are simply sketches from oral descriptions. There are no maps of the Two Brothers Mine.

Due to the inaccuracy of the oral descriptions, it was necessary to drill the hole considerably deeper than planned. W-1 was completed on September 8th and all of the casing (80' of NX, 253' of BX and 549' of AX) was recovered.

The rig was moved to the proposed location for hole W-2 on the hanging wall side of the fault system. The hole was started September 15th and the present depth is 250'.

A summary log for W-2 to date is as follows:

From	To	Description
0	30	Overburden, hard sand boulder (or Hardinsburg sandstone) at 18'.
30	163.5	Golconda Formation. Shale and limestone.
163.5	205	Sandstone and shale. Golconda to Cypress transition zone (usually mapped as Cypress).
205	205.5	Cypress Sandstone.

From	To	Description
205.5	207	Fault. Mud, shale and quartzite, fragments.
207	236.5	Cypress-Bethel sandstone.
236.5	238	Limestone.
238	248	Cavity, sand and sandstone fragments recovered in gravel barrel.
248	250	limestone.

(present depth is 250')

The cavity at 238' to 248' may represent the Vein "A" fault but a test of the cavity material with a gravel barrel sampler yielded no fluorspar.

This hole is expected to make a footwall intersection of veins "C" and "D". We have only a general idea of the strike of these structures and the depth of these penetrations cannot be predicted with any degree of accuracy.

Drilling Summary:

Hole No.	Started	Finished	Bottom Depth	September footage	
W-1	7/16/58	9/8/58	916'	80'	(836' to 916')
W-2	9/15/58			250'	(present depth)
			Total footage for month	330'	

REYNOLDS METALS COMPANY

Diamond Drill Hole No: W-1 Angle: -46½° at collar, -45° at 400, -45½° at 758
Bearing: S 67° 30' E Depth: 916'
Coordinates: N 9736, E 10,633 Elevation: 480'
Property: Watson Area: NE Salem County: Crittenden State: Kentucky
Contractor: Joy Manufacturing Co. Started: 7/16/58 Finished: 9/8/58
Driller: E. J. Hayes

From	To	Fm.	Description
0	25		Overburden. Sandstone boulders (Cb), sand and mud.
25	35	Cr	Shale, grey green, weathered brown. Angle of bedding (shearing possibly) 25°. Slightly fossiliferous and calcareous. 3' recovery.
35	48(?)	Cr	Shale, grey green, weathered to red brown. Very weathered at top. Slightly less near bottom. Fossiliferous and calcareous. 3' recovery.
48(?)	51.5	Cr	Limestone (bottoms only), silty, weathered brown, in upper part. Lower part of run shale, green, calcareous and weathered.
51.5	63	Cr	Limestone, brown, very fine crystalline, conchoidal fracture, slightly fossiliferous.
63	73	Cr	Shale, weathered in upper part, grey in lower part. 1' recovery.
73(?)	74.5(?)	Cr	Limestone, brown, fine crystalline, fossiliferous.
74.5	82	Cr	Limestone as sheve and weathered shale, contact and shale bedding dipping along hole.
82	85	Cr	Shale, grey green, weathered. Angle of bedding 37° with hole.
85	87	Cr	Limestone, brown, fine crystalline, fossiliferous.
87	97		No recovery, possible fault.
97	97.5	Cag	Upper zone weather limestone, brown, medium crystalline, fossiliferous, with weathered shale. Lower 4", limestone, medium crystalline, fossiliferous, partially weathered.
97.5	109.5	Cag	Limestone, grey brown, medium crystalline, fossiliferous, oolitic, with occasional green shale inclusions, small calcite veinlets. Shale partings from 99.5 to 101. Heavy stylolites in upper part. Angle of bedding along shale partings 45°. 101.5-102.5 limestone with alternating grey and light red zones. Shaley partings from 103-109.5. Angle of bedding 45° at 106. Cavity 107-109. Cavity 109.5-112.

From	To	Fm	Description
112	113	Cag	Limestone, light-medium grey, medium crystalline, oolitic.
113	114.5	Cag	Limestone, medium grey, coarse crystalline, oolitic, stylolitic.
114.5	126	Cag	Limestone, medium grey, medium crystalline, fossiliferous, slightly oolitic. 121-123 cavity.
126	129.5	Cag	Limestone, light grey, oolitic, fossiliferous, stylolite contact with limestone below.
129.5	132.5	Cag	Limestone, medium grey, fine crystalline, stylolitic, slightly fossiliferous, stylolite contact.
132.5	137	Cag	Limestone, medium grey, fine to medium crystalline, fossiliferous, stylolitic, stylolite contact.
137	140.5	Cag	Limestone, medium grey, coarse crystalline, oolitic, fossiliferous, slightly stylolitic.
140.5	151.5	Cag	Limestone, medium to dark grey, medium crystalline, very sandy, thin zones of dark grey sandy limestone. Weathered brown from 147.5 to 150. Angle of bedding at 150' 45°.
151.5	156	Cag	Limestone, medium grey, medium crystalline, oolitic, fossiliferous. Angle of bedding 50° at 156'.
156	156.5	Cag	Limestone, medium grey, shaley, fossiliferous.
156.5	157	Cag	Limestone, medium grey medium crystalline, slightly oolitic, fossiliferous.
157	159	Cag	Limestone, shaley, green-grey, highly fossiliferous.
159	161.5	Cag	Limestone, medium grey, oolitic with irregular shale (brown) partings. More limestone near base.
161.5	167	Cag	Limestone, medium grey, medium crystalline, oolitic fossiliferous, with increasing oolite near bottom.
167	168.5	Cag	Limestone, green-grey, shaley, fossiliferous, grades into shale.
168.5	170	Cag	Shale, medium grey, calcareous, fossiliferous angle of bedding 20°.
170	178	Cag	Limestone, medium grey, shaley, highly fossiliferous, questionable if limestone or shale. Transition to limestone below in last 1.5'. Angle of bedding at 171', 30°.

From	To	Fm.	Description
178	189	Cag	Limestone, medium grey, colitic, slightly fossiliferous, 1" calcite veinlet at 178.5, other scattered calcite stringers, stylolitic.
189	193	Cag	Limestone, medium grey, coarse crystalline, fossiliferous.
193	194	Cag	Shale, medium grey, calcareous. Angle of bedding 40°.
194	200	Cag	Limestone, medium grey, fine grained (2" coarse crystalline fossiliferous). Silty. Petroleum odor.
200	201.5	Cag	Limestone, medium grey, fine crystalline, silty.
201.5	207.5	Cag	Limestone, medium grey, coarse crystalline, fossiliferous.
207.5	224	Cag	Limestone, medium grey, medium crystalline, fossiliferous colitic, stylolitic with calcite veinlets, oil coming from small vug in calcite. Two 6" zones between 212 and 214.5 of shale partings.
224	234		Cavity, open, possible fault.
234	236	Cag	Limestone, medium brown grey, fine crystalline, slightly fossiliferous, stylolitic with small calcite stringers.
236	253		Cavity, open, possible fault.
253	273	Cag	Limestone, medium grey, medium crystalline, fossiliferous, colitic, stylolitic, calcite stringers, oil shows in vugs in small calcite veinlet from 256' to 258. 268-269.5 oil impregnated calcite. Stylolitic at 270'. 2" calcite vein with trace of CaF_2 at 271.5-272 calcite, impregnated with oil, trace of CaF_2 near bottom. Slightly fractured small veinlets from 272' to 273' of calcite with oil in vugs in calcite.
273	294	Cag	Limestone, medium grey to brown, medium crystalline fossiliferous, colitic, small stringers with either calcite or CaF_2 and little Pb. Oil along these stringers from 276.5-288.5. Heavy stylolites also in this zone.
294	299.5	Cag	Limestone, medium grey, medium to coarse crystalline, colitic, fossiliferous, calcite veinlet at 294 and 294.5 with trace of CaF_2, trace of CaF_2 also at 296.
299.5	336	Cag	Limestone, light grey, medium crystalline, colitic, stylolitic, trace of CaF_2 from 301.5-305 in small scattered veinlets. Trace of Pb at 305.

From	To	Fm.	Description
336	343.5	Cag	Limestone, dark grey, medium crystalline, fossiliferous, stylolitic, with fewer calcite veinlets than above, no oil.
343.5	347	Cag	Limestone, medium grey, fossiliferous, shaley, angle of bedding 43° at 346. (Marl)
347	374	Cag	Limestone, grey, medium to fine crystalline, cherty and few calcite stringers.
374	400	Cag	Limestone, dark grey, medium crystalline, oolitic, fossiliferous, few calcite stringers, stylolitic (some intersection). Weathered with slickensides at 396'. 3" calcite veinlet at 397 with shines of CaF_2 and trace of Pb. Stylolite at base.
400	422.5	Cag	Limestone, light grey, medium crystalline, oolitic, fossiliferous, stylolitic, small calcite veinlets with oil in vugs in veinlets at 407 (3" zone). Slickensides along fractures. Intersecting calcite stringers at 413 with few spots of oil along stringers.
422.5	436	Cag	Limestone, medium grey, medium crystalline, oolitic, fossiliferous, stylolitic, calcite stringers, oil stains in small vugs in limestone from 422.5 to 424. 6" calcite vein with trace PbS from 430 to 431. Trace of CaF_2 in calcite veinlet at 436'. Intersecting calcite and CaF_2 stringer at 437.
436	467	Cal(?)	Limestone, medium grey, fine crystalline, cherty, fossiliferous, stylolitic, calcite stringers. Trace of CaF_2 at top, PbS at 437'. Slickensides along fractures, from 446-449, calcite stringers with trace of PbS and CaF_2. From 447-448.5 possible fault. Fractured zone, limestone and calcite breccia. Trace of CaF_2 at top. Oil shows in calcite.
467	473	Cag	Limestone, light brown, grey, medium crystalline, oolitic, slightly fossiliferous. Weathered limestone, calcite veinlets and chert at top. Intersecting calcite stringers. Increasingly more weathered and fractured near bottom.
473	475.5	Fault	Limestone, medium grey, fine crystalling, brecciated in calcite vein.
475.5	492.5	Cal	Limestone, medium grey fine crystalline, slightly fractured at top. Numerous intersecting calcite stringers. Some breccia in zone from 479 to bottom.
492.5	504.8	Cal	Limestone, dark grey, fine crystalline, slightly fossiliferous with oil from vugs in calcite stringers. Marcasite concentration along stringer at 496. Broken in lower 3' weathered in last 3".

From	To	Fm.	Description
504.8	516	Fault	504.8 - 504.8 cavity, open. 505.8 516.8 vein calcite with shines of CaF_2; 506.5, 507-508.5, 512-515.5 (with traces of lead at 513.5). 516.1 516.2 Shines of CaF_2 and Pb. Assay values: 4.72% CaF_2 - 0.21% Pb - 0.20% Zn (from 505.8-516.8)
516.8	543.1	Cal	Limestone, medium grey, fine crystalline, cherty, stylolitic with calcite stringers. 518.2 518.6 Shines of CaF_2 in small calcite veinlets, little oil along veinlets. Shines of spar in veinlets at 520.3, 520.8, 522, 522.2 to 522.3, 522.7-523.1, 526.6, 530.8-531.4, 531.7, 532.1, 532.3, 538.7, 539.3, 540.2, 540.6-541.3. Shines of Zn in veinlets, some disseminated in dense limestone from 523-534.

		CaF_2	Pb	Zn
Assay values:	530.6-533	0.24	0.53	1.49
	533 -538	0.98	0.11	0.50
	538 -540.5	7.50	0.16	0.39
	540.5-543.1	15.50	0.16	0.10

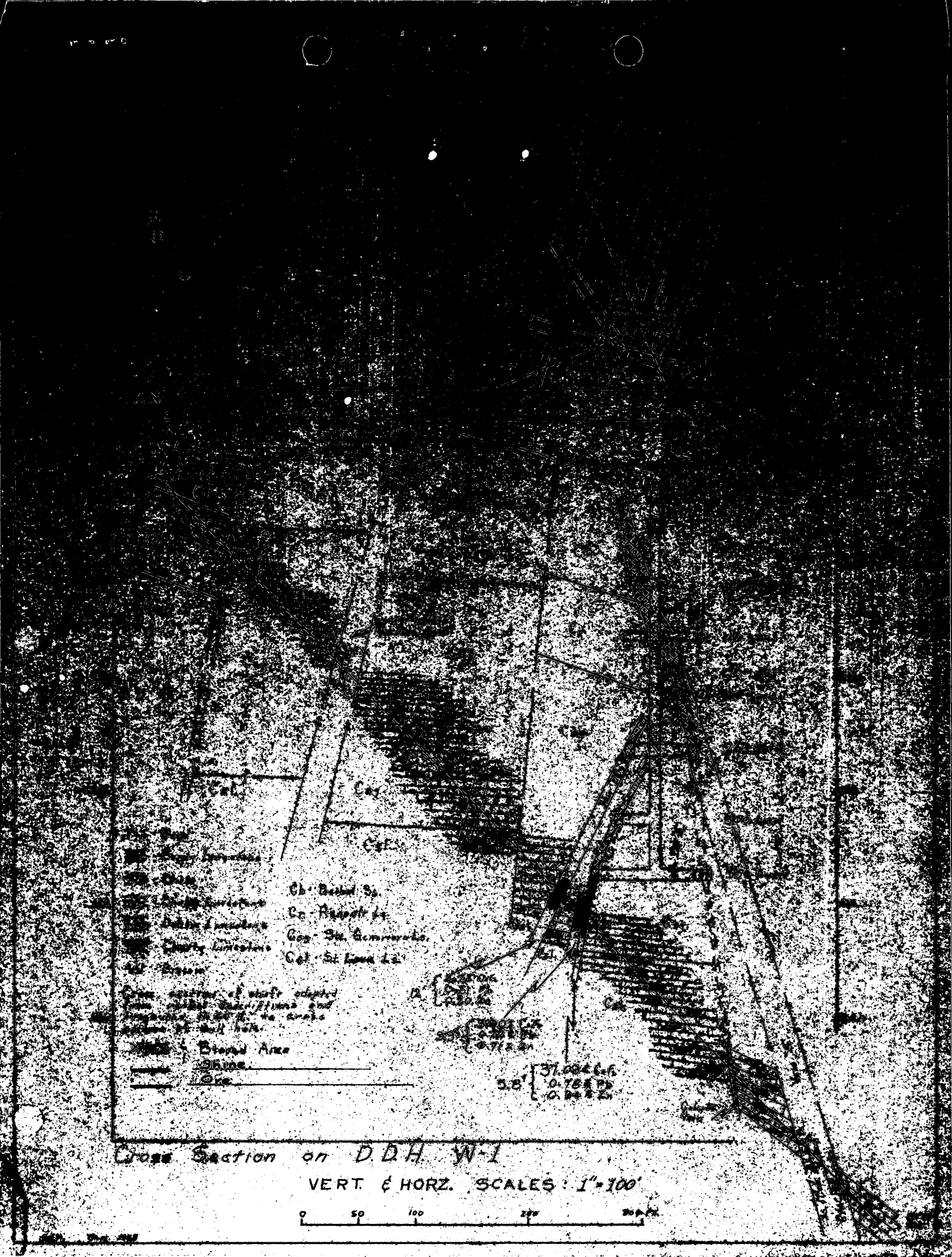
543.1	545.3	Fault	Vein CaF_2, little limestone breccia at top and bottom. Shines of Zn and Pb. Evidence of grinding in the vein. Angle of bending in the vein 50°-55°. 2.2' of core recovered. 0.5' missing from run probably from grinding in vein. Thus the real length in the high-grade vein was probably 2.7'. Assay values: 76.28% CaF_2 - 1.83% Pb - 0.69% Zn.
545.3	555.2	Cag	Limestone, medium grey, fine crystalline, stylolitic, with calcite stringers with some oil shows. Trace of spar at 545.3-545.6, 547.3. Assay values: 545.3-546.3 10.02% CaF_2, 0.11% Pb, 0.30% Zn Trace of ZnS and CaF_2 548.9'.
555.2	586.3	Cag	Limestone, brown, fine crystalline, (partially siliceous, possibly dolomite) stylolitic, slightly weathered in areas. Oil shows in calcite vein at 557.1, 560.3. Trace PbS, CaF_2 at 556.1. Shines CaF_2 557.2-557.5, 573.8, 582.3, 583.8. Siliceous vuggy zone from 555.1 to 558, from 561.1-561.9, 565.2-566.2. Calcite with some oil shows throughout.
586.3	686.2	Cal	Limestone, medium grey, fine crystalline, slightly cherty, stylolitic at top. Calcite veinlets. Trace CaF_2 and Pb at 586.4, 586.5, 591.4. Trace of CaF_2 589.7, 590.3, 615.7, 616-616.5, 617.5, 618.3, 622.6-622.8, 653.3. Large vugs between 618.3 and 631.

From	To	Fm.	Description
686.2	725	Cal	Limestone, dark grey, medium crystalline, fossiliferous, few shale partings, angle bedding at 702' 40°, little chert, alternating beds with no bedding. Angle of bedding at 723.5' 40°.
725	728.2	Fault?	Vein calcite, oil impregnated.
728.2	772.8	Cal?	Limestone, medium grey, fine crystalline, heavy stylolites, broken with numerous calcite stringers to 737.7, less fractured, heavy stylolite, calcite stringers below to 772.8.
772.8	805.2	Cal	Limestone, medium grey, fine crystalline, broken with calcite veinlets. Angle of bedding at 783' 21°. Scattered chert. 797.8-799.8 limestone and calcite breccia.
805.2	870.5	Fault	805.2 – 810: Limestone and calcite breccia. 810 – 818.5: mylonite recemented limestone and calcite. 818.5 – 823: Limestone and calcite breccia. 823 – 838: Mylonite, recemented limestone and calcite, with scattered zones of limestone and calcite breccia. 838 – 845: Limestone and calcite breccia. 845 – 867: Vein calcite. 867 – 868: Limestone and calcite breccia. 868 – 870.5: Brecciated limestone and calcite veinlets.
870.5	916		Limestone, dark grey, shaley, fossiliferous, broken with numerous calcite veinlets. Calcite vein from 874-874.5, 875.3-877 (breccia in last 0.5'). From 879-884 (mostly breccia) less calcite veins with depth, scattered up to 1' core length. Shines of CaF2 at 903.5. Below 905.6 bedding dips with hole.

Bottom 916'

Acid Surveys

depth	angle of hole
0	- 46½°
400	- 45°
758	- 45½°



Cross Section on D.D.H. W-1

VERT. & HORZ. SCALES: 1" = 100'

Form MF-104 (Rev.)
(April 1952)

Watson Project
Stage I

Budget Bureau No. 42-R1036.5

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
OPERATOR'S MONTHLY REPORT AND VOUCHER

PAID ON VOUCHER & SCHEDULE OF PAYMENTS
OCT 6 1958
O.M.E.

Month of August, 1958 Docket No. DMEA 4962 Contract No. Idm E-1199
Operator's Name Reynolds Metals Company Minerals Fluorspar
Address Richmond, Virginia
Contract Amount, $ 28,310.00 Government Participation: 50 % Amount, $ 14,155.00

ITEMS OF COSTS	FOR OPERATOR'S USE			FOR GOVERNMENT USE ONLY		
	Monthly Total	Totals Previously Reported	Totals To Date	Approved Monthly Total	Approved Totals Previously Reported	Approved Totals To Date
(1) Independent Short Form Contracts:						
Drilling core	0	0	0			
~~Bulldozing~~ reaming	0	0	0			
~~Crosscutting~~ cementing	0	0	0			
~~Drifting~~ lost BX casing	0	0	0			
lost AX casing	0	0	0			
(2) Labor and Supervision:						
Labor						
Supervision						
Technical Services						
(3) Operating Mat'ls. and Supplies:						
Timber						
Explosives						
Pipe						
Track						
Core boxes	0	0	0			
(4) Operating Equipment:						
Rental						
Purchase						
Depreciation						
(5) Initial Rehabilitation and Repairs						
(6) New Bldgs., Improvements, etc.						
(7) Miscellaneous:						
Repairs to Equipment						
~~Sampling~~ and Analysis CaF_2	4.50	0	4.50			
~~Payroll Taxes~~ CaF_2, Zn, Pb	45.50	0	45.50			
Liability Insurance						
Incidental allow.	0	0	0			
(8) Contingencies (specify):						
TOTALS	45.50		45.50	45.50	—	45.50

I certify that the above bill is correct and just and that payment therefor has not been received.
Date 9-11-58 *Payee Reynolds Metals Company

Per W. E. McDaniel Title Accounting Official

*When a voucher is signed or receipted in the name of a company or corporation, the name of the person writing the company or corporate name, as well as the capacity in which he signs, must appear. For example: "John Doe Company, per John Smith, Secretary," or "Treasurer," as the case may be.

NOTE.—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.

(Instructions on reverse)

Pursuant to authority vested in me, I certify that this account is correct and proper for payment in the amount of:
$ 22.75

Signature Helen R. Miller
(Authorized Certifying Officer)

Date OCT 3 1958 Vou. No. 45
(See other side)

22.75

(For Government use only)

CERTIFICATION BY GOVERNMENT REPRESENTATIVE:

I certify that to the best of my knowledge and belief the contractor submitting this voucher is operating a Defense Minerals Exploration Administration project under Contract No. E 1199 in accordance with the terms of the contract.

Signature [illegible] Title Mining Engr. Date 9/29/58

APPROVAL BY DMEA EXECUTIVE OFFICER OR ALTERNATE:

Signature Robert A. Lawrence Title EXECUTIVE OFFICER ONE FIELD TEAM REGION V Date OCT 3 1958

MONTHLY REPORT OF OPERATOR

The Operator (Contractor) of an exploration project is required to make a monthly report to the Government through the Regional Executive Officer. This report consists of three parts as follows:

(a) *Form MF-104—Operator's Monthly Report and Voucher.*—This form details expenditures and constitutes a voucher for reimbursing the Operator for the Government's share of costs;

(b) *Form MF-104A—Operator's Unit Cost and Progress Report.*—This is a statistical report of expenditures which shows costs for the various types of operation; and

(c) *Narrative.*—A concise narrative description of progress made, results accomplished, and any unusual difficulties encountered must be furnished as an attachment to this Report and Voucher. Wherever possible, the narrative is to be illustrated with maps or sketches showing formations penetrated and location and assays of samples taken as well as advances in workings. In the case of diamond drilling or churn drilling, the location and inclination of holes is to be shown on a map; logs and assays also are to be submitted.

The Monthly Report of Operator should be prepared in an original and four copies all of which must be sent to the Executive Officer of the Region not later than the 15th of the month following.

Preparation of Form MF-104—Operator's Monthly Report and Voucher.—All the applicable spaces in Form MF-104 should be filled in by the Operator, and the Operator or his agent should sign the certification in the lower left corner of the form.

The items of costs are arranged in the order they appear in Article 6 (a) of Form MF-200 (Revised February, 1952), however, this form is readily adaptable for use in reporting activities under other contract forms.

Under Item (1) delete words "Short Form" if the contract is a sub-contract under Form MF-200; and delete word "Independent" if the contract reported is on Form MF-200 (A). Also, report work paid for on a unit basis under contract Form MF-200 as though it were performed under an independent contract.

Under Item (2) include labor, supervision and technical services incurred for the exploratory operations. Do not include labor, supervision and technical services used for work performed under items (5) and (6).

Under Item (3) include the costs of material and supplies used in the project other than that used under items (5) and (6).

Under Item (4) appear the three types of operating equipment expenditures, that is, rental, purchase and depreciation. The expenditures made for renting equipment belonging to a third party will be reported under "Rental". The amount paid or duly obligated for payment for the purchase of equipment will be reported under "Purchase". The amount of expenditures due the Operator to reimburse him for depreciation of equipment owned will be reported under "Depreciation".

Item (5) comprises costs of labor, supervision, technical services, materials, etc., which are used in the initial rehabilitation and repair of existing buildings, installations, fixtures, and equipment. These costs, therefore, should not be reported under items (2) and (3).

Item (6) includes the labor, supervision, technical services, materials, etc., used in the installation or construction of new buildings, fixed improvements, etc., necessary for the project. These costs, therefore, should not be reported under items (2) and (3).

Item (7) covers miscellaneous types of expenditure such as payroll taxes, liability insurance, workmen's compensation insurance, repairs to equipment and sampling and analysis. Only that part of payroll taxes, liability insurance and workmen's compensation which are paid by the operator should be reported under item (7). The share paid by the employee as a payroll deduction is to be included under item (2) as labor costs.

Item (8) includes any unforeseen costs not included in the other seven categories.

The original of Form MF-104 when submitted for reimbursable expenses incurred under contract Form MF-200 must be supported by original documentation or by certified copies of purchase orders, payrolls or transcripts of payrolls, unless such documentation has been waived by the Regional Executive Officer. This certification may be stated thus, "Certified True Copy (or Transcript)", followed by appropriate signature. If the Executive Officer of the Region determines that a contract under Form MF-200 should have an "on-site" audit, that is, a Government auditor should make an audit of the Operator's books and records of account, the Operator need not support his monthly voucher with original or certified documents except in cases of equipment purchases whose individual costs exceed $50.00. In these cases the original or a certified copy of the purchase order or invoice should be attached to the Monthly Voucher. N. B.—Only the *original* of Form MF-104 is required to be documented. The four copies of Form MF-104 are not to be thus supported.

Form MF-104 submitted for reimbursement under fixed price contracts on Form MF-200 (A), however, are not required to be supported by documentation of any kind. The Operator will submit his claim under item (1) of Form MF-104 by deleting as stated above the word "Independent" and by showing the number of feet or other units immediately after the appropriate descriptive word, such as, drilling, bulldozing, crosscutting, drifting, etc., and giving the "Monthly Total" amount due. "Totals Previously Reported", and "Totals to Date" columns should also be filled in.

Form MF-104A
(April 1952)

Budget Bureau No. 42-R1151.2

Watson Project
Stage I

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
OPERATOR'S UNIT COST AND PROGRESS REPORT

RECEIVED OCT 6 1958 M.E.

Month of August 1958 Docket No. DMEA 4962 Contract No. Idm E-1199
Operator's Name Reynolds Metals Company Minerals Fluorspar
Address Richmond, Virginia

OPERATION	UNIT	COSTS THIS MONTH	UNITS THIS MONTH	COSTS TO DATE	UNITS TO DATE	UNIT COSTS TO DATE	AUTHORIZED BY CONTRACT Units	AUTHORIZED BY CONTRACT Unit Costs
Drifting								
Crosscutting								
Raising								
~~Shafts~~	1	0	0	0	0		75	225.00
Winzes								
Drilling: Core	Ft.	0	0	0	0		6900	20,355.00
~~Chip~~ reaming	Ft.	0	0	0	0		2000	3,500.00
~~Auger~~ cement	Hr.	0	0	0	0		80	640.00
~~Stripping~~ lost BX casing	Ft.	0	0	0	0		300	648.00
~~Trenching~~ lost AX casing	Ft.	0	0	0	0		300	510.00
~~Test Pits~~ Assays CaF_2	1	0	0	0	0		75	337.00
~~Roads and Trails~~ CaF_2, Pb, Zn	1	45.50	7	45.50	7		25	162.50
Incidental allow.	Ft.	0	0	0	0		6900	1,932.00
TOTAL DISTRIBUTED COSTS		45.50		45.50				TOTAL COSTS AUTHORIZED BY CONTRACT
Operating Equipment Purchased								
Initial Rehabilitation and Repairs								
New Buildings, Improvements, etc.								
TOTAL COSTS		45.50		45.50				28,310.00

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

Date 9-11-58 Operator Reynolds MetalsCompany

Per H. E. McDaniel Title Accounting Official

NOTE.—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.

(Instructions on reverse)

REMARKS: No drilling or incidental allowance charges because hole is incomplete.

(For Government use only)

R. H. Burmeister 9/29/58

MINING ENGINEER
U. S. BUREAU OF MINES

INSTRUCTIONS

Preparation of Form MF-104A—Operator's Unit Cost and Progress Report.—Applicable places on Form 104A should be filled in by the Operator. The purpose of this form is twofold as follows: (1) to furnish the supervising engineers and other administrators with statistical information necessary to better determine the progress of the project; and (2) to furnish more permanent information on mining costs for future use. The more important phases of operation on which permanent information is desired have been outlined in the form. There are blank lines, however, for those unusual phases which may need to be reported for a particular project. It will be necessary for the Operator to distribute his costs among the applicable phases reported with the exception of three items the costs of which are not to be distributed by the Operator. These three items are: "Operating Equipment Purchased", "Initial Rehabilitation and Repairs", and "New Buildings, Improvements, etc." The reason for not distributing these items on a monthly basis is doubtless clear to the Operator, since such distribution might well overstate the cost for any one month or period short of the entire contract period.

Form MF-104A has been designed to tie in with Form MF-104 for both monthly and cumulative costs. The "Total Costs" on Form MF-104A for each month should equal the monthly "Total Costs" as reported on Form MF-104. This is also true of the "Total Costs To Date".

In preparing Form MF-104A, it will be necessary frequently to distribute certain costs over a number of items. For instance, supervisory and engineering costs may have to be distributed over several phases, such as, drifting, crosscutting, raising, etc., provided that these items were reported active for the month. Such distributions should be made on the basis of time spent on the various phases, on man days of labor charged to such phases, or on some other equitable basis. "Operating Equipment", "Initial Rehabilitation and Repairs", and "New Buildings Improvements, etc.", will be distributed to the several phases of the project by the Washington Office of DMEA at the close of the project if determined necessary. The last two columns headed "Authorized by Contract" will be filled in by the Operator if such information is found in the contract. This information is usually a part of Exhibit "A" of the contract. A space for remarks has been provided for the use of the Operator to call attention to any unusual circumstances causing excessive or disproportionate unit costs.

GPO 872894

REYNOLDS METALS COMPANY

(A DELAWARE CORPORATION)

GENERAL OFFICES: RICHMOND, VIRGINIA

PLEASE MAIL ALL REMITTANCES TO:
REYNOLDS METALS COMPANY
REYNOLDS METALS BUILDING,
RICHMOND 18, VIRGINIA

COPY OF INVOICE

MO. SCHEDULE WK.	SHIPPING POINT	CABLE ADDRESS:	CODES USED:
	Geological Division	"FOILWAX"	WESTERN UNION—A. B. C. AND LIEBLERS

REYNOLDS ORDER NO.	TERMS (FROM DATE OF INVOICE)	DATE	INVOICE NO.
	NET 30 DAYS	9-11-58	49-9-1

CUSTOMER ORDER NO.	CUST. ORDER DATE	USE CODE	CONTRACT NO.	BILL OF LADING NO.	CHECK IF ORDER COMPLETE	TALLY NO.
					☐	

CUSTOMER CODE	TAX	SALES CREDIT	ITEMS SHIPPED COMPLETE	ITEMS SHIPPED PARTIAL

SOLD TO Department of the Interior
Defense Mineral's Exploration Admin.
Attention: H. L. Burmeister
U. S. Bureau of Mines
College Park, Maryland

SHIP TO (SAME AS SOLD TO UNLESS INDICATED.)

ROUTE

QUANTITY SYMBOLS
#—POUNDS
P—PIECES, EACH
W—THOUSAND PIECES
S—SETS
T—THOUSAND SETS
F—FEET
C—HUNDRED FEET
K—THOUSAND FEET
E—SQUARE FEET
L—LINEAL YARDS
Y—SQUARE YARDS
R—REAMS
G—GALLONS

ITEM	DESCRIPTION	PRODUCT CODE	PRICE	CASES	GROSS WGT.	NET WGT.	QUANTITY (IF OTHER THAN #)	AMOUNT
	To bill you with 50% of August, 1958, items of costs per the Operators Monthly Report and Voucher for Docket No. DMEA 4962, Contract No. Idm-E-1199. Monthly Total $45.50 Less 50% 22.75		$					$22.75

TRANSPORTATION CLAUSE APPLICABLE (SEE ACKNOWLEDGMENT BACK)

PPD OR COL: P

VIA: AS DIRECTED BY REYNOLDS' TRAFFIC DEPARTMENT

R - 142 - 53 (REV. 6 - 57)

SELLER REPRESENTS THAT WITH RESPECT TO THE PRODUCTION OF THE MATERIAL AND/OR THE PERFORMANCE OF THE SERVICES COVERED BY THIS INVOICE. IT HAS FULLY COMPLIED WITH THE REQUIREMENTS OF THE FAIR LABOR STANDARDS ACT OF 1938 AS AMENDED. OUR RESPONSIBILITY FOR SAFE DELIVERY OF GOODS CEASES WHEN WE OBTAIN CLEAR BILL OF LADING FROM CARRIER

4962
#13

Monthly Report - August, 1958
Watson Project - DMEA 4963 - Dm E-1199
Crittenden County, Kentucky

By

John W. Keck, Geologist

Stage I

Hole W-1 was drilled from 253 to 836 during the month of August. Progress was slow because of cavities and broken ground. The hole presently has NX casing to 80', BX casing to 253' and AX casing to 549'.

The hole had to be reduced to AX size at 549' because of a flow of sand from a cavity which the drillers could not cement. Because of a very large cavity above 253', it was not advisable to pull the BX casing to ream the hole. The AX core recovery has been very good.

The enclosed cross section gives a graphic log of the hole to date. (The detailed log will be sent next month when the hole is completed.) The underground workings have been adapted from verbal descriptions and adjusted to fit the information from hole W-1.

The first vein, vein B, was calcite with 4.72% CaF$_2$, 0.21% Pb, and 0.20% Zn. This vein apparently had good ore at the 240' level.

Vein C had a 2.2' (red length) high grade core which averaged 76.20% CaF$_2$, 1.83% Pb and 0.69% Zn. This was grouped with the mineralization in the wall rock to give 5.8' 37% CaF$_2$, 0.70% Pb and 0.34% Zn.

Vein E was not recognized in the core. Apparently this small structure dies out below the 350' level.

A small calcite vein, which we will call vein F, may be vein E of the 350' level, but it seems more probable that this was mistakenly thought to be vein A in the 350 cross cut.

Apparently vein A maintains the same dip it had above the 240' level. We had previously thought that it steepened and was cut on the 350' level, and expected the drill hole to intersect it at 700'. The hole actually entered the vein at 805' and is still in it at the present depth of 836'. The part cut so far has been calcite and limestone fault breccia, with no fluorspar. This vein is on a major fault

and likely to be quite wide. We will attempt to test its full width and bottom the hole about 20' beyond the other side. This vein was the major producer in the mine.

Assays to date for W-1 are as follows:

From	To	CaF_2	SiO_2	$CaCO_3$	Pb	Zn
504.8	- 516.8	4.72	0.58	94.12	0.12	0.20
530.6	- 533	6.24	11.28	76.24	0.53	1.49
533	- 538	0.98	6.64	89.64	0.11	0.50
538	- 540.5	7.50	8.06	81.86	0.16	0.39
540.5	- 543.1	15.50	4.22	77.62	0.16	0.10
543.1	- 545.3	76.28	2.54	16.76	1.83	0.69
545.3	- 546.3	10.02	8.16	80.06	0.11	0.30

The only charges shown on the accounting forms are for assays to date. The cost of this hole will be listed next month when the hole is completed.

Summary:

Hole W-1	253'	7-31-58
Hole W-1	836'	8-31-58

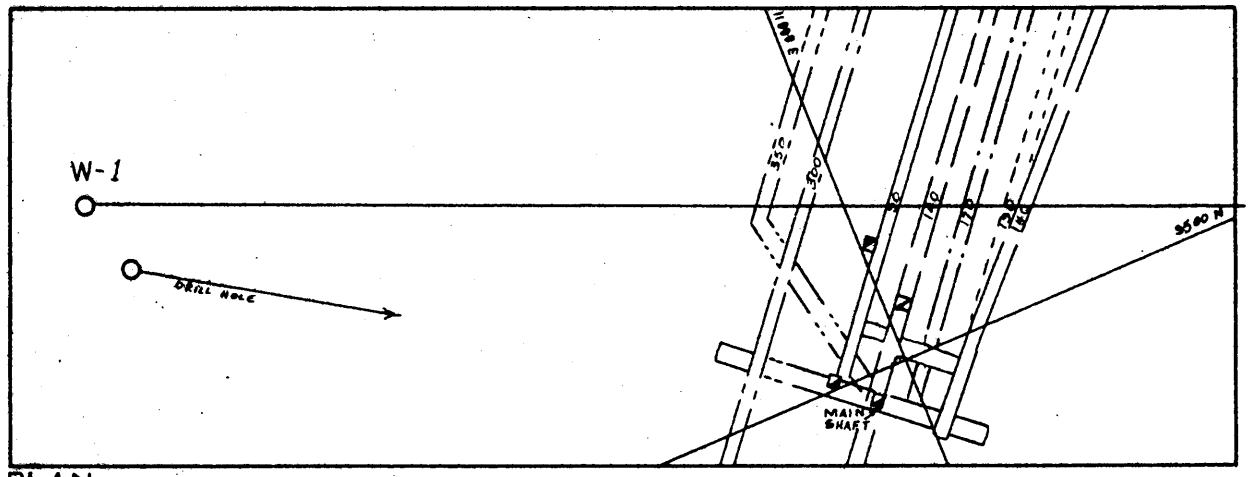
Total footage for August - 583'.

WATSON PROJECT

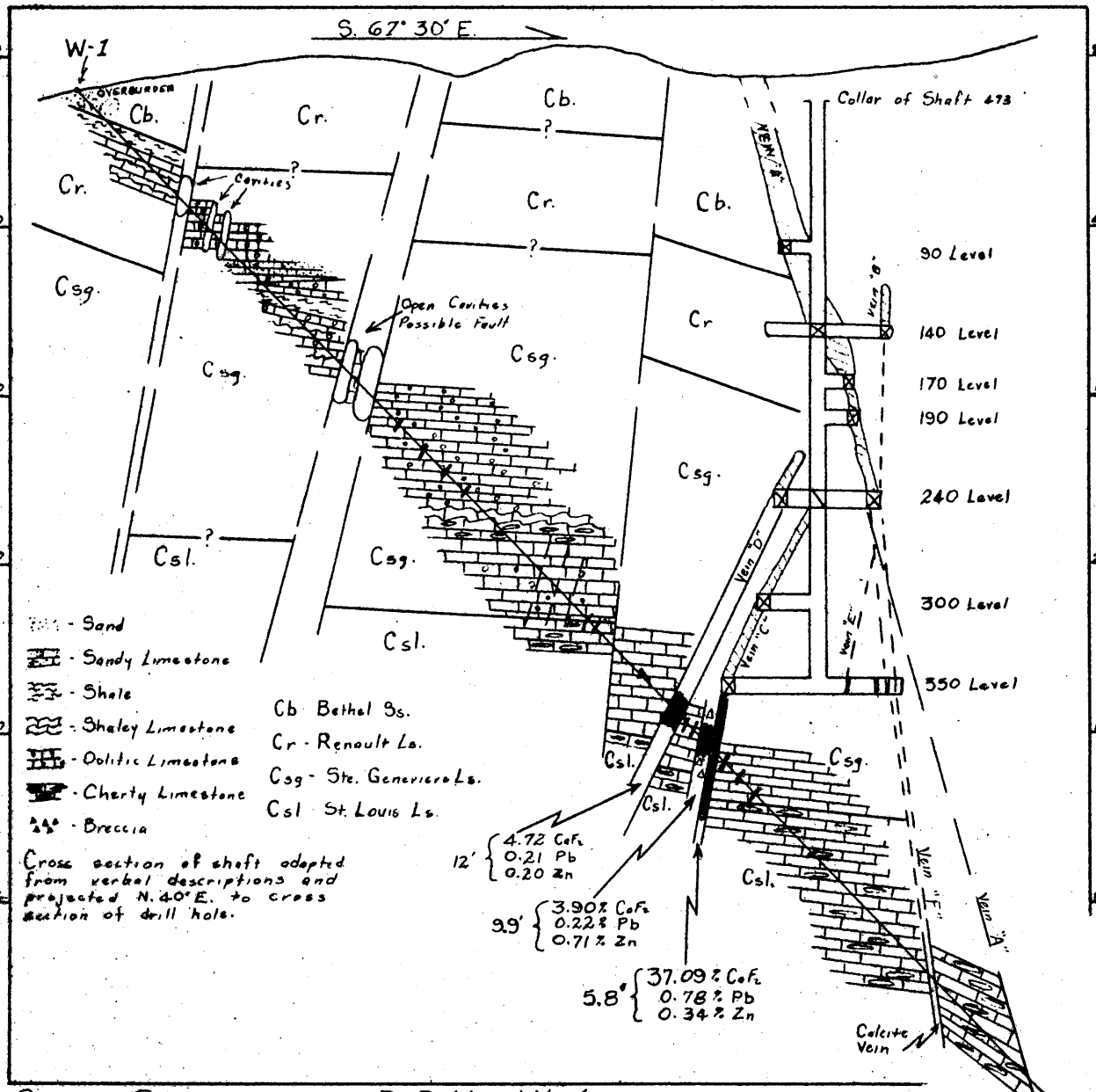
CRITTENDEN COUNTY, KENTUCKY

DMEA - 4962

Idm-E 1199



PLAN



Cross Section on D.D.H. W-1

VERT. & HORZ. SCALES: 1" = 100'

0 50 100 200 300 FT.

FILE COPY
DMEA
RECEIVED SEP 22 1958

DATE	INITIALS	CODE
9-22	C	220
22	Copy	100
"		110
9/29	Talbot	800
		600

INTERIM REPORT

DMEA-4962, Idm-E1199 - Fluorspar

Operator: Reynolds Metals Company, Richmond, Virginia

Location: Watson-Hicks-Tyner Properties, Crittenden County, Kentucky

A project inspection of the subject contract was conducted on September 16, 1958. Results obtained to date and contemplated future work were discussed with Mr. John Hook, the Operator's geologist. Drill core obtained since the last project inspection were examined.

Drilling completed under the contract is summarized as follows:

Total number of holes completed to date	1
Total footage in holes completed to date	916
Number of ore holes	1
Number of trace holes	0
Number of barren holes	0

Hole No. 1, located approximately as shown on the contract map has been completed at a depth of 916 feet. It was necessary to drill the hole deeper than originally anticipated because the dip of the main target (Fault 12) was less than inferred from the surface mapping. Mineralization of commercial grade and mineable thickness was encountered in the hole. This mineralization occurs along the fault designated as Fault 12B on the contract map and along a small parallel fault. Heavy gangue mineralization is present along the main fault (Fault 12) but contains only traces of fluorite. A summary log of Hole No. 1 is as follows:

Depth in Feet	Remarks
0-25	Overburden.
25-87	Renault limestone and shale.
87-97	Fault gouge. Fault 12A.

Depth in Feet	Remarks
97-436	Ste. Genevieve limestone. Scattered traces of fluorite at 253-336 feet; scattered shines of fluorite with traces of galena at 374-400 feet; scattered traces of fluorite with galena at 422½-436 feet.
436-447	St. Louis limestone. Scattered traces of fluorite with galena.
447-448½	Fractured zone (fault ?). Trace of fluorite.
448½-467	St. Louis limestone. Scattered traces of fluorite and galena.
467-473	Ste. Genevieve limestone.
473-475½	Fault.
475½-504½	St. Louis limestone.
504½-516½	Fault (see assay below).
516½-543	St. Louis limestone (see assays below).
543-545	Fault (see assay below).
545-586	Ste. Genevieve limestone (see assay below). Scattered traces of fluorite and galena.
586-686	St. Louis limestone. Scattered traces of fluorite and galena.
686-725	St. Louis limestone.
725-728	Fault.
728-805	St. Louis limestone.
805-870½	Breccia. Fault 12. Heavy calcite mineralization.
870½-916	St. Louis (?) limestone. Trace of fluorite at 903½ feet.
916	Bottom.

Assay results of Hole No. 1 are as follows:

Depth in Feet	Thickness in Feet	%CaF_2	%Pb	%Zn
504.8-516.8	12.0	4.72	0.21	0.20
530.6-540.5	9.9	3.90	0.22	0.71
540.5-546.3	5.8	37.09	0.78	0.34

Hole No. 2 is in progress and was at a depth of 12 feet at the time of the inspection. The hole is located as shown on the contract map.

Dewey H. Amos
Geologist
U.S. Geological Survey

Form MF-104 (Rev.)
(April 1952)

Budget Bureau No. 42-R1036.5

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION

Stage I
Watson Project

OPERATOR'S MONTHLY REPORT AND VOUCHER

RECEIVED AUG 1958 D.M.E.A.

Month of July, 1958 Docket No. DMEA 4902 Contract No. Idm-1 119
Operator's Name Reynolds Metals Company Minerals Fluorspar
Address Richmond, Virginia
Contract Amount, $ 28,310.00 Government Participation: 50 % Amount, $ 14,155.00

ITEMS OF COSTS	FOR OPERATOR'S USE: Monthly Total	Totals Previously Reported	Totals To Date	FOR GOVERNMENT USE ONLY: Approved Monthly Total	Approved Totals Previously Reported	Approved Totals To Date
(1) Independent Short Form Contracts:						
Drilling Core	0	0	0			
~~Bulldozing~~ Tooling	0	0	0			
~~Crosscutting~~ Cementing	0	0	0			
~~Drifting~~ Lost BX Casing	0	0	0			
Lost AX Casing	0	0	0			
(2) Labor and Supervision:						
Labor						
Supervision						
Technical Services						
(3) Operating Mat'ls. and Supplies:						
Timber						
Explosives						
Pipe						
Track						
Core Boxes	0	0	0			
(4) Operating Equipment:						
Rental						
Purchase						
Depreciation						
(5) Initial Rehabilitation and Repairs						
(6) New Bldgs., Improvements, etc.						
(7) Miscellaneous:						
Repairs to Equipment						
~~Sampling and~~ Analysis CaF2	0	0	0			
Payroll Taxes CaF2	0	0	0			
Liability Insurance						
Incidental Allow.	0	0	0			
(8) Contingencies (specify):						
TOTALS	0	0	0			

I certify that the above bill is correct and just and that payment therefor has not been received.

Date ..... *Payee .....

Per ..... Title .....

*When a voucher is signed or receipted in the name of a company or corporation, the name of the person writing the company or corporate name, as well as the capacity in which he signs, must appear. For example: "John Doe Company, per John Smith, Secretary," or "Treasurer," as the case may be.

NOTE.—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.

(Instructions on reverse)

Pursuant to authority vested in me, I certify that this account is correct and proper for payment in the amount of:

$.....

Signature .....
(Authorized Certifying Officer)

Date ..... Vou. No. .....

(See other side)

(For Government use only)

CERTIFICATION BY GOVERNMENT REPRESENTATIVE:

I certify that to the best of my knowledge and belief the contractor submitting this voucher is operating a Defense Minerals Exploration Administration project under Contract No. E 1199 in accordance with the terms of the contract.

Signature R. L. Burmeister Title Mining Engr. Date 8/7/58

APPROVAL BY DMEA EXECUTIVE OFFICER OR ALTERNATE:

EXECUTIVE OFFICER

Signature Robert A. Laurence Title DMEA REGION V Date AUG 14 1958

MONTHLY REPORT OF OPERATOR

The Operator (Contractor) of an exploration project is required to make a monthly report to the Government through the Regional Executive Officer. This report consists of three parts as follows:

(a) *Form MF-104—Operator's Monthly Report and Voucher.*—This form details expenditures and constitutes a voucher for reimbursing the Operator for the Government's share of costs;

(b) *Form MF-104A—Operator's Unit Cost and Progress Report.*—This is a statistical report of expenditures which shows costs for the various types of operation; and

(c) *Narrative.*—A concise narrative description of progress made, results accomplished, and any unusual difficulties encountered must be furnished as an attachment to this Report and Voucher. Wherever possible, the narrative is to be illustrated with maps or sketches showing formations penetrated and location and assays of samples taken as well as advances in workings. In the case of diamond drilling or churn drilling, the location and inclination of holes is to be shown on a map; logs and assays also are to be submitted.

The Monthly Report of Operator should be prepared in an original and four copies all of which must be sent to the Executive Officer of the Region not later than the 15th of the month following.

Preparation of Form MF-104—Operator's Monthly Report and Voucher.—All the applicable spaces in Form MF-104 should be filled in by the Operator, and the Operator or his agent should sign the certification in the lower left corner of the form.

The items of costs are arranged in the order they appear in Article 6 (a) of Form MF-200 (Revised February 1952), however, this form is readily adaptable for use in reporting activities under other contract forms.

Under Item (1) delete words "Short Form" if the contract is a sub-contract under Form MF-200; and delete word "Independent" if the contract reported is on Form MF-200 (A). Also, report work paid for on a unit basis under contract Form MF-200 as though it were performed under an independent contract.

Under Item (2) include labor, supervision and technical services incurred for the exploratory operations. Do not include labor, supervision and technical services used for work performed under items (5) and (6).

Under Item (3) include the costs of material and supplies used in the project other than that used under items (5) and (6).

Under Item (4) appear the three types of operating equipment expenditures, that is, rental, purchase and depreciation. The expenditures made for renting equipment belonging to a third party will be reported under "Rental". The amount paid or duly obligated for payment for the purchase of equipment will be reported under "Purchase". The amount of expenditures due the Operator to reimburse him for depreciation of equipment owned will be reported under "Depreciation".

Item (5) comprises costs of labor, supervision, technical services, materials, etc., which are used in the initial rehabilitation and repair of existing buildings, installations, fixtures, and equipment. These costs, therefore, should not be reported under items (2) and (3).

Item (6) includes the labor, supervision, technical services, materials, etc., used in the installation or construction of new buildings, fixed improvements, etc., necessary for the project. These costs, therefore, should not be reported under items (2) and (3).

Item (7) covers miscellaneous types of expenditure such as payroll taxes, liability insurance, workmen's compensation insurance, repairs to equipment and sampling and analysis. Only that part of payroll taxes, liability insurance and workmen's compensation which are paid by the operator should be reported under item (7). The share paid by the employee as a payroll deduction is to be included under item (2) as labor costs.

Item (8) includes any unforeseen costs not included in the other seven categories.

The original of Form MF-104 when submitted for reimbursable expenses incurred under contract Form MF-200 must be supported by original documentation or by certified copies of purchase orders, payrolls or transcripts of payrolls, unless such documentation has been waived by the Regional Executive Officer. This certification may be stated thus, "Certified True Copy (or Transcript)", followed by appropriate signature. If the Executive Officer of the Region determines that a contract under Form MF-200 should have an "on-site" audit, that is, a Government auditor should make an audit of the Operator's books and records of account, the Operator need not support his monthly voucher with original or certified documents except in cases of equipment purchases whose individual costs exceed $50.00. In these cases the original or a certified copy of the purchase order or invoice should be attached to the Monthly Voucher. N. B.—Only the *original* of Form MF-104 is required to be documented. The four copies of Form MF-104 are not to be thus supported.

Form MF-104 submitted for reimbursement under fixed price contracts on Form MF-200 (A), however, are not required to be supported by documentation of any kind. The Operator will submit his claim under item (1) of Form MF-104 by deleting as stated above the word "Independent" and by showing the number of feet or other units immediately after the appropriate descriptive word, such as, drilling, bulldozing, crosscutting, drifting, etc., and giving the "Monthly Total" amount due. "Totals Previously Reported", and "Totals to Date" columns should also be filled in.

Form MF-104A
(April 1952)

Budget Bureau No. 42-R1151.2

UNITED STATES
DEPARTMENT OF THE INTERIOR

DEFENSE MINERALS EXPLORATION ADMINISTRATION

Stage I
Pateon Project

OPERATOR'S UNIT COST AND PROGRESS REPORT

RECEIVED AUG 18 1958 D.M.E.A.

Month of July 8 195 Docket No. DMEA 933 Contract No. DMEA-3 1990
Operator's Name Reynolds Metals Company Minerals Fluorspar
Address Richmond, Virginia

OPERATION	Unit	Costs This Month	Units This Month	Costs to Date	Units to Date	Unit Costs to Date	Authorized by Contract: Units	Authorized by Contract: Unit Costs
Drifting								
Crosscutting								
Raising Core Holes	1	0	0	0	0		75	225.00
Shafts								
Winzes								
Drilling: Core	Ft.	0	0	0	0		6,300	20,355.00
Churn Reaming	Ft.	0	0	0	0		2,000	3,500.00
Auger Cementing	Hr.	0	0	0	0		80	640.00
Lost in Casing	Ft.	0	0	0	0		300	48.00
Stripping Lost At Casing	Ft.	0	0	0	0		300	510.00
Trenching Assays CaF_2	1	0	0	0	0		75	337.50
Test Pits CaF_2, Zn, Pb	1	0	0	0	0		25	112.50
Roads and Trails Flow.	Ft.	0	0	0	0		6,900	2,932.00
Incidental								
Total Distributed Costs								Total Costs Authorized by Contract
Operating Equipment Purchased								
Initial Rehabilitation and Repairs								
New Buildings, Improvements, etc.								
Total Costs								28,310.00

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

Date ..... Operator .....

Per ..... Title .....

NOTE.—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.

Remarks: No charges will be made until first hole is completed.

(Instructions on reverse)

H. D. Burmeister
8/7/58

(For Government use only)

INSTRUCTIONS

Preparation of Form MF-104A—Operator's Unit Cost and Progress Report.—Applicable places on Form 104A should be filled in by the Operator. The purpose of this form is twofold as follows: (1) to furnish the supervising engineers and other administrators with statistical information necessary to better determine the progress of the project; and (2) to furnish more permanent information on mining costs for future use. The more important phases of operation on which permanent information is desired have been outlined in the form. There are blank lines, however, for those unusual phases which may need to be reported for a particular project. It will be necessary for the Operator to distribute his costs among the applicable phases reported with the exception of three items the costs of which are not to be distributed by the Operator. These three items are: "Operating Equipment Purchased", "Initial Rehabilitation and Repairs", and "New Buildings, Improvements, etc." The reason for not distributing these items on a monthly basis is doubtless clear to the Operator, since such distribution might well overstate the cost for any one month or period short of the entire contract period.

Form MF-104A has been designed to tie in with Form MF-104 for both monthly and cumulative costs. The "Total Costs" on Form MF-104A for each month should equal the monthly "Total Costs" as reported on Form MF-104. This is also true of the "Total Costs To Date".

In preparing Form MF-104A, it will be necessary frequently to distribute certain costs over a number of items. For instance, supervisory and engineering costs may have to be distributed over several phases, such as, drifting, crosscutting, raising, etc., provided that these items were reported active for the month. Such distributions should be made on the basis of time spent on the various phases, on man days of labor charged to such phases, or on some other equitable basis. "Operating Equipment", "Initial Rehabilitation and Repairs", and "New Buildings Improvements, etc.", will be distributed to the several phases of the project by the Washington Office of DMEA at the close of the project if determined necessary. The last two columns headed "Authorized by Contract" will be filled in by the Operator if such information is found in the contract. This information is usually a part of Exhibit "A" of the contract. A space for remarks has been provided for the use of the Operator to call attention to any unusual circumstances causing excessive or disproportionate unit costs.

GPO 872894

Reynolds Metals Company
Monthly Report - July, 1958
Watson Project - DMEA 4962 - Idm-E1199
Crittenden County, Kentucky
by
John W. Hook, geologist

Stage I

The drill site for hole W-1 was cleared July 1st and the drilling equipment moved in on July 3rd. Heavy rains and pump trouble delayed the start of actual drilling until July 16th.

The hole collared in loose sand and sandstone boulders representing residual Bethel sandstone to a depth of 25'. The underlying Renault shale and limestone (25 to 87') was very badly weathered with many clay filled cavities. About 27% of this material was recovered as core. The return cuttings were checked for fluorspar in the zones of poor recovery. Frequant reaming and casing were necessary in this zone.

A fault at 87 feet cut out the lower part of the Renault, the Levias, Rosiclaire, and possibly some of the Fredonia formations.

Except for open cavities, the recovery in the Fredonia has been about 100%. Large open cavities at 224 to 232 and 236 to 253 had to be cased. The drillers completed setting the BX casing to 253 at the end of the shift on July 31st.

As the veins are likely to be soft, we are attempting to maintain a BX size hole so that a BXM bit may be used if needed. The first vein is expected at 500' and the last at 700'. Several small intermediate veins are reported by local miners but these may intersect the two larger veins in the down dip projection.

No charges are shown on the accounting forms because the first hole is imcomplete, no core boxes have been purchased, and there have been no assays.

SUMMARY

Project started	————	7-1-58
Hole W-1 collared	————	7-16-58
W-1 253' deep	————	7-31-58

INTERIM REPORT

DMEA-4962, Idm-E1199 - Fluorspar

8/14	21.9	225
14	[illegible]	100
11	[illegible]	110
8/15	[illegible]	800
8/15	[illegible]	600

Operator: Reynolds Metals Company, Richmond, Virginia

Location: Watson-Hicks - Tyner Properties, Crittenden County, Kentucky

A project inspection of the subject contract was made August 7, 1958. Results obtained to date and contemplated future work were discussed with Mr. John Hook, the Operator's geologist.

Hole No. 1, located approximately as shown on the contract map, is in progress and has been drilled to an inclined depth of 374 feet. The target is expected to be intersected at an inclined depth of about 750 feet. A summary log of the hole is as follows:

Depth in Feet	Remarks
0 - 15	Overburden, sand, Bethel sandstone.
15 - 25	Overburden, clay, Renault formation.
25 - 87	Limestone and green shale, Renault formation.
87 - 97	Fault gouge, Fault 12-A on contract map.
97 - 140	Limestone, Renault limestone, lower 20 feet probably Levias limestone.
140 - 151	Sandstone, probably Rosiclare sandstone.
151 - 156	Limestone, Fredonia limestone.
156 - 189	Shale, some interbedded limestone, Fredonia limestone.

Depth in Feet	Remarks
189 - 347	Limestone, Fredonia limestone, cavities at 224 - 234 and 236 - 253 feet, scattered traces of fluorite and galena associated with coarsely crystalline calcite at 270 - 321 feet.
347 - 374	Dense limestone with chert nodules, St. Louis limestone.

The hole was inclined -45° at the collar but a survey at a depth of 374 feet showed an inclination of - 47°.

Dewey H. Amos
Geologist
U. S. Geological Survey

ORIGINAL FILE COPY
DMEA
RECEIVED JUL 18 1958

DATE	INITIALS	CODE
7/18	J.G.	225
21	Cogn	100
"		110
7/22		800
		~~600~~
		600

DMEA EXPLORATION PROJECT

INTERIM REPORT

DMEA-4962, Idm-E1199-~~Zinc~~ Fluorspar

Operator: Reynolds Metals Company, Richmond, Virginia

Location: Watson-Hicks-Tyner Prospects, Crittenden County, Ky.

A project inspection of the subject contract was conducted July 10, 1958. Provisions of the contract and exploration plans were discussed with Mr. John Hook, the Operator's geologist.

Work under the contract began on July 1, 1958. A sump to store water for drilling has been constructed and water lines have been laid to some of the drill sites. A drill has been set up on the Watson Property at the site of proposed hole No. 1. Drilling began on July 10, 1958.

Inspected: July 10, 1958

Dewey H. Amos, Geologist
Geological Survey (DMEA)

z

DATE	INITIALS	COST
6/26	C	220
6/26	[illegible]	800
6/30	[illegible]	600

June 24, 1958

Mr. John W. Hook
Reynolds Metals Company
P. O. Box 84
Salem, Kentucky

Re: DMSA-1962 (Fluorspar)
Watson-Hicks-Tyner Properties
Crittenden County, Kentucky
Contract No. Ida-41199

Dear John:

We have received the executed copies of the subject exploration contract, and I assume that you have been so advised by your Company.

Please note that work is to start within 30 days of the date of the contract (i.e., on or before July 3) and be completed on or before March 10, 1959. Please advise me when you expect to begin work.

Please note also (Exhibit "A", pages 2-3) that the holes are to be drilled in numerical sequence as shown on the map, unless prior Government approval is obtained. Also, please note that holes 7 and 20 are not authorized by the contract.

Henry Amos will call on you on his way back from Missouri on Thursday, July 10, to inspect the project and discuss the contract with you.

Sincerely yours,

Robert A. Laurence
Executive Officer
DMSA Field Team, Region V

RAL/mg
cc - Operating Committee (2)
Mr. W. J. Lynch
Mr. G. L. Burmeister
Mr. Henry H. Amos
Mr. Robert E. Trace
Bill

DMEA Form 7
(12-56)

OFFICIAL FILE COPY

Date	Surname	Code
6/24	Houk	600
6/25	[illegible]	130
"	Johnson	110
"	Crittenden	100
6/26	[illegible]	220
		600

600

JUN 25 1958

Mr. Robert A. Laurence
Executive Officer, DMEA
Field Team, Region V
Room 13, Post Office Bldg.
Knoxville 2, Tennessee

Re: Docket No. DMEA-4962-Fluorspar
Reynolds Metals Company
Watson, Hicks and Tyner Properties
Crittenden County, Kentucky
Contract No. Idm-E1199

Docket No. DMEA-4963-Fluorspar
Reynolds Metals Company
Grimes (Eli Brown) Property
Livingston County, Kentucky
Contract No. Idm-E1200

Dear Mr. Laurence:

Reference is made to the telephone call of June 23, 1958, on the additions to Article 2, Section 2 of the Reynolds Metals Company's contracts. What call?

You may mark your copies of the contracts with the initials "C.O.M." indicating acceptance of the additions by DMEA.

Sincerely yours,

George C. Selfridge

Chairman, Operating Committee (GCS)

Approved:

Frank D. Lamb (GCS)
Member, Bureau of Mines

Thor H. Kiilsgaard (GCS)
Member, Geological Survey

LGHouk:gad 6/24/58
Copy to: Admr. R. File
Operating Committee
Mr. Kiilsgaard, 5222
Mr. McDougal, 3405
Mr. Houk

8623

DMEA Form 7
(12-56)

OFFICIAL FILE COPY

Date	Surname	Code

600

June 24, 1958

Memorandum to the files

From: Lawrence G. Houk, Director, Division of Nonmetallic Minerals

Subject: Additions to Article 2, Section 2, by Reynolds Metals Company's Attorney

Docket No. DMEA-4962-Fluorspar
Reynolds Metals Company
Watson, Hicks and Tyner Properties
Crittenden County, Kentucky
Contract No. Idm-E1199

Docket No. DMEA-4963-Fluorspar
Reynolds Metals Company
Grimes (Eli Brown) Property
Livingston County, Kentucky
Contract No. Idm-E1200

The Reynolds Metals Company's Attorney added: "and Indenture of Mortgage and Deed of Trust dated June 1, 1955, held by Manufacturers Trust Company which is by its terms subject to the lien provided for in this contract." This clause has been used in previous contracts but was not added to DMEA-4962 and DMEA-4963. The change was initialed by the Vice President of Reynolds Metals Company. Legal has accepted the change and Mr. Mittendorf has accepted and initialed the change on both contracts.

LGHouk:gad 6/24/58
Copy to: Admr. R. File
Mr. Houk

DMEA Form 7
(12-56)

OFFICIAL FILE COPY

Date	Surname	Code
5/21	Anderson	600
5/21	Houk	600
5-21	Chambers	800
6/2	GCS	130
6/3	Johnson	110
"	Stetbacks	100
6/4	C	220
		600

600

JUN 3 1958

Mr. Robert A. Laurence
Executive Officer, DMEA
Field Team, Region V
Room 13, Post Office Bldg.
Knoxville 2, Tennessee

Re: Docket No. DMEA-4962-Fluorspar
Reynolds Metals Company
Watson, Hicks and Tyner Properties
Crittenden County, Kentucky

Dear Mr. Laurence:

Enclosed are the original and four copies of a proposed long-form contract signed by the Administrator for the Government. It consists of the form, Annex I (1 page), Annex II (1 page), one Consent to Lien and Subordination Agreement, Exhibit "A" (5 pages), and one map. Also enclosed are two extra copies of Annex I, Annex II, Exhibit "A", and the map for Field Team use.

If the proposed contract meets with your approval, present it to the applicant for execution. Copies of the executed contract are to be distributed in the usual manner. If any part of this proposed contract does not have either your approval or that of the applicant and cannot be amended within your delegated authority, then the original and all copies of the contract and the two extra copies of Annex I, Annex II, Exhibit "A" and the map are to be returned to this office, together with the proposed changes for consideration.

Copies of memoranda dated April 29 and 30, 1958, by Mr. Robert B. McDougal, USBM, and Mr. T. H. Kiilsgaard, USGS, respectively, relating to the project are enclosed.

Sincerely yours,

George C. Selfridge

Chairman, Operating Committee (GCS)

Approved:

Frank D. Lamb (GCS)
Member, Bureau of Mines

Thor H. Kiilsgaard (GCS)
Member, Geological Survey

WCAnderson:rsi 5/21/58
Copy to: Admr. R. File
Operating Committee
Mr. Kiilsgaard, 5222
Mr. McDougal, 3405
Mr. Houk

Enclosures 15

8623

EXPLORATION PROJECT CONTRACT
REYNOLDS METALS COMPANY
DOCKET NO. DMEA-4962

EXHIBIT "A"

Description of the Work

General Provisions

Exploration for fluorspar shall be performed with conventional AX, BXWL, or BXM core drilling equipment in the area indicated on the map, entitled "Watson-Hicks-Tyner Props., Crittenden Co., Ky., DMEA-4962," attached hereto and made a part hereof.

The Government shall not contribute to the cost of an incompleted hole, or to one that bottoms less than AX size.

Records of each hole drilled, together with assay certificates of samples taken and type of rock penetrated, shall be submitted with the Operator's monthly progress report, which shall include a map showing the location, inclination and direction of all holes drilled during the reporting period. All samples shall be properly identified as to drill hole number and depths represented.

The holes shall be drilled into the fault zones as indicated on the map and as nearly normal to their strike as possible.

No hole shall be drilled closer than approximately 100 feet to a property line.

The work shall be divided into two stages as hereinafter described. The Operator shall complete Stage I, and shall perform as much of Stage II as the Government approves in writing.

The location, inclination, direction, and extent of all drilling are subject to the approval of the Government.

Stage I

Drill 18 diamond core holes at the approximate locations indicated on the map, aggregating not more than 6,900 feet, as follows:

No.	Property	Bearing	Inclination	Approximate depth	Exploration Target
1	Watson	S.67°E.	-45°	725 ft.	Dip extension of Two Brothers ore body
2	Watson	N.55°W.	-45°	425 ft.	Western extension of Two Brothers ore body
3	Watson	S.48°E.	-45°	500 ft.	Faults 3 and 12
4	Watson	N.48°W.	-45°	400 ft.	Fault 3
5	Watson	S.48°E.	-45°	300 ft.	Fault 12B
6	Watson	N.44°W.	-45°	350 ft.	Fault 3
8	Hicks	S.60°E.	-45°	250 ft.	Fault 10
9	Hicks	S.56°E.	-45°	450 ft.	Fault 10
10	Hicks-Watson	S.35°E.	-45°	280 ft.	Fault 12B
11	Tyner	S.57°E.	-45°	340 ft.	Intersection of faults 10 and 12B
12	Tyner	S.55°E.	-45°	330 ft.	Fault 10
13	Tyner	S.53°E.	-45°	350 ft.	Fault 10
14	Tyner	S.37°E.	-45°	530 ft.	Faults 3 and 4
15	Tyner	N.53°W.	-45°	270 ft.	Intersection of faults 3 and 4
16	Tyner	N.42°W.	-45°	350 ft.	Fault 3
17	Tyner	S.43°E.	-45°	330 ft.	Fault 3
18	Hicks	N.49°W.	-45°	350 ft.	Dip extension of Hicks ore body
19	Hicks	S.49°E.	-45°	250 ft.	Western extension of Hicks ore body

The holes shall be drilled in numerical sequence beginning with Hole No. 1 as shown on the map, except when information obtained from completed holes indicates that deviation from the numerical sequence, change of location, or omission of holes is advisable. Such changes may be made only with prior Government approval.

Stage II

Significant mineralization encountered in Stage I holes shall be further explored by diamond drilling not in excess of 8,000 feet of additional holes. The number, locations, inclinations, and depths of the holes shall be determined by agreement of the Operator and the Government. No Stage II hole shall be closer than ~~50~~ 100 feet to a previously completed hole.

Estimated Costs of the Project

Stage I

Actual Costs

Category (1) Independent Contracts

6,900 feet of diamond drilling @ $2.95/ft. 1/	$20,355.00
2,000 feet of reaming and casing @ $1.75/ft.	3,500.00
80 hours of cementing and hole survey @ $8.00/hr.	640.00
300 feet of lost casing, BX size, @ $2.16/ft 2/	648.00
300 feet of lost casing, AX size, @ $1.70/ft. 2/	510.00

Categories (2) through (7)

None

Fixed Unit Costs (See Article 13 of the Contract)

Incidental allowance for each foot of drilling completed 3/, 6,900 feet @ ~~$0.33/ft.~~ $0.28/ft.	1,932.00 ~~$2,277.00~~
75 wooden core boxes @ $3.00/box	225.00
75 samples to be assayed for CaF_2 @ $4.50/assay	337.50
25 samples to be assayed for CaF_2, Pb, and Zn @ $6.50/sample	162.50
Estimated total cost of Stage I	~~$28,655.00~~ 28,310.00

Stage II

Actual Costs

Category (1) Independent Contracts

8,000 feet of diamond drilling @ $2.95/ft. 1/	$23,600.00
2,000 feet of reaming and casing @ $1.75/ft.	3,500.00
100 hours of cementing and hole survey @ $8.00/hr.	800.00
300 feet of lost casing, BX @ $2.16/ft. 2/	648.00
300 feet of lost casing, AX size, @ $1.70/ft. 2/	510.00

Categories (2) through (7)

None

Fixed Unit Costs (See Article 13 of the Contract)

Incidental allowance for each foot of drilling completed 3/, 8,000 feet @ ~~$0.33/ft.~~ 0.28/ft	1,840.00 ~~$2,640.00~~
75 samples to be assayed for CaF_2 @ $4.50/assay	337.50
25 samples to be assayed for CaF_2, Pb, and Zn @ $6.50/assay	162.50

Estimated total cost Stage II (rounded)	31,399.00 ~~$32,199.00~~

S U M M A R Y

Estimated total cost, Stage I	28,310.00 ~~$28,655.00~~
Estimated total cost, Stage II	31,399.00 ~~32,199.00~~
Estimated total cost of Project (rounded)	59,710.00 ~~$60,854.00~~
Government participation @ 50 percent	~~$30,427.00~~ $29,855.00

1/ Includes costs of moving in and out, changing of locations, water supply, replacement of bits, and all charges which may be incurred by the diamond drill contractor.

2/ The Government will not contribute to the cost of casing left in the hole at the option of the Operator.

3/ Includes all costs that otherwise would be allowable costs under categories (1) through (7) except as scheduled in Exhibit "A."

Memorandum

To: Files

From: Walter C. Anderson

Subject: Incidental costs: DMEA 4962 and 4963.

1. Supervision

Basis for costs: Use of two drills, double shift, and 6 days a week on each project, with supervision consisting of resident geologist, geological assistant and two engineering assistants, working 6 hours/day.

Drilling progress: - 30 feet per shift per drill.

Time for drilling DMEA-4962, during which time DMEA-4963 will also be drilled.

Footage - 4962 -	Stage I	- 6900 feet	
	Stage II	- 8000 feet	
	Total	14900 feet	
" - 4963 -	Stage I	- 4200 feet	
	Stage II	- 8000 feet	
	Total	12200 feet	
			27,100

Drilling per day at 4962 - 4 x 30 = 120 feet

14900 ÷ 120 = (rounded) - 124 days

Supervisor of drilling puts in plus or minus 6 hrs./day or 800 to 900 hours.

Resident Geologist - 900 hours @ $3.60/hr. -	$3,240.00
Geological Assistant - 800 hours @ $1.85/hr. -	1,480.00
Engineering Assistant - 800 hours @ $1.80/hr.	1,440.00
Engineering Assistant - 800 hours @ $1.80/hr.	1,440.00
	$7,600.00

2. Miscellaneous

Engineering & accounting office expenses, 6 months @ $100.00/mo.	$600.00
Payroll taxes and insurance @ 6.0% on $6,160.00	456.00

Use of Company jeep to check drill rigs.

Salem, Kentucky to Watson Property and return - 8 miles.

Salem, Kentucky to Grimes Property and return - 6 miles.

Total 14 miles per day.*

* No road between Watson & Grimes Properties.

124 trips @ 14 miles/trip/day = 1736 miles

1736 miles @ $0.07/mile	121.52
Total (exclusive of drilling, core boxes & assaying)	$8,777.52

$\frac{8,777.52}{27,100}$ = (rounded) $ 0.33/ft of drilling.

Note: The Field Examiners' estimate of $0.40/ft. for incidentals was based on working the two projects one after the other, instead of simultaneously as this estimate is based on.

Walter C. Anderson, Nonmetallic Minerals

Form 7
(56)

OFFICIAL FILE COPY

Date	Surname	Code

600

May 8, 1958

Memorandum

To: Mr. C. O. Mittendorf, Administrator

From: Lawrence G. Houk, Director, Division of Nonmetallic Minerals

Subject: Reynolds Metals Company and New Jersey Zinc Company contracts and applications pending.

Reynolds Metals Company

DMEA	Idm-E	Mine Name	Total Amt. of contract	Govern. Part.	Amount Spent	Remarks
4372	1015	Ben Belt	$21,984.00	$10,992.00	$4,863.30	
4750	1152	Kemper	45,890.00	22,945.00	7,958.93	
4962	(	Watson, Hicks, Tyner	60,854.00	30,427.00	-0-	contract preparation.
4963	(	Grimes	128,728.00	64,364.00		

New Jersey Zinc Company

4907	Project II	$40,635	contract recommended.

LGHouk:gad 5/8/58

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DMEA
RECEIVED APR 30 1958

DATE	INITIALS	CODE
4/30	C	220
		600

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

Date April 29, 1958

DMEA Docket No. 4962
DMEA Contract No.
Commodity Fluorspar
Name of Applicant Reynolds Metal Company
Name of property Watson, Hicks, Tyner
Location of property Crittenden County, Ky.
Estimated cost of project $62,096.00

Memorandum

To: Lawrence G. Houk, Chief, Non-Metallic Division, Defense Minerals Exploration Administration

From: Robert B. McDougal, Commodity Specialist, Branch of Construction and Chemical Materials

Subject: Review of Field Team Report
(~~Application~~, Field Team Report, etc.)

1. Date of subject document: 4/18/58. 2. Date received by reviewer: 4/28/58

3. Prior reports on this property known to reviewer: Yes ☐ No ☐

4. Prior reports on nearby properties known to reviewer: Yes ☐ No ☐

5. Information available on past production: Yes ☐ No ☐

6. Other pertinent factors known to reviewer: Yes ☐ No ☐

7. Explain items marked 'yes' above:

8. Factors needing special consideration:
   a. Location ☐
   b. Ownership ☐
   c. Evidence of mineralization ☐
   d. Geology ☐
   e. Proposed exploration method ☐
   f. Alternate exploration method ☐
   g. Costs
   h. _____ ☐

9. Action advised:
   a. Obtain information from applicant ☐
   b. Refer to Field Team ☐
   c. Denial ☐
   d. Agree with Field Team ☒
   e. Disagree with Field Team ☐
   f. Suggest alternate plan ☐
   g. Request another examination ☐
   h. Approval ☐
   i. Consult with Mr. _____ at _____ AEC office.

10. Remarks: (Use back of page if necessary)

Copy to: Thor H. Kiilsgaard, Rm. 5222
Frank D. Lamb
Division of Minerals
Br. of Const. & Chem. Mats.
F I L E S

Robert B. McDougal

Robert B. McDougal

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION

ROOM 13 POST OFFICE BLDG.
KNOXVILLE 2, TENN.

APR 21 1958

4/21	C	220
4/25	JHB	130
4/25	C	220
		600

April 18, 1958

Memorandum

To: Operating Committee, DMEA, Washington, D. C.

From: Field Team, DMEA, Region V, Knoxville, Tennessee

Subject: Examination Report - Docket No. DMEA-4962 (Fluorspar)
Reynolds Metals Company, Richmond, Virginia
Watson, Hicks and Tyner properties, Crittenden County, Ky.

Enclosed are the original and two copies of the field examination report on the subject application.

Based on past history of the Moore Hill fault system and the examiners' interpretation of the geologic conditions, this appears to be a favorable site for exploration. Therefore, we recommend approval of a two-stage contract as outlined in the report, with fixed unit costs for (1) all engineering geological and other service (i.e. "incidental allowance"), (2) core boxes, (3) assays, and estimated costs for independent contract work.

Robert A. Laurence
Robert A. Laurence
Executive Officer

V. J. Lynch
V. J. Lynch, Member
Bureau of Mines

Ex. - Site Exam Rpt

Enclosures 3

Reviewed by
DMEA OPERATING COMMITTEE
4-25-58
(date)

4/25 ~~2/2~~ 130
220

UNITED STATES
DEPARTMENT OF THE INTERIOR

DEFENSE MINERALS EXPLORATION ADMINISTRATION
REGION V

FIELD EXAMINATION REPORT

ON

WATSON, HICKS AND TYNER PROPERTIES
Crittenden County, Kentucky
DMEA-4962 (Fluorspar)

By

Dewey H. Amos, Geologist
Geological Survey

and

H. L. Burmeister, Mining Engineer
Bureau of Mines

April 12, 1958

Reviewed by
DMEA OPERATING COMMITTEE
4-25-58
(date)

SUMMARY

The Watson, Hicks and Tyner properties lie along the Moore Hill fault system, one of the major producing units of the western Kentucky fluorspar district. Considerable production of fluorspar has been obtained from the Watson and Hicks properties and large tonnages have been recovered from the Davenport and Eagle-Watson mines which are located on contiguous tracts. Several major faults which have not been explored traverse the properties. They are structurally and stratigraphically favorable for significant fluorspar mineralization. It is recommended that exploratory assistance be granted and a two-stage drilling program is proposed. The Applicant's exploration proposal has been modified slightly to which the Applicant is in agreement.

Core drilling bids were not included in the application but were obtained at the time of the examination. One copy each of bids from Joy Manufacturing Company and E. J. Longyear Company were sent to the Executive Officer for attachment to the original of the application.

Arrangements have been made for the Applicant to immediately supply "Consent to Lien" to the Executive Officer.

INTRODUCTION

A field examination of the Watson, Hicks and Tyner properties was conducted on April 5, 1958 by H. L. Burmeister, USBM, and D. H. Amos, USGS. Messrs. John Hook and Thomas Winans, the Applicant's geologists in the western Kentucky fluorspar district, accompanied

the examiners on this inspection which required about three hours. In addition, Burmeister spent April 7th in discussion with the Applicant's representatives regarding costs and Burmeister and Amos spent April 8th in discussion with the Applicant's geologists concerning the proposed exploration program.

LOCATION AND ACCESSIBILITY

The Watson, Hicks and Tyner properties are contiguous tracts in the western Kentucky fluorspar district near the west-central border of Crittenden County. The properties are about nine miles southwest of the town of Marion (see attached location map).

The properties are about one mile south of hard-surfaced U. S. Highway No. 60. All-weather gravel roads extend from Highway 60 to the Two Brothers mine located along the northeast border of the Watson property and to the Davenport mine near the property line between the Watson and the Hicks properties. Numerous dirt roads traverse the properties making the area accessible to drilling equipment. Relief is moderate and the area is either lightly forested or cleared fields; thus, any necessary roads could be constructed at a very modest cost.

AVAILABILITY OF LABOR, SUPPLIES, EQUIPMENT, ETC.

As the Applicant proposes to have the drilling done under contract, availability of labor, supplies and equipment is not of immediate concern. Experienced mining personnel can be obtained locally. Most kinds of mining materials, supplies and equipment can be purchased in nearby towns. Any other required material could be shipped to Marion by rail.

Except during periods of heavy rains, the surface streams do not contain adequate water for core drilling needs. The Applicant has obtained permission to pump water for drilling purposes from the Davenport No. 4 shaft on an adjacent property (see attached map). Any mining operations conducted on the properties would supply sufficient water for milling or other needs.

Electric power is available at the Two Brothers mine on the Watson property and at the Davenport mine on the adjacent Davenport property (see attached geologic map). Railway shipping facilities are available at Marion, about nine miles northeast of the properties.

APPLICANT'S PROPERTY RIGHTS

The area under consideration consists of three separate but contiguous properties. These properties are known and referred to in the legal description attached to the application by name and number as the Watson (28), Hicks (27) and Tyner (26). All of these properties are held by the Applicant under a four year lease with option to purchase from the Fluorspar Consolidated, Inc. The lease is dated December 26, 1957. The Fluorspar Consolidated, Inc., has title to the mineral rights only on the Watson, Hicks and Tyner properties.

In the Applicant's letter of transmittal attached to the application, it is stated that "Consent to Lien" can and will be secured and submitted. This had not been done at the time of the examination. Copies of Form MF-205 have been supplied the Applicant and proceedings are now underway to secure a "Consent to Lien".

COMPETENCY OF APPLICANT

The Applicant has had extensive exploration and mining experience in fluorspar ores and in the past has successfully conducted exploration similar to that proposed in the application. The Applicant has had two prior DMEA contracts in the western Kentucky fluorspar district (DMEA-4372 and DMEA-4750). Work completed under both of the contracts was conducted in an efficient and satisfactory manner. Any exploration program would be under the direct supervision of competent personnel of the Geological Division of Reynolds Metals Company who have had experience in the district.

PAST OPERATIONS AND EXPLORATION

A detailed history of the past mining operations conducted on the properties is given in the application. A summary of estimated past production from the properties under consideration and from the contiguous properties is as follows:

Two Brothers mine (Watson property)	60,000 T. fluor.
Hicks mine (Hicks property)	5,000 T. fluor.
Davenport mine (Davenport property)	100,000 T. fluor.
Eagle-Watson mines (Eagle-Watson property)	200,000 T. fluor.

No known reserves have been developed on the Watson, Hicks or Tyner properties. Considerable reserves are believed to exist in the Davenport and the Eagle-Watson mines, although the amount is not known. The Aluminum Corporation of America controls drilled reserves on the Eagle-Watson property adjacent to the Two Brothers mine. The amount, extent and exact location of these reserves are not known.

Scattered prospect pitting, shafting and drilling has been conducted on the properties under consideration (see attached map for locations). The history of most of this work is not known. The U. S. Bureau of Mines conducted exploratory drilling in the area during World War II (USBM Report of Investigation 3943). A few of these holes were along the northwestern boundary of the Watson property but failed to discover ore (see attached geologic map for locations).

DESCRIPTION OF PROPERTIES

A description of the Two Brothers mine (Watson property) and of the Hicks mine (Hicks property) is given in the application, in USGS Bulletin 1012-E and in USBM Report of Investigation 3943. Both mines are now flooded, partially caved and inaccessible. No surface or underground facilities exist on the properties.

GEOLOGY

The western Kentucky fluorspar district is underlain by flat-lying sedimentary beds of Upper Mississippian age which are displaced by numerous normal faults. The faults commonly have steep dips and the major ones have a northeasterly strike. Many minor faults of limited displacement and extent occur transverse to the regional structural trend. Mineralization consists of fluorite with subordinate sphalerite and galena in a gangue of calcite and barite. It occurs as cavity-filling deposits along the faults and is accompanied by minor replacement.

Stratigraphic units present in the vicinity of the Grimes property are as follows:

	Stratigraphic Unit	Thickness
	Hardinsburg sandstone	100 ft.
	Golconda limestone and shale	135 ft.
	Cypress sandstone	90 ft.
Chester series	Paint Creek shale	10 ft.
	Bethel sandstone	80 ft.
	Renault limestone and shale	90 ft.
	Ste. Genevieve formation	
	Levias limestone	10 ft.
Meramac series	Rosiclare sandstone	10 ft.
	Fredonia limestone	205 ft.
	St. Louis limestone	500 ft.

Detailed lithologic descriptions of these units are given in USGS Bulletin 1012-E.

Since the deposits are predominately of cavity-filling origin, major mineralization is restricted along the faults to places where both walls consist of competent rock units (massive limestone and/or sandstone). Significant mineralization occurs at certain favored stratigraphic positions along the faults; namely, (1) the middle and upper part of the Fredonia limestone member, (2) the upper part of the Renault limestone, and (3) the upper part of the Levias limestone member and the basal portion of the Renault limestone. The largest deposits and the major production of the western Kentucky district occur where at least one wall of the faults consist of the Fredonia limestone member of the Ste. Genevieve

formation. Individual ore bodies commonly have a strike extent 400 to 600 feet and may have a dip extent up to 200 feet. Such bodies are generally most productive at or near fault intersections.

The Watson, Hicks and Tyner properties lie along the Moore Hill fault system, one of the major producing units of the district. In the vicinity of the properties under consideration the Moore Hill fault system is 1000 to 1200 feet wide and trends in a N.45°E. direction. This system is bounded by two major faults which are approximately parallel; the Moore Hill fault on the northwest side and a fault, designated as "Fault No. 3" by the Applicant, on the southeast side (see attached geologic map). At least ten cross-faults traverse the fault system on or near the Watson, Hicks and Tyner properties. As exposures of bedrock are poor in the area, several other cross-faults probably exist.

Considerable production of fluorspar has been obtained from the properties under consideration and from contiguous tracts. An estimated 60,000 tons of fluorspar have been recovered from the Two Brothers mine located along the central part of the northeastern boundary of the Watson property. An equal amount of reserves can be inferred for this mine. The Aluminum Corporation of America controls drilled reserves on the Eagle-Watson property that are immediately adjacent to the Two Brothers mine. The amount, extent and exact location of these reserves are not known. This mineralization occurs along "Faults 3 and 12" (see attached geologic map). A detailed description of the geology of the Two Brothers mine is given in the application and in USBM Report of Investigation 3943.

The major portion of the past production has been from the Renault limestone and the upper part of the Fredonia limestone member.

Past production of the Davenport mine which is located northwest of the Watson property and northeast of the Hicks property has exceeded 100,000 tons of fluorspar. The main mineralization occurs along the Moore Hill fault and along "Faults No. 10 and 11". Several cross sections of the mine are presented in the application and a detailed description is given in USBM Report of Investigation 3943. The Eagle-Watson mine which is located on the Eagle-Watson property northeast of the Davenport mine and north of the Watson property has produced about 200,000 tons of fluorspar from mineralization along the Moore Hill fault and along "Fault No. 10". Both the Davenport and the Eagle-Watson mines have been inoperative since the decline of fluorspar prices in the early 1950's. The main production from these two mines has been where the Fredonia limestone member of the Ste. Genevieve formation constitutes both walls of the faults. Reserves of the mines are not known but are believed to be considerable, possibly about equal to the total past production.

About 5,000 tons of fluorspar have been recovered from the Hicks mine which is located along the northeast-central boundary of the Hicks property. This production was from the Moore Hill Fault adjacent to the Fredonia limestone member. About 5,000 tons of reserves of fluorspar can be inferred at this mine. All production is reported to have been from above the 100-foot level.

Minor amounts of fluorspar have been produced from the Moore Hill fault just northwest of the Tyner property. This production is reported to have been from shallow depths and to have been low in grade. Traces of fluorite occur on dumps of prospect pits and shafts scattered throughout the area and all drilling conducted on the Watson, Hicks and Tyner properties has revealed shines of fluorite (USBM Report of Investigation 3943).

All prior exploration conducted in the area has been confined chiefly to the Moore Hill fault, to "Faults 3 and 12" in the vicinity of the Two Brothers mine, and to the eastern end of "Fault 10"(along the northwestern edge of the Watson property). The remainder of the area traversed by faults has not been explored. All of these faults are favorable sites for mineralization (open, normal-type faults) and have the most favorable stratigraphic unit of the area (Fredonia limestone) along at least one wall at a reasonably shallow depth. This favorable stratigraphic unit occurs at a depth not in excess of 350 feet along all the known faults underlying the Watson, Hicks and Tyner properties.

APPLICANT'S PROPOSAL

The Applicant proposes to explore for fluorspar mineralization along all the major faults which traverse the Watson, Hicks and Tyner properties. A two-staged exploration program is proposed; all exploration is to consist of diamond core drilling. It is proposed that Stage I consist of drilling 20 holes totaling an

estimated 8,000 feet. Stage I holes would be spaced about 400 feet along all the known faults that underlie the properties. Any significant mineralization encountered in Stage I holes would be further explored by Stage II drilling. The Applicant proposes that an additional 8,000 feet of drilling be provided for in Stage II.

It is suggested by the Applicant that Bx wire-line core drilling be employed and that the "dry-core" drilling method, recently developed by the Applicant for this district, be used where necessary in sampling fault zones. A detailed description of this method is given in the application.

RECOMMENDATIONS

It is strongly recommended that exploration assistance be granted on the Watson, Hicks and Tyner properties. The following factors favor discovery of significant deposits of fluorspar:

(1) The Watson, Hicks and Tyner properties occur along the Moore Hill fault system which has been one of the major producing units of the western Kentucky fluorspar district. These properties are at about the center of production along this belt.

(2) Considerable production has been obtained from the Watson and Hicks properties and large tonnages have been recovered from the Davenport and the Eagle-Watson mines which are located on contiguous tracts.

(3) The structures from which the past production has been obtained traverse the Watson, Hicks and Tyner properties and have not been explored.

(4) Additional unexplored faults similar in character to those from which past production has been obtained underlie the properties. Prospect pitting, shafting and drilling has revealed mineralization along these structures.

(5) The most favorable stratigraphic unit of the area, the Fredonia limestone member of the Ste. Genevieve formation, is present along all of the known faults on the properties at depths less than the economic mining limits of the district.

A two-stage exploration contract consisting of diamond core drilling is recommended. This drilling should be of Ax, BxWL or BxM size. Stage I should consist of 18 holes summarized as follows (proposed locations are shown on the attached geologic map):

No.	Property	Bearing	Inclination	Estimated Depth	Exploration Target
1	Watson	S.67°E.	-45°	725 ft.	Dip extension of Two Brothers ore body.
2	Watson	N.55°W.	-45°	425 ft.	Western extension of Two Brothers ore body.
3	Watson	S.48°E.	-45°	500 ft.	Faults 3 and 12.
4	Watson	N.48°W.	-45°	400 ft.	Fault 3.
5	Watson	S.48°E.	-45°	300 ft.	Fault 12B.
6	Watson	N.44°W.	-45°	350 ft.	Fault 3.
8	Hicks	S.60°E.	-45°	250 ft.	Fault 10.
9	Hicks	S.56°E.	-45°	450 ft.	Fault 10.
10	Hicks-Watson	S.35°E.	-45°	280 ft.	Fault 12B.
11	Tyner	S.57°E.	-45°	340 ft.	Intersection of faults 10 and 12B.
12	Tyner	S.55°E.	-45°	330 ft.	Fault 10.

No.	Property	Bearing	Inclination	Estimated Depth	Exploration Target
13	Tyner	S.53°E.	-45°	350 ft.	Fault 10.
14	Tyner	S.37°E.	-45°	530 ft.	Faults 3 and 4.
15	Tyner	N.53°W.	-45°	270 ft.	Intersection of faults 3 and 4.
16	Tyner	N.42°W.	-45°	350 ft.	Fault 3.
17	Tyner	S.43°E.	-45°	330 ft.	Fault 3.
18	Hicks	N.49°W.	-45°	350 ft.	Dip extension of Hicks ore body.
19	Hicks	S.49°E.	-45°	250 ft.	Western extension of Hicks ore body.

These 18 holes total 6,730 feet; an additional footage of 170 feet should be provided for in Stage I as a "safety factor". Several of the faults can be located only approximately and faults in this district commonly change amount of dip and even direction within a short distance. Inclusion of this additional footage would total 6,900 feet for Stage I. This is 1,100 feet less than requested by the Applicant. Two of the holes proposed by the Applicant do not appear justified by existing DMEA policies. In addition, the locations of three other proposed holes have been changed slightly. A summary of these eliminations and changes compared to the Applicant's proposal is as follows:

Applicant's Proposed Hole No.	Remarks
1	Collar location moved 100 feet south to maintain a reasonable distance from an exterior property; target and depth remains the same and hole is to intersect the favorable structure at about the same place; bearing of hole altered slightly.

Applicant's Proposed Hole No.	Remarks
7	Eliminate hole; too close to exterior property line.
10	Collar location moved 120 feet northeast to maintain a reasonable distance from an exterior property line; Bearing, depth and general target remains the same.
17	Collar location moved 80 feet southwest to maintain a reasonable distance from an exterior property line; bearing, depth and general target remain the same.
20	Eliminate hole; target at property line; both walls of the proposed target is the St. Louis limestone which is not productive in this district.

The Applicant is in agreement with these changes in the original proposal.

The holes would probably be drilled in numerical sequence, although information obtained from completed holes might necessitate deviation from the planned sequence for the remaining holes. As many of the faults in the area can be only approximately located with existing data, locations of several of the holes will probably have to be changed once drilling is underway. In addition, completion of some of the proposed holes may indicate that others will not be warranted. Any contract should provide for deviation from the numerical sequence, change of location and omission of holes. Significant changes in location and the omission of holes should have prior Government approval.

It is proposed that Stage II drilling provide for about 20 holes totaling 8,000 feet; the total footage proposed in this stage is the same as requested by the Applicant. The estimated depth per hole in Stage II is 400 feet; this is about 70 feet more than the estimated average for Stage I holes. The increased average depth of Stage II holes will be required as some of the holes may be exploration for possible down dip extensions of mineralization encountered in Stage I holes. Prior Government approval should be required before entry into Stage II can be effected and for all Stage II hole locations.

The "dry-core" drilling method recently developed by the Applicant for this district during work on the Ben Belt property (DMEA-4372) will be used for the proposed exploration when necessary and any extra cost will be borne by the Applicant. Core recovery of veins in this district has been very poor when conventional drilling methods have been employed because mineralized ground is often badly broken and weathered. Examination of many logs from this district reveals that fault zones (sites of mineralization) are commonly recorded as cavities. Undoubtedly much ore in the district has been overlooked because of poor core recovery. A detailed description of the method is given in the application.

Any significantly mineralized ground should be assayed for CaF_2 and where applicable for lead and zinc. Breaks in an individual run to be assayed should be made at significant changes in mineralization. No individual assay should exceed five feet in length.

Work under a contract could begin within 60 days and be completed within 15 months after date of contract.

ESTIMATED COSTS

In this estimate, recognition has been taken of the fact that the exploration area contains a number of faults the characteristics of which are little known. This will make close supervision necessary. Previously used core boxes are available from prior DMEA contracts and will decrease the number that will have to be purchased.

Stage I

Independent Contracts

6900ft. Ax,BxWL or BxM drilling @$2.95/ft.	$20,355.00	
2000ft. Reaming and casing @$1.75/ft.	3,500.00	
80hr. Cementing and hole survey @$8.00/hr.	640.00	
300ft. Lost casing, Bx size @$2.16/ft.	648.00	
300ft. Lost casing, Ax size @$1.70/ft.	510.00	
		$25,653.00

3.72

Supervision, Payroll Taxes, Travel, Etc.

6900ft. @$0.40/ft. (incidental allowance)	2,760.00

Supplies

75 core boxes @$3.00/box	225.00

Assays

75 assays for CaF_2 @$4.50/assay	$337.50	
25 assays for CaF_2, Pb and Zn @$10.50/assay	262.50	
		600.00
Total Stage I		$29,238.00

This is what it costs ~~the~~ in the area for assays - WDA

Stage II

Independent Contracts

8000ft. Ax,BxWL or BxM drilling @$2.95/ft.	$23,600.00	
2000ft. Reaming and casing @$1.75/ft.	3,500.00	
100hr. Cementing and hole survey @$8.00/hr.	800.00	
300ft. Lost casing, Bx size @$2.16/ft.	648.00	
300ft. Lost casing, Ax size @$1.70/ft.	510.00	
		$29,058.00

Supervision, Payroll Taxes, Travel, Etc.

3.62

8000ft. @$0.40/ft. (incidental allowance)	3,200.00

Supplies

None

Assays

75 assays for CaF_2 @$4.50/assay	$337.50	
25 assays for CaF_2, Pb and Zn @$10.50/assay	262.50	
		600.00
Total Stage II		$32,858.00

Total Estimated Cost of Stage I and Stage II $62,096.00

Dewey H. Amos
Geologist
U.S. Geological Survey

H. L. Burmeister
Mining Engineer
U. S. Bureau of Mines

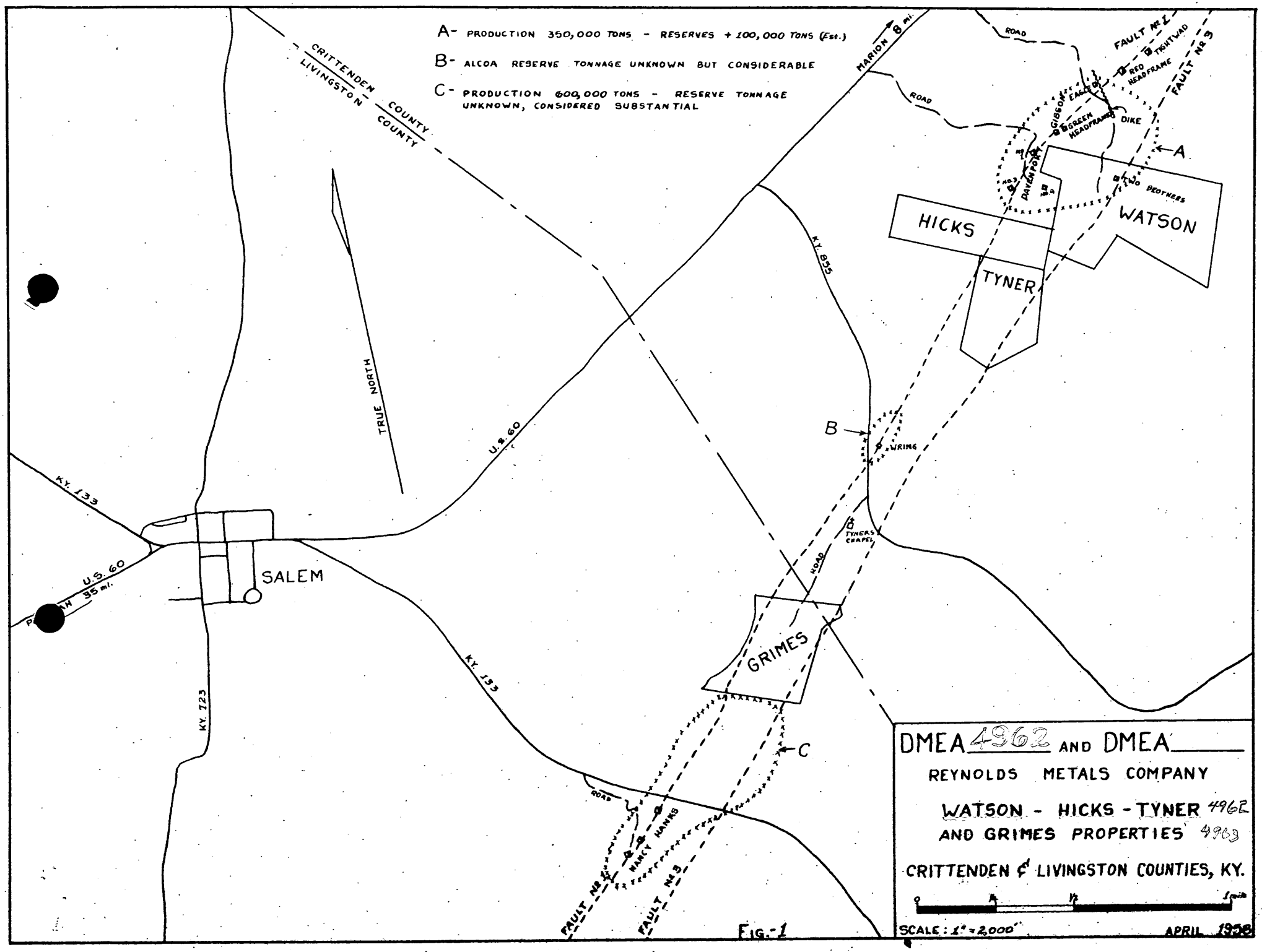

A- PRODUCTION 350,000 TONS - RESERVES + 100,000 TONS (Est.)
B- ALCOA RESERVE TONNAGE UNKNOWN BUT CONSIDERABLE
C- PRODUCTION 600,000 TONS - RESERVE TONNAGE UNKNOWN, CONSIDERED SUBSTANTIAL
CRITTENDEN COUNTY
LIVINGSTON COUNTY
MARION 8 mi.
ROAD
FAULT Nº 2
FAULT Nº 3
TIGHTWAD
RED HEADFRAME
EAGLE
GIBSON
GREEN HEADFRAME
DIKE
DAVENPORT
TWO BROTHERS
A
HICKS
WATSON
TYNER
KY. 855
TRUE NORTH
U.S. 60
B
WRING
TYNER'S CHAPEL
KY. 133
U.S. 60
95 mi.
SALEM
GRIMES
KY. 723
KY. 133
C
NANCY HANKS
FAULT Nº 2
FAULT Nº 3
DMEA 4962 AND DMEA
REYNOLDS METALS COMPANY
WATSON - HICKS - TYNER 4962
AND GRIMES PROPERTIES 4963
CRITTENDEN & LIVINGSTON COUNTIES, KY.
SCALE: 1" = 2,000'
APRIL 1958

FIG.-1

OFFICIAL FILE COPY
DMEA
RECEIVED APR 21 1958

DATE	[illegible]	CODE

COPY

attach to Watson

Salem, Kentucky
Feb. 20, 1958

EXTRA COPY 4962
DMEA
RECEIVED APR 21 1958
DATE | INITIALS | CODE

Dr. J. H. Moses
Reynolds Metals Company
Boyle Building
Little Rock, Arkansas

Drilling Bids on Watson and Grimes DMEA Projects

Dear John:

Enclosed are the Joy bids on subject contracts. The Longyear bids were sent directly to your office with a corbon to me.

The Joy bid is better in all respects except for casing left in the hole which is usually a minor item:

	Longyear	Joy	
Overburden Drilling	$3.00	$2.95	per ft.
AX and/or BXWL	$3.00*	"	"
Ditto in quartzite	$3.30*	"	"
BXL = BXM	$3.50*	"	"
Ditto in quartzite	$3.80*	"	"
Reaming and Casing	$1.75**	$1.75	"
Cementing	$8.00	$8.00	per hr.
Acid Surveys and delays	8.00	$8.00	per hr.
AX casing lost	——	1.70	per ft.
BX casing lost	——	$2.16	per ft.

* Price from top of ledge to 500 feet. Add $0.25 per ft. from 500 to 1000 feet. The Joy price of 2.95 is from 0 to 800 feet.
** Price to ream hole to receive B X casing. Longyear also had a price of $1.25 for reaming AX hole to receive AX casing. The Joy bid is for a BXWL hole which will receive AX casing without reaming.

In addition to the better bid, I have more confidence in the Joy drillers. Thus far on the Kemper drilling they have made almost 100% recovery in the vein material.

Yours very truly,

John W. Hook

JOY MANUFACTURING COMPANY

900 WOODLAND AVENUE

MICHIGAN CITY, INDIANA

EXECUTIVE OFFICES
HENRY W. OLIVER BUILDING
PITTSBURGH 22, PA.

Watson Project

January 31, 1958

4962

Reynolds Metals Company
Salem, Kentucky

Attention: Mr. J. Hook

Dear Mr. Hook:

In accordance with your request, we set forth below prices and conditions under which we are prepared to undertake a minimum of 4,000 feet of drilling at the ~~Eagle~~ Watson Project near Salem, Kentucky, and which will be for the exploration of fluorspar deposits.

BX Wireline and BXM Drilling	@ $2.95 per ft.
Reaming and Casing	@ $1.75 per ft.
Cementing Drill Holes	@ $8.00 per hour
Acid Surveys & Delays on your part	@ $8.00 per hour
BX Casing lost or ordered left in place	@ $2.16 per ft.
AX Casing lost or ordered left in place	@ $1.70 per ft.

The above per foot prices cover holes to maximum depths of 800 feet.

We will furnish water for drilling purposes provided that the holes are spotted not more than 3,000 feet from an ample source of supply.

If it is your desire to save cores of the drilling, then it will be necessary that you furnish the proper containers for same.

We will furnish for this proposed drilling one of our Joy gasoline driven core drills complete with operating equipment, and will conduct the drilling operations on the basis of one or two 8-hour shifts per day and six days per week.

We have the necessary equipment and crews available, and can start this work on short notice.

Thank you for giving us an opportunity of quoting on your requirements. We hope that we may have the pleasure of being of service to you.

Yours very truly,
JOY MANUFACTURING COMPANY

W. J. Pilprski, Manager
Contract Drill Division

WJP/ct

Longyear

E. J. LONGYEAR COMPANY
General Offices, Foshay Tower
Minneapolis 2, Minnesota, U. S. A.
TELEPHONE: FEDERAL 2-2447 • CABLE LONGCO

February 15, 1958

4962

Reynolds Metals Company
Boyle Building
Little Rock, Arkansas

Attention: Mr. J. H. Moses, Chief Geologist

DIAMOND CORE DRILLING - NEAR MARION, KENTUCKY - WATSON AND GRIMES PROPERTIES

Gentlemen:

1. Based on the information furnished by our Mr. Williamson Ward after his conversations with your Mr. John Cook, we are pleased to submit below proposal for your contemplated diamond core drilling program which is to be carried out in the vicinity of Marion, Kentucky.

2. We understand that the drilling area will be accessible by truck transportation, and that the drill sites will also be accessible by truck-mounted drill rigs; that the work as now planned will consist of a series of holes to be drilled at angles varying from 45 degrees (measured from the horizontal) to vertical, averaging approximately 350 feet in depth; that the minimum footage will be 6,000 feet, with a possible maximum of 18,000 feet; that the materials penetrated will consist of interbedded, moderately-hard limestone, sandstone, shale, and possibly some quartzite; and that BX wire line or standard AX cores will be acceptable with the exception of some BXL standard coring in softer seams. We further understand that the water required for the drilling operations will be available within a maximum distance of 3,000 feet of any proposed drill hole, and that the source will be an old mine shaft at the Watson property, and from a creek at the Grimes property.

3. For this work we propose to furnish one Longyear truck-mounted diamond core drilling unit, together with the necessary accessory equipment, including rims and coring tools, required to accomplish the work. We further propose to operate the drill on a two shift basis, six days per week.

4. We will carry public liability insurance covering personal injury and property damage, and Workmen's Compensation insurance, and also, all-risk insurance on the drilling equipment protecting against loss by theft, fire, flood, land-slides and other similar hazards.

We will also assume and pay any and all Old Age Benefit, Unemployment and Social Security taxes and contributions imposed by federal or state authorities.

Certificates showing the coverage referred to will be furnished upon request.

5. Based upon the conditions as outlined above, we are pleased to quote as follows:

a) Overburden Drilling - in angle holes with minimum inclination of 45° (measured from the horizontal) -

0 to 75 feet in depth.....$3.40 per ft.

b) Diamond core drilling - in angle holes with minimum inclination of 45° (measured from the horizontal) -

4962

	Limestones, Sandstones, & Shales	Quartzite
Top of Ledge to 500 ft. in depth -		
AX standard, and/or AX wire line, recovering core approximately 1-3/16" in diameter.....	$3.00 per ft.	$3.30 per ft.
AXL - recovering core approximately 1-3/16" in diameter.....	$3.50 per ft.	$3.60 per ft.
500 to 1000 feet in depth -		
AX standard and/or BX wire line.....	$3.25 per ft.	$3.55 per ft.
BXL.....	$3.75 per ft.	$4.05 per ft.

c) Reaming and Casing

Top of Ledge to 500 feet in depth -

Ream AX hole to receive AX casing..... 1.[illegible] per ft.
Ream BX hole to receive BX casing..... 1.75 per ft.

500 to 1000 feet in depth -

Ream AX hole to receive AX casing.....$1.75 per ft.

d) Cementing, waiting for cement to set, and drilling out cement.....$[illegible].00 per hour, for two-man crew, plus cost of cement

e) Inclination testing.....$[illegible].00 per hour, for two-man crew

f) Delays for your convenience or for [illegible] you are responsible.....$[illegible].00 per hour, for two man crew

6. The above-quoted drilling rates are based on wages currently being paid in the State of Kentucky. If during the life of this project, it becomes necessary for us to adjust the wages being paid our workmen because of demands of labor union or otherwise, it is understood and agreed that the Longyear Company reserves the right to increase drilling rates to cover resultant additional operating expenses.

7. Drill cores will be turned over to your representative at the drilling site in receptacles furnished by you.

8. Invoices covering the work performed will be prepared promptly following the first of each month.

9. We appreciate very much the opportunity to consider this project. If our

proposal is found acceptable, we are prepared to furnish the necessary personnel and equipment within approximately fifteen days after receipt of official notice to proceed.

Sincerely,

E. J. LONGYEAR COMPANY

Manager
Contract Drilling Division

E.J.Gleason:bal

ACCEPTED:

REYNOLDS METALS COMPANY

By_____

Date_____

IN REPLY REFER TO:

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

MAY 1 1958

5/1	C	220
		600

April 30, 1958

Memorandum

To: L. G. Houk, Defense Minerals Exploration Administration

From: T. H. Kiilsgaard, U. S. Geological Survey

Subject: Review of Field Team Examination Report, DMEA Docket 4962 (Fluorspar) Reynolds Metals Company, Crittenden County, Ky.

Field Examiners have recommended a contract on the Watson, Hicks and Tyner properties held by the applicant. Like the Grimes property, these too are along the Moore Hill fault zone and are about at the center of the productive area along this fault zone. Considerable production has been obtained from the Watson and Hicks properties and large tonnages have been recovered from contiguous tracts. The Field Examiners strongly recommend exploration of these properties, although they have proposed a program slightly modified from that of the applicant. This modified program has the approval of the applicant. The Examiners also recommend that the "dry-core" drilling method suggested by the applicant be used in this project even though it is more expensive than conventional drilling.

I concur with the Field Team and recommend that a contract be approved.

T. H. Kiilsgaard

T. H. Kiilsgaard

DMEA Form 7
(12-56)

OFFICIAL FILE COPY

Date	Surname	Code
4/28	Houk	600
4/28	[illegible]	130
"	Johnson	110
"	Dietrich	100
4/28	[illegible]	220
		600

600

APR 28 1958

Mr. Robert A. Laurence
Executive Officer, DMEA
Field Team, Region V
Room 13, Post Office Bldg.
Knoxville 2, Tennessee

Re: Docket No. DMEA-4962-Fluorspar
Reynolds Metals Company
Watson, Hicks and Tyner Properties
Crittenden County, Kentucky

Dear Mr. Laurence:

The two copies of the Bureau of Mines memorandum dated April 23, 1958, by Mr. Robert B. McDougal, and the extra copy of the application mentioned in our letter of April 4, 1958, are enclosed.

Sincerely yours,

George C. Selfridge

Chairman, Operating Committee

Approved:

JAMES PAONE

Member, Bureau of Mines

Thor H. Kiilsgaard

Member, Geological Survey

Enclosures 3

LGHouk:gad 4/28/58
Copy to: Admr. R. File
Operating Committee
Mr. Kiilsgaard, 5222
Mr. Dietrich, 3061
Mr. Houk

8623

OFFICIAL FILE COPY DMEA RECEIVED APR 24 1958		
DATE	INITIALS	CODE
4/24	H. F.	220
		600

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

Date April 23, 1958

DMEA Docket No. 4962
DMEA Contract No.
Commodity Fluorspar
Name of Applicant Reynolds Metals Company
Name of property Watson-Hicks-Tyner
Location of property Crittenden County, Kentucky
Estimated cost of project $101,664.00

Memorandum

To: Lawrence G. Houk, Chief, Non-Metallic Division, Defense Minerals Exploration Administration

From: Robert B. McDougal, Commodity Specialist, Branch of Construction and Chemical Materials

Subject: Review of Application
(Application, [redacted])

1. Date of subject document: 3/18/58. 2. Date received by reviewer: 3/24/58

3. Prior reports on this property known to reviewer: Yes [X] No [ ]

4. Prior reports on nearby properties known to reviewer: Yes [X] No [ ]

5. Information available on past production: Yes [X] No [ ]

6. Other pertinent factors known to reviewer: Yes [X] No [ ]

7. Explain items marked 'yes' above:

See attached sheet.

8. Factors meeting special consideration:
   a. Location [ ]
   b. Ownership [ ]
   c. Evidence of mineralization [ ]
   d. Geology [ ]
   e. Proposed exploration method [ ]
   f. Alternate exploration method [ ]
   g. Costs
   h. _____ [ ]

9. Action advised:
   a. Obtain information from applicant [ ]
   b. Refer to Field Team [X]
   c. Denial [ ]
   d. Agree with Field Team [ ]
   e. Disagree with Field Team [ ]
   f. Suggest alternate plan [ ]
   g. Request another examination [ ]
   h. Approval [ ]
   i. Consult with Mr. _____ at _____ AEC office.

10. Remarks: (Use back of page if necessary)

Copy to: Thor H. Kiilsgaard, Rm. 5222
Frank D. Lamb
Division of Minerals
FILES Br. of Const. & Chem. Mats.

Robert B. McDougal

Robert B. McDougal

7. a. Bureau of Mines, Report of Investigations 3943, Exploration for Fluorite, Crittenden and Livingston Counties, Kentucky. Part I. Moore Hill Fault Vein, Crittenden and Livingston Counties, Kentucky, September 1946.

b. Geological Survey Bulletin 1012-E, F, Fluorspar Deposits in Western Kentucky. Part 3. Moore Hill Fault System, Crittenden and Livingston Counties.

c. Currier, Lewis Wade, Fluorspar Deposits of Kentucky, Kentucky Geological Survey, Series VI, 1923.

d. In mid 1940 J. D. Summers & Co., operator of the Two Brothers Mine, surrendered the lease. Production was about 65% less than in 1939. No production has been reported since according to information in the Fluorspar and Cryolite chapter, Minerals Yearbook.

DMEA Form 7
(12-56)

OFFICIAL FILE COPY

Date	Surname	Code
4/3	Houk	600
4/4	[illegible]	130
"	[illegible]	110
"	[illegible]	100
[illegible]	[illegible]	220

600

APR [illegible]

Mr. Robert A. Laurence
Executive Officer, DMEA
Field Team, Region V
Room 13, Post Office Bldg.
Knoxville 2, Tennessee

Re: Docket No. DMEA-4962-Fluorspar
Reynolds Metals Company
Watson, Hicks and Tyner Properties
Crittenden County, Kentucky

Dear Mr. Laurence:

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

Two copies of a memorandum dated March 27, 1958, by Mr. N. E. Nelson, USGS, relating to the project are enclosed. The Bureau of Mines memorandum and the extra copy of the application will be forwarded when received.

Sincerely yours,

George C. Selfridge

Chairman, Operating Committee (GCS)

Approved:

Frank D. Lamb (GCS)
Member, Bureau of Mines

Thor H. Kiilsgaard (GCS)
Member, Geological Survey

Enclosures 2

LGHouk:gad 4/3/58
Copy to: Admr. R. File
Operating Committee
Mr. Kiilsgaard, 5222
Mr. McDougal, 3522
Mr. Houk

8623

DMEA Form 7
(12-56)

OFFICIAL FILE COPY

Date	Surname	Code
4/3	Houk	600
4/4	Selbridge	130
4/4	Lamb	130
4/4	Kiilsgaard	130
"	Johnson	110
"	Rutledge	100
		220

600

APR 4 1958

Reynolds Metals Company
301 East Grace Street
Richmond, Virginia

Re: Docket No. DMEA-4962-Fluorspar
Reynolds Metals Company
Watson, Hicks and Tyner Properties
Crittenden County, Kentucky

Gentlemen:

Your application for assistance in exploring the subject property has been reviewed by the Division of Nonmetallic Minerals of the Defense Minerals Exploration Administration and has been referred to Mr. Robert A. Laurence, Executive Officer, DMEA Field Team, Region V, Room 13, Post Office Building, Knoxville 2, Tennessee, 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 you may give the members of the Field Team during the examination will be appreciated.

Sincerely yours,

(for)

Administrator

LGHouk:gad 4/3/58
Copy to: Admr. R. File
Operating Committee
Field Team, Region V
Mr. Kiilsgaard, 5222
Mr. McDougal, 3522
Mr. Houk

8623

IN REPLY REFER TO:

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

March 27, 1958
Re: DMEA 4962
Reynolds Metals Company
Watson-Hicks-Tyner tracts
Crittenden County, Kentucky
$101,664.00 - Fluorspar

Memorandum

To: L. G. Houk, Defense Minerals Exploration Administration

From: N. E. Nelson, U. S. Geological Survey

Subject: Review of application.

The applicant requests assistance in exploring by 2 stages of core drilling major faults which at other places in the general vicinity are known to be ore bearing. Each stage is estimated to consist of 8,000 feet of drilling.

The holes are planned to cut the faults at points where Fredonia limestone is one wall of the fault being tested.

Referral of the application to the Field Team is recommended.

N. E. Nelson

N. E. Nelson

If you have a chance, please tell Reynolds to number the pages of the applications. I have one page left over.

N.

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

March 20, 1958

Reynolds Metals Company
301 East Grace Street
Richmond, Virginia

Subject: DMEA-4962

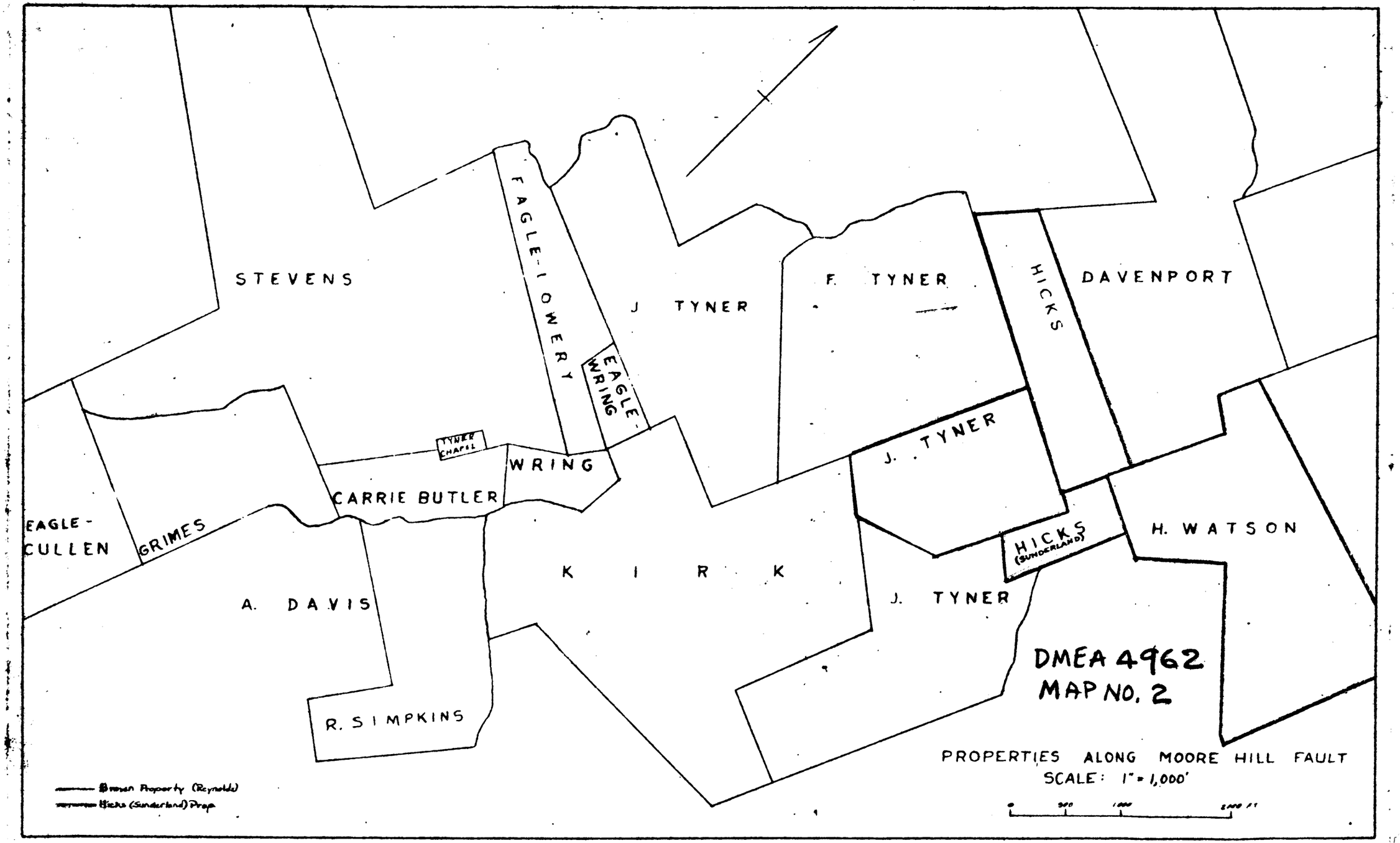
Gentlemen:

Your application for exploration assistance, dated March 12, 1958 submitted to our office at Washington, D. C. has been assigned Docket Number DMEA-4962 and referred to the Non Metallics Minerals Division in the Washington office. Kindly identify all future correspondence relating to your application by this Docket Number.

Sincerely yours,

Allen S. Dakan, Director
Operations Control and
Statistics Division

Copy to: Region V


STEVENS
FAGLE-LOWERY
J TYNER
F. TYNER
HICKS
DAVENPORT
EAGLE-WRING
TYNER CHAPEL
WRING
CARRIE BUTLER
J. TYNER
EAGLE-CULLEN
GRIMES
HICKS (SUNDERLAND)
H. WATSON
K I R K
A. DAVIS
J. TYNER
R. SIMPKINS
DMEA 4962
MAP NO. 2
PROPERTIES ALONG MOORE HILL FAULT
SCALE: 1" = 1,000'
Brown Property (Reynolds)
Hicks (Sunderland) Prop.

OFFICIAL FILE COPY
O. M. E.
RECEIVED FEB 9 1959

DATE	INITIALS	CODE

CROSS SECTION, WATSON - DAVENPORT AREA
CRITTENDEN COUNTY, KENTUCKY

SCALE 1" 100'

0 50 100 200 300

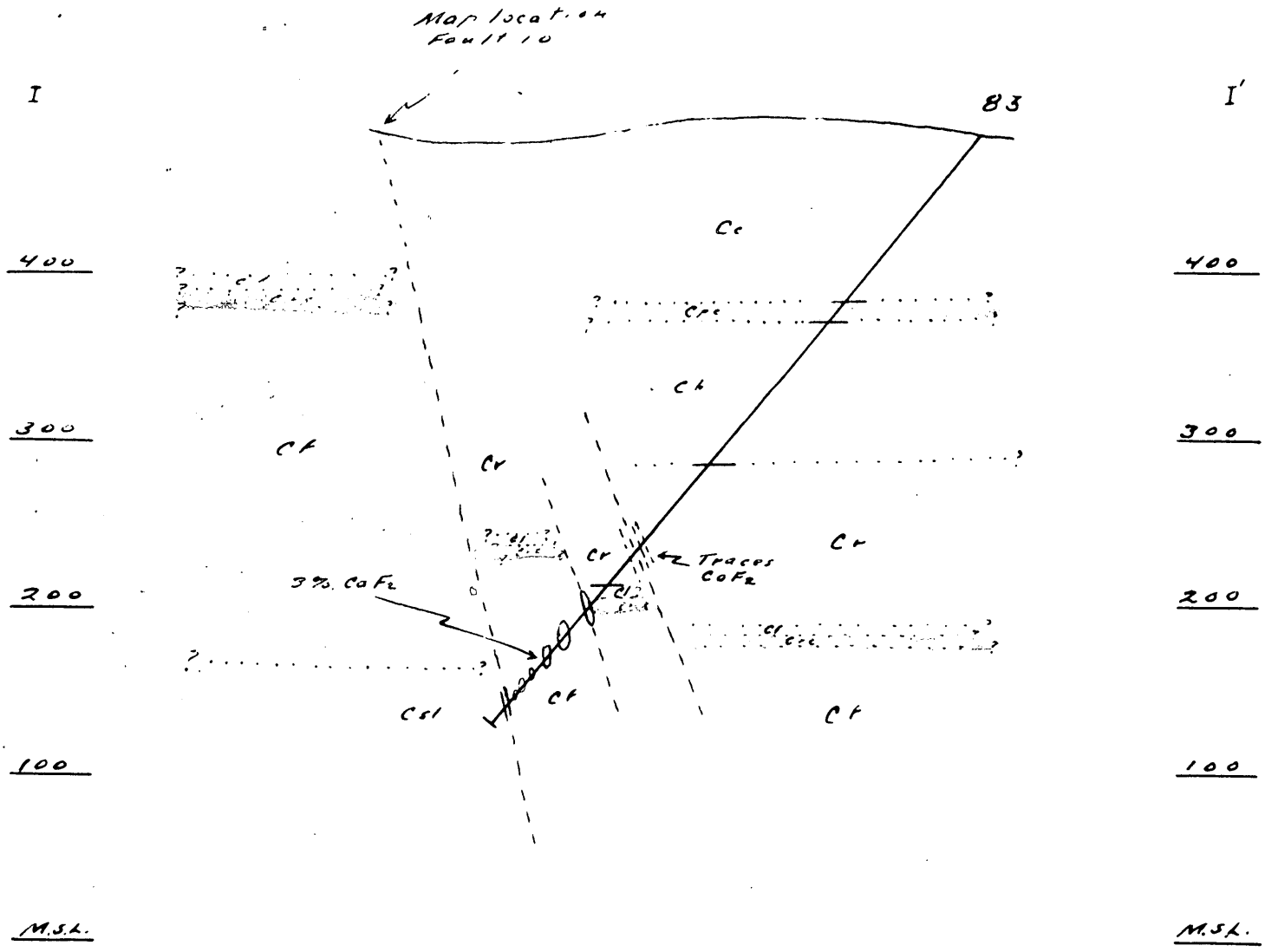


PLATE 10

OFFICIAL FILE COPY
DMEA
RECEIVED MAR 18 1958

DATE	INITIALS	CODE

CROSS SECTION, WATSON-DAVENPORT AREA
CRITTENDEN COUNTY, KENTUCKY

SCALE: 1" = 100'

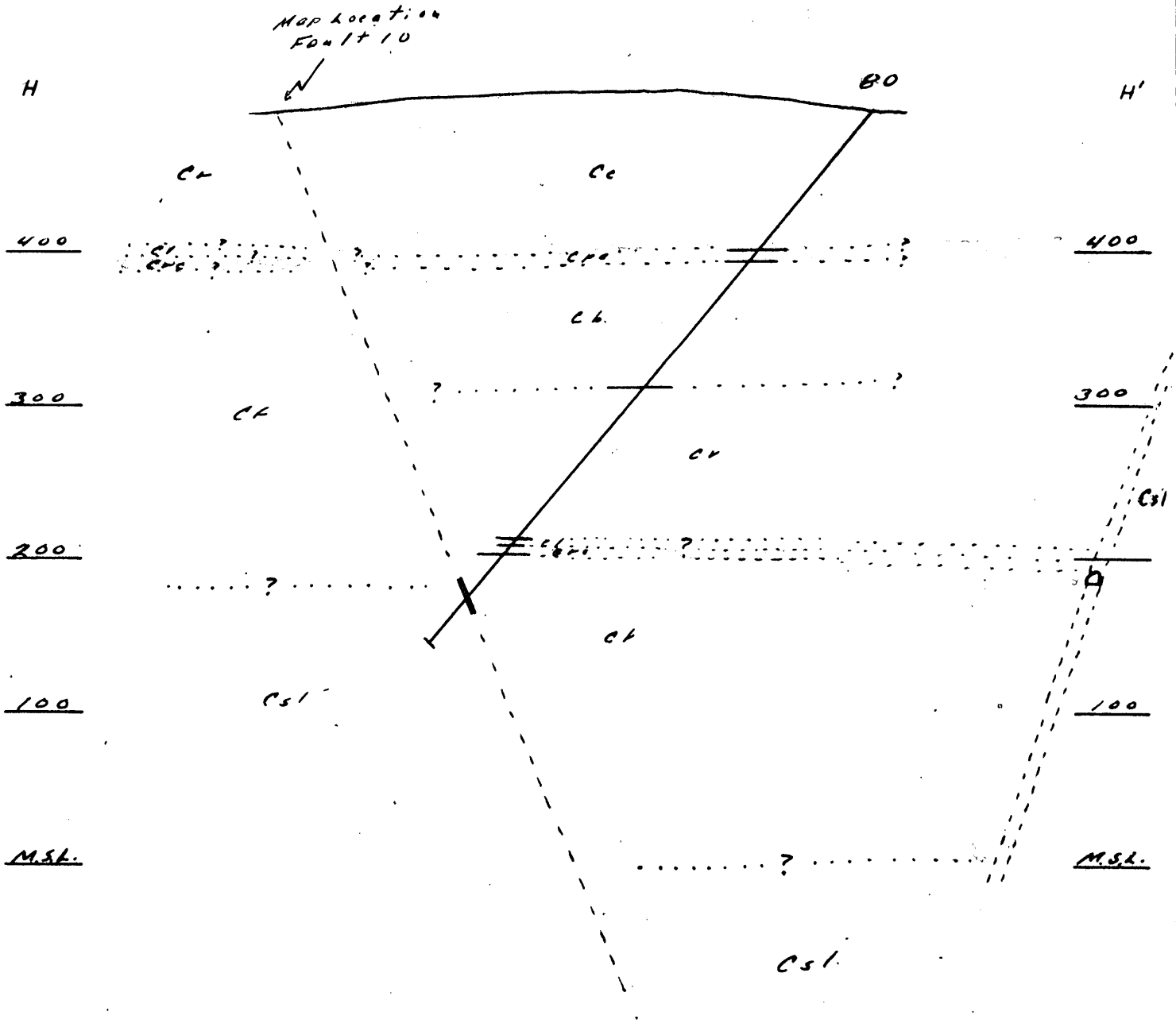


PLATE 9

OFFICIAL FILE COPY
DMEA
RECEIVED MAR 18 1958

DATE	INITIALS	CODE

CROSS SECTION, WATSON - DAVENPORT AREA
CRITTENDEN COUNTY, KENTUCKY

SCALE: 1" = 100'

0 50 100 200 300

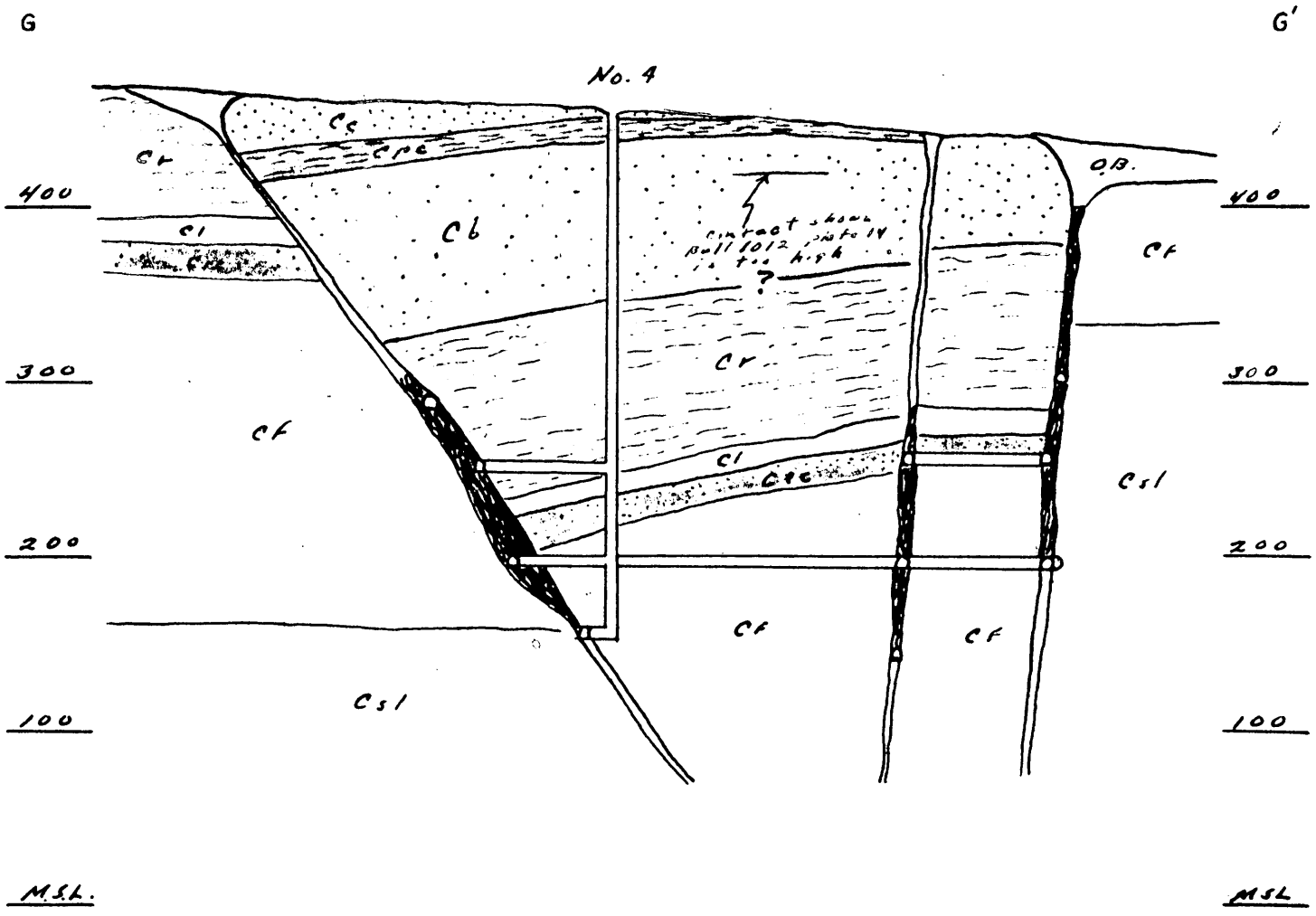


PLATE 8

DMEA
RECEIVED MAR 18 1958
DATE | INITIAL | CODE

CROSS SECTION, WATSON - DAVENPORT AREA
CRITTENDEN COUNTY, KENTUCKY

SCALE: 1" = 100'

0 50 100 200 300

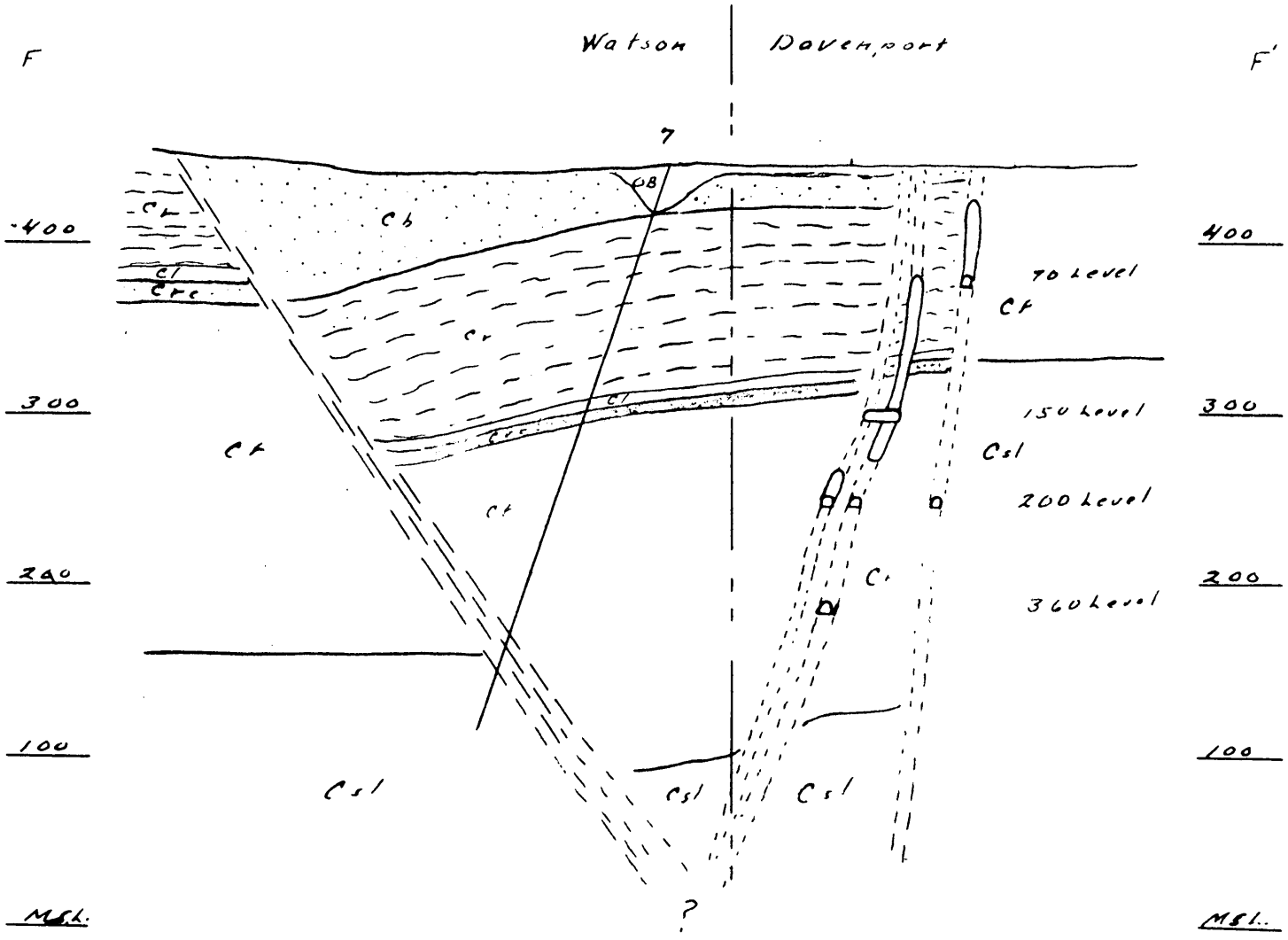


PLATE 7

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RECEIVED MAR 18 1958

DATE	INITIAL	CODE

CROSS SECTION, WATSON-DAVENPORT AREA
CRITTENDEN COUNTY, KENTUCKY

SCALE: 1" = 100'

0 50 100 200 300

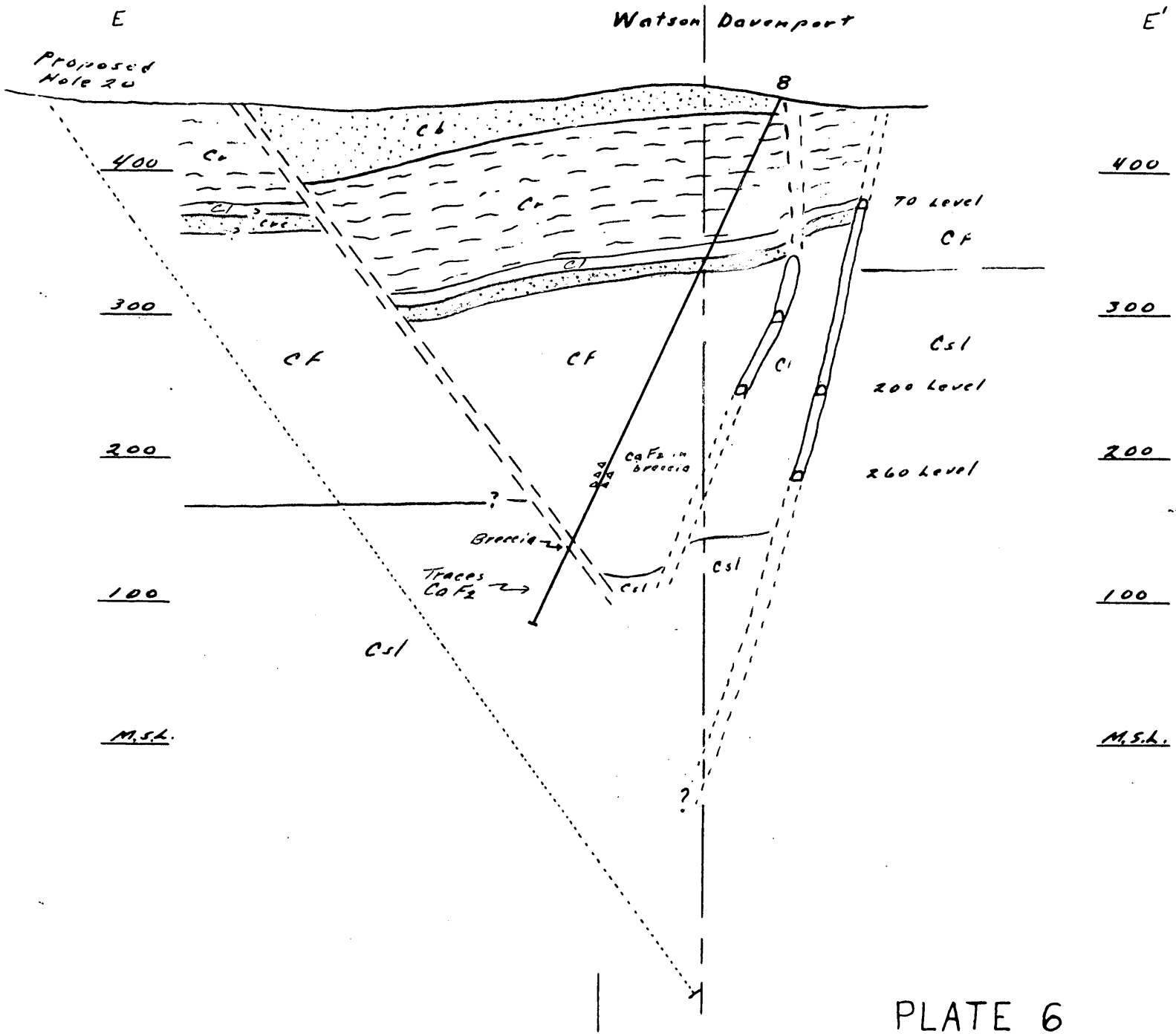


PLATE 6

CROSS SECTION, WATSON-DAVENPORT AREA
CRITTENDEN COUNTY, KENTUCKY

SCALE: 1" = 100'

0 50 100 200 300

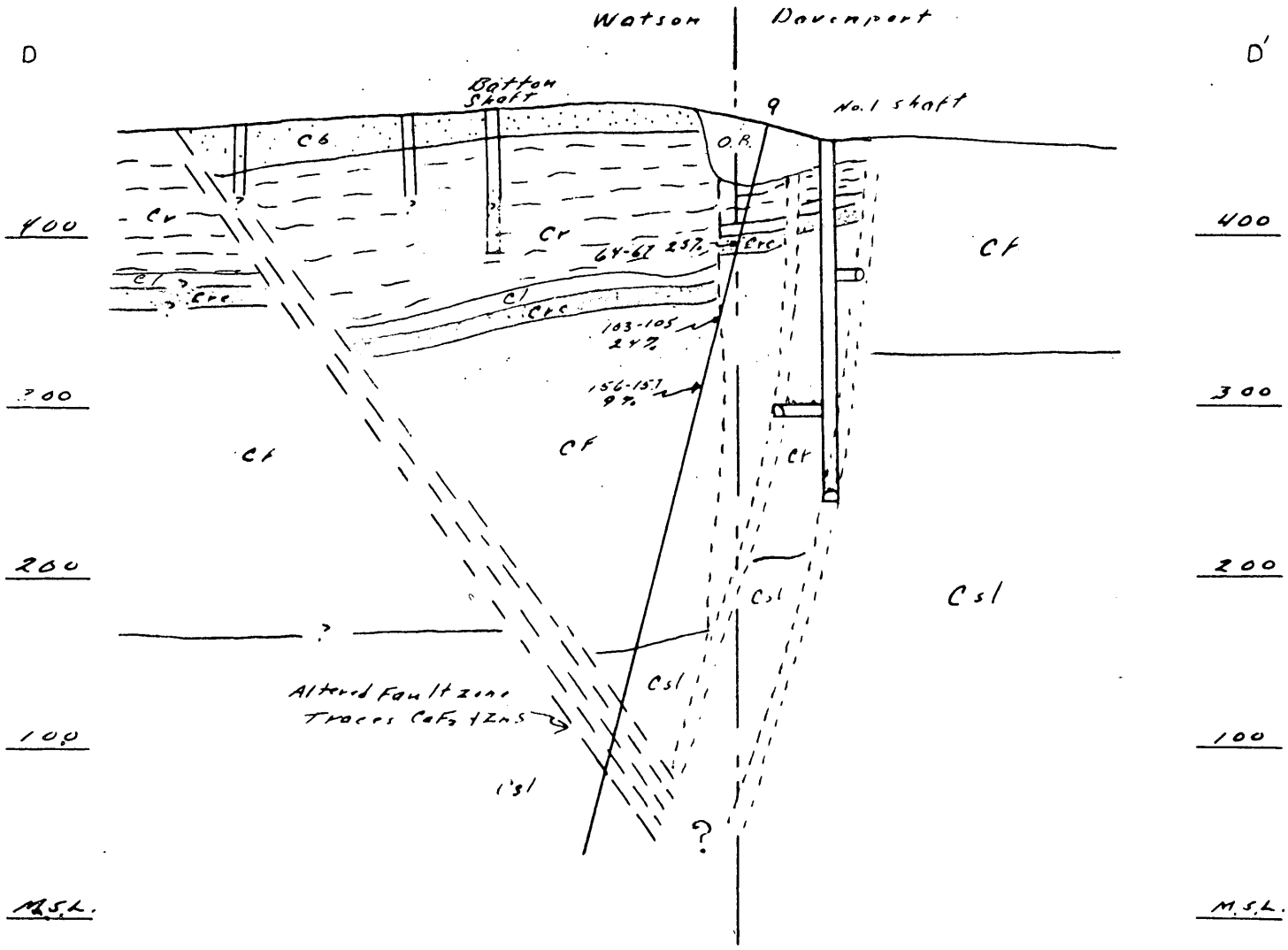
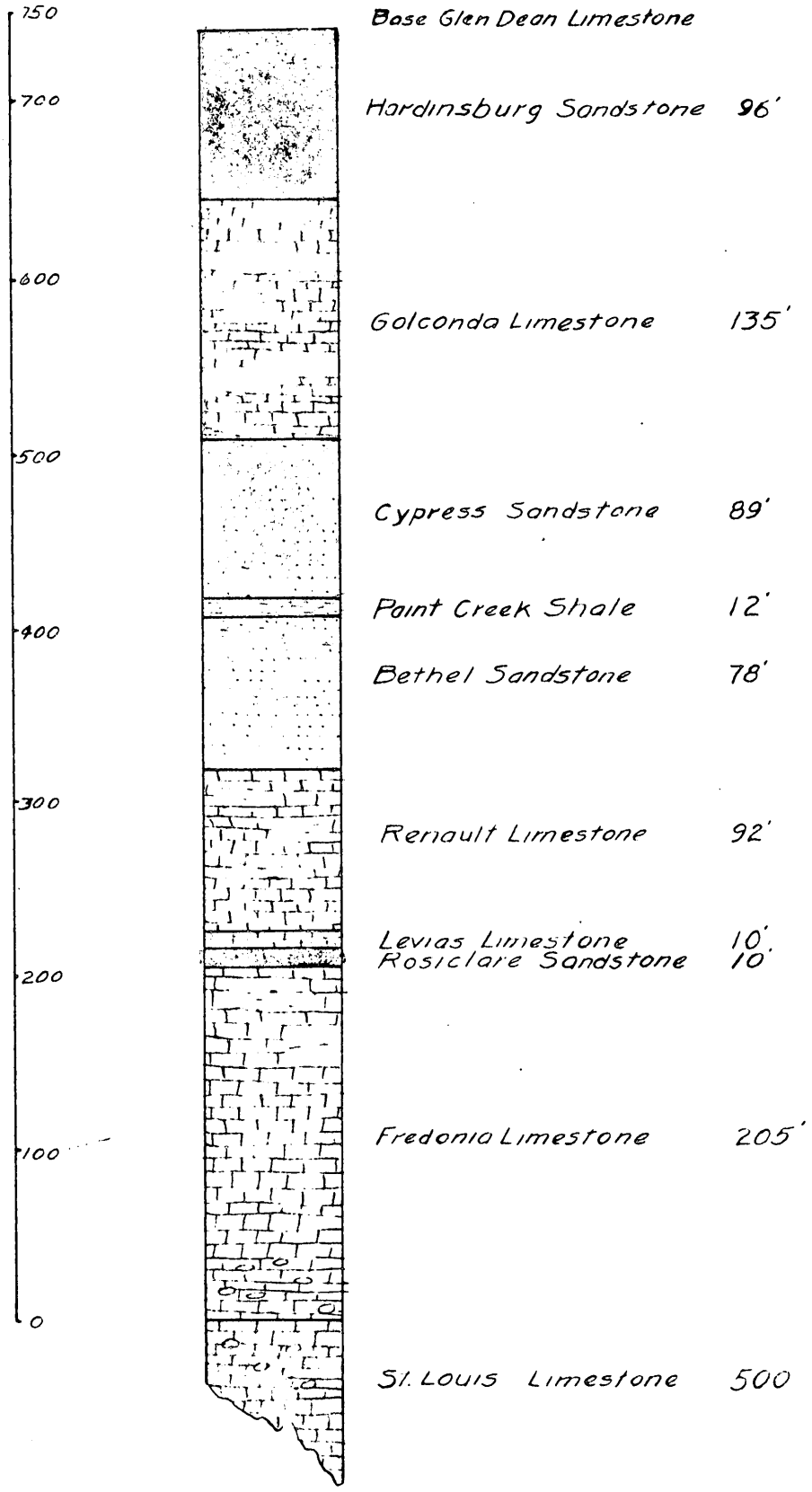


PLATE 5

OFFICIAL FILE COPY
DMEA
18 1958

COLUMNAR SECTION, WATSON-DAVENPORT AREA
CRITTENDEN COUNTY, KENTUCKY



Average thicknesses compiled from: U.S.B.M. holes 1, 8, 9, 80 83; U.S.G.S. Bull. 1012 E, and A.H. Sutton - W.A. Oersterling Bull. A.A.P.G. Vol. 36 No. 9

PLATE 3

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RECEIVED MAR 18 1958

DATE	INITIALS	CODE

DAVENPORT MINE
EAGLE-WATSON MINES
MOORE-HILL FAULT
FAULT 9
Shallow
HICKS MINE
W. TYNER
Tract No. 26
Tract No. 27
Tract #28
J. HICKS
W. TYNER
DAVENPORT
J. HICKS
FAULT 10
FAULT 4
FAULT 3
DAVENPORT
H. WATSON
FAULT 11
FAULT 11A
MAIN SHAFT
No. 2 SHAFT
No. 3 SHAFT
No. 4 SHAFT
GREEN SHAFT
EAGLE-WATSON
H. WATSON
FAULT 12A
FAULT 12B
FAULT 12
TWO BROTHERS MINE
FRAZER SHAFT
WATSON SHAFT
H. WATSON
RED SHAFT
N
WATSON-HICKS-TYNER PROPS.
CRITTENDEN CO., KY.
0 100 200 300
scale 1" = 200'
DMEA-4962
Fault, known
Fault, inferred
Contact, normal
Shaft
Outline of extensive underground works
Existing drill holes
Proposed drill holes (~45° inclination)
Property boundary
Ch Hardinsburg ss
Cg Golconda ls.
Cc Cypress ss.
Cpc Paint Creek sh
Cb Bethel ss.
Cr Renault ls.
Cf Fredonia ls.
xxxx Peridotite dike