FINAL REPORT--OME EXPLORATION PROJECT

OME-6873 (Fluorspar-beryllium-rare earths-thorium-niobium)
Gilbert Kerlin, Robert G. Goelet, Francis Goelet, d/b/a
Hicks Dome Account, a partnership
Hicks Dome Property
Hardin County, Illinois
Contract 2306 (Long Form)

by
Harold Kirkemo, Chief
Office of Minerals Exploration
November, 1978

Preface

This report summarizes the program of work, costs, and results of the Hicks Dome OME project. The report is based on detailed and voluminous reports, monthly and final, by Joseph A. Porter, the Operator's project representative, memoranda by Robert D. Trace, Allen V. Heyl and other USGS geologists who frequently visited the project while drilling was in progress and who (Heyl in particular) carefully studied the drill core, and on the final audit and cost review of the project.

1. Operator: Kerlin, Goelet and Goelet d/b/a
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Mr. Porter stated in a letter dated September 11, 1972, that Hicks Dome Account is a General Partnership and all expenditures were to be made solely for the Account and not for the account of any other person, corporation, or entity in the mining industry or otherwise.

Property: The land included in the Contract consisted of eight (8) contiguous tracts of leased land or mineral rights thereto totalling approximately 615 acres in section 25, T. 11 S., R. 7 E., and sections 30 and 31, T. 11 S., R. 8 E., Third Principal Meridian, Hardin County, Illinois. Information on the leases follows:

Date of lease or deed	Acres	Parties to lease or deed	Description
March 20, 1970	160	First State Bank of Elizabethtown, Illinois, lessor, Industrial Minerals Exploration Co., lessee.	E-1/2 NE-1/4 sec. 25, T. 11 S., R. 7 E., and W-1/2 NE-1/4, Sec. 30, T. 11 S., R. 8 E.
March 13, 1971	79.543	Mabel A. Pankey, grantor Industrial Minerals Exploration Co., grantee. (17/21st interest in tract)	NE-1/4 NW-1/4 and SE-1/4, NW-1/4, Sec. 30, T. 11 S., R. 8 E, less a parcel containing approximately 0.457 acre excepted in lease.
July 30, 1971	Same as above	Etta Irby and Iley "Doc" Pankey, lessors, Antaeus Resources Corp., lessee. (4/21st interest in tract)	Same as above
March 12, 1970	40	Florence F. Loyd, Fluorine Loyd, S. D. Loyd, Beulah Loyd, Marybelle L. McLin, W. R. McLin, lessors, Industrial Minerals Exploration Co., lessee.	SW-1/4 NE-1/4 sec. 30, T. 11 S., R. 8 E., less a parcel containing approximately 0.45 acre excepted in lease.
Feb. 18, 1972	61.5	William L. Hamp, Applena Hamp, James E. Hamp, Diane K. Hamp, Franklin E. Hamp, and Mary H. Hamp, lessors, Antaeus Resources Corp., lessee.	N-1/2 NW-1/4 SW-1/4 Sec. 30, and portion of E-1/2 SW-1/4 sec. 30, T. 11 S., R. 8 E.
April 14, 1970	40	Lola Ewell Fredericks, Jack L. Fredericks, and Sophia Coy, lessors, Industrial Minerals Exploration Co., lessee	N-1/2 SW-1/4 SW1/4 and S-1/2 NW-1/4 SW-1/4 sec. 30, T. 11 S., R. 8 E.
March 9, 1970	20	Emma D. Jenkins, Eulala Wunderlich and Fred Wunderlich, lessors, Industrial Minerals Exploration Co., lessee.	Portion of E-1/2 SW-1/4 sec. 30, T. 11 S., R. 8 E.
May 14, 1971	90	Edwin E. Rose, Gladys Rose, Thomas Rose, Vivian Rose, Veloise Zeller, William Zeller, Maude E. Williams, and Virgil H. Williams, lessors, Antaeus Resources Corp., lessee.	N-1/2 SE-1/4, sec. 30, and E-1/4 NE-1/4 SW-1/4 sec. 30, T. 11 S., R. 8 E.
Feb. 22, 1972	105	J. J. Coan Co., Inc. International Fastener Research Corp., J.D. Quarant, Allene B. Quarant, lessors, Antaeus Resources Corp., lessee.	S-1/2 SE-1/4 sec. 30, T. 11 S., R. 8 E. except the north 15 acres of SE-1/4 SE-1/4; and the NW-1/4 NE-1/4 sec. 31, T. 11. S., R. 8 E.

These tracts are shown on Figure 1, revision 2, which was adapted from the figure in Amendment No. 2 to the Contract.

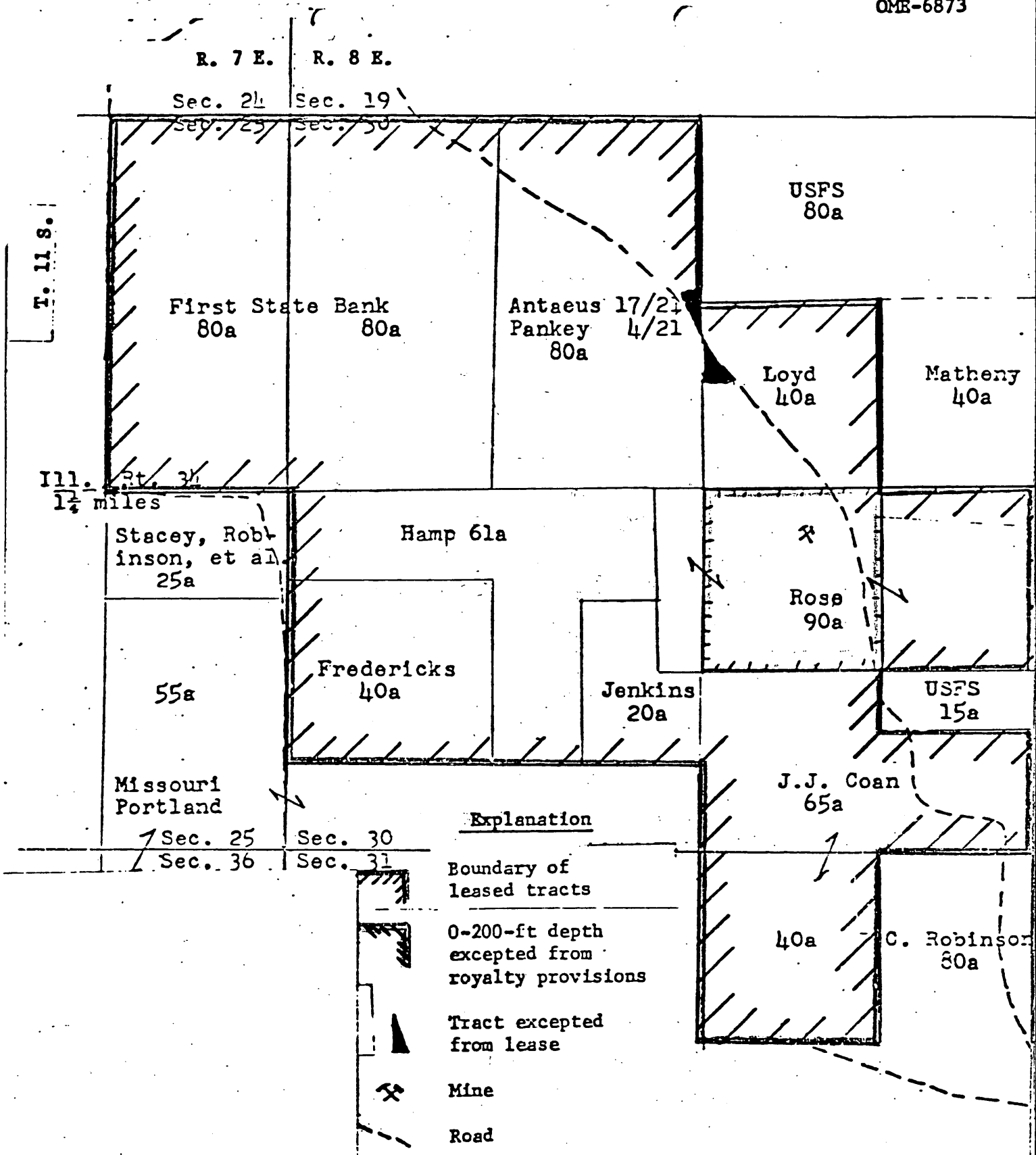

Figure 1, revision 2

Map showing leased land

Scale: 1"=1,000'

Hicks Dome Account

Hardin County, Illinois

Ownership: The Operator is in possession of this land or mineral rights under terms of an Agreement dated May 10, 1971, between Hicks Dome Account and Antaeus Resources Corporation, which granted to Hicks Dome Account all of the leases held by Antaeus Resources. The lease with J. J. Coan Company was entered into after the Agreement was executed. The requirement for payment of royalty to the Government on mineral production does not apply to production obtained from mining above the 200-foot level in the NW¼ SE¼, section 30, T. 11 S., R. 8 E. of the Rose-Zeller-Williams tract.

2. Purpose of Project: The purpose of the project was to explore by diamond core drilling for fluorspar-beryllium-rare earths-thorium-niobium ores in mineralized breccias in the Hicks Dome cryptovolcanic structure.

3. Contract: Dated September 26, 1972, for a term of eight (8) months, or to June 10, 1973. Extended by amendments to June 26, 1975. Original contract amount $95,450 (Gov't share at 50 percent, $47,725).

If a certification of possible production is issued on this Contract, the period of royalty obligation would be fifteen (15) years. In lieu of a Consent to Lien and Subordination Agreements, the Operator posted a performance bond for $47,725 (Aetna Insurance Co.).

Amendments:

No. 1: June 29, 1973, extended time for completion of work from 8 to 15 months, or to December 26, 1973, increased the total allowable cost of the work to $151,930.00 (Government share at 50 percent on the first $47,725, and 35 percent on an additional $19,768.00 for a total of $67,493.00), revised Article 1(c) of the Contract concerning interest computation to:

8¼ percent on Government's contribution to $47,725.00 and

9 percent on Government's contribution over $47,725.00 but not in excess of $67,493.00.

It also required the Operator to post another performance bond to cover the penal sum of $19,768.00 for Stage II.

Exhibit A of the Contract was revised by adding rotary drilling to the statement on purpose of the project, establishing a 2-stage work program, and changing the Actual Costs section in Exhibit A of the Contract.

No. 2: January 31, 1974, extended time for completion of work from fifteen (15) months to twenty-one (21) months from date of the Contract, or to June 26, 1974, increased the the total allowable cost of the work to $266,110.00 (Government share at 50 percent for Stages 1 and III, and 35 percent for Stage II for a total sum of $113,558.00), revised interest computation to:

8-1/4 percent on Government's contribution to $47,725.00,

9 percent on Government's contribution over $47,725.00 but not in excess of $67,493.00, and

8-3/4 percent on Government's contribution over $67,493.00 but not in excess of $113,558.00.

The Operator was required to post an additional bond to cover Government's share of the added cost of the work, and the work plan was revised to three stages.

No. 3: June 26, 1974, extended time for completion of work from twenty-one (21) to twenty-seven (27) months from date of Contract, or to December 26, 1974, extended period of obligation for payment of royalty from fifteen (15) to seventeen (17) years from the date of Contract, or until September 26, 1989 (incorrectly stated originally in the Amendment), substituted 17 years for 15 years in paragraph on page 3 of Annex I to the Contract which pertains to extending obligation for royalty payments to lands acquired within 1,000 feet of the boundaries of the land described in the Contract, and allowing deletion of lands and reacquisition.

No. 4: June 28, 1974, increased the total allowable cost of the work to $276,110.00 (Government's share at 50 percent in Stages I, III, and IV, and 35 percent in Stage II for a total sum of $118,558.00), revised interest computation to:

8-1/4 percent on Government's contribution to $47,725.00,

9 percent on Government's contribution over $47,725.00 but not in excess of $67,493.00,

8-3/4 percent on Government's contribution over $67,493.00 but not in excess of $113,558.00, and

9-3/4 percent on Government's contribution over $113,558.00, but not in excess of $118,558.00.

Required the Operator to post performance bonds adequate to cover $118,558.00.

The work plan was revised to four stages with Stage IV allowing analytical work and related services on samples obtained from drilling.

No. 5: December 20, 1974, extended time for completion of work from twenty-seven (27) to thirty-three (33) months from date of Contract, or to June 26, 1975.

4. Project Work: Drilling started October 5, 1972, was completed May 10, 1974, and analytical work was completed in March 1975. The Operator's report on Stage IV (analytical work) was dated June 25, 1975, and the Operator's Final Report was dated November 26, 1975.

The project was conducted in four stages. Stages I, II, and III involved drilling, assaying, services, and items necessary to complete work set forth in the Contract. Stage IV consisted of additional analytical work and interpretation.

Work completed on the Contract consisted of 12 drill holes totalling 29,339 feet of which 3,670 feet were rotary drilled and 25,669 feet were diamond drilled.

A total of 2,043 analyses were made of drill core and cuttings for specific elements of which 610 were for CaF_2. In addition, 143 spectrographic analyses and 229 x-ray fluorescence determinations were made.

The Operator submitted 19 vouchers showing costs of $259,137 of which OME accepted $255,516 and reimbursed the Operator $118,207 for Government participation. The units of work authorized and approved under the Contract were summarized as follows in the final audit dated April 1, 1976:

Allowable Costs	Costs claimed and approved by Audit
Stage I	
Category:	
(1) Independent Contracts	$60,436
(2) Personal Services	9,314
(3) Operating Materials and Supplies	1,491
(7) Miscellaneous	2,144
Stage II	
Category:	
(1) Independent Contracts	53,679
(2) Personal Services	6,802
(3) Operating Materials and Supplies	797
(7) Miscellaneous	2,399
Stage III	
Category:	
(1) Independent Contracts	98,007
(2) Personal Services	14,280
(3) Operating Materials and Supplies	1,553
(7) Miscellaneous	3,961
Stage IV	
Category:	
(7) Miscellaneous	4,274
Total Allowable Cost	259,137 a/
Government Participation	118,207

a/ Includes $3,621 of excess allowable type costs not accepted by OME.

A summary of drilling completed, shown as Table 1 in the Operator's Final Report, was the basis for the following compilation:

Summary of drilling

Hole no.	Land tract	Started	Finished	Feet Drilled Rotary	Feet Drilled Cored	Total depth, feet
OME-1	Hamp	10/5/72	12/2/72	141	2,185	2,326
OME-2	Fredericks	12/5/72	1/20/73	120	2,080	2,200
OME-3	Pankey	12/11/72	3/26/73	361	2,016	2,377
OME-4	Hamp	2/5/73	5/25/73	166	2,034	2,200
OME-5	FSB[1/]	5/16/73	8/2/73	325	2,080	2,405
OME-6	Hamp	8/6/73	9/8/73	719	1,685	2,404
OME-7	FSB	9/10/73	10/6/73	785	1,760	2,545
OME-8	FSB[2/]	10/25/73	2/1/74	105	2,892	2,997
OME-9	Hamp	10/25/73	1/16/74	676	1,717	2,393
OME-10	Fredericks	11/28/74	3/15/74	128	2,339	2,467
OME-11	FSB	2/2/74	4/6/74	64	2,452	2,516
OME-12	Fredericks	3/18/74	5/10/74	80	2,429	2,509
			Totals	3,670	25,669	29,339

1/ FSB - First State Bank

2/ Represents second attempt to drill this hole. First attempt totaled 720 feet of rotary. Hole was abandoned and is not included in the totals.

Locations of these holes are shown on Figure 1, revision 3, which follows.

The Government retained no equity in any of the materials or equipment used.

Effectiveness of the Work: The target area was explored satisfactorily considering the amount of Federal funds available. Adequate funding would have enabled the Operator to drill more holes to better determine the extent and grade of mineralized material within the property.

Efficiency of Operation: The extended duration of the project from the original 8 months to 33 months was due to:

1. Inability of the first drilling contractor to continue with the project.

2. Need to recast Estimated Costs and to prepare amendments to the Contract allowing more realistic prices for goods and services.

3. Long period of time required to obtain results from a commercial analytical laboratory.

5. Reports:

Operator's Final Report: A final report, dated June 20, 1975, on all assay data resulting from analytical work completed under Stage IV of the Contract was submitted by Joseph A. Porter. An acceptable Final Report, also by Mr. Porter, dated November 26, 1975, was received December 5, 1975.

Cost Review: A Memorandum Audit Report and Cost Review of the Contract was issued April 1, 1976, by the Office of Audit and Investigation, Eastern Region.

Royalty Review: There was no production from the project area during the OME project, and none to date (November 1978), therefore, a Royalty Review has not been requested.

6. Project Results:

Discoveries: In a memorandum dated May 17, 1974, Allen V. Heyl, geologist, USGS, reported as follows in support of the Operator's request for increased funding for additional funding (subsequently provided in Amendment No. 4 to the Contract):

" Examination of the analysis results completed to date show a very large mineral body, which is not only enriched in fluorspar, beryllium, niobium, yttrium, and barite, but also in thorium and the specific yttrium family, heavy rare earth elements such as ytterbium, gadolinium, dysprosium, holmium, erbium, and thulium. Thorium is becoming of increased importance in new-phase nuclear reactors, and this body at Hicks Dome may be the largest single thorium resource in the country of great future value. The yttrium family heavy rare earth elements are very recently of great value for color television screens, electronic uses, petroleum-cracking catalysts, and high intensity lighting. Again, the Hicks Dome body may be a major potential source of these elements.

"The analyses completed to date show that parts of the mineral body lean in fluorspar may be enriched in the other elements, Be, Nb, rare earths, Ti, Th, and yttrium. Much of this lower grade ore needs analyses for these elements, which together make up the potentially most valuable parts of the deposit. For example, the better fluorspar (i.e., 50 - 20%) if recovered, has a potential value of $15 to $25 per ton, but the average niobium content of 0.2% Nb has a potential value of about $25 per ton and the average total heavy rare earth (from sparse analyses) of one to two per cent would have a potential value of $40 to $80 per ton in the ore in the ground. Hence, the average value of rock in the ground would probably be increased from perhaps $20 per ton to about $100, or to $150 per ton if the values of all the major elements are known and successful recovery methods developed."

The Operator estimated resources indicated by the OME drilling (page 4 of Final Report) to be as follows:

Total mineralized material 11,324,000 tons (rounded)

Average Grade

11.45% CaF_2	0.209% Thorium
3.64% $BaSO_4$	0.177% Yttrium
0.155% Niobium	

The resources were calculated to be in seven blocks of which four were based on or influenced by more than one drill hole, and three were based on one hole each, as shown in the following tabulation:

SUMMARY OF TONNAGE AND AVERAGE GRADE

Resource block	Tons	CaF_2	$BaSO_4$	Nb	Th	Y
		(Percent)				
		Based on or influenced by more than one hole				
Hamp A	4,462,500	9.90	N.A.	.159	.239	.193
Hamp B	2,649,375	9.36	3.26	.159	.239	.193
FSB-A	1,880,000	15.30	5.36	.119	.147	.157
FSB-B	662,000	22.22	2.89	.250	.180	.176
		Based on one hole				
FSB-C	870,000	10.67	2.00	.149	.144	.114
FSB-D	295,000	9.27	2.78	.117	.104	.045
Fred-A	523,333	10.33	3.57	.133	.232	.214
Total	11,342,208	11.45	3.64[1/]	.155	.209	.177

1/ Block Hamp-A is not included in weighted average.

Depths to the top and bottom of drill hole intersections with the mineralized material included in the Operator's resource estimates, and the average thickness of the mineralized zone in each resource block were as follows:

Resource block	Intersection, range in feet from surface	Average thickness, feet
Hamp-A	1906-2262	238
Hamp-B	1906-2224	157
FSB-A	2055-2243	188
FSB-B	2300-2366	66
FSB-C	2233-2494	261
FSB-D	2154-2243	89
Fred-A	1908-2065	157

Since the project work was completed, the Operator has been arranging more permanent rights to the land tracts than the leaseholds which had been signed with the property owners prior to the OME contract. This is a long, protracted, procedure because of the many landowners, heirs, and claimants involved. Upon completing these negotiations, presumably the next goal of the Operator will be to further evaluate the Hicks Dome deposit, and eventually to undertake production.

Certification: A Certification of Possible Production was issued on April 21, 1976. The Government's lien for payment of royalties expires on September 26, 1989, or earlier if the total amount ($118,206.55) contributed by the Government and accrued interest are repaid in full. Interest is charged at varying rates as set forth in Amendment No. 4 to the Contract.

Royalties: No ore or concentrate was sold during the period of the exploration work and no royalties were paid or due the Government.

7. Environmental Considerations: Work done under the Contract was not a major Federal action significantly affecting the quality of the environment. Therefore, an environmental impact statement as specified under section 102 of the National Environmental Policy Act as amended and Executive Order No. 11514, 35 F.R. 4247 (1970) was not required.

8. Geologic Summary: Hicks Dome is located on the south rim of the Illinois basin in complexly faulted, broadly folded Paleozoic strata underlying the Illinois-Kentucky fluorspar district. The project area is located in the central portion of the dome, and is about 6,000 feet long in a northwest direction and 3,500 feet wide. Sedimentary rocks in the area, either exposed or cut in deep drill holes, consist of dolomites, sandstone, chert, and shale of Ordovician, Silurian, or Devonian age. Total thickness of these strata is several thousand feet.

   The only igneous rocks in the area are a few mica peridotite dikes which have been cut in some of the drill holes.

   The economically important lithologic structures in the dome are explosion or cryptovolcanic breccias which penetrate into the sedimentary rocks. An inverted funnel configuration is suggested for these bodies. The main breccia mass which was the exploration target for this project consists of intensely brecciated fragments of the enclosing rocks to a depth of about 2,500 feet and coarser, larger and less well mixed fragments below that depth. The better grade and more persistent mineralization occurs as finely disseminated minerals replacing rock flour matrix and breccia fragments. The more common location for the consistently mineralized material is in the breccias occupying the stratigraphic position of the lower part of the Decorah-Plattin limestone in the Ordovician strata. The coarser matrix referred to by Porter as "monomineral" is not as well mineralized.

   Heyl concludes that drilling on the OME project showed a very large mineral body. Its future development will require extensive, additional exploration drilling followed by shaft sinking, crosscutting, and drifting to determine the lateral extent, thickness, and grade of the mineralized material.

Kirkham Final Report
Nov. 1978

United States Department of the Interior

GEOLOGICAL SURVEY
RESTON, VIRGINIA 22092

21 APR 1976

Messrs. Gilbert Kerlin, Robert G. Goelet,
Francis Goelet d/b/a Hicks Dome Account
c/o Mr. John L. Carroll
Room 4120, 345 Park Avenue
New York, New York 10022

Re: OME-6873 (Fluorspar, et al.)
Kerlin, Goelet and Goelet d/b/a
Hicks Dome Account
Hicks Dome Property
Hardin County, Illinois
Contract 2306

Pursuant to Article 7 of the referenced contract, as amended, the Government hereby certifies that mineral or metal production may be possible as a result of the exploration work.

Therefore, royalties shall be paid to the Government as provided in the contract on all production from the land described in the contract from September 26, 1972, to September 26, 1989, or until the total amount contributed by the Government under the contract ($118,206.55, plus accrued interest) is fully repaid, whichever occurs first. Under provisions of Article 1(c) of the Contract, as amended, and Paragraph 2 of Amendment No. 4, thereto, simple interest accrues on the amount contributed by the Government at the annual rate of:

8-1/4 percent on the first $47,725.00,
9 percent on the amount between $47,725.00 and $67,493.00,
8-3/4 percent on the amount between $67,493.00 and $113,558.00, and
9-3/4 percent on the balance to $118,206.55.

The payment of royalties is secured by Performance Bonds executed by the Aetna Insurance Company under dates of September 29, 1972, June 22, 1973, January 28, 1974, and July 5, 1974.

Royalty payments on any production computed as provided in the contract should be made in favor of the U.S. Geological Survey and mailed or delivered to the Chief, Office of Minerals Exploration, U.S. Geological Survey, National Center, 12201 Sunrise Valley Drive, Reston, Virginia 22092. Each payment should be accompanied by two copies of settlement sheets or other

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suitable sales evidence showing the date of sale, name of the purchaser, the quantity and grade of the production sold, the price per unit, and the gross proceeds and allowable deductions therefrom. The purchaser should be notified of the Government's royalty on production and directed to pay the royalty, computed as provided in the contract, directly to the Government.

The Office of Minerals Exploration should be promptly notified upon the commencement of any production and upon any extended cessation thereof. Production unsold or unused six months after extraction from the ground should be reported promptly to the Office of Minerals Exploration.

Attention is specifically invited to the provisions of Article 2(c) of the Contract referring to the preservation of the Government's royalty rights. Two true copies of any instrument transferring, surrendering or encumbering any of said rights shall be furnished to the Office of Minerals Exploration.

Dated this 21st day of April, 1976.

THE UNITED STATES OF AMERICA

Harold Kirkemo

Chief, Office of Minerals Exploration
U.S. Geological Survey

Martin 4/20/76

cc:
DRF
MR Rdg.
OME Rdg.
OME Files
Mr. Kirkemo
Trace, Laurence
Heyl,

Mr. Porter

Received Knoxville 6/15/77

(Final Report)

OME-HICKS DOME ACCOUNT

SUMMARY AND RESULTS
of
EXPLORATION CONTRACT 2306

This report summarizes the work completed, costs and the results of the work done under the terms of the contract between the Office of Minerals Exploration and Hicks Dome Account. Detailed supporting data such as details of cost items, reports on drilling of individual holes, core logs, assay certificates, assay graphs and sections have been previously submitted as part of the operator's monthly reports. These data are not included here.

Work Completed

The work was conducted in four stages. Stages I, II and III involved drilling, assaying and other services and items necessary to the execution of the drilling program. Stage IV involved additional assaying and interpretation.

Drilling commenced on October 4, 1972 and terminated on May 10, 1974. Twelve holes totalling 29,339 feet were drilled. Table I on the following page summarizes for each hole the dates, footage rotary and core drilled and total depths.

A total of 2,043 analysis were made for specific elements. Of these, 610 were for CaF_2. In addition, 148 spectrographic analysis and 229 x-ray fluoresence determinations were made.

Table I

Summary of Holes Drilled

Hole OME #	Hole Prop. #	Started	Finished	Feet Drilled Rotary	Feet Drilled Cored	Total Depth
OME-1	Hamp 5	10/5/72	12/2/72	141'	2,185'	2,326
OME-2	Fredricks 1	12/5/72	1/20/73	120'	2,080'	2,200
OME-3	Pankey 3	12/11/72	3/26/73	361'	2,016'	2,377
OME-4	Hamp 6	2/5/73	5/25/73	166'	2,034'	2,200
OME-5	FSB-1	5/16/73	8/2/73	325'	2,080'	2,405
OME-6	Hamp 7	8/6/73	9/8/73	719'	1,685'	2,404
OME-7	FSB-2	9/10/73	10/6/73	785'	1,760'	2,545
OME-8	FSB-3[1]	10/25/73	2/1/74	105'	2,892'	2,997
OME-9	Hamp 8	10/25/73	1/16/74	676'	1,717'	2,393
OME-10	Fredricks 2	11/28/74	3/15/74	128'	2,339'	2,467
OME-11	FSB-4	2/2/74	4/6/74	64'	2,452'	2,516
OME-12	Fredricks 3	3/18/74	5/10/74	80'	2,429'	2,509
		Totals		3,670'	25,669'	29,339

1. Represents second attempt to drill this hole. First attempt totaled 720' of rotary. Hole was abandoned and is not included in the totals.

Total Cost

Total cost of the contract by stages is summarized by the following:

Stage	Allowed	Total
I	$ 95,450	$ 73,385.59
II	56,480	63,676.52
III	114,180	114,180.00
IV	10,000	4,274.00
Total	$ 276,110	$255,516.11

Because of unforeseen cost items and contractual limitations, total costs exceeded the totals allowed in the contract. These were borne by Hicks Dome Account and were not reimbursed by the OME.

Results and Tonnage Calculations

Though significant mineralization was intersected by eight of the twelve holes, grade and distribution of the intersections do not warrant use of the term ore. The tonnages cited here are considered a resource and do not constitute an ore reserve.

Total resources indicated by the drilling are 11,342,208 tons averaging 11.45% CaF_2, 3.64% $BaSO_4$, 0.155% niobium, 0.209% thorium and 0.177% yttrium. These tonnages are in seven blocks. Four of the blocks are based on or influenced by more than one hole. Three of the blocks are based on only one hole.

The calculations of the tonnages and average grades for each block are shown by Table II on the following page. The relationships of the drill holes and blocks and the tonnage and average grade of each block are shown by Plate I. Sections are included which show the vertical relationship of each block and the mineralized zones which were used to determine thickness.

Simple methods are used to calculate the tonnages and average grade. Available data do not warrant more sophisticated volumetric calculations or averaging of values.

Horizontal dimensions used to calculate the volumes of the blocks are based on hole spacing where more than one hole is located within the block. Where only one hole is used to delineate a block, horizontal dimensions of 200' x 200' are arbitrarily used. Grade of CaF_2 in a continuous zone within the favorable breccia is used to determine thickness. To be considered in the tonnage calculation, the zone must average nearly 10% CaF_2

Table II

Calculations of Tonnages and Averages
of Individual Blocks

Block	Hole	Intercept	Feet Thick	Weighted Average Value In % CaF_2	$BaSO_4$	Nb	Th	Y
Based on or influenced by more than one hole								
Hamp A								
	Hamp 3	2001-2215	214	11.10	NA	NA	NA	NA
	Hamp 4	1906-2119	240	8.44	NA	NA	NA	NA
	OME-6	2001-2262	261	10.27	NA	0.161	0.187	0.197
		Average	238	9.90	NA	0.159[1]	0.239[1]	0.193[1]

Tons $\frac{(500' \text{ length} \times 450' \text{ width} \times 238' \text{ thick})}{12} = 4,462,500$ T

Hamp B								
	OME-1	2039-2224	183	9.44	3.26	0.144	0.275	0.244
	OME-4	1906-2119	131	9.09	NA	0.178	0.290	0.254
		Average	157	9.36	3.26	0.159[1]	0.239[1]	0.193[1]

Tons $\frac{(450' \text{ length} \times 450' \text{ width} \times 157' \text{ thick})}{12} = 2,649,375$ T

FSB-A								
	OME-5	2055-2243	188	15.30	5.36	0.119	0.147	0.157

Tons $\frac{(400' \text{ length} \times 300' \text{ width} \times 188' \text{ thick})}{12} = 1,880,000$ T

FSB-B								
	OME-8	2299.8-2366	66.2	22.22	2.89	0.250	0.180[2]	0.157[2]

Tons $\frac{(400' \text{ length} \times 300' \text{ width} \times 66.2' \text{ thick})}{12} = 662,000$ T

(cont.)

NA - Not Assayed

1. Assumes assays for OME-6, OME-1 and OME-4 are representative of both Blocks Hamp A and Hamp B.

2. Assumes assays for higher grade portion at bottom of OME-5 (FSB-1) are representative of intersection in OME-8 (FSB-3).

Table II
(cont.)

Block	Hole	Intercept	Feet Thick	Weighted Average Value In % CaF_2	$BaSO_4$	Nb	Th	Y
Based on one hole								
FSB-C								
	OME-7	2233-2494	261	10.76	2.00	0.149	0.144	0.114

Tons $\frac{(200' \text{ length} \times 200' \text{ width} \times 261' \text{ thick})}{12} = 870,000$ T

FSB-D								
	OME-11	2154.5-2243	88.5	9.27	2.78	0.117	0.104	0.045

Tons $\frac{(200' \text{ length} \times 200' \text{ width} \times 88.5' \text{ thick})}{12} = 295,000$ T

Fred. A								
	OME-2	1908-2065	157	10.33	3.57	0.133	0.232	0.214

Tons $\frac{(200' \text{ length} \times 200' \text{ width} \times 157' \text{ thick})}{12} = 523,333$ T

and contain significant accessory mineralization. If more than one hole is used to delineate the block the average thickness is used.

Grades of intersections, blocks and total tonnages are determined by weighted averages. Assaying is not complete for all elements and some interpretation is required to arrive at the grade of minor or accessory elements in certain blocks.

A brief discussion of each block and the dimensions used to calculate tonnages follows.

Hamp A

This block is based on holes Hamp 3, Hamp 4 and OME-6 (Hamp 7). Sections showing the vertical relationship of the mineralization and the zones used to determine thickness are given by Plates II and III. Plate II also shows the vertical relationships and continuity of blocks Hamp A and Hamp B.

Thickness used is based on the average intersection in the three holes. Length and width are chosen on the basis of the spacing of the five holes in blocks Hamp A and Hamp B. This block probably would be cut off to the north by the Pankey breccia and joins Hamp B on the south.

No assays were made for accessory minerals in holes Hamp 3 and Hamp 4. A certain amount of spectrographic analysis was done which indicated the presence of niobium, barium, yttrium and beryllium. Since these elements are known to be present, the averages for these elements in holes OME-1, OME-4 and OME-6 are considered to be representative of this block.

Hamp B

Hamp B is based on holes OME-1 (Hamp 5) and OME-4 (Hamp 6). The vertical relationship of the mineralized zones used to calculate thickness is shown by Plate IV.

Thickness used is the average of significant mineralization in the two holes. The length and width of the block are determined by hole spacing as in block Hamp A. This block joins Hamp A on the north and extends southwest approximately one-half the

distance to OME-9. A parallelogram is used as the shape of the block in order to reflect the apparent change in strike of the trend to the southwest.

Since the intersections in holes OME-1 and OME-4 are thinner and contain significantly less +10% CaF_2 than the holes in block Hamp A they are both considered to be close to the margin of the block.

FSB-A

This block is based on hole OME-5 (FSB-1). The dimensions used are influenced by the nearby holes OME-8 (FSB-3) and OME-3 (Pankey 3). A section showing the vertical relationship of the mineralization and significant zones in blocks FSB-A and FSB-B is given as Plate V.

The total intersection of 188 feet is used as thickness. Length used is northeast one-half the distance to hole OME-8 (FSB-3), a distance of 200 feet. Length is projected an additional 200 feet southwest of OME-5 for a total length of 400 feet. A width of 300 feet is arbitrarily taken. The trend is probably cut off to the southeast by the Pankey breccia as expressed by hole OME-3 (Pankey 3), a distance of 300 feet southeast of the centerline of the block. It is assumed the block extends one-half that distance and the width can be projected an equal distance to the northwest.

FSB-B

This block adjoins FSB-A and is based on hole OME-8 (FSB-3). The horizontal dimensions are influenced by holes OME-5 (FSB-1) and OME-3 (Pankey 3).

A length of 400 feet and width of 300 feet is used. These dimensions were derived as cited above for block FSB-A. Only the bottom 66.2 feet is used as thickness. Mineralization occurs above this zone but lacks sufficient continuity to be included.

Neither the thorium or yttrium were assayed. The average thorium and yttrium assays for the bottom higher grade portion of hole OME-5 (FSB-1) is taken to represent the average for this hole.

FSB-C

This block is based entirely on one hole, OME-7 (Hamp 2). The vertical relationship of the mineralized zone used to determine thickness is given by Plate VI. A total of 261 feet of the intersection is used as thickness. A horizontal area of 200' x 200' is arbitrarily used.

FSB-D

Block FSB-D is based on one hole, OME-11 (FSB-4). It is the most marginal of the seven blocks cited. A vertical section showing the mineralized zone is given as Plate VII. A thickness of 88.5 feet is used and is based on the best part of the mineralized zone. A horizontal area of influence of 200' x 200' is arbitrarily used.

Fred. A

Hole OME-2 (Fred. 1) is used to delineate this block. Hole OME-12 (Fred. 3) was drilled 400 feet due west of OME-2. It intersected 25 feet of poorly mineralized breccia. It seriously restricts the tonnage potential of this block. The horizontal and vertical relationship of the mineralized zones in these holes is shown by Plate VIII.

Horizontal dimensions of 200' x 200' are arbitrarily used. A total of 157 feet of the mineralized zone is taken as thickness.

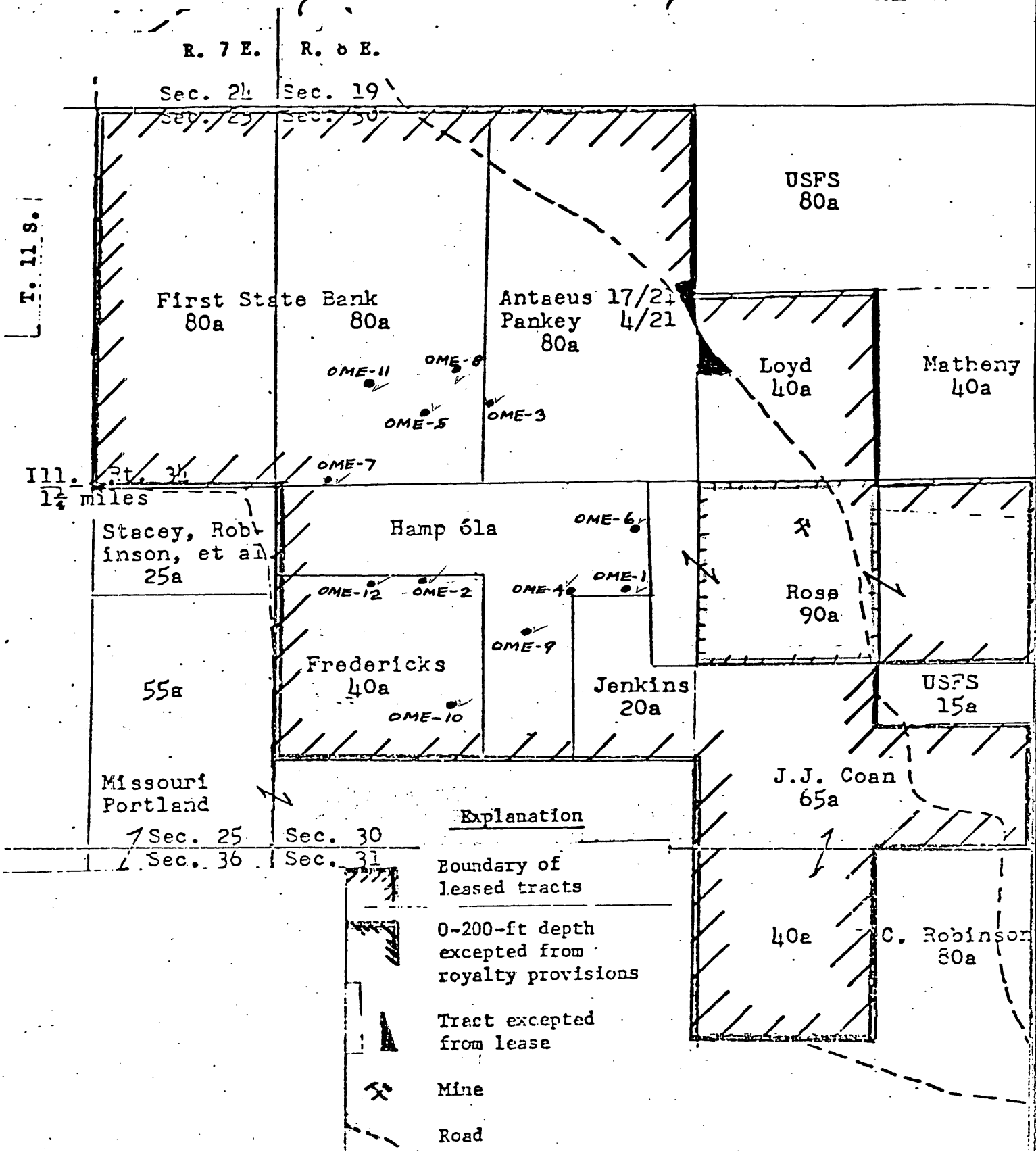
Other Holes

Though mineralization was encountered in favorable breccia in all twelve holes no resources can be attributed to four holes. These are OME-3 (Pankey 3), OME-9 (Hamp 8), OME-10 (Fred. 2) and OME-12 (Fred. 3).

OME-3 and OME-9 both intersected a considerable thickness of favorable breccia but were poorly mineralized and averaged significantly less than 10% CaF_2. OME-10 and OME-12 encountered 110 feet and 25 feet respectively of favorable breccia which also averaged well less than 10% CaF_2.

Respectfully submitted,

Joseph A. Porter
Geologist
November 26, 1975



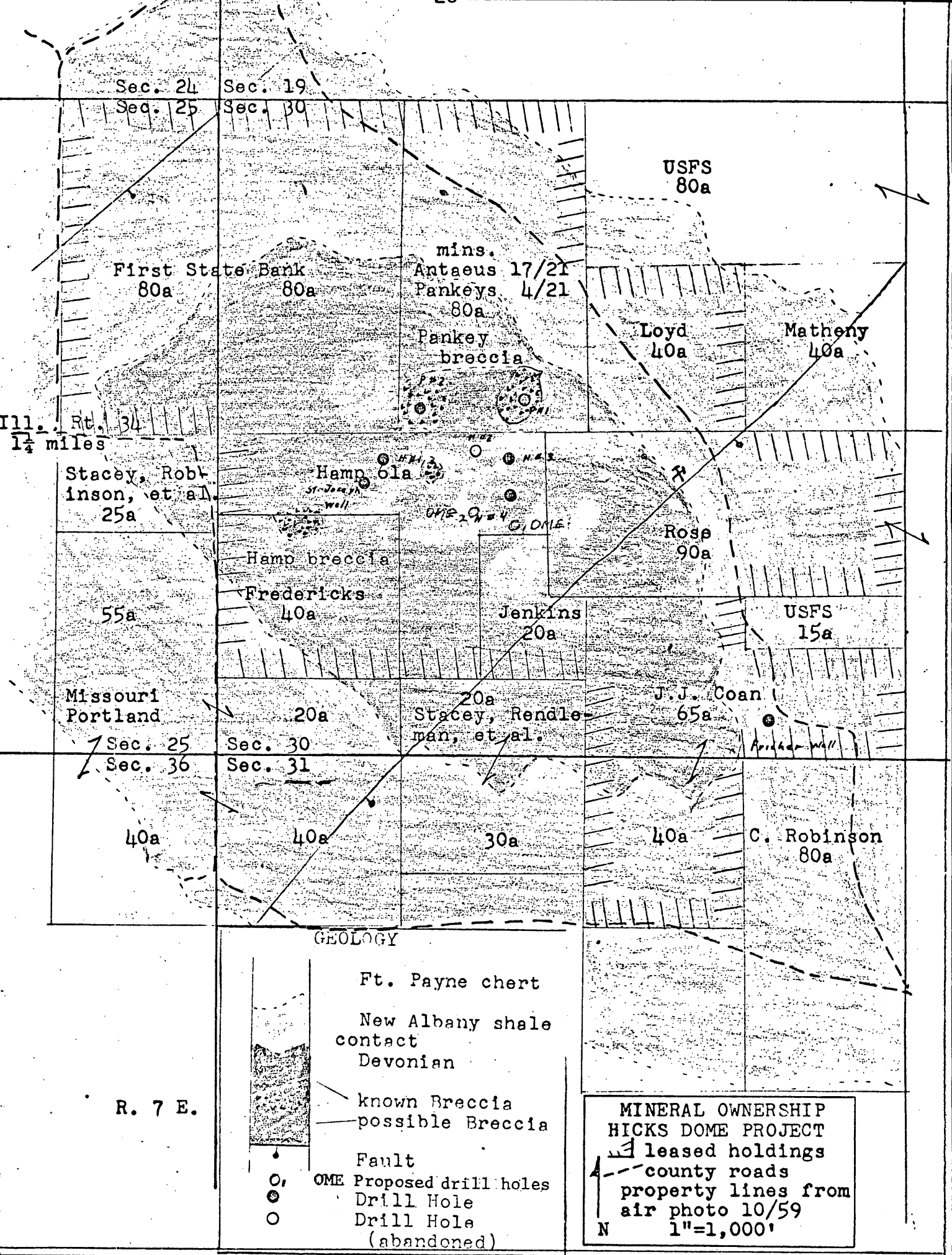
Scale: 1"=1,000'

Figure 1, revision 3

Map showing leased land and OME Drill Holes

Hicks Dome Account

Hardin County, Illinois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USFS
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First State Bank
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Antaeus 17/21
Pankeys 4/21
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breccia
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Ill. Rt. 34
1¼ miles
Stacey, Robinson, et al.
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Hamp 6la
St. Joseph well
Hamp breccia
Rose
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Fredericks
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Jenkins
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USFS
15a
Missouri
Portland
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Stacey, Rendleman, et al.
J. J. Coan
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C. Robinson
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Ft. Payne chert
New Albany shale
contact
Devonian
known Breccia
possible Breccia
Fault
OME Proposed drill holes
Drill Hole
Drill Hole
(abandoned)
R. 7 E.
MINERAL OWNERSHIP
HICKS DOME PROJECT
leased holdings
county roads
property lines from
air photo 10/59
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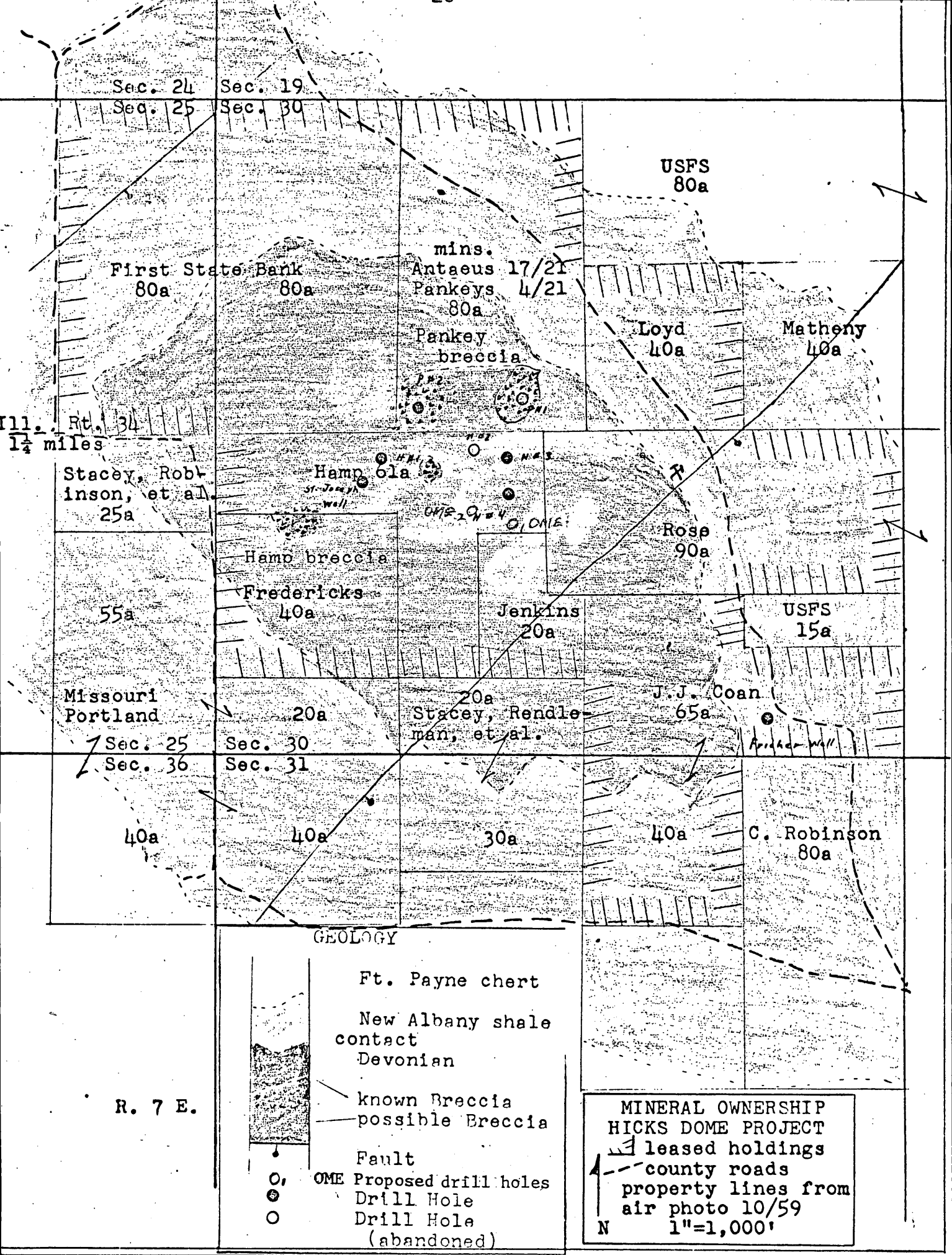
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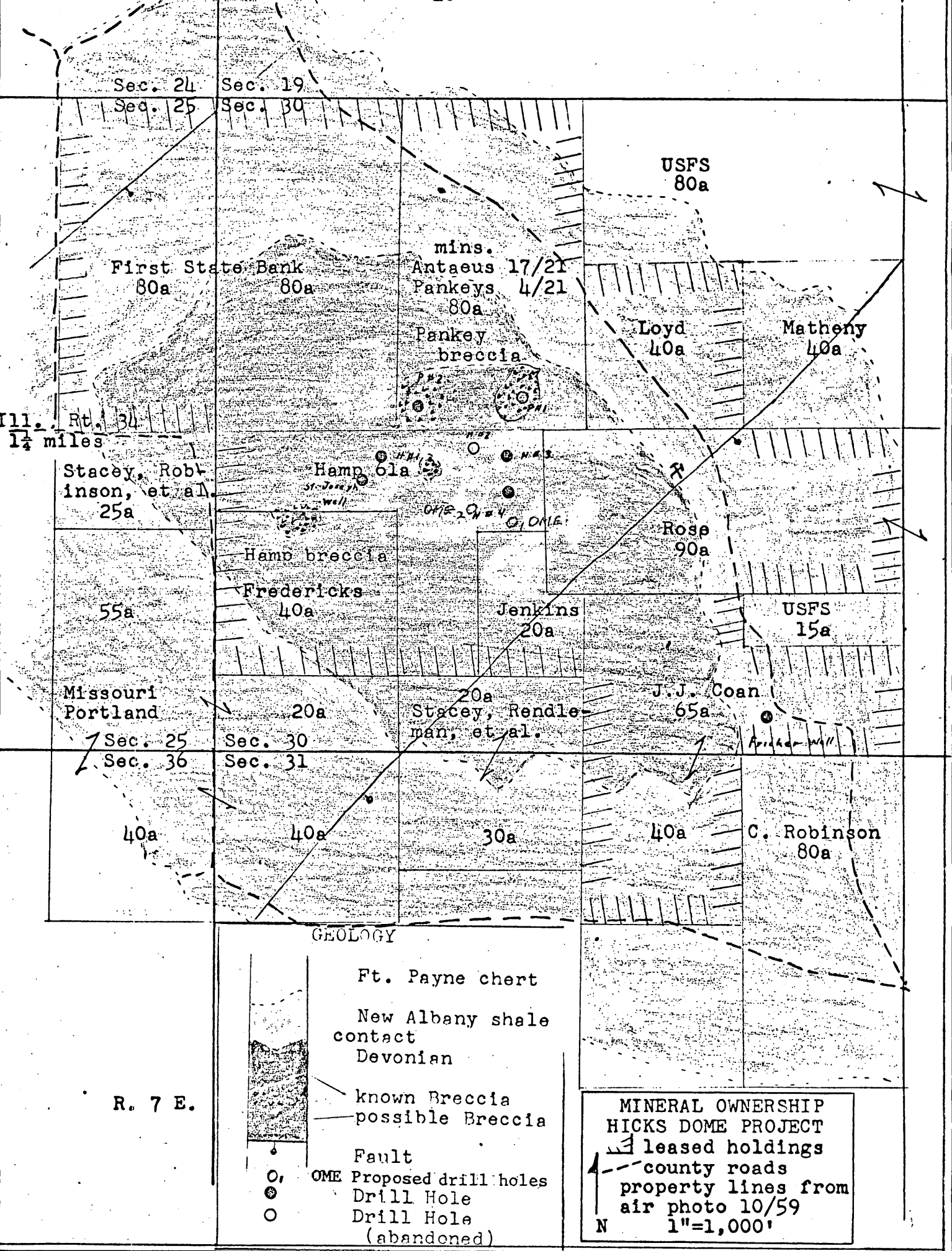
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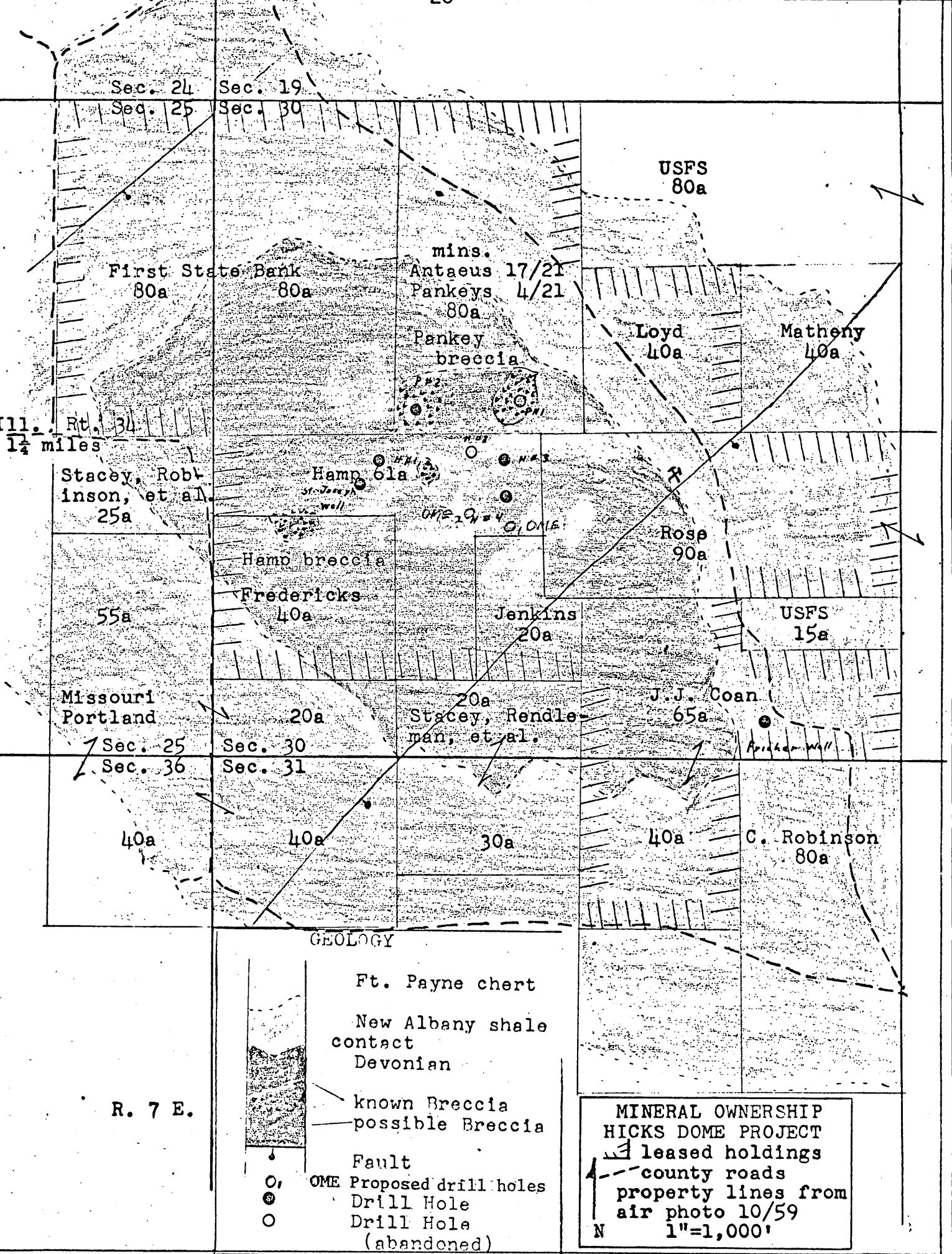
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UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF MINERALS EXPLORATION
WASHINGTON 25, D. C.

RECEIVED
AUG 16 1972

8-10-72

Bill Hasler
Denver

Dear Bill:

Here is the draft of the Hicks Dome contract. Kirk has not yet reviewed it, so nothing is yet firm about the wording or numbers, but it is a starting point from which we can modify the final result.

Your comments and suggestions are solicited, particularly on General Provisions and estimated costs. Kirk still is not certain about Porter's assistant, maybe we need a better title for him than "Geologic assistant" - perhaps something to reflect his probable duties, such as "Sample preparer" or some such name, that will strengthen the rationale for including his cost as a part of the necessary work.

Sincerely
Bob Weeks

2500
2500
2500
1755
9255

Hicks Dome Proposed Drilling

OME 1 — 2500'

OME 2 — 2500'

OME 3 — 1755' Hamp 2 from 645' - 2500'±

OME 4 — 2500'

9255

Drill OME Holes 1 & 2 first

Then drill OME Hole 3 & 4 depending upon success of Holes 1 & 2

Should Drill Hole 3 & 4 depending on and then will depend upon success of Holes 1 & 2.

Should Hole OME-1 prove unfavorable OME-2 should be drilled ~~north~~ approximately 300 feet N of OME 2

2500
645
1755

If OME-1 is successful drill PBx dead on CIL 58973 End SE in Pathy By

2500' ±5%

Hole No OME 2 or proposed

This will ~~prove~~ ~~[illegible]~~ or ~~[illegible]~~ target area Particularly ~~[illegible]~~ Gulch Age in years from Hamp 1 - Hamp 3

If hole No 2 is good build South line
Hanger DMB No 2 - 4000'

If Hole 2 is unfavorable either deepen
Hanger 2 from 845' to 2500 or move
H 55 BMB 2 300'

Area around St Joe Well many
citizens & complaints for gas
drilling

JHH Hasler

Re: OME-6873(Fluorspar et. al.)
Hicks Dome Account
Hicks Dome Property
Hardin County, Illinois

MEMORANDUM REPORT 5/26/72

To: H arold Kirkemo, Chief, OME

From: Robert D. Trace, Geologist
U. S. Geol. Survey
Princeton, Kentucky 42445

This brief report is in response to your request to "review the geologic and explorational aspect" of the above listed OME application.

The completeness of the applicant's report and the existence of a previous report by the writer on the broad aspects of the area, precludes the necessity of a complete formal report at this time. Please refer to DMEA Docket 3855, which describes the general area and the results of an earlier, albeit shallower than here proposed, exploration project on the same property.

Since the earlier project in 1956, the present applicant has completed four diamond drill core holes to depths of approximately 2,500 feet. The present objective of the writer was:

1. To examine and sample some of the results of this deep exploration
2. To evaluate the potential economic possibilities of the property
3. And to discuss the exploration proposed by the applicant.

The writer conferred with Joe Porter, applicant's geologist, in Rosiclare, Illinois on May 19, 1972. Hamp Hole No. 3 was examined and sampled, and the proposed project was discussed in some detail with Porter.

1. Hamp No. 3 core was examined from about 1,400 to the bottom (2,621), and 10 samples were taken. These samples have been sent to Allen Heyl in Denver for whatever confirmatory analyses you or he may deem necessary. Visual examination by the writer would tend to confirm that this hole does contain 5-10 to 20 percent CaF_2 in a rather thick zone at in-hole depths of about 2,000 to over 2,200 feet. The fluorite-bearing zone is a breccia that consists of scattered country rock fragments generally about 1/4 inch in diameter in a purplish fine-grained ground mass

2. Economic possibilities: No mining at depths of 2,000 feet has been done in this area nor has any metallurgical work been completed on the potential ore--so the writer can only compare with the present type of fluorspar operation, and speculate!

Currently, bedded-type fluorspar ore bodies are from 50 to 200 feet wide, 5 to 20 feet thick, and vary in length or "run" from 200 feet to 2 miles, in mines that are usually a few hundred feet deep. Mine-run ore cutoff varies, but in general 20 to 25 percent CaF_2 ore can be handled. Small zinc and lead values are commonly in the ore, and assist in lowering the CaF_2 cutoff.

In contrast, the potential Hicks Dome ore body is about 2,000 feet in depth, might average from 100 to 200 feet in thickness, and appears to average 10 to 15 percent CaF_2.

Obviously a comparison is extremely difficult because: although Porter suggests that the possibly economic zone may be bedlike, data are still too incomplete to prove this. Several pipe-like mineralized zones are within the realm of possibility. Therefore the area extent is difficult to evaluate at this time. Mining and metallurgical problems and costs are outside my field of competence and I will not even speculate.

An important factor, heretofore unmentioned by me, is the highly unusual rare earth and beryllium content. Based primarily on work by Heyl, there appears to be some correlation between the fluorite and rare earths and possibly beryllium. If the fluorite ore does contain significant quantities of rare earths and beryllium--and the metallurgical problems can be handled--then their byproduct value might be substantial.

3. The applicant is flexible upon location of drill holes. Holes A and B basically are simple offsets of Hamp Nos. 3 and 4. Holes C and D are essentially wildcat holes. I understand via phone and memo from Heyl that Geophysics has flown a closely spaced network over the area and has come up with several anomalies. These data are not available to me as yet, but if they can be available soon, then I suggest that they might be used to assist in hole location. My uncertainty here reflect my wondering whether or not surface anomalies will reflect 2000-foot deep possibly bedded-type ore. Certainly at least one hole south of H amp 3 and 4 should bethe first hole. Further holes should be predicated on the results of the first, as well as Geophysics' anomaly data.

RECOMMENDATIONS:

I strongly recommend a drilling project for the area. These completely different and highly unusual types of mineralization(perhaps the most unusual in the country, and certainly the most unusual in my limited experience) are present in sufficient quantities to warrant further exploration. The exact location of the proposed drilling should be left open, pending Geophysics' data. Perhaps we can all agree on the first hole(at this time, either H ole A or B would be satisfactory to me) and the remainder of the drilling be set up on a contingency basis.

Robert D Trace
5/26/72

OPTIONAL FORM NO. 10
MAY 1962 EDITION
GSA FPMR (41 CFR) 101-11.6

Hasler

UNITED STATES GOVERNMENT

Memorandum

JUL 7 - 1972
Denver, Colorado

TO : Harold Kirkemo, Chief, OME

DATE: July 3, 1972

FROM : Robert D. Trace, Geologist
U. S. Geol. Survey
Princeton, Ky. 42445

SUBJECT: OME-6873 (Fluorspar et. al.)
Hicks Dome Account
Hicks Dome Property
Hardin County, Illinois

Environmental impact supplement

The sites for the proposed diamond drilling are in an area of low rolling hills, part of which is wooded and partly in unused pastureland. No farming would be disturbed. Few, if any, small trees will have to be removed, as the area needed for a drill set-up is small.

Water will be obtained from existing ponds. If return drill water is obtained, in general it will be returned to the same ponds.

Based on previous experience with similar drilling in this area, no adverse effect on the environment is anticipated.

Robert D Trace
7/3/72

5010-103

Buy U.S. Savings Bonds Regularly on the Payroll Savings Plan

Princeton, Ky.
May 26, 1972

Dear Allen,

Under separate cover 10 core samples are on their way to you. Enclosed is a copy of the memo I wrote to Kirk(could you give the extra copy to Hasler).

I talked to Joe for several hours. He's not nearly as positive sounding on several ffeatures of the deposits as the report sounds--but this I can understand. He's got to say something.

Some miscellaneous "answers": The higher grade zone does appear to be somewhat finer in fragment size (in Hamp No. 3 at least) than the material above and below the 2000-2200 foot zone. The box after box of purplish core is certainly beautiful to behold. Regarding more assays up and down hole, many are in process now. See the sample numbers on the log plots.

Joe had just finished running a counter over splits of sampled units. Enclosed are the results of this " Radiometric Survey" for Hamp 3, 4 and Panky 2. Roughly the count and CaF_2 seem to go together

I told Joe about the Geophysics' anomalies and that we hoped to get preliminary results soon. He is, or course, highly interested--but he is NOT interested in waiting too long. He is interested in getting the show on the road, but on the other hand, if something real useful is coming up, we should certainly use it(which I pointedly pointed out, if you will pardon the alliteration??.)

The enclosed memo report does not really say anything new. But I can very definitely confirm that the purplish "high grade" does exist as shown in Joe's logs. The primary target, namely southward of Hamp 3 and 4 also appears to be an obvious fact. Practically anything else regarding target, configuration of CaF_2 deposit, origin, rare earth and Be, etc. has multitudinous posibilities.

I'm leaving tomorrow for a 2 weeks trip westward, but I doubt that we'll get to Denver. If I do however, I'll give you a call.

Bob

Also under separate cover, the OME docket material submitted by Porter.

Hardin

JUL 5 - 1972

Re: OME 6873 (Fluorspar et al.)
Hicks Dome Account
Hicks Dome Property
Hardin County, Illinois

MEMORANDUM REPORT 6/27/72

TO: Harold Kirkemo, Chief, O.M.E.

FROM: Allen V. Heyl, Geologist
U.S. Geological Survey
Denver Federal Center, Bldg. 25
Denver, Colorado 80225

I have recently visited Hicks Dome, Illinois and have reviewed the geological, geophysical and exploration aspects of the Hicks Dome property, and the available core and records from the previous drilling. Robert D. Trace has also recently examined the property and has reported to you on May 26, 1972 on the results of his examination. Trace and John Adams, expert mineralogist, also accompanied us during the examination.

The applicant's report is unusually complete and well prepared, and can be used to understand the broad aspects of the problem except for a few points:

(1) Examination in the field and of the core indicate that the fluorspar is pervasively deposited in explosion breccia, which occurs as large breccia pipes and lateral, thick, sill-shaped extensions that lie between capping strata and a less finely ground breccia of perhaps an earlier stage in the central core of Hicks Dome. The so-called "bedded ore" consists of large injected sill-like bodies of fluorspar-rich micro-explosion breccia. Some of the capping strata also is shattered to a crackle breccia and mineralized with fluorspar, barite and calcite.

Although much of the fluorspar breccia is capped with 1500 to 2000 feet of strata, locally mineralized breccia pipes and dikes of at least 2 ages extend to the surface. One of these breccia pipes was cut in Panky No. 2 hole. The breccia in it contains about 5 percent fluorspar. Such 5% breccia was intersected from the surface to the total depth of about 2500 feet. The coarser breccias that lie beneath the main ore zone in Hamp 3 and 4 drill holes at about 2200 feet are also mineralized as far as drilled with about 5 to 10 percent fluorspar. Fragments of mafic intrusive

igneous rocks and of Precambrian basement granite and quartzite are found scattered sparsely in the explosion breccias indicating their origin from deep-seated volcanic explosions. These fragments may have been blown upward 5000 or 10,000 feet.

(2) Almost none of the fluorite breccia ore seen fits the term "bedded replacements," although the largest and richest body found in Hamp holes 3 and 4 are tabular, and injected laterally between beds.

(3) Because of the hundreds of feet of low-grade fluorspar breccia cut in all of the five deep holes completed to date, much of the lower grade material has not been analysed. For example, the entire Panky hole No. 2 core will probably contain fluorspar in about the same percentage as the parts analysed. Thus in addition to the 200-250 feet of best fluorspar material which is the target proposed for further exploration, a very large tonnage of lower grade material containing at least 5% fluorspar and in places 10 percent has been cut in all of the drill holes. In no place has any of the five drill holes gone out of this low-grade material when drilling was stopped. Thus a very large low-grade deposit is indicated, which unless future drilling negates the present results, contains a very large fluorspar resource.

(4) Except where locally silicified, the rock drills very well and the core and sludge recovery to date has been quite good--85% or better. Future hole locations should avoid the highly silicified areas exposed at the surface which are very expensive to drill.

(5) The best 200-250 ft thick fluorspar zone cut in Hamp holes 3 and 4 and in somewhat a leaner zone in Hamp 1 is much thicker than any presently mined ore body, and if continuity between holes exists, it probably contains more than 5,000,000 tons. The average grade is lower than presently mined. Possibly, however, it will be amenable to large production methods; the lower costs that could result, places it within the realm of economic possibility.

(6) Local zones 1 to 20 feet thick that contain .5 to 5 percent lead and zinc combined will provide potential byproduct values.

(7) The fluorspar breccia contains rare earth, niobium and beryllium values. The beryllium values in Hamp hole 3 are much higher for 220 feet than in the presently productive Spor Mountain, Utah beryllium mine; the niobium values approach that of Oka, Quebec, thus other major byproduct values are indicated, if the metallurgical problems can be successfully handled. High beryllium rare earth zones correspond, in general, to the high fluorspar zones.

(8) Surface field checking of the recent U.S.G.S. aerial radioactivity survey indicate that any area of regolith or bed rock in the center of Hicks Dome is quite radioactive. In local areas such as the old trenches the radioactivity is very high. Elsewhere it is extensive and pervasive over about a square mile. It appears local and spotty only because of a partly eroded cap of non radioactive loess that covers much of the central domal crest. Thus the surface radioactive anomalies can be used in a very general way to assist in exploration. They will only reflect exposures of mineralized rock, and are of no help to find 2000-foot deep breccia bodies.

(9) Porter's analyses in his application appear to be excellent, both for fluorspar and the other elements. His sampling is well done, and his estimates of fluorspar are quite good, generally falling within a percent or two of the analysed results.

Recommendations:

I strongly recommend a drilling project for the Hicks Dome prospect. This fluorspar prospect is very different and geologically unusual, and the possibility exists for a very large ore body that could become a major resource. The results to date have been excellent. Every completed hole on a very wide spacing is mineralized with hundreds of feet of fluorspar. There are no known limits to the bodies in any lateral direction except the barren Frickes oil test one-half mile towards the southeast. Vertically the best material is in a zone 200-250 feet thick at depths of about 1900 to 2150 feet, but no hole to date has ever extended into barren unbrecciated rock at depth. There could be barren spots between holes, but none have been found as yet. Quite obviously there is sufficient mineralization to warrant further exploration. The previous exploration work has been handled carefully and properly.

I would like to suggest that the first hole be proposed hole A, then hole B. The third and fourth holes should be located depending on the results found in A and B.

Allen V. Heyl

Allen V. Heyl

APR 28 1972

Hicks Dome Account
c/o Gilbert Kerlin, Esquire
Shearman and Sterling
53 Wall Street
New York, New York 10005

Re: OME-6373 (Fluorspar, et al.)
Hicks Dome account
Hicks Dome Property
Hardin County, Illinois

Gentlemen:

Your application for exploration assistance, dated April 14, 1972, has been assigned Docket No. OME-6373. Please identify all future correspondence relating to your application by this docket number.

We enclose for your information a copy of Exhibit A, entitled "Notice to Prospective Federally Assisted Construction Contracts", which describes certain recent additional regulations and requirements. This should be filed with your copy of the application.

The application has been reviewed in this office and referred to Mr. Robert D. Trace, U. S. Geological Survey, 206 South Darby Street, Princeton, Kentucky 42445.

Mr. Trace will contact you if additional information concerning the application is needed. In the event a field examination is necessary, he will arrange a suitable schedule with you or Mr. Porter.

Sincerely yours,

Harold Kirkemo

Harold Kirkemo
Chief, Office of
Minerals Exploration

Enclosure

Copy to: Mr. Joseph A. Porter
Geologist
Rosiclare, Illinois 62982

Robert A. Laurence, Knoxville, Tenn.
Robert D. Trace, Princeton, Kentucky
Mr. Kirkemo
Mr. Weeks

RAWeeks/gla 4-28-72

cc: Director's Reading File
Mineral Resources
OME docket
OME Reading File

Box 506

Telephone (618) 285-6685

Joseph A. Porter

Geologist

Rosiclare, Illinois
62982

April 14, 1972

COPY
M. E.
RECEIVED
APR 20 1972
INITIALS | CODE

Mr. Harold Kirkemo
Chief, Office of Minerals Exploration
United States Department of Interior
Geological Survey
Washington, D. C. 20242

Dear Mr. Kirkemo:

As agent for the Hicks Dome Account I am submitting herewith two copies of Form MME-40 with all of the necessary supplementary data. Several additional items are being submitted under separate cover. I will be happy to furnish any further information you might require.

To summarize, work to date has shown considerable potential for development of a large tonnage fluorspar ore body with interesting byproducts.

Four diamond drill holes costing $93,180 are proposed. They have an excellent chance of blocking out a substantial ore reserve and if successful would reduce to a minimum the risks in further development of the property.

Respectfully submitted,

Joseph A. Porter

JP:vb
Enclosures
Copies 4

MME Form 40
(Revised Nov. 71)

Form approved
Budget Bureau No. 42-R1368

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

APPLICATION FOR FINANCIAL ASSISTANCE IN MINERALS EXPLORATION

Pursuant to Public Law 85—701 (72 Stat. 700; 30 U.S.C. 641)

NAME OF APPLICANT *(Full legal name and mailing address as they should appear on contract if one is executed.)*

Hicks Dome Account
c/o Gilbert Kerlin, Esq.
Shearman and Sterling
53 Wall Street
New York, NY 10005

APPLICANT DO NOT USE THIS BLOCK

DOCKET NUMBER: 6893

DATE RECEIVED: 4-20-72

REGION: IV

DIVISION CODE:

BUSINESS ORGANIZATION *(Check one)*

- INDIVIDUAL [ ]
- CORPORATION [ ]
- PARTNERSHIP [X]
- OTHER *(Specify)* [ ]

STATE IN WHICH FIRM IS ORGANIZED:

LIST CORPORATE OFFICERS OR PARTNERS HERE, IF APPLICABLE

NAME	ADDRESS	TITLE
Gilbert Kerlin	as above	
Robert Goelet	425 Park Ave., New York, NY 10022	
Francis Goelet	" " " " " " "	

MINERAL(S) FOR WHICH YOU WISH TO EXPLORE: Fluorspar, Niobium, Beryllium, Rare Earths, Thorium

ESTIMATED COST OF PROJECT: $93,180.00

PROPERTY NAME	LOCATION COUNTY	STATE
Hicks Dome	Hardin	Illinois

GENERAL INSTRUCTIONS

Before filling out this application, please read the *OME Regulations for Obtaining Federal Assistance in Financing Explorations for Mineral Reserves* (30 CFR Chap. II). To assure prompt action, your application must provide all applicable material and information specified on the back of this application form. Avoid unnecessary correspondence and delays by submitting complete and accurate information. *Please submit two copies of this application and all accompanying papers* except as otherwise noted. Place your name and address on each sheet. Each item of information, maps, and reports required as a part of this application is described on the back of this form. Identify each attached statement by the item number to which it applies. If an item does not apply to your application, show the item number on your statement and after it write "not applicable." Maps or sketches should be used to supplement narrative descriptions of the property location and boundaries in item 2, existing mine workings and geology in item 3, and the proposed exploration work in item 5. When this information is not too complex, all of it may be shown on one map or sketch. All documents and other attachments submitted as a part of this application, except those in item 3(g) which you mark to be returned, become the property of the Government and will not be returned to the applicant. Send true copies, *not originals*, of leases, contracts, and other documents which are an essential part of your business records. *File this application with the Department of the Interior, U.S. Geological Survey, Office of Minerals Exploration, Washington, D. C., 20242, or with the nearest OME Field Office.*

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, and that he would not ordinarily undertake the proposed exploration under current conditions and circumstances at his sole expense.

Joseph A. Porter

April 14, 1972
DATED

BY *(Signature)*

Geologist
TITLE

A wilfully false statement or certification to any Department or Agency of the United States Government is a criminal offense.
U. S. Code, Title 18, Sec. 1001.

INFORMATION REQUIRED WITH THIS APPLICATION

(submit on accompanying pages)

1. Financial Eligibility:

(a) Submit evidence of efforts made within 90 days preceding the filing of this application to obtain credit from your bank of account and at least one other banking institution or other private source of credit. Such evidence shall include (1) *true copies of your letters to credit sources* which show date of loan request, amount and terms requested, and proposed use of loan funds and (2) *true copies of replies from credit sources.* If the loan was offered under terms which you consider unreasonable, state why you consider them so.

(b) List names and addresses of affiliated, parent, or controlling companies or organizations and state extent and nature of their interest.

(c) State how you propose to furnish your share of the cost of the exploration work.

2. Applicant's Rights in Land:

(a) State your interest in the land and mineral rights, whether owner, lessee, purchaser under contract, or other. If you are not the owner, submit one true copy of the lease, contract, or other document (with address of owner) under which you control the property. Describe all liens, mortgages, or other encumbrances on the land and state book and page number and official place where recorded.

(b) State the legal description (section, township, and range; metes and bounds; patent number of claims) of the land upon which you wish to explore and all adjacent land which you own or control. Describe any part of the land or workings which should not be subject to Government royalty and liens. If the land consists of unpatented claims, state book and page number for each recorded location notice, including amended locations, and official place where recorded. State all the names by which you know the property.

(c) For all land or mineral rights encumbered or not owned, submit five copies of Lien and Subordination Agreements signed by owner on MME Form 52. If the agreements cannot be obtained, state reasons and whether you can furnish a performance bond.

3. Physical Description:

(a) Describe in detail and illustrate with maps or sketches all mining or exploration operations which you know have been or are being conducted upon the land. Include existing mine workings and all production facilities.

(b) State your interest, if any, in operations described in (a)

(c) State, if you know, the past and current production, supporting your statement with copies of settlement sheets, mine records, or published data if available.

(d) Describe known ore reserves, giving quantities and grades.

(e) Describe by narrative and maps or sketches the geologic features of the property, including ore minerals, geologic formations if known, and type of deposit (vein, bedded, etc.).

(f) If you have sampled the area you propose to explore, show where the samples were taken, describe sampling methods used, and provide copies of assay certificates. State your reasons for expecting to find ore.

(g) Send with your application at least *two* copies of all geologic or engineering reports, assay maps, or technologic information which you have, indicating whether you require their return.

4. Accessibility of Property:

(a) To aid the OME representative who may examine the property state name, address, and telephone number of person who will meet him; give directions for reaching the property; and describe accessibility of property and of any mine workings.

(b) Name the shipping and supply points and state the distances to the property.

5. Exploration Work:

(a) Describe fully the proposed exploration work giving individual footages and sizes of openings *for each item of work.* Use narrative, maps, plans, and sections as necessary. Show location of the proposed work as related to geologic features such as veins, ore-bearing beds, contacts of rock formations, etc. Show on maps also the relation of the proposed work to any existing mine workings and to *claim boundaries* or to the closest identifiable corner.

(b) If an access road must be built, show the proposed location on the property map and state the length, type and construction methods proposed.

(c) If an OME contract is executed, state how soon thereafter work would be started and finished. State your anticipated average daily or monthly rate of progress for each type of work.

6. Experience:

State your operating experience and background to conduct this exploration work and also that of the person who will supervise the work.

7. Estimate of Costs:

Furnish detailed estimates of the necessary costs for time and materials *for each item of the work proposed in 5(a)* under the headings listed below with a total for each heading and the estimated total cost of the work. Costs for any work to be performed by an independent contractor should be listed separately under category (a) below. Costs for any work that is not to be performed by an independent contractor should be listed under categories (b) through (g).

(a) Independent contracts. State the total cost of any proposed independent contract for all or any part of the work, and the number of units and the unit cost for each type of work, such as per foot of drilling, per foot of drifting, per hour of bulldozer operations, or per cubic yard of material moved. Cost estimates should be supported by bids from three contractors if possible. (*Note*—If none of the work is to be contracted, write "none" after this item.)

(b) Personal services. The cost of supervision, engineering and geological services, outside consultants, and labor should be itemized by numbers and classes of employees; rates of wages, salaries or fees; and periods of employment. State whether these services are available.

(c) Operating materials and supplies. List items of material and supplies giving quantity and price of each. Include under this heading power, water, and fuel, and units of equipment and tools costing less than $50 each.

(d) Operating equipment. List items of equipment and tools costing $50 or more per unit. Give specifications and indicate how each item is to be acquired—i. e., rented, purchased or provided by the applicant. If rented or purchased, state the estimated rental or purchase price and mobilization charge. If furnished by the applicant, state condition and present fair market value.

(e) Initial rehabilitation and repairs. Describe the type and the cost of *initial* rehabilitation or repair of existing buildings, fixtures, installations (exclusive of mine workings), and movable operating equipment now owned by the applicant which will be used in the exploration work.

(f) New buildings, fixtures, installations. Describe each building, fixed improvement, and installation to be purchased, constructed, or installed for the exploration work, stating specifications and cost including labor, and materials.

(g) Miscellaneous. Describe the type and estimate the cost of repairs and maintenance of the operating equipment listed in 7(d). Do not repeat initial repairs listed in 7(e). Show also the costs of analytical work, accounting, workmen's compensation and employees' liability insurance, payroll taxes, and other required costs that do not fall within the previous categories. [*Note*—The Government will not contribute to costs incurred before the date of the contract, or to costs of or incident to: (1) acquiring, using, or possessing land and any existing improvements, facilities, buildings, installations, and appurtenances, or the depreciation and depletion thereof; (2) general overhead, corporate management, interest and taxes (other than payroll and sales taxes); (3) insurance (other than employees' liability insurance); and (4) damages to persons or property (other than authorized repair to or replacement of equipment or other property used in the work).]

EXPLORATION CONTRACT
RICHMOND HILL EXPLORATION COMPANY, INC.
ONE-6415

EXHIBIT A

The purpose of the project is to explore by drilling, from sites to be prepared on the land surface, for silver-bearing ore bodies below an elongate geochemical anomaly which is approximately coextensive with the outcrop areas of the Leadville limestone and of the transverse Woody Creek and Lenado faults between offset segments of the limestone.

Ore bodies are inferred in and along the transverse faults and possibly along bedding-plane faults where the faults intersect or traverse limestone strata of the Manitou, Dyer, Leadville, and Belden formations of Paleozoic age.

General Provisions

A bulldozer no smaller than a Caterpillar D-7 shall be used for preparation of access roads and drill sites.

All drill holes shall be cased as necessary. The Government will not contribute to the cost of casing left in a hole at the Operator's request.

Drill holes shall be surveyed as necessary by an in-hole instrument suitable for determining both bearing and inclination.

Facilities shall be provided for recovering drill sludge, and such sludge shall be retained when drilling in significantly mineralized rock.

All drill core shall be stored in boxes identified as to hole number with markers in the core sections indicating the depths represented. Significantly mineralized core shall be split and one split assayed for gold and silver and for lead and zinc as warranted. Whenever core recovery is less than 60 percent, a split of the corresponding retained sludge shall be assayed separately. The remaining core shall be stored in proper sequence with the unsampled core, and the remaining sludge shall be stored in suitable containers properly identified as to hole number and depth. Stored samples shall be made available for Government inspection and possible use, and may be disposed of with prior Government approval.

All drill core shall be logged and copies of the logs showing locations of all samples taken and the geological formations and structures traversed by the drill holes shall be furnished monthly to the Government.

True copies of assay certificates of all samples shall be submitted with the Operator's monthly report.

The Operator shall provide such supervision, labor, and technical services as may be required to perform the work in a satisfactory manner.

The Government will not contribute to the cost of any holes closer than 150 feet to the outer boundary of the project area or closer than 50 feet to the ore intercept in any other hole.

The location, direction, and extent of each work item shall be subject to Government approval.

The work shall be divided into two stages. The Operator shall complete all of Stage I and as much of Stage II as is authorized in advance by the Government and confirmed in writing. Approval of Stage II shall depend upon the results obtained in Stage I.

Description of the Work

Stage I

The work shall consist of bulldozing access roads to and the levelling of a maximum of four drill sites, core drilling an estimated 2150 feet in four inclined holes, and evaluating the results.

The holes shall be drilled to intersect the Woody Creek fault, the Lenado fault, or the upper or lower contact of the Leadville limestone near one of these faults.

The approximate inclinations and depths of the holes are as follows:

Hole No.	Inclination	Depth
1	-45°	600 feet
2	-45°	400 feet
3	-40°	600 feet
4	-40°	550 feet 580'

(B) - Three

Any drilling footage not used in completing Stage I may be applied to Stage II.

The approximate locations of the drill sites and bearings of the drill holes are shown on Figure 2 entitled "Lenado Project" attached and made part hereof.

Stage II

The work shall consist of bulldozing access roads to, and the levelling of drill sites, drilling an estimated 2150 feet in four or more holes, and evaluating the results.

The locations of the drill sites and the bearings, inclinations, and depths of the drill holes may be selected either to delineate further any ore bodies discovered in Stage I by offset drilling or to explore the favorable geologic setting southwest of the Leadville Tunnel by holes 5, 6, 7, and 8 approximately as illustrated on Figure 2.

Any footage not used in completing the foregoing options in Stage II may be used to core drill in the area of the Tillie shaft at sites to be selected by the Operator and approved in advance in writing by the Government.

Estimated Costs of the Work

Stage I

Actual costs

Category (1) Independent Contracts

Mobilization and demobilization, drilling equipment and personnel	$ 350.00
Bulldozing roads and drill sites, including moving bulldozer in and out, 90 hours @ $18.00 hour	1,620.00
Drilling four holes, est. 2150 feet	16,510.00

Depth, feet	NC	HX	BX	AX&EX
0 - bedrock	$7.85			
Bedrock-250	$7.75	$7.40	$6.50	$6.00
250 - 500		$8.20	$7.10	$6.60
500 - 750			$8.00	$7.30
750 - 1,000			$8.95	$8.20

B. Rhees

Category (1) Independent Contracts (continued)

Reaming, including installing and removing casing		$2,220.00	
Rates, all sizes:			
0 - 500 feet	$3.80/foot		
500 - 1,000 feet	$5.40/foot		
Casing lost in hole		1,500.00	

Sizes:	4-inch	NX	BX	AX	EX
Cost/foot	$4.14	$3.31	$3.00	$1.81	$1.62

Freight allowance 20 cwt. @ $1.25/cwt	25.00	
Cementing and Redrilling, 14 hours @ $12.50/hour	1,750.00	
Additives, 120 sacks @ $7.50/sack	900.00	
Water truck rental, 4 months @ $190.00/month	760.00	
Water truck mileage - 500 miles/month 2000 miles @ $0.12/mile	240.00	
Truck driver, including F.I.C.A., etc. 640 hours @ $3.51/hour (rounded)	2,250.00	
Surveying, 16 hours @ $12.00/hour (rounded)	190.00	
Surveying instrument, in-hole, including transport 5 days @ $80.00/day	400.00	
Standby time, 40 hours @ $11.00/hour	440.00	
Core boxes, 215 boxes @ $1.00/box	215.00	$29,370.00

Category (2) Personal Services

Subcategory (a) Supervision and Technical Services

None except:

1 Supervisor-geologist-engineer, 4 months @ $910.00/month	3,640.00	

P. Rheo

Subcategory (b) Labor

1 Engineer's assistant, 4 months @ $650.00/month	$2,600.00	$ 6,240.00

Category (3) Operating Materials and Supplies

None except:

Explosives, including detonators	75.00	75.00

Category (7) Miscellaneous

None except:

Samples assayed for gold and silver, 150 samples @ $3.00/sample	$ 450.00	
Samples assayed for lead and zinc, 150 samples @ $4.00/sample	600.00	
Vehicle mileage (3,000 miles/month), 12,000 miles @ $0.12/mile	1,440.00	
Accounting and office expense, 4 months @ $40.00/month	160.00	
F.I.C.A., payroll taxes, insurance, etc., 4 months @ $266.00/month (rounded)	1,065.00	3,715.00

Total Estimated Cost of Stage I $39,400.00

Stage II

Actual Costs

The schedule for Stage I applies

Total Estimated Actual Costs - Stage II $39,400.00

Total Estimated Actual Costs of the Work $78,800.00

Government Participation @ 75% $59,100.00

.20 .20

14
7
98

$1,400.00 for 4 Holes.

$3.50/sack

1400) 10,0000 (7.1
9800
2000
1400
600

10,000
.20
2,000.00

$2.50/sack

10,000 ft.

10,000) 1400.0 (.14
10000
40000

.20
$2,000.00
1400
600.00 ft

$500.00

.20¢/100 bags

100 - 50# bags @ 2.50 = $250.00 per hole
3.50/sack 4
$1000.00

$3.50/sack.
350.00
4
$1400.00

.20¢/ft = 5,2000

2000.00
1400.00
600

aquagel Halliburton Cem 100# 50 bags

(2) Cementing (Time est. is included) types of additives are not suggested (with prices eg: aquagel, Bron, Cabeal, Tennile, Cellex H.V., Saloss, Portland Cement, Quebracho etc etc size #, gd + price.

(3) No quote for mobilization + demobilization (does your bid include those costs (should there be a quote) eg $500.00. (Must be included)

(4) No quote for bid other than, Rotary and NX size core 2 1/8".
Should we provide a bid for BX in case a hole should have to be reduced in order to complete it to the maximum depth proposed if warranted.

(5) Sludge? At what % core rec. need we collect Sludge. Is it necessary and/or advantageous. < 80% core?
Bulldozing 15 Hrs @ 12.50/Hr
4 Holes = 60 Hrs @ 12.50/Hr = $750.00

(6) Core boxes (5' in 4 rows = 20 feet per box
Are 880 enough?

(7) Sample Bags. Are 330 enough?

(8) Analytical Works
(a) No allowance for transportation of samples from property for assayer.

over

Trace
(BP 400B 63-64)

(3)

Analytical Work — continued

(b) Spectrographic analyses (Skyline Labs)

(c) Wet assays (CaF_2, Pb Zn other)

(d) Specific ion electrode

Survey Job (DEA, here) may want to do some confirmation work? Do you think this is necessary, or is it objectionable and or desirable

9. Geologic Assistant @ $500.00 / month
Is this man required (why)
could a non technical man do Driller's helper or someone like that.
Will you as Supervisor be away from the drilling for extended periods of time. (How much time out of the 7 months time estimated would the Geol. Asst be in charge?)

(35)

(10) Office Expense
7 months at $100.00 / mo. $700.00

OME 6873 Fluorspar etal

Hicks Dome Property 8/7/72
Hardin Co, Illinois

Mr. Joseph Porter (618-285-6685)
Rosiclare, Ill

① Provide Washington with the following documents (free copies)

the 17/21st interest of Mabel Pankey sold to Industrial Mineral Exploration Co dated 3-13-71

plus

the companion document for the sale of 17/21st interest by Industrial Mineral Exploration Co., to Antacus Resources Corp. on 4-1-71.

↓

Sale recorded in Hardin Co, Ill. Courthouse in Book 9-page 66

no record of them having been recorded showed they be, ~~overcorded~~

Preferred not to record at this time — Keep Quiet

OVER

Holes — 3.01

2500'

4 | 10,000
8'
20

250
250
250.00
$ 5

1
0
0
20
1

3
5.67
50
$ 283.50

(100 bags) $250.00)
50#
Borsod
$ 4-500

Borsod Kop. .20¢/#
fish.

40 — 50# bags.

Borsod .20¢/#

50 — 100#

Ubrecen —

10,000
.20
2,00000

100
50#
5000 #

NLI.

Div. NLI and
Borsod Division of
266-1953
Dresser, Industries —

See
Beal Mear

Joseph Poulton —
Reid Johnston —
J. M. Murray —
Jay Murray, Denver
" " Ill

Carmi, Ill
Polymer — quik-trol
quik-mud

~~Beal Mear Corp~~

Ernie Hicks — →
~~Howard Morton~~ —
Weeks
Kirk —

(100 - 50# Bags.
quik-gell)

quik-gell — 50# bag 2.50/bag

30 ton lots — KK co. Borsod. Warehouse .25

Northern Saskatchewan →

(Aq) back on

(2n) (Jamie)

Hilton Downe

Joseph Porter Physician Del

(618) 285-6685

Connecting — Tom

Porter Additions (materials)
How much & what

No money lun
no mob.

Mob. demob. — No estimate
BXWL Bid as
Core Box or. 10,000 → How much does he need really?
pour 4" Bull dozer — (880) →
5(20) 2 1/8
1000 box ?

Sand Bags 300 is it enough.

Assay. Rett — 80% Would change
assay lab adequate to confirm
Bob Face → Fluorine & Silica
low at Fosicloser
minerals

(Transport/samples — (+ spec analyses Skyline Labs Chas Thompson)

Fluorine compound species Assaying (costs) low
Confirmation work
Jon Riley ← Hoffman

Part time Sec. include as Office Expense.
$100.00/month

Samples-Bags
Humidle Meet Cost $500.00
Porter — No?

Legal Docum
Copy of Doc. that shows
the 17/21 interest in
Mabel Parsley sold
to Industrial Mineral Expl.
Co. 3/13/71 +
Companion document for
sale of 17/21st int by
IME Co. to Artemis on
4/1/71

Sale recorded in Hardin Co.
Book 9 p. 66

No record of these leases ever
recorded — — —

x 5/8 Sludge —

Memo:— Just two holes, depend on 1st two

"Bx vs welded"

5% fluorspar

Memo - Bx — —

10% Flor

(2')— 5"

1.5' 5 x 1"

2/3 dia

$20.00

32

5.00

2.00

32.00

15.00

Dick Richards

Richard M Richards
Spokane, Wash.

RADIOMETRIC SURVEY by Joe Porter May 1972

Obtained from Joe by RDT 5/19/72

(Hamp 3)

Number	Reading	Background	X Background
501	0.021	.019	1.1
502	0.022		1.1
503	0.029		1.5
504			
505	0.07		3.6
506	0.10		5.2
507	0.09		4.7
508	0.15		7.8
509	0.36		18.9
510	0.41	.035	11.6
511	0.41		11.6
512	0.47		13.4
513	0.41		11.6
514	0.30		8.5
515	0.43		12.2
516	0.60		17.1
517	0.36		10.4
518	0.24		6.8
519*	0.44	.021	20.9
520	0.11		5.2
521	0.17		8.0
522	0.175		8.3
523	0.165		7.8
524	0.195		9.2
525	0.10		4.7
526	0.10	.020	5.0
527	0.12	.029	4.1
528	0.10		3.4
529	0.18		6.2
530	0.17		5.8
531	0.25		8.6
532	0.26		8.6
533	0.19		6.5
534	0.18		6.2
535	0.10		3.4
536	0.04		1.3
537	0.05		1.7
538			
539			
540			
541			
542			

* Small Sample

RADIOMETRIC SURVEY

(Hamp 4)

Number	Reading	Background	X Background
543	0.25	.029	8.6
544	0.22		7.5
545	0.11		3.7
546	0.075		2.5
547	0.12		4.1
548	0.10		3.4
549	0.11		3.7
550	0.09		3.1
551	0.11		3.7
552	0.115		3.9
553	0.13		4.4
554	0.13		4.4
555	0.15		5.1
556	0.13		4.4
557	0.15		5.1
558*	0.09	.026	3.4
559	0.16		6.1
560	0.14		5.1
561	0.19		7.3
562	0.11 (Bad Sample)		4.2
563	0.165		6.3
564	0.19		7.3
565	0.19		7.3
566	0.22		8.4
567	0.31		11.9
568	0.20		7.6
569	0.20		7.6
570	0.22		8.4
571	0.21		8,0
572			
573	0.08		3.0
574			
575			
576	0.23		8.8
577			
578	0.16		6.1
579	0.10		3.8
580	0.08		3.0
581	0.05		1.9
582			
583			
584			

* Small Sample

RADIOMETRIC SURVEY

(Pankey 2)

Number	Reading	Background	X Background
585	0.038	.026	1.4
586	0.04		1.5
587	0.44		16.9
588	0.044		1.6
589			
590	0.043		1.6
591	0.047		1.8
592	0.06		2.3
593	0.04		1.5
594	0.048		1.8
595	0.041		1.5
596	0.04		1.5
597	0.030		1.1
598	0.045		1.7
599	0.04		1.5
600	0.04		1.5
601	0.045		1.7
602	0.045		1.7
603	0.03		1.1
604	0.05		1.9
605	0.045		1.7
606	0.045		1.7
607	0.05		1.9
608	0.05		1.9
609	0.04		1.5
610	0.035		1.3
611	0.051		1.9
612	0.06		2.3
613	0.04		1.5
614	0.03		1.1
615	0.046	.029	1.5
616	0.09		3.1
617	0.04	.026	1.5
618	0.045		1.7
619	0.041		1.5
620	0.041		1.5
621	0.04		1.5
622	0.04		1.5
623	0.09		3.4
624	0.035		1.3
625	0.04		1.5
626	0.04		1.5
627	0.05		1.9
628	0.036		1.3
629	0.028		1.0
630	0.046		1.7
631	0.04		1.5
632	0.065		2.5
633	0.06		2.3
634	0.05		1.9
635	0.045		1.7
636	0.06		2.3
637	0.075		2.8

RADIOMETRIC SURVEY

(Pankey 2 cont.)

Number	Reading	Background	X Background
638	0.075	.026	2.8
639	0.041		1.5

HICKS DOME ACCOUNT

APPLICATION TO OME
FOR
EXPLORATION ASSISTANCE

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1.	Exhibit 3-1, Areal Geologic Map by Illinois Geologic Survey	Separate Cover
2.	Exhibit 3-2, Map Showing Geology, Topography and Drill Holes, 1"=100'	" "
3.	Exhibit 3-3, Sections Based on Drilling	" "
4.	Exhibit 3-4, Composite Strip Logs of Drill Holes	" "
5.	Appendix A, Copies of Lease and/or Option Agreements	" "

1. FINANCIAL ELIGIBILITY

(a) Efforts to Obtain Credit: Evidence of efforts to obtain credit from private sources is given on the following pages and consists of correspondence with the First National City Bank and Morgan Guaranty Trust Company, both of New York, New York.

The First National City Bank is applicant's Bank of account.

MORGAN GUARANTY TRUST COMPANY
OF NEW YORK
FIFTH AVENUE AT 44TH STREET, NEW YORK, N.Y. 10036

New York March 20, 1972

RICHARD FLENDER
Vice President

Mr. John L. Carroll
Room 4120
345 Park Avenue
New York, New York 10022

Dear Mr. Carroll:

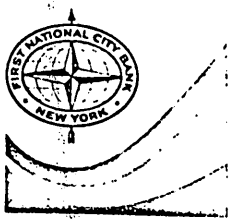
Thank you for your letter of March 15, 1972. I have considered carefully its contents with some of my associates. We are sorry to have to advise you that Hicks Dome Account's situation does not appear to be one with respect to which we would be in a position to make it a loan.

With my best regards,

Sincerely,

Richard Flender

Financial management



FIRST NATIONAL CITY BANK 55 WALL STREET, NEW YORK, N.Y. 10015

March 16, 1972

Mr. John Lee Carroll
345 Park Avenue
New York, N.Y. 10022

Re: Hicks Dome Account

Dear Mr. Carroll:

Thank you for your letter of March 10, 1972 outlining the exploration work being done by your group and requesting a commercial loan of approximately $80,000 to the Hicks Dome account to defray the expenses of exploration work on the property known as Hicks Dome in the Flurospar District, Hardin County, Illinois.

We have examined this application, and while we wish to respond favorably to your request, we must conclude that the properties in their present condition do not lend themselves as a basis for the credit requested. If and when flurospar is developed on the properties in proven commercial quantities, and provided an acceptable plan of exploitation is developed, we would be pleased to review with you the possibility of a loan at that time.

With kindest regards.

Sincerely,

Robert P. Fallon

Robert P. Fallon
Assistant Vice President

March 15, 1972

Mr. Richard Flender
Morgan Guaranty Trust Company
522 Fifth Avenue
New York, N. Y. 10015

Hicks Dome Account

Dear Mr. Flender:

During the past year we have been engaged in exploration work on a group of mineral properties located on a geologic structure known as Hicks Dome, in the fluorspar district, Hardin County, in extreme southern Illinois. The results of this work were encouraging and we strongly feel that these properties merit additional exploration work.

Hicks Dome Account is a partnership set up to pursue this activity, and has no substantial assets other than the mineral leases themselves.

During 1971 a total of three holes were completed. Two of the drill holes encountered substantial but subeconomic mineralization at a depth of approximately 2,000 feet. It consisted of low grade fluorspar mineralization in thicknesses exceeding 100 feet. Associated with the fluorspar are various amounts of rare earth and beryllium. The thicknesses encountered and the horizontal extent indicate an excellent chance of discovering a large tonnage, low grade fluorspar deposit.

In view of this, we would like to apply to your bank for a loan with which to undertake additional exploration work on these properties in the coming year. We need approximately $80,000 for the work we propose to do this year. We would hope that you could make this available to us at the normal commercial rates, but would be willing to discuss any terms that you might feel appropriate.

We presently control approximately 600 acres of land by virtue of various mining leases and/or purchase options. The individual leases are generally for long term and cite production royalty payments which are generally less than those that are ordinarily common in the fluorspar mining district.

In the event this could be viewed favorably by your bank, we would be happy to submit to you all the necessary information to substantiate our lease-hold plus all technical data resulting from our previous work.

Thank you for your consideration.

With kindest regards,

Sincerely yours,

JLC:AG

March 10, 1972

Mr. Robert P. Fallon, Asst. Vice President
First National City Bank
55 Wall Street
New York, N. Y. 10005

Hicks Dome Account

Dear Mr. Fallon:

During the past year we have been engaged in exploration work on a group of mineral properties located on a geologic structure known as Hicks Dome, in the fluorspar district, Hardin County, in extreme southern Illinois. The results of this work were encouraging and we strongly feel that these properties merit additional exploration work.

During 1971 a total of three holes were completed. Two of the drill holes encountered substantial but subeconomic mineralization at a depth of approximately 2,000 feet. It consisted of low grade fluorspar mineralization in thicknesses exceeding 100 feet. Associated with the fluorspar are various amounts of rare earth and beryllium. The thicknesses encountered and the horizontal extent indicate an excellent chance of discovering a large tonnage, low grade fluorspar deposit.

In view of this, we would like to apply to your bank for a loan with which to undertake additional exploration work on these properties in the coming year. We need approximately $80,000 for the work we propose to do this year. We would hope that you could make this available to us at the normal commercial rates, but would be willing to discuss any terms that you might feel appropriate.

We presently control approximately 600 acres of land by virtue of various mining leases and/or purchase options. The individual leases are generally for long term and cite production royalty payments which are generally less than those that are ordinarily common in the fluorspar mining district.

In the event this could be viewed favorably by your bank, we would be happy to submit to you all the necessary information to substantiate our lease-hold plus all technical data resulting from our previous work.

Thank you for your consideration.

With kindest regards,

Sincerely yours,

JLC:AG

(b) <u>Affiliations</u>: None.

(c) Applicant's Share of Cost: If an OME contract is executed, Hicks Dome Account will deposit funds sufficient to meet the first month's operating expenses and pay applicant's share of the cost of the project. Deposit will be in applicant's bank of account, the First National City Bank, 55 Wall Street, New York, New York 10015.

2. APPLICANT'S RIGHTS IN LAND

(a) Applicant's Interest: Applicant's interest in land, mineral rights and mining rights is in most instances by virtue of various mining leases with or without purchase options. The majority interest in one tract has been purchased.

The main lease block consists of eight contiguous properties totalling approximately 615 acres. Continuing efforts are being made to acquire additional adjoining properties.

A map given on the following page shows the relationship of the subject properties. Properties are named for the principal lessor. Copies of the agreements by which the properties are held are submitted as Appendix A.

To the best of our knowledge, all the subject lands are free and clear of liens, mortgages, or other encumbrances, except for the leases or options described herein.

Most of the leases presently held are not recorded. They will be recorded when all the desired adjoining ground has been acquired. Pertinent recording data will be furnished when available.

Most of the subject land was originally leased by Industrial Minerals Exploration Company in 1963 and 1964. The leases were essentially kept in effect until they were superseded by new leases either with Industrial Minerals or their successor, Antaeus Resources Corporation. As of this date all the original leases have been renegotiated. Several adjoining tracts of land have been acquired, and negotiations are continuing to acquire additional adjoining land.

Industrial Minerals Exploration Company was dissolved and the subject leases were assigned to Antaeus Resources Corporation on January 20, 1971. Antaeus Resources subsequently entered into an agreement whereby the leases were conveyed to Hicks Dome Account. Under this agreement dated May 10, 1971, Antaeus Resources retains an interest in net profits which may result, and Hicks Dome Account agrees to provide funds for exploration on the properties.

Though basically similar, terms and conditions vary slightly for each of the eight agreements covering the subject properties. A summary of the history, terms, and available recording data of the individual agreements follows.

1. First State Bank, Lease: This property is held by virtue of a Mining Lease, dated March 20, 1970, made initially to Industrial Minerals Exploration Company. It was assigned to Antaeus Resources who in turn assigned it to Hicks Dome Account. This lease takes the place of a similar lease made by the principals in 1963.

The land consists of 160 acres of mineral and mining rights.

The lease is for a primary term of ten years and for so long thereafter as mining, development, exploration, or prospecting is conducted. Production royalties are based on mine mouth values and escalate from 5% of the "net proceeds" for ore having values of $0 to $12.00 per ton to 12% for ores having a "net proceeds" value exceeding $22.00 per ton. Annual advance minimum royalties are in the amount of $500.00 per year.

The lease and the subsequent assignments have not been recorded.

2. Antaeus-Pankey, Own-Lease: A 17/21sts interest in the mineral and mining rights was purchased by Industrial Minerals Exploration Company. This interest was subsequently deeded to Antaeus Resources, who in turn have assigned it to Hicks Dome Account.

The remaining 4/21sts of the mineral rights and all of the surface rights are covered by a Mining Lease from Etta Irby and Iley Pankey to Antaeus Resources, dated July 30, 1971. This lease has subsequently been assigned to Hicks Dome Account.

The property consists of 79.53 acres.

The lease on the 4/21sts interest is for a primary term of five years. Production royalties escalate from 5% for ore having from $0 to $12.00 per ton "net proceeds" value to 12% for ores having a "net proceeds" value exceeding $22.00 per ton. Annual minimum royalty amounts to approximately $95.00 per year.

The deed for the 12/21sts interest, between Mrs. Mabel Pankey and Industrial Minerals Exploration Company, dated March 13, 1971, is recorded in Miscellaneous Book 8, page 50 in the Hardin County Court House. The Mining Lease is recorded in Miscellaneous Book 9, page 66.

3. Loyd, Lease: The Loyd property is held by virtue of a Mining Lease dated March 12, 1970, between three principal lessors and their spouses and Industrial Minerals Exploration Company. The lease was subsequently assigned to Antaeus Resources who in turn have assigned their interest to Hicks Dome Account. This lease takes the place of an earlier agreement dated in August, 1963.

The land covered consists of mineral and mining rights only and totals forty acres.

This lease is for a primary term of ten years and for so long thereafter as any mining development, exploration, or prospecting is conducted. Production royalties escalate from 5% for ores having from $0 to $12.00 per ton "net proceeds" value to 12% for ores having a "net proceeds" value exceeding $22.00 per ton. Annual advance or minimum royalties are in the amount of $240.00 per year.

This lease has not as yet been recorded.

4. Hamp, Lease: The Hamp property was acquired by virtue of a Mining Lease, dated February 18, 1972, between three principal lessors and their spouses and Antaeus Resources Corporation. This agreement supersedes an oil, gas, and mineral lease dated in 1963 between the lessors and Industrial Minerals Exploration Company. This new lease was acquired after the previously described agreement between Antaeus Resources and Hicks Dome Account was made. It is presently in process of being assigned to Hicks Dome Account.

The land covered by the Hamp Lease consists of mineral and mining rights only and totals sixty-one acres.

This lease is for a primary term of ten years and for so long thereafter as mining development, exploration, or prospecting is conducted. Minimum average expenditure of $2,000.00 per year is required. Production royalties have been based on mine mouth values and escalate from 5% of the "net proceeds" for ore having value of $0 to $12.00 per ton to 12% for ores having a "net proceeds" value exceeding $22.00 per ton. Annual advance minimum royalties are $2,160.00.

This lease has not as yet been recorded.

5. Fredericks-Coy, Lease: Rights to this property were obtained by virtue of a Mining Lease, dated April 14, 1970, between Lola and Jack Fredericks and W. F. Coy, Lessors, and Industrial Minerals Exploration Company. This lease was subsequently assigned to Antaeus Resources Corporation on January 20, 1971, and later assigned by Antaeus to Hicks Dome Account. This new lease takes the place of an earlier lease made by the principals in 1963.

The property consists of forty acres of mineral and mining rights only.

This lease is for a primary term of ten years and for so long thereafter as mining development, exploration, or prospecting is being conducted. Production royalties are based on mine mouth values and escalate from 5% of the "net proceeds" for ore having a value of $0 to $12.00 per ton to 12% for ores having a "net proceeds" value exceeding $22.00 per ton. Advance or minimum royalties in the amount of $80.00 per year are due.

This lease has not as yet been recorded.

6. Jenkins-Wunderlich, Lease-Option: Rights to this tract are held by virtue of a Mining Lease and Option to Purchase dated March 9, 1970, between the two principal lessors and Industrial Minerals Exploration Company. Industrial Minerals subsequently assigned its interests to Antaeus Resources on January 20, 1971. Antaeus in turn subsequently assigned the lease to Hicks Dome Account. This takes the place of an earlier agreement made by the principals in 1963.

Subject lands consist of mineral and mining rights only and total twenty acres. This agreement is for primary term of ten years and for so long thereafter as mining development, exploration, or prospecting is conducted. Production royalties are based on mine mouth values and escalate from 5% of the "net proceeds" for ores having values of $0 to $12.00 per ton to 12% for ores having a "net proceeds" value exceeding $22.00 per ton. Advance or minimum royalties are $100.00 per year.

The option price is $20,000.00.

The present Lease-Option has not been recorded.

7. Rose, et al., Lease: Mineral and mining rights to the Rose property are held by virtue of a Mining Lease dated May 14, 1971, between four principal lessors and their spouses and Antaeus Resources Corporation. Antaeus Resources subsequently assigned the lease to the Hicks Dome Account. This lease takes the place of an agreement made between Industrial Minerals and present lessors in 1964.

Land covered consists of surface and mineral rights totaling ninety acres.

This lease is for a primary term of five years and for so long thereafter as any mining, development, or prospecting is conducted. Royalty due is in the amount of 12% of the net returns, defined essentially as the value of the ore at the mouth of the mine. Annual advance rental payments are in the amount of $1,200.00 per year.

This lease is recorded in Miscellaneous Book 8, page 558, in the Hardin County Court House.

8. Coan-Quarant, Lease-Option: Rights to this tract of land are held by virtue of a Mining Lease with Option to Purchase, dated February 22, 1972, between three principal lessors and Antaeus Resources Corporation. Antaeus Resources will assign the Lease-Option to the Hicks Dome Account.

This lease covers the mineral and mining rights only and totals 105 acres. The primary term is for a period of eight years, and it may be extended so long thereafter as any mining development or exploration is being conducted. Production royalty is 10% of the value of the ore at the mouth of the mine. Minimum royalty for the first year is $750.00. After the first year minimum royalties are $1,500.00 per year.

Lessee has an option to purchase the entire 105 acres for $157,500.00.

This lease has not as yet been recorded.

9. Adjoining Ground: Land presently controlled is adequate for the development of a large ore body. Efforts are currently being made however, to acquire as much adjoining ground as is reasonably possible.

Application has been made for a prospecting permit and a Preference Rights Lease for land owned by the U. S. Forest Service in Section 30 and the surrounding Sections. In addition, contact has been made with all the owners shown on the mineral ownership map on page 5.

(b) Legal Description: The proposed exploration work will be done on one or more of the eight properties described herein. The subject properties are contained principally in Section 30, Township 11 South, Range 8 East, with minor adjoining acreage in Section 31, Township 11 South, Range 8 East, and Section 25, Township 11 South, Range 7 East, all east of the third principal meridian in Hardin County, Illinois. Legal description of the individual properties follows:

1. First State Bank:
   E½ of the NE¼, Section 25, T. 11 S., R. 7 E.; and W½ of the NW¼ of Section 30, T. 11 S., R. 8E., containing 160 acres.

2. Antaeus-Pankey:
   NE¼ of the NW¼ (except a parcel containing 0.31 acres in the SE¼); and the SE¼ of the NW¼ (except a parcel containing 0.147 acres), all in Section 30, T. 11 S., R. 8 E. (the exceptions being more fully described by metes and bounds on the appended Mining Lease), containing 79.5 acres.

3. Loyd: SW¼ of the NE¼, Section 30, T. 11 S., R. 8 E. (except a small tract more fully described by metes and bounds on the appended Mining Lease) containing 40 acres.

4. Hamp: N½ of the NW¼ of the SW¼, and a part of the E½ of the SW¼ described by metes and bounds as follows:

4. Hamp: (Continued)

Beginning at the NW corner of the said E½ of the SW¼, thence running South with the West line thereof to the center point of the West line of the SE¼ of the SW¼, being the NW corner of the Lilas Stacy tract, thence East 40 rods, thence North to a point 30 rods North of the North line of the SE¼ of the SW¼, thence East 33 rods to the West line of the Pleas Rose tract, thence, North to the North line of the said E½ SW¼, thence West to the place of beginning, all in Section 30, Township 11 South, Range 8 East of the Third Principal Meridian, containing in the aggregate, 61½ acres, more or less.

5. Frederick-Coy:

N½ of the SW¼ of the SW¼; and the S½ of the NW¼ of SW¼, Section 30, containing 40 acres.

6. Jenkins-Wunderlich:

A part of the E½ of the SW¼ of Section 30, T. 11 S., R. 8 E. of the Third Principal Meridian described by metes and bounds as follows: Beginning at a point on the south line of the NE¼ of the SW¼, 40 rods east of the SW corner thereof, thence running north 30 rods, thence east 33 rods to the west line of the Pleas Rose land, thence south 30 rods to the south line of the NE¼ of the SW¼, thence east to the SE corner of the said NE¼ of the SW¼, thence south to a point that is halfway to the SE corner of the SE¼ of

6. Jenkins-Wunderlich: (Continued)
the SW¼, being the NE corner of the Silas Stacy tract, thence due west to a point 40 rods east of the west line of the SE¼ of the SW¼, thence north to the place of beginning, containing 20 acres, more or less.

7. Rose:
NW¼ of the SE¼ and NE¼ of the SE¼; and 10 acres off the east side of the NE¼ of the SW¼, all in Section 30, T. 11 S., R. 8 E., containing 90 acres.

8. Coan-Quarant:
The S½ of the SE¼, except the north 15 acres of the SE¼ of the SE¼, Section 30; and the NW¼ of the NE¼, Section 31, T. 11 S., R. 8 E., containing 105 acres.

As of this writing, no additional adjoining ground is controlled. If any adjoining ground is acquired it could be included here and made subject to the government royalty and lien.

The Rose property, down to 200 feet of depth, should not be subject to government royalty or lien. A small block of drill indicated ore exists on the Rose property. It is described more fully in Part 3 (a) and (d). It is the result of considerable diamond drilling, rotary drilling, and digging, which has been done in the past. Attempts to prove continuity vertically or laterally have been unsuccessful. It is possible that this small block of ore could sustain a small sublessee operation. None of the proposed work will be in the vicinity of this small ore body.

(c) Lien and Subordination Agreements: Because of the number of properties and the multiple ownership of each, lien subordination agreements would be very difficult and expensive to obtain. For the previously described eight properties, a total of thirty-seven signatures would be required on the lien subordination agreements.

In lieu of the lien subordination agreements, we propose to furnish, and can furnish, a performance bond.

3. PHYSICAL DESCRIPTION

(a) Previous Work: Work done on the subject properties has been almost entirely of an exploratory nature. Most of the work has been relatively recent and has been done by Hicks Dome Account and predecessor organizations. A property map given on page 5 shows the location of the holes which have been drilled and of the only mining which has been done in the vicinity.

The work to date has been directed at two separate targets; the shallow material in the vicinity of the Rose Mine near the flanks of the central part of the dome and the deep ore potential in the explosion breccias near the geometric and geologic center of the dome.

None of the work proposed herein will be directed at the shallow ore potential on the Rose property. Though of minor importance, as a matter of background the work done on the Rose property will be discussed first.

It was previously thought that the mineralized breccias on the Rose property were somehow connected or associated with the deeper seated breccias. Though a considerable amount of work has been done based on this premise, it has not been demonstrated that there is any geometric, geologic, mineralogic or genetic continuity between these and the mineralized breccias intersected at depth by drill holes.

A detailed report by Porter summarizing the work done up to 1970 is appended. This report summarized history, geology and the results of drilling and digging. At that time there were a number of core and air rotary holes intersecting mineralization. They were not sufficient to indicate whether the mineralization persisted vertically or laterally. A drill indicated tonnage of ten to fifteen thousand tons between 30% and 40% CaF_2 could be postulated.

In 1971 five additional diamond drill holes were drilled beneath and on strike of the known mineralization. All of these were barren. It was concluded that the oreshoot found by the previous drilling was a small, isolated pod or lense and does not persist vertically or laterally. The information pertaining to these holes is added to the Porter report.

No additional work is presently proposed for the Rose mine area. It may be possible to justify a small lessee operation on the known small oreshoot but no firm plans exist at this time.

Deep holes which have been completed in the central part of Hicks dome consist of two oil well tests and four diamond drill core holes. These and two uncompleted holes are described here in the sequence in which they were drilled. The results and interpretations of the holes are given in parts (e) and (f) to follow.

First exploration done on Hicks dome was done as oil exploration. First hole of any consequence is the Fricker well which was churn drilled in 1935 to a depth of 3,306 feet. No oil was encountered. A lithologic log was made by the Illinois Geologic Survey. It is doubtful the hole could be precisely located.

Another oil well test was drilled by St. Joseph Lead Company in 1952. It was located near what is taken to be the center of the dome. Rotary oil field equipment was used and the hole was drilled to 2,944 feet. Samples consisted of cuttings. The samples apparently were not complete, due to lost circulation. Some side wall coring was done. Surface casing was left in the hole and it is still open to at least 300 feet. This hole can and has been used to furnish water for drilling.

As an oil test this hole was unsuccessful. It did however provide data which on later analysis contributed substantially to the working knowledge of the Hicks dome structure and mineralization. Subsequent analysis of the data provided the basis for additional drilling.

The hole intersected rather intense brecciation at about 1,600 feet and was in similar breccia to its total depth of 2,944 feet. Brown et al., (1954), based on the character and distribution of the breccia interpreted Hicks dome as an incipient cryptovolcanic structure. The breccia was mineralized with fluorite throughout, usually in minor amounts, occasionally in amounts of seven or eight percent CaF_2. In addition to the fluorite, it was reported to contain thorium, barite, calcite, quartz, pyrite, sphalerite and galena.

Reports of thorium, uranium and radioactivity in the center part of the dome partly contributed to a minor uranium boom in 1955. Some minor exploration in the form of diamond drilling

was directed at radioactive breccias found near the St. Joseph Well. The work was largely unsuccessful. Thorium was eventually identified as the source of radioactivity, and there was no subsequent interest in uranium exploration.

Additional mineralogic work was reported by Trace (1960). According to him radioactivity at the surface was due to high thorium monazite. In addition he reported the results of semi-quantitative spectrographic analysis of some of the well cuttings. These tests disclosed anomalous quantities of thorium, rare earths, niobium, zirconium and beryllium.

Some of the subject properties were acquired by International Minerals and Chemicals in 1961. Several shallow holes were attempted and abandoned, probably short of bedrock. It is believed that their major interest was the beryllium fluorite mineralization.

Industrial Minerals Exploration Company acquired leases on the subject properties in 1963 and '64. The first hole, Hamp #1, was drilled in 1964. It is located approximately 200 feet northeast of the St. Joseph Well and was drilled to test the continuity of the mineralization and the breccia. The hole was rotary drilled to solid rock at about 118 feet. It was then cored with BXWL tools to a total depth of 2,499 feet. No particular problems were encountered. Recovery was good throughout except for a section around 1,500 feet where trouble was experienced with mis-latching of the inner-tube. BX casing was left in the hole and it could be re-entered with little trouble.

Some subsequent drilling was attempted by Industrial Minerals in 1966 and 1968. Two holes were started. Both were abandoned. Hole Pankey #1 was located in the center of the outcropping of the Pankey breccia. This hole did not reach solid bedrock. It was drilled principally by rotary methods. Several unsuccessful attempts were made to core. The hole was abandoned about 400 feet deep. It was still in loose, caving and broken chert breccia.

Hole Hamp #2 was started when Pankey #1 was abandoned. It was drilled to about 200 feet with air rotary. Caving ground and heavy water necessitated abandoning the hole at 200 feet. In 1968 an attempt was made to continue the hole with mud rotary. It was drilled with mud rotary down to approximately 610 feet where solid rock was thought to have been encountered. Casing was set and an attempt was made to core. The hole was advanced

to 645 feet. Little core was recovered. A number of twist-offs were experienced, and the hole was abandoned at 645 feet. Various tools were left on the bottom of the hole. Surface casing is still in the hole. Very little useful information was obtained from this hole. Several pieces of core that were recovered indicate that the hole probably bottomed in Bailey limestone.

The leases were ultimately assigned to Hicks Dome Account, who successfully completed three diamond drill holes in 1971. No particular problems were experienced. Core recovery was generally excellent throughout. Surface casing through overburden was left in all the holes, and they could all be re-entered with a minimum of difficulty.

Hamp #3 was rotary drilled to about 200 feet and then cored with NXWL to its total depth of 2,622 feet. Core recovery was excellent throughout except for a zone from 2,135 feet to 2,155 feet where the hole is thought to have passed through 20 feet of open ground.

Two hundred feet of NX casing was left in the hole. The hole should be open at least to 2,135 feet where the open ground was encountered. Two attempts were made to drill Hamp #4. The first attempt was abandoned at about 240 feet because NX casing was set before the hole was into solid bedrock. On the second attempt Hamp #4 was rotary drilled to approximately 292 feet. NX casing was then set and the hole was drilled NXWL to approximately 985 feet here encountered some loose ground, and it was again cased and reduced to BXWL. It was then drilled BX to its total depth of 2,380 feet. Core recovery was excellent throughout.

Eighty-four feet of five and one half inch surface casing and 292 feet of NX casing were left in the hole. This hole should be easy to re-enter.

Pankey #2 was rotary drilled to a depth of 205 feet. Solid rock was encountered, and five and one half inch surface pipe was set to a depth of 143 feet. The hole was then reduced to four and seven-eighths inches and drilled to 205 feet where NX casing was set. It was then drilled NXWL to approximately 980 feet. Because of some caving in the hole it was again reduced to BXWL. It was then cored to its total depth of 2,485 feet.

All BX casing was removed. An attempt was made to remove all of the NX casing, but several joints were left at 205 feet. The five and one half inch surface casing was left in the hole.

Detailed logs were made of all the holes. Results of the holes are discussed more fully in parts (e) and (f).

There are no known production facilities on the property. There are no known mine workings outside those previously discussed on the Rose property.

(b) Applicant's Interest in Previous Work: None of the operators pre-dating Industrial Minerals Exploration Company retained any interest in the properties. The interest of Industrial Minerals Exploration Company was wholly assigned to Antaeus Resources on May 10, 1971, when Industrial Minerals was essentially dissolved. Antaeus Resources subsequently entered into an agreement with Hicks Dome Account, whereby Antaeus reserved an interest in any net profits, and Hicks Dome Account agreed to furnish certain exploration funds. No other persons or entities have an interest.

(c) Production: There has been no production in the vicinity at the depths at which the proposed work is directed.

The only production in the near vicinity is that by small lessees at shallow depths on the Rose property. No record was made of this production. Based on the size of the old works it is estimated that probably less than 5,000 tons have been produced.

Some crude ore was produced by Industrial Minerals Exploration in 1969 and 1970 on the Rose property. This was the result of digging and an attempt to determine the attitude and nature of the existing oreshoot. A total of 436 tons averaging 53% CaF_2 were saved and sold.

(d) Ore Reserves: There are no known reserves in the vicinity of the targets of the work proposed here.

A small drill-indicated tonnage of fluorspar ore has been drilled out immediately north of the Rose pit at depths less than 120 feet. This tonnage probably ranges from ten to fifteen thousand tons, grading between 32% and 37% CaF_2. None of the proposed work is directed at extending this tonnage.

(e) Geology: Considerable geologic data are available as a result of the work done on Hicks dome to date. Space and time preclude inclusion of all available data or discussion of all facets and possible interpretations.

Summary

The work done to date and the proposed work are directed at targets previously unrecognized in the Illinois-Kentucky fluorspar district. Future success could establish ore in a unique mineralogic suite, at a stratigraphic horizon and in a geologic environment previously untested.

All interpretations are presently necessarily rather tenuous. Data are sparse in comparison with the complexity of the structure involved. Present data suggest certain interpretations which are summarized below.

1. The existence of a very large mass or body of intensely brecciated rock has been established. The exact shape of the breccia mass is not presently known but information suggests a rather broad based, inverted funnel configuration.

At depth the brecciation is known to exist over a lateral extent of at least 1,200 feet in an east-west direction across the center of the dome. A vertical extent of over 2,000 feet has been shown for the breccia zone. The brecciation penetrates upward to the surface through unbrecciated rocks of Ordovican, Silurian and Devonian age. Diameter of the breccia body at the surface has not been determined.

2. The breccia mass consists principally of fine, angular fragments of sedimentary rocks in a rock flour matrix. The fragments and the matrix grossly reflect the mineralogic and lithologic composition of unbrecciated rocks occupying the same stratigraphic position. This is particularly evident and most definitive where distinctive lithologies such as brick red streaks in Silurian limestones, Maquoketa shale or St. Peter sandstone have been included in the brecciation.

This feature allows a broad classification of the breccias on the basis of the matrix material. Those with a rock flour matrix can be further classified as calcareous, dolomitic, siliceous or argillaceous--or fluoritic if replaced by fluorite.

3. Individual breccia fragments have been moved a considerable distance. Though fragments of a stratigraphic unit are usually dominant at any one point within the breccia, considerable vertical mixing has occurred. Fragments of distinct, recognizable units can be found above and below their anticipated stratigraphic position. Some of these may have been moved as much as 500 feet up or down. Some fragments have also moved laterally and down.

4. The breccias are more or less mineralized throughout. The most common mineral of economic importance is fluorite. Pyrite is common, often associated with the fluorite. Galena, sphalerite and barite are usually associated with the fluorite and traces occur throughout.

5. Mineralization is in places substantial in quantity and quality. Best mineralization occurs in a rather distinct "purple breccia" zone. Purple coloration has been imparted by dark purple fluorite which replaces matrix material.

In Hamp No. 3 the purple breccia was approximately 235 feet thick, including most of the transitional zone. The main part was 214 feet thick and averaged 11.1% CaF_2. The best zone was 97 feet averaging 17.4% CaF_2. In Hamp No. 4 the purple breccia was approximately 240 feet thick and averaged 8.44% CaF_2. Best zone was 112 feet thick and averaged 14.15% CaF_2. The zones were correlative in terms of stratigraphic position and elevation. Both contain significant amounts of thorium, yttrium, niobium and beryllium plus interesting amounts of other elements, including other rare earths. A substantial contribution to the economics of the property and the mineral economy in general might result from the establishment of a cheap, byproduct source of these materials.

Hamp No. 1 intersected similar material at about the same stratigraphic horizon. It was less definitive and was distinctly less mineralized.

6. Several factors influencing localization of mineralization are suggested. These are principally influence of stratigraphy and degree of comminution. A combination stratigraphy and overall intensity of brecciation may be a localizing factor in a very broad sense.

Certain stratigraphic positions within the breccia body seem to be more favorable for mineralization. The purple breccia zone occurs approximately from 500 feet to 750 feet beneath the base of the Maquoketa shale. This is the approximate stratigraphic position of the lower part of the Plattin limestone. The bottom of the purple breccia roughly coincides with the top of the Joachim dolomite.

Fluorite replacement within the purple breccia zone is noticeably more intense in zones where the limestone is very finely comminuted. Replacement is most thorough in the rock flour matrix. Small fragments appear to be only partly replaced. Larger fragments are only replaced around the margins and on sharp corners.

In a more general sense, changes in the overall character of the breccia may have a localizing effect on the purple breccia. A distinct change in the character of the breccia is evident at the bottom of the purple breccia zone. This is marked by a rather abrupt transition from generally fine breccia to coarse breccia. The fragments are generally much larger and there is noticeably less mixing. These may actually be best defined as "mega-breccias." Some fine breccia is present but it appears to be injected between the larger fragments. These breccias appear to be only sparsely mineralized.

7. A large tonnage, low grade, multimineral ore body is possible on the subject properties. Brecciation is wide spread and continuous and a favorable stratigraphic zone over 200 feet thick exists over a wide area. The result is a combination of two favorable loci over an area sufficient to provide room for a multimillion ton ore body.

8. Breccia fragments in a crystalline calcite matrix are found in the upper portions of the main breccia body. Fragments are generally coarse (+1"). They often contain fair amount of fluorite as encrustations surrounding fragments. These are presently thought to be collapse breccias and late fluorite mineralization.

9. Several generations of brecciation are indicated. In the part of the breccia which extends to the surface, small angular fragments of fine breccia are common. Fragments of the igneous dike material are also common.

10. The central core of the breccia does not presently appear to be an attractive target. It is sparsely mineralized throughout but not in any appreciable quantity. A possible explanation is the central core or diatreme is the result of second generation, post-mineralization brecciation that brecciated and scattered existing mineralized breccia to such an extent it is no longer recognizable as a discrete entity. Supporting this is the fact that small angular fragments of purple breccia, closely resembling the previously described material are fairly common in the central core.

The lack of significant mineralization in the central core may also have been due to extreme mixing before mineralization. A favorable horizon that did exist might be so highly mixed that the fragments and matrix amenable to replacement have been too scattered to constitute a continuous favorable zone.

General Geology

Hicks dome is a rather prominent domal structure located on the south rim of the Illinois basin in the complexly faulted, broadly folded Illinois-Kentucky fluorspar district. It is commonly referred to as an incipient cryptovolcanic structure. It was first defined as such by Brown, et al. (1954). It is one of a number of grossly similar structures generally aligned in an east-west direction that range from Pennsylvania to western Kansas. This general trend constitutes the 38th Parallel Lineament.

Hicks dome differs from the other aligned structures and similar structures in that it is within the geologic if not geographic center of an active, producing mining district. Some of the other structures appear to be loosely associated with a mineral district, particularly if plotted on a large scale map. Others have no known association.

These structures have been the subject of much research and discussion in recent years. No attempt will be made here to go into the details of the other structures or of the theoretical considerations of these structures. The reader is referred specifically to the papers by Heyl (1965, 1968) and Snyder (1965, 1970) cited in the bibliography for discussions and summaries. Excellent bibliographies are given therein for further reference.

Basic geology of the Illinois-Kentucky district is fairly well documented. The reader is referred to a paper by Heyl (1965) which delineates the regional structural setting of Hicks dome and the Illinois-Kentucky district. The geology and mineralization of the district is best summarized by Grogan and Bradbury (1968). The surficial geology of the Illinois part of the district has been mapped in detail by Baxter, et al. (1963, 1965, 1967). Copies of the maps covering the subject area are submitted here as Exhibit 3-1.

Hicks dome is situated on the northwest extremity of the Kattawa arch, an elongated, complexly faulted anticlinal flexure trending approximately N. 40° W. The dome itself has a nearly circular diameter of approximately nine miles. Central uplift and annular folding and faulting are prominent. Stratigraphic displacement at the surface is approximately 4,000 feet. Dips are steepest toward the center of the dome and diminish gradually toward the extremity. Lower or middle Devonian rocks are at the surface in the center of the dome and lower Pennsylvanian rocks are at the furthest margin. The furthest margins of the dome are roughly coincident with the margins of the gentler, more broadly defined Kattawa arch.

The project area is located in the central portion of Hicks dome. The central portion is marked by an elliptical outcrop ring of New Albany shale which forms an annular valley. The valley is surrounded by a rather prominent elliptical cuesta formed by the resistant Fort Payne chert. The ellipse is oriented with its long axis striking N. 40° w., roughly in accordance with the axis of the Kattawa arch.

The area of maximum interest is that bordered by the outcrop of the base of the New Albany shale. This area is approximately 6,000 feet long in a northwest direction and 3,500 feet wide in a northeasterly direction.

This central area of maximum interest is shown on the map given on the following page which shows the location and extent of outcrops. Parts of this area are also shown on the 1"=100' scale map which is included as Exhibit 3-2. It also shows the location of the existing drill holes, topography and other relevant features.

Surface geology in the center part of Hicks dome is effectively masked by bedded chert residuum. This material, apparently the result of deep leaching is approximately 20 feet thick around the margins of the dome but toward the center may be as much as 400 feet thick.

The only rocks exposed in the center part of the dome are several small outcrops of silicified, very hard, resisant breccias. Most prominent of these is the Pankey breccia which is exposed in the northeast quadrant of the interior part of the dome. In outcrop it consists of coarse and fine angular fragments of chert or silicified limestone in siliceous, hematitic rock flour matrix. Acicular quartz crystals are common and the matrix contains shows of barite.

The Hamp breccia occurs diametrically opposite the Pankey breccia on the southwest flank of the dome. It differs from the Pankey in that it is much smaller and contains no barite. It may also be somewhat more hematitic. A minor outcrop of similar breccia occurs between the two.

Considerable annular faulting probably exists within this central area. One or more of these may account for the variations in thickness of the deeply weathered chert residuum. If they exist they are hidden by the residuum.

Present information is not sufficient to fully describe or interpret Hicks dome. Drill hole information indicates it is composed essentially of two elements--a central mass or core of intensely brecciated rock and unbrecciated sedimentary rocks that dip steeply away from the breccia core.

A section based on the current drilling information is included here as Exhibit 3-3.

The central mass of breccia provides the exploration targets for the proposed work.

An inverted funnel configuration is suggested for the breccia mass. Drill hole information indicates that the central mass or core probably represents the geologic and geometric center of the dome. Intense brecciation comes to the surface in what is thought to be a pipe like body centered in the vicinity of drill hole Pankey #2. This central core may be more properly described as a diatreme. It has penetrated through and is surrounded by unbrecciated rocks of Ordovician, Silurian and Devonian age.

Brecciation persists to depths of approximately 3,000 feet in the St. Joseph well. None of the core holes got out of breccia at depth. A change in breccia character is evident at approximately 2,100 feet in all of the holes. Above this horizon the breccia

Proposed hole
locations

OME 1, 2, 3 & 4

consists of rather fine, intensely brecciated material. Below this the brecciation is less intense, fragments are generally larger and less mixing is evident. The change is transitional and coincides with a lithologic change from limestone to dolomite. Degree or intensity of brecciation could be expected to diminish at depth due to increases in confining pressure. The abruptness of the change here is difficult to explain.

The breccia body in places is wider at depth. Three of the core holes passed through from 1,350 feet to 1,900 feet of unbrecciated rock before intersecting breccia. The brecciation was intense down to approximately 2,100 where it appeared to diminish in intensity. This gives a crude inverted funnel appearance, at least to the intensely brecciated portion.

The unbrecciated rocks in the center part of the dome area consist of the normal sequence of Devonian, Silurian and Ordovician strata. They appear to be dipping away from the central core. Dips may be as much as 20°. Though unbrecciated, these rocks are commonly well fractured. Slight displacements are common on the fractures. These may be appreciable in total. The composite displacement and possible irregular folding may account for inconsistencies in thicknesses of stratigraphic units.

Details of petrography and petrofabrics, certain interpretations and classification of the breccias within the central breccia mass are given in parts to follow (page 38). Since stratigraphic interpretation is necessary for and contributes to interpretation of the breccia, stratigraphy will be discussed first.

Stratigraphy

Ordovician, Silurian and Devonian stratigraphy has never been well defined in southeastern Illinois. Nearest outcrop of these units is about 80 miles to the west along the Mississippi River Valley in southwestern Illinois and southeastern Missouri. Until recently the only data available was cuttings from the Fricker and St. Joseph wells. Recently completed core drill holes provide excellent data for stratigraphic interpretation.

Definition of stratigraphy is presently somewhat cursory. It is sufficient to contribute to interpretation of the breccia. At least parts of most of the units have some distinctive feature that can be distinguished in small breccia fragments. More detailed stratigraphic differentiation is probably warranted and can be done at a later date. Stratigraphic terminology assigned here is subject to change.

A generalized geologic column is given on the following page.

Ordovician

pre-St. Peter dolomites: This stratigraphic horizon has been penetrated by all of the holes on the central part of the dome. Each intersection, however, was within the breccias zone. Consequently the lithology of these units is somewhat speculative. These units are made up principally of fine grained gray dolomites which are sometimes sandy and cherty and contain varying amounts of quartzite and quartzitic sandstones. Because of the mixing of fragments within the breccia it is impossible to determine the top of these units.

St. Peter sandstone: Stratigraphic position thought to be occupied by St. Peter was also intersected within the breccia masses. St. Peter is only vaguely recognizable as a unit but is easily recognized as fragments. Fragments characteristically consist of well rounded and sorted frosted quartz grains.

The St. Peter is estimated to be approximately 1,000 feet deep beneath the base of the Maquoketa. Thickness in the area has been estimated at 100 feet. Because of the brecciated character where encountered in the drill holes, no estimate of thickness is justified in the center part of Hicks dome.

Joachim-Dutchtown dolomites: These formations have also been intersected within the breccia zone. No attempt is made here to distinguish them. Where intersected the breccias occupying this stratigraphic position are made up of gray, crystalline dolomites, mostly fine grained. Scattered throughout are fragments of fine grained, sub-rounded sandstone and quartzite. Fairly abundant fragments of siltstone and some chert is also present.

This zone is thought to be 400 to 450 feet thick. Where encountered in the Fricker well, Joachim dolomite was 312 feet thick.

The bottom is not defined. The top however is probably represented by a rather abrupt transition from domination of the breccias by Plattin limestone fragments to domination of the breccias by the dolomite and sandstone fragments of the Joachim.

STRATIGRAPHIC COLUMN

Formation	Thickness
Devonian system	
Lower Devonian Series	
Clear Creek limestone	470 (?)
Backbone limestone	23-38
Grassy Knob chert	272-291
Bailey limestone	201-260
Silurian system	
Niagaran series	
Moccasin Springs limestone	121-127
St. Clair-Sexton Creek limestone	57-67
Alexandrian series	
Edgewood limestone	84-107
Ordovician system	
Cincinnatian series	
Maquoketa shale	208-235
Champlainian series	
Kimmswick limestone	72-101
Decorah limestone	
Plattin limestone	700-(?)[1]
Joachim dolomite	312[2]
Dutchtown dolomite	143[2]
St. Peter sandstone	100

[1]Bottom not seen out of breccia.

[2]Based on Fricker well.

Decorah-Plattin limestone: Most of the holes in the center portions of Hicks dome penetrated the Plattin limestone in breccia. Some data are available. The Fricker well on the flanks of the dome indicated 785 feet of Decorah-Plattin. Hamp No. 4 passed through 400 feet of unbrecciated Decorah-Plattin limestone, giving a fair idea of its lithology.

It consists principally of a very fine grained, dark gray limestone with fairly distinct, wavy, interlaminated argillaceous streaks. There are a few lighter and darker gray limestones and an occasional cherty zone. It generally appears to be a rather high calcium limestone but in places is somewhat dolomitic.

Best mineralization seems to occur in fine breccia in the bottom 250 feet of the stratigraphic position of the Plattin limestones.

Kimmswick limestone: Kimmswick limestone has been logged as being between 75 and 100 feet thick. It differs from the underlying Decorah-Plattin in that it is lighter in color and distinctly more coarse grained. It is essentially free of chert and argillaceous material and from appearances would qualify as a high calcium limestone.

The bottom contact is not sharp or clear and no great amount of effort has been made to distinguish the contact except in a general way. The upper contact with the overlying Maquoketa is distinct.

This unit should be an excellent host rock where brecciated.

Maquoketa shale: Maquoketa shale ranges from 208 feet thick in the Hamp No. 1 hole to about 240 feet in the vicinity of the Hamp No. 3 and 4 holes. It consists principally of very dark gray to black hard and brittle, silty, well laminated shale. It is in places very fissile. It contains occasional interbedded, fine grained sandstones streaks and a few limestone streaks. The bottom 25 feet consists largely of a very argillaceous sandstone. Pyrite is fairly abundant throughout.

The top and the bottom of the Maquoketa is easily recognized in the core.

Silurian

Edgewood limestone: The Edgewood limestone varies from 84 feet in Hamp No. 1 to 107 feet in Hamp No. 3. It consists principally of extra fine to sub-lithographic, gray and dark gray limestone. It contains abundant wavy, interlaminated argillaceous streaks which give the limestone a somewhat nodular appearance. Chert is fairly abundant throughout and is generally light brown to tan with some gray and dark gray. Parts of the Edgewood are fairly silty.

The bottom of the Edgewood is easy to distinguish. The top can be picked principally on the basis of the increased chert and darker color. Fragments of this formation where brecciated are fairly easy to distinguish.

St. Clair-Sexton Creek limestone: This section varies from 57 feet in Hamp No. 1 to 67 feet in Hamp No. 4. No attempt has been made to differentiate between the two.

This unit consists principally of gray to light gray very fine grained limestone. The upper part is generally lighter gray and contains distinct coarse pink grains. Occasional zones are distinctly streaked with pink and also contain large pink crystals. It is slightly silty throughout and occasionally dolomitic. In places it contains fairly abundant interlaminated darker gray streaks which are generally very silty. The bottom part probably contains more pink grains and more pink streaks.

Neither the top or bottom of this unit is very distinct. Where brecciated it can sometimes be distinguished by its pink streaks and coarse pink grains.

Moccasin Springs limestone: The Moccasin Springs limestone varies from 122 feet in Hamp No. 1 to 127 feet in Hamp No. 4.

It consists of fine to very fine light gray to gray limestone. It is characterized by interbedded streaks of orange, pink and slightly green limestone and commonly has distinct scattered pink grains. It is commonly very pyritic. Some units are distinctly brick red. It commonly contains rather wavy, interlaminated argillaceous streaks or darker gray streaks which are distinctly silty. The entire unit is somewhat silty throughout, in places in excess of 50%. Few places are sandy and dolomitic streaks are fairly common.

Though the bottom of the Moccasin Springs is somewhat vague, the top can be picked exactly. Where encountered as fragments in the breccia the brick red, orange, pink or green limestones are fairly distinct.

Devonian

Bailey limestone: No differentiation was made between the Bailey limestone and the Grassy Knob formation in the study of the Fricker well cuttings. Though the contact between the two is transitional and difficult to pick, contrasting lithology justifies the differentiation. The Bailey varies from 201 feet thick in the Hamp No. 3 to 260 feet thick in the Hamp No. 1. More detailed study may allow for the contact to be picked more consistently.

It consists of extra fine to sublithographic, very silty and slightly sandy limestone and very calcareous siltstone. It is generally gray and light gray and very uniform in appearance. It contains fairly abundant thin, interlaminated argillaceous streaks throughout and distinct darker gray splotches parallel to the bedding. It contains occasional interbedded nodular and white novaculitic chert.

The bottom contact is very distinct. These fragments are very distinct when encountered within the breccia. Most distinguishing characteristic is the high percentage of silt which is readily apparent after slight etching.

Grassy Knob formation: Grassy Knob formation appears to vary from 272 feet in the Hamp No. 1 to 291 feet in the Hamp No. 3. It consists of very fine grained dark gray very argillaceous limestone with abundant nodular and interbedded, tan and brown novaculitic chert. Total chert in the unit probably exceeds 40%. Besides the abundant chert this formation can be distinguished by the very irregular, dark gray to black interlaminated argillaceous streaks in the limestone surrounding the bedded and nodular chert. These streaks give the unit a sort of sheared or "gniessic" texture.

Both the bottom and top contact to the Grassy Knob is somewhat vague. Detailed stratigraphic study could probably make a concise differentiation. Angular fragments of the Grassy Knob are easy to distinguish in breccia.

Backbone limestone: The Backbone limestone is difficult to differentiate from the overlying Clear Creek. It is thought to consist of about 38 feet of fine grained crystalline, light gray limestone. It differs from the Clear Creek in that Clear Creek contains much less chert and is lighter in color.

Both bottom and top contacts are transitional.

Clear Creek limestone: According to the sample study of the Fricker well the Clear Creek limestone probably is about 470 feet thick. All the drilling described here collared in Clear Creek. The maximum thickness penetrated was about 250 feet.

It consists principally of light tan to light gray very fine grained limestone which is partly sublithographic. There are some interbedded coarse zones. Chert is rather abundant and is generally light brown and somewhat sandy in appearance. It occurs as irregular bands and nodules. In places chert can exceed 50%.

Upper parts of the formation have not been seen in drill core. The bottom contact is somewhat vague.

Overburden (bedded chert residuum): The entire central part of the dome is mantled by a thick layer of bedded chert residuum. This residuum is approximately 20 feet thick in the vicinity of the Rose Mine but is generally over 200 feet thick in the center part of the dome. It was approximately 250 feet thick in Hamp No. 4. In Hamp No. 2, the hole that was abandoned, it may have been as much as 600 feet thick.

This material consists of crudely bedded rather massive, brittle chert and red clay. It contains fairly abundant fossil casts. It is commonly fairly sandy in appearance. It contains no calcareous material. Best explanation for this material is that it represents the decalcified cherty limestone. However, its thickness and wide extent plus its occurence over upper and middle Devonian limestones creates certain problems in interpretation.

This material creates a drilling problem. It is impossible to core. The individual fragments of chert are too loose and tend to roll into the hole and wipe out the diamonds very quickly. It does however drill rather rapidly with a rock bit. The problem encountered with the rock bit is maintaining adequate circulation and keeping the hole open. It is sometimes necessary to resort to casing and to reduction of the hole size in order to get through to solid rock.

Igneous Rocks

Numerous igneous dikes have been described around Hicks dome. These are principally mica peridotite dikes. Several thin dikes or sills were encountered in Hamp No. 4. The best intersection was at about 1,125 feet where approximately 10 feet of dike material was cut. It was not possible to determine the attitude. All the intrusives contained various sized angular fragments of surrounding wall rock and fragments of other material.

These were all logged as peridotites. Subsequent petrographic work by Bradbury (person communication) indicate that the matrix of this material consists of rock flour and carbonates. Carbonate replacement obscures identification of the original constituents. The most numerous fragments that he found are composed of light gray granite which in turn are composed of orthoclase quartz and minor albite. No dark minerals were seen. The granite was apparently being replaced by carbonate. It was also mineralized with fluorite. Finely disseminated pyrite occurs throughout in the matrix.

Coarse angular fragments of this material is common in the Pankey No. 2 hole indicating that at least one stage of the brecciation post dated these intrusions.

No interpretation is made at this time.

Breccia

In terms of mineralization the breccias are the most important lithologic units in the subject area. The brecciation and fine comminution serve as ground preparation for mineralization. Brecciation is thought to have provided the permeability and porosity necessary for mineralization.

The breccias underlying Hicks dome are commonly considered explosion breccias resulting from cryptovolcanic explosions. The main mass consists principally of fine angular fragments, well cemented in a rock flour matrix. The breccias are rather dense and appear to make up competent rock throughout.

The breccias are more or less uniform in appearance. Some classification can be done on type of matrix material. Subclasses could probably be formed on the basis of size and character of the breccia fragments. Any lines drawn between classes are imprecise, and the breccias grade from one type to another.

Two basic types of matrix material are recognized, rock flour and monomineralic. Most of the breccia mass is made up of breccias with rock flour matrix. In places they contain substantial mineralization. The breccias with a monomineralic composition make up a small percent of the total and are less important.

(Rock Flour Matrix) Breccias with a rock flour matrix can be classified according to their mineralogic and chemical composition. They are classified here as calcareous, dolomitic, siliceous or argillaceous, with some modifications applied if altered or mineralized.

Stratigraphic position is the most dominant factor controlling composition of the breccia matrix. Though a certain amount of mixing of fragments is evident, most are more or less in situ in terms of stratigraphic position. The rock flour matrix is principally the result of comminution of the fragments, hence they will have the same composition. Therefore, the composition of the matrix material will also grossly reflect stratigraphic position.

Classification of the breccias by composition of the matrix is considered important. Best mineralization seen to date consists principally of replacement of rock flour matrix. In the Illinois-Kentucky fluorspar district fluorite replacement mineralization exhibits a marked preference for calcareous environments. Identification of stratigraphic units providing this environment in a brecciated condition should help identify favorable loci for mineralization.

Breccias with a calcareous rock flour matrix are probably best developed in hole Hamp No. 1, No. 3 and No. 4, where intense brecciation was encountered in the rather pure Plattin limestone. In these holes the breccia generally consists of fine and very fine angular fragments of Plattin limestone in a very calcareous, rock flour groundmass. Occasional fragments and grains of sandstone and dolomite are scattered throughout as fragments and matrix.

Rock flour breccias classified as dolomitic, siliceous, or argillaceous were encountered in stratigraphic positions dominated respectively by dolomite, sandstone or shale. Dolomitic and siliceous rock flour breccias occur at depths exceeding 750 feet beneath the base of the Maquoketa shale. They are generally quite coarse. Fragments and matrix reflect the lithologies of the Joachim dolomite and sandstone, St. Peter sandstone or other dolomites. In the Pankey No. 2 drill hole at the stratigraphic position of the Maquoketa shale, the breccia consisted of shale fragments in an argillaceous matrix.

(Fluoritic "Purple Breccia" Matrix) Best and most consistent mineralization found to date is localized in the calcareous breccias in the stratigraphic position occupied by the lower part of the Plattin limestone. This zone occurs at depths ranging from 500 feet to 750 feet beneath the base of the Maquoketa shale. The base of this zone is at about the anticipated stratigraphic position of the contact with the underlying Joachim dolomite.

These zones are termed here purple breccias. These purple breccias represent very finely comminuted limestone in which the calcareous rock flour matrix has been extensively replaced by deep purple fluorite. This gives the rock a distinct purple cast. These breccias consist mainly of rock flour and very fine and fine angular to sub-rounded fragments. Replacement is most intense in the fine rock and smaller fragments. In places the outer margins or sharp corners of the coarser fragments have been replaced. In general, the higher the degree of comminution the greater the percentage of fluorite. Conversely, zones within the purple breccia with abundant larger fragments (+½") contain correspondingly less fluorite.

Though the purple breccia zone is rather distinct it grades into and is transitional to calcareous, rock flour breccias.

Substantial mineralization was encountered in this purple breccia zone in the three completed Hamp holes, particularly in Hamp No. 3 and No. 4. The relationship of these intersections to each other and other stratigraphic units is shown on the strip logs submitted here as Exhibit 3-4.

A total of approximately 240 feet of purple breccia was intersected in Hamp No. 3. It was more or less mineralized with fluorite throughout and a 214 foot zone averaged nearly 11.1%. One section 97 feet thick averaged 17.4% CaF_2. This intersection also averaged from 0.4% to 0.5% zinc and 0.3% to 0.4% lead. Purple breccia was also 240 feet thick in Hamp No. 4. It occurred at the same approximate stratigraphic horizon and elevation. The entire 240 feet averaged 8.4% CaF_2. A high grade zone roughly correlating with that in Hamp No. 3 was intersected. This zone was 112 feet thick and averaged 14.1% CaF_2. At the bottom of this zone was a zone 15.5 feet wide which averaged 21.4% CaF_2. Zinc and lead assays have not been completed.

Of possible equal ultimate importance are the significant and anomolous amounts of other elements detected by spectrographic analysis. Of particular economic interest are the analyses of the intersection in Hamp No. 3, particularly in the 97 foot zone of higher grade material. These analyses indicated beryllium in amounts exceeding 1%, niobium up to 0.15%, titanium from 0.5% to 1%, and yttrium ranging from 0.15 to 1%. Other analyses indicated 0.7% thorium in one fragment of the material. Other rare earths and other elements were also detected in anomolous amounts.

Detailed assay graphs of purple breccia intersections in Hamp No. 3 and No. 4 holes are given on the following pages. Assay certificates, comparisons and complete spectrograph analyses are given in part (f) to follow.

There was a corresponding intersection of purple breccia at a comparable stratigraphic position in the Hamp No. 1. It was less purple and less distinct. It contained anomolous fluorite and other elements but in less amounts than the Hamp No. 3 and No. 4 intersections.

(Monomineralic Matrix) Breccias with the monomineralic matrix consisting principally of crystalline calcite make up a recognizable class. Calcite as matrix material occurs scattered throughout all the previously described types. In places the

calcite matrix dominates. This is particularly evident in the upper part of the Pankey No. 2, the upper part of the breccia zone in Hamp No. 1, and the upper part of the breccia zone in the Hamp No. 3. It is thickest and most distinct in Hamp No. 3.

In the Hamp No. 3 the calcite breccia was intersected at 1,575 feet and persisted to approximately 1,925 feet, where it graded into the gray rock flour breccia. They are considered here to be typical of the calcite breccias. They consist of fairly coarse (+1") angular to sub-angular fragments of Plattin limestone in a milky white crystalline calcite matrix. The percent of matrix material varies considerably. It probably makes up about one third of the total.

The fragments in the calcite breccia are distinctly more angular than in the breccias with the rock flour matrix. In general they do not seem to have moved very far.

In the calcite breccias in Hamp No. 3 the breccia fragments are commonly coated or encrusted with pale blue to purple crystalline fluorite. These fluorite encrustations are commonly around the upper part of the fragment, the encrustations being very thin or absent on the bottom parts of the fragments. Vugs with clear hexagonal calcite crystals are common, and they in turn are commonly coated with pyrite and small blue fluorite crystals.

One possibly significant mineralized zone of particular interest was intersected in calcite breccia at about 1,750 feet in Hamp No. 3. This intersection consisted of approximately 10 feet of fine breccia fragments in a matrix consisting of approximately 33% barite and 2.6% lead. Similar zones may be encountered by future drill holes.

These calcite breccias are rather loosely thought of as representing collapse breccias and very late fluorite mineralization. Little mixing or moving of fragments is evident.

Some monomineralic breccia occurs at the Rose mine. Here coarse angular chert fragments are contained in a matrix of crystalline fluorite. Their relationship to the other breccias is not known.

(Movement of Breccia Fragments) Though a certain amount of stratigraphic identity has been preserved within the breccia zones and the dominant breccia fragments reflect the stratigraphy, a considerable amount of movement by fragments is evident. This could be shown with all units but is best shown by lithologies with very distinct characteristics, such as the distinct pink and red Silurian fragments, fragments of Maquoketa shale or fragments of St. Peter type sandstone.

Vertical movement and mixing is probably greatest in the breccia that penetrates to the surface. In hole Pankey No. 2 Silurian fragments were first seen at depths of 300 to 350 feet. They became the dominant fragment at depths of 950 to 1,100 feet and were still occasionally visible down to depths of 1,500 feet. Fragments of Maquoketa shale appeared at approximately 700 feet and were still visible down to 1,600 feet. It is interesting to note that Maquoketa was dominant from approximately 1,100 feet to 1,200 feet in hole Pankey No. 2. Where encountered elsewhere the normal thickness of the Maquoketa was slightly over 200 feet.

This same mixing phenomenon is apparent and can be shown with other less distinct stratigraphic units in the Pankey No. 2.

Vertical mixing was less distinct in holes Hamp No. 1, 3, and 4. This is because brecciation was encountered where there was less variation in lithologic character. However in these holes fragments of St. Peter sandstone and sand grains were encountered several hundred feet above the anticipated stratigraphic horizon.

It was also noted that in general the further out of place an individual fragment was, the finer it tended to be, and the coarser the brecciation the less mixing was apparent. This does not imply that all very fine breccia has been moved a long distance.

Fragments in the calcite breccias are rather uniform as to lithology and size. They do not appear to have been subjected to much mixing. They are generally more angular and little rock flour is found in the matrix.

A certain amount of horizontal mixing is evident in addition to the vertical movement. This is best illustrated in Hamp No. 1 hole. This hole penetrated a normal sequence of unbrecciated

stratigraphy well down into the Plattin limestone. At a depth of 1,350 feet massive breccia was intersected. In the upper parts of this massive fine breccia distinct, pyritic red limestone fragments typical of Silurian units were scattered throughout. These fragments would have had to have been moved vertically down from 500 feet to 600 feet and would have had to move a certain distance laterally.

(Coarse Breccias) A possibly important feature of the breccia mass is that brecciation becomes distinctly less intense at depths below 2,100 feet. Fragments are much larger and appear to be much less mixed. Though the transition from fine to coarse breccia is rather abrupt, no contact per se is evident.

This feature is evident in all of the holes. The transition was somewhat less distinct and brecciation more intense in the central core or diatreme where cut by the Pankey No. 2.

The change in character may be due to differing physical properties of the brecciated rock. It vaguely reflects the contact of the Plattin limestone and Joachim dolomite. It may also be due to an increase in confining pressure due to depth.

The effect of the change in character of the brecciation on mineralization is entirely speculative. It is possible that the coarse brecciation may have had some effect on localizing the better mineralization in the lower part of the fine, calcareous breccia, just above the coarse dolomitic breccias. Assuming ascending mineralizing solutions, it may be that the coarse breccias were rather unfavorable for deposition and allowed the mineralizing solutions to pass upward before becoming impoverished in fluorine.

Ore Minerals

The economic mineral of most interest is fluorite. It occurs as finely disseminated material replacing rock flour matrix and breccia fragments. Associated with the fluorite are minor amounts of galena and sphalerite. Barite in varying quantities also occurs.

No work has been done as yet to determine the minerals containing the beryllium, niobium, titanium and yttrium. Isolation of the minerals containing these elements will probably require a rather comprehensive laboratory research program.

As yet no metallurgical testing has been done to determine the milling characteristics of the fluorspar, galena and sphalerite.

Type of Deposit

Present data are insufficient to determine the geometry or form of the known mineralization. Data suggest a rather broad replacement zone, confined to the bottom 250 feet of the Plattin limestone and roughly conforming to the geometry of the central part of the dome. The fluorite values contained are the result of replacement of finely comminuted limestone within this zone, the best values being found where the comminution is the most complete.

The thickness of the favorable zone and the total acreage within the central part of the dome provide adequate room for a multimillion ton ore body.

(f) Sampling and Assays:

Sampling

All drill core, particularly the more mineralized portions in the breccia zone, have been extensively sampled. Locations of the samples taken and the results of the assays are best shown on Exhibit 3-4.

The samples assayed consisted entirely of split core. Most of the core was split by the writer. Attempts were made to split the core in a representative manner. Inasmuch as the material is rather homogenous this was not a problem.

The cores, including the remaining one-half of the split portion, are essentially intact and are in storage at Rosiclare. Since the samples were generally quite large, a considerable portion of the split which was assayed remains. This is also in storage and is available for inspection and future work.

Assaying

Calcium fluoride is difficult to assay. Considerable experience is necessary plus some trial and error to assay accurately calcium fluoride ores. Different methods are available. An experienced assayer usually uses some judgment as to what method is best suited for an individual ore.

Most of the samples of interest have been run by several different methods. The results were not consistent. Table I and Table II on the following pages give and compare the assay results of several methods and several assayers of the purple breccia zones in Hamp No. 3 and Hamp No. 4. Relevant assay certificates are given following each table.

Frazer Laboratories employed the Bidtel and calcium oxalate methods. Neither of these methods is considered to be very accurate or reliable for the type of mineralization involved here. Frazer Laboratories assays have not been consistent, and they probably will not be employed for future work.

Best method for this material is the Willard-Winter method. By this method the fluorine is distilled off in the presence of perchloric acid and the amount of fluorine in the distillate is then determined by a thorium nitrate titration. Again a certain amount of experience is required in determining the amount of the original sample to use and determining the end point of the titration.

TABLE I
Comparison of Assay Results by
Assayer and Method
Drill Hole Hamp No. 3

SAMPLE	DEPTH	TOTAL PERCENT CALCIUM FLUORIDE					
		Assayer Method	Frazer Calcium Oxalate	Broeman Willard Winter	MacDonald Willard Winter	Porter Estimate	Skyline Specific Ion Electrode
507	1981.0-1987.3	6.3	2.26			6.0	
508	1987.3-1995.0	7.7	5.91			8.0	
509	1995.0-2001.0	6.0	7.02		8.75	9.0	
510	2001.0-2005.0	4.0	16.37			12.0	
511	2005.0-2015.0	10.0	14.74	15.05	18.75	14.0	
512	2015.0-2026.5	11.5	14.29	13.75	15.12	15.0	15.2
513	2026.5-2036.0	9.5	13.61	14.89	20.11	20.0	
514	2036.0-2045.0	9.0	10.49	8.78	13.52		14.8
515	2045.0-2052.0	7.0	14.19	11.67	15.48	18.0	
516	2052.0-2058.5	6.5	18.62	16.95	18.76	22.0	17.3
517	2058.5-2063.0	4.5	15.37	14.34	20.10	20.0	
518	2063.0-2068.0	5.0	11.52	10.94	12.60	15.0	14.4
519	2068.0-2076.5	8.5	20.46	17.25	23.10	20.0	22.6
520	2076.5-2082.5	6.0	7.02	6.01	7.70	7.0	

TABLE I CONTINUED

SAMPLE	DEPTH	TOTAL PERCENT CALCIUM FLUORIDE					
		Assayer Method	Frazer Calcium Oxalate	Broeman Willard Winter	MacDonald Willard Winter	Porter Estimate	Skyline Specific Ion Electrode
521	2082.5-2089.5	7.0	21.14	20.30	26.40	15.0	
522	2089.5-2098.0	8.5	19.29	19.18	22.20	15.0	22.6
523	2098.0-2105.0	7.0	6.93	6.75	8.34	8.0	
524	2105.0-2111.0	6.0	8.67	10.21	10.91	8.0	
525	2119.0-2125.0	6.0	9.84	9.44	9.28	5.0	8.6
526	2125.0-2135.0	10.0	9.02	5.23	6.34	3.0	
527	2111.0-2118.0	7.0	10.21	8.10			
528	2154.0-2165.0	11.0	8.81	3.71		3.0	
529	2165.0-2170.0	5.0	13.63	11.23		13.0	
530	2170.0-2175.0	5.0	8.26	9.67		16.0	7.8
531	2175.0-2185.0	10.0	8.14	11.25	12.1	20.0	
532	2185.0-2195.0	10.0	13.08	13.50	12.4	22.0	12.7
533	2195.0-2205.0	10.0	10.29	10.50	12.2	22.0	
534	2205.0-2215.5	10.5	13.79	13.00			12.2
535	2215.5-2222.0	6.5	6.91	5.53		10.0	
536	2222.0-2229.0	7.0	3.72	4.14		1.0	
537	2229.0-2241.0	12.0	1.73			1.0	4.8

FRAZER LABORATORIES
MARION, KY. 42064

July 9,1971

Mr.Joseph A.Porter
Rosiclare.Ill.

Certificate of analysis

Sample	No.	CaF_2	SiO_2	$CaCO_3$		ZN
#505	9463	2.91	6.18	86.04	95.13	0.00
#506	9464	5.06	10.68	75.56		0.00
#507	9465	2.26	7.46	84.96	94.79	0.11
#508	9466	5.91	15.52	70.48	92.07	0.16
#509	9467	14.02	13.68	61.66	89.92	0.56
#510	9468	35.14	11.44	39.02	86.03	0.43
#511	9469	30.22	14.86	39.96	85.55	0.51
#512	9470	37.14	14.22	32.68	84.63	0.59
#513	9471	37.39	11.76	34.56	84.09	0.38
#514	9472	28.26	11.32	43.64	83.46	0.34

Error Bad

C. L. Frazer
Chemist

FRAZER LABORATORIES

MARION, KY. 42064

July 15,1971

Mr.Joseph A.Porter
Rosiclare,Ill.

Certificate of analysis

Sample	No.	CaF_2	SiO_2	$CaCO_3$	Pb
#509	9467				0.32
#510	9468				0.27
#511	9469				0.37
#512	9470				0.31
#513	9471				0.33
#514	9472				0.24
#515	9473	14.19	23.04	53.02	0.33
#516	9474	18.62	24.42	45.58	0.31
#517	9475	15.37	17.78	53.42	0.35
#518	9476	11.52	18.68	59.28	0.39
#519	9477	20.46	18.28	45.52	0.44
#520	9478	7.02	18.08	69.48	0.17
#521	9479	21.14	17.82	54.02	0.38
#522	9480	19.29	17.64	54.84	0.36
#523	9481	6.93	20.46	64.88	0.27

C. L. Frazer
Chemist

FRAZER LABORATORIES
MARION, KY. 42064

July 25,1971

Mr.Joseph A.Porter
Rosiclare,Ill.

Certificate of analysis

Sample	No.	CaF_2	SiO_2	$CaCO_3$	ZN	Pb	
#524	9482	8.67 ~~13.04~~	23.22	53.56	0.00	0.23	10.0
#525	9483	9.84 ~~15.96~~	15.72	58.64	0.00	0.16	9.5
#526	9484	9.02 ~~17.21~~	18.72	50.52	0.00	0.21	13.3
#527	9485	10.21 ~~14.96~~	19.02	56.56	0.00	0.33	[illegible]
#528	9486	8.81	23.08	61.28	0.00	0.11	[illegible]
#529	9487	13.63	24.22	47.42	0.00	0.17	[illegible]
#530	9488	8.26 ~~12.14~~	26.03	55.82	0.00	0.39	[illegible]
#531	9489	8.14 ~~11.17~~	25.82	54.70	0.00	0.23	[illegible]
#532	9490	13.08	25.56	51.12	0.00	0.31	10.0
#533	9491	10.29	25.28	52.12	0.00	0.17	[illegible]
#534	9492	13.79	26.22	50.78	0.00	0.42	8.8
#535	9493	6.91	15.92	69.64	0.00	0.14	
#536	9494	3.72	10.06	81.96	0.00	0.00	

O. L. Frazer
Chemist

FRAZER LABORATORIES
MARION, KY. 42064

August 9,1971

Mr. Joseph A. Porter
Rosiclare, Ill.

Certificate of analysis

Sample	No.	CaF_2	$BaSO_4$	SiO_2	$CaCO_3$	Pb	ZN
#501	9455	3.21	36.58	9.44	42.56	2.11	
#502	9456	4.18	31.02	8.32	48.52	3.16	
#662	9458	34.14		48.02	15.68		
#665	9459	20.08		54.66	21.52		
#509	9467	7.02	6.82	13.68	61.66	0.32	0.56
#510	9468	16.37	10.82	11.44	39.02	0.27	0.43
#511	9469	14.74	9.76	14.86	39.96	0.37	0.51
#512	9470	14.29	10.94	14.22	32.68	0.31	0.59
#513	9471	13.61	12.36	11.76	34.56	0.33	0.38
#514	9472	10.49	7.62	11.32	43.64	0.24	0.34

repeats

C. L. Frazer
Chemist

CHECK-Assays
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FRAZER LABORATORIES
MARION, KY.

Sept.3,1971

Mr.Joseph A.Porter
Rosiclare,Ill.

Certificate of analysis

Sample	No.	CaF_2
#524	9482	8.67
#525	9483	9.84
#526	9484	9.02
#527	9485	10.21
#530	9488	8.26
#531	9489	8.14
#387	9502	14.27

C.L.Frazer
Chemist

F. C. BROEMAN & CO.
ESTABLISHED 1904
ANALYTICAL AND CONSULTING
CHEMISTS
1926 RACE STREET - - PHONE 621-5441
CINCINNATI 10, OHIO

Lamp #3

August 11, 1971

Mr. Joseph A. Porter
P. O. Box 506
Rosiclare, Illinois 62982

Dear Mr. Porter:

The following results were obtained upon samples submitted to us for testing.

Sample	Calcium Fluoride	Sample	Calcium Fluoride	Sample	Calcium Fluoride
510	16.37%	519	17.25%	528	3.71%
511	15.05% 15.2	520	6.01% out	529	11.23% 7.89
512	13.75%	521	20.30% 22.4	530	9.67%
513	14.89%	522	19.18%	531	11.25% 12.7
514	8.78% 14.8	523	6.75%	532	13.50%
515	11.67% 17.3	524	10.21%	533	10.50%
516	16.95%	525	9.44% 8.4	534	13.00% 13.2
517	14.34% 14.4	526	5.23%	535	5.53%
518	10.94%	527	8.10%	536	4.14% 4.8

Samples 510 - 511

Major	Calcium, Magnesium, Silicon
Minor	Aluminum, Iron, Titanium
Heavy Trace	Barium
Trace	Beryllium, Cobalt, Sodium, Phosphorus, Vanadium
Slight Trace	Manganese, Lead
Detected	Copper, Molybdenum, Zinc

Samples 521--522

Major	Calcium, Magnesium, Silicon
Minor	Aluminum, Iron, Titanium
Heavy Trace	Barium
Trace	Beryllium, Cobalt, Sodium, Phosphorus, Vanadium
Slight Trace	Molybdenum, Manganese, Lead
Detected	Copper

Cont'd.

F. C. BROEMAN & CO.
ESTABLISHED 1904
ANALYTICAL AND CONSULTING
CHEMISTS
1926 RACE STREET - - PHONE 621-5441
CINCINNATI 10, OHIO

August 11, 1971

Samples 532 - 533

Major	Calcium, Magnesium, Silicon
Minor	Aluminum, Iron, Titanium
Heavy Trace	Barium
Trace	Cobalt, Sodium, Phosphorus, Vanadium
Slight Trace	Beryllium, Manganese, Molybdenum, Lead
Detected	Copper

Sample 512

Further chemical analysis on this sample indicates the following:

Barium sulfate	10.70%
Silica (volatile with HF)	16.60%
Calcium fluoride	18.10%

(calculated from calcium insoluble in 30% acetic acid)

A calcium fluoride determination based on the residue obtained after treating a sample with acetic acid to remove calcium carbonate and with hydrofluoric acid to volatilize silica is inaccurate because of the presence of barium sulfate and complex silicates of aluminum, calcium, and magnesium. A direct fluoride determination is a more satisfactory method for evaluating these samples.

Yours very truly,

F. C. BROEMAN & COMPANY

F. I. BROEMAN

FIB:dr

BC2633-59

SKYLINE LABS, INC.
SPECIALISTS IN GEOCHEMICAL EXPLORATION
12090 WEST 50TH PLACE • WHEAT RIDGE, COLORADO 80033 • TEL.: (303) 424-7718

REPORT OF ANALYSIS

Job No. M-1220
October 6, 1971

Mr. J. Porter
P. O. Box 506
Rosiclare, Illinois 62982

11 Crushed rock samples

Item	Sample No.	CaF_2 (%)
1.	819	3.9
2.	820	15.2
3.	821	14.8
4.	822	17.3
5.	823	14.4
6.	824	22.6
7.	825	8.6
8.	826	7.8
9.	827	12.7
10.	828	13.2
11.	829	4.8

DDH
All Hole #3

Charles E. Thompson
Chief Chemist

SKYLINE LABS, INC.
SPECIALISTS IN GEOCHEMICAL EXPLORATION
12090 WEST 50TH PLACE • WHEAT RIDGE, COLORADO 80033 • TEL.: (303) 424-7718

REPORT OF SPECTROGRAPHIC ANALYSIS

Job No. M-1220
October 6, 1971

Mr. J. Porter
P. O. Box 506
Rosiclare, Illinois 62982

Values are reported in parts per million, except where noted otherwise, to the nearest number in the series 1, 1.5, 2, 3, 5, 7 etc.

Element	Sample Numbers 819	820	821	822	823	824
Fe	2%	3%	3%	3%	2%	2%
Ca	>20%	20%	20%	20%	20%	20%
Mg	3%	5%	5%	5%	7%	7%
Ag	<1	<1	<1	<1	<1	<1
As	<500	<500	<500	<500	<500	<500
B	20	20	20	20	20	20
Ba	3,000	>10,000	>10,000	>10,000	>10,000	>10,000
Be	200	>10,000	>10,000	>10,000	10,000	5,000
Bi	<10	30	30	50	30	20
Cd	<50	<50	<50	<50	<50	<50
Co	<5	<5	<5	<5	<5	<5
Cr	70	50	70	50	50	70
Cu	5	10	10	15	10	10
Ga	<10	<10	<10	<10	<10	<10
Ge	<20	<20	<20	<20	<20	<20
La	50	<20	<20	<20	<20	<20
Mn	700	1,500	1,000	1,000	1,000	1,000
Mo	<2	<2	<2	<2	<2	<2
Nb	300	700	1,000	1,500	1,500	700
Ni	5	10	10	15	10	10
Pb	3,000	2,000	5,000	2,000	2,000	2,000
Sb	<100	<100	<100	<100	<100	<100
Sc	100	200	150	150	100	100
Sn	<10	<10	<10	<10	<10	<10
Sr	2,000	2,000	3,000	3,000	2,000	2,000
Ti	5,000	7,000	7,000	10,000	5,000	5,000
V	300	200	200	200	200	200
W	<50	<50	<50	<50	<50	<50
Y	1,500	10,000	7,000	10,000	7,000	5,000
Zn	<200	1,500	1,000	200	<200	<200
Zr	200	300	300	300	200	150

Element	Sample Numbers 825	826	827	828	829
Fe	2%	2%	2%	2%	1%
Ca	20%	20%	20%	20%	20%
Mg	7%	7%	7%	7%	10%
Ag	2	<1	<1	1	<1
As	<500	<500	<500	<500	<500
B	20	20	20	20	20
Ba	>10,000	>10,000	>10,000	>10,000	10,000
Be	200	200	300	500	50
Bi	10	10	15	10	<10
Cd	<50	<50	<50	<50	<50
Co	<5	<5	<5	<5	<5
Cr	50	50	50	50	20
Cu	10	10	15	15	3
Ga	<10	<10	<10	<10	<10
Ge	<20	<20	<20	<20	<20
La	<20	<20	<20	50	<20
Mn	1,000	1,500	1,000	1,500	700
Mo	<2	<2	<2	<2	<2
Nb	500	700	700	500	100
Ni	10	5	10	5	<5
Pb	1,000	3,000	7,000	>10,000	700
Sb	<100	<100	<100	<100	<100
Sc	70	70	150	100	15
Sn	<10	<10	<10	<10	<10
Sr	1,000	1,500	1,000	1,500	500
Ti	3,000	5,000	7,000	5,000	1,500
V	150	200	300	200	200
W	<50	<50	<50	<50	<50
Y	1,500	1,500	3,000	2,000	200
Zn	<200	<200	<200	<200	<200
Zr	150	200	300	200	50

Charles E. Thompson
Chief Chemist

Box 592
Rosiclare, Ill. 62982

V. C. McDonald
Chemist Assayer
Lab. Flotation Research

Telephone 285-6823
(Area Code 618)

2-28-72

Mr. Joe Porter
Rosiclare, Illinois

RESULTS OF SIX CORE DRILL SAMPLES

W Winter

Sample No-	CaF_2	SiO_2	Total Calcium
517	20.10	13.00	19.86
518	12.60	17.40	19.05
519	23.10	12.78	19.44
520	7.70	16.00	20.22
512	15.12	13.78	16.04
513	20.11	16.78	19.36

V.C.McDonald

Box 592
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(Area Code 618)

3-20-72

Mr. Joe Porter Geogolist
Rosiclare, Illinois

ASSAYS OF CORE SAMPLES

Sample No	CaF_2	SiO_2	Total Calcium	$BaSO_4$	Zn	Pb	Al_2O_3 Fe_2O_3
157 563	17.51	21.68	20.31				
518	12.60	17.40	19.05				
519	23.10	12.78	19.44				
520	7.70	16.00	20.22				
512	15.12	13.78	16.04				
513	20.11	16.78	19.36				
508	7.80	15.08	24.78				
510	21.0	12.80	24.88				
Composite	21.51	14.84	20.04	1.14	0.28	0.16	8.4
509	8.75	13.80	17.54				
511	18.75	16.38	19.35				
521	22.31	14.78	22.57				
522	22.20	14.52	19.35				
514	13.52	13.66	19.02				
515	15.48	12.42	19.36				
516	18.76	12.20	19.17				
523	8.34	14.42	18.50				
524	10.91	17.48	18.79				
525	9.28	17.90	20.72				
526	6.34	16.52	18.96				
560	10.32	20.44	19.93				
572	21.24	16.04	19.70				

22 Samples

V. C. McDonald

FRAZER LABORATORIES
MARION, KY. 42064

August 9,1971

Mr. Joseph A. Porter
Rosiclare, Ill.

Certificate of analysis

Sample	No.	CaF_2	Sample	No.	CaF_2
#537	9497	1.73	#801	9516	2.21
#538	9498	1.49	#802	9517	2.43
#539	9499	2.64	#803	9518	3.56
#540	9500	3.07	#804	9519	2.97
#541	9501	1.82	#805	9520	1.61
#387	9502	52.21	#806	9521	3.09
#388	9503	6.04	#807	9522	2.12
#389	9504	4.53	#808	9523	4.79
#390	9505	3.59	#809	9524	1.38
#391	9506	0.84	#810	9525	1.03
#392	9507	0.53	#811	9526	1.92
#393	9508	0.49	#812	9527	4.86
#394	9509	8.38	#813	9528	3.11
#395	9510	3.11	#814	9529	1.86
#396	9511	1.24			
#397	9512	1.97			
#398	9513	0.61			
#399	9514	0.36			
#400	9515	3.38			

O. L. Frazer
Chemist

TABLE II
Comparison of Assay Results by
Assayer and Method
Drill Hole Hamp No. 4

SAMPLE	DEPTH	TOTAL PERCENT CALCIUM FLUORIDE					
		Assayer Method	Frazer Calcium Oxalate	Brooman Willard Winter	MacDonald Willard Winter	Porter Estimate	Skyline Specific Ion Electrode
543	1895.5-1906.0	10.5	4.41			3.0	
544	1906.0-1913.0	7.0	9.27			4.5	
545	1913.0-1925.0	12.0	4.36			2.0	
546	1925.0-1932.5	7.5	5.28			3.0	
547	1932.5-1942.5	10.0	4.44				
548	1942.5-1948.5	6.0	2.79			2.0	
549	1948.5-1955.0	6.5	3.44			3.5	
550	1955.0-1963.5	8.5	2.17			3.0	
551	1963.5-1970.0	6.5	4.08			3.5	
552	1970.0-1978.0	8.0	4.79			4.0	
553	1978.0-1985.0	7.0	5.12			6.0	↑
554	1985.0-1992.0	7.0	6.61	7.93		5.0	7.79
555	1992.0-1999.5	7.5	6.57	6.36		6.0	*
556	1999.5-2007.0	7.5	6.48	7.36	7.24	8.5	11.07

TABLE II CONTINUED

SAMPLE	DEPTH	TOTAL PERCENT CALCIUM FLUORIDE					
		Assayer Method	Frazer Calcium Oxalate	Broeman Willard Winter	MacDonald Willard Winter	Porter Estimate	Skyline Specific Ion Electrode
557	2007.0-2014.5	7.5	9.89	9.67	11.83	12.0	[illegible]
558	2014.5-2018.0	3.6	13.16	14.10	15.06	20.0	15.17
559	2018.0-2023.5	5.5	7.54	8.68	9.44	12.0	11.45
560	2023.5-2039.0	5.5	9.02	10.23		10.0	
561	2029.0-2038.0	9.0	10.54	9.24	14.50	14.0	12.91
562	2038.0-2038.5	.5					5.94
563	2038.5-2045.0	6.5	11.88	14.60	17.51	11.0	
564	2045.0-2050.5	5.5	11.39	12.18	15.30	13.0	13.53
565	2050.5-2056.0	5.5	9.44	10.06	11.83	15.0	
566	2056.0-2063.0	7.0	12.39	13.54	16.50	12.0	15.17
567	2063.0-2068.0	5.0	15.57	16.53	20.31	15.0	20.09
568	2068.0-2073.0	5.0	9.08	13.07	15.06	16.0	
569	2073.0-2081.0	8.0	8.93	9.91	10.33	17.0	13.12
570	2081.0-2086.0	5.0	15.17	15.46	15.02	22.0	

TABLE II CONTINUED

SAMPLE	DEPTH	TOTAL	PERCENT CALCIUM FLUORIDE				
		Assayer Method	Frazer Calcium Oxalate	Brooman Willard Winter	MacDonald Willard Winter	Porter Estimate	Skyline Specific Ion Electrode
571	2086.0-2090.0	4.0	11.36	12.42	9.02	20.0	24.60
572	2090.0-2092.5	2.5	16.38	17.15	21.24	20.0	↓
573	2092.5-2103.0	10.5	3.13	7.36	6.19		4.10
574	2103.0-2107.0	4.0	22.49	26.40	25.29	35.0	30.75
575	2107.0-2109.5	2.5	12.78	14.59	16.77	17.0	↑
576	2109.5-2115.5	6.0	17.53	18.17	20.90	14.0	18.86
577	2115.5-2118.5	3.0	16.82	17.42	19.35	15.0	↓
578	2118.5-2126.0	7.5	6.74	9.16	8.80	7.0	
579	2126.0-2136.0	10.0	3.43			4.0	
580	2136.0-2146.0	10.0	6.85			3.0	
581	2146.0-2156.0	10.0	2.92				

FRAZER LABORATORIES

MARION, KY. 42064

Oct. 4, 1971

Mr. Joseph A. Porter
Rosiclare, Ill.

Certificate of analysis

Sample	No.	CaF_2
#573	9541	3.13
#574	9542	22.49
#575	9543	12.78
#576	9544	17.53
#577	9545	16.82
#561	9546	10.54
#563	9547	11.88
#564	9548	11.39
#565	9549	9.44
#566	9550	12.39
#567	9551	15.57
#568	9552	9.08
#569	9553	8.93
#570	9554	15.17
#571	9555	11.36
#572	9556	16.38
#543	9557	4.41
#544	9558	9.27
#545	9559	4.86
#546	9560	5.28
#547	9561	4.44
#548	9562	2.79
#549	9563	3.44
#550	9564	2.17
#551	9565	4.08
#552	9566	4.79
#553	9567	5.12
#554	9568	6.61
#555	9569	6.57
#556	9570	6.48
#557	9571	9.89
#558	9572	13.16
#559	9573	7.54
#560	9574	9.02
#578	9575	6.74
#579	9576	3.43
#580	9577	6.85
#581	9578	2.92

C. D. Frazer
Chemist

F. C. BROEMAN & CO.
Established 1904
ANALYTICAL AND CONSULTING
CHEMISTS
1926 RACE STREET - - PHONE 621-5441

REPORT OF ANALYSIS

SAMPLE OF 24 Ore Samples

CINCINNATI, OHIO 45210 October 12, 1971

FROM Joe Porter

RECEIVED October 4, 1971

Sample	Calcium Fluoride	Sample	Calcium Fluoride
554	7.93%	567	16.53%
555	6.36%	568	13.07%
556	7.36%	569	9.91%
557	9.67%	570	15.46%
558	14.10%	571	12.42%
559	8.68%	572	17.15%
560	10.23%	573	7.36%
561	9.24%	574	26.40%
563	14.6%	575	14.59%
564	12.18%	576	18.17%
565	10.06%	577	17.42%
566	13.54%	578	9.16%

FIB:dr

BC3627-50

SKYLINE LABS, INC.
SPECIALISTS IN GEOCHEMICAL EXPLORATION
12090 WEST 50TH PLACE • WHEAT RIDGE, COLORADO 80033 • TEL.: (303) 424-7718

REPORT OF ANALYSIS

Job No. M-1234
October 26, 1971

Mr. J. Porter
P. O. Box 506
Rosiclare, Illinois 62982

14 Crushed rock chip samples

Item	Sample No.	F (%)
1.	830	3.8
2.	831	5.4
3.	832	7.4
4.	833	5.6
5.	834	6.3
6.	835	2.9
7.	836	6.6
8.	837	7.4
9.	838	9.8
10.	839	6.4
11.	840	12.
12.	841	2.8
13.	842	15.
14.	843	9.2

Charles E. Thompson
Chief Chemist

cc. John Carroll
New York, New York

SKYLINE LABS, INC.
SPECIALISTS IN GEOCHEMICAL EXPLORATION
12090 WEST 50TH PLACE • WHEAT RIDGE, COLORADO 80033 • TEL.: (303) 424-7718

REPORT OF SPECTROGRAPHIC ANALYSIS

Job No. M-1234
October 26, 1971

Mr. J. Porter
P. O. Box 506
Rosiclare, Illinois 62982

Values are reported in parts per million, except where otherwise noted, to the nearest number in the series 1, 1.5, 2, 3, 5, 7, etc.

Element	Sample Numbers 830	831	832	833	834	835	836
Fe	7%	10%	7%	7%	10%	20%	5%
Ca	>20%	20%	20%	20%	15%	2%	20%
Mg	5%	5%	5%	5%	5%	1%	5%
Ag	<1	<1	<1	<1	<1	<1	<1
As	<500	<500	<500	<500	<500	1,000	<500
B	50	50	50	50	50	70	30
Ba	10,000	>10,000	>10,000	>10,000	>10,000	5,000	>10,000
Be	1,000	1,000	1,500	1,500	2,000	1,000	1,500
Bi	10	15	20	15	20	<10	20
Cd	<50	<50	<50	<50	<50	<50	<50
Co	10	10	20	10	20	50	5
Cr	150	150	150	150	200	50	100
Cu	20	20	30	20	20	50	15
Ga	10	10	10	10	10	20	10
Ge	<20	<20	<20	<20	<20	<20	<20
La	100	100	100	150	100	<20	100
Mn	1,000	1,000	1,000	1,500	1,000	200	1,000
Mo	<2	2	<2	2	5	10	2
Nb	500	500	700	500	1,000	500	500
Ni	20	50	50	50	50	100	20
Pb	500	500	1,000	700	700	500	2,000
Sb	<100	<100	<100	<100	<100	300	<100
Sc	200	200	200	300	200	50	150
Sn	<10	<10	<10	<10	<10	<10	<10
Sr	7,000	5,000	7,000	7,000	7,000	5,000	7,000
Ti	5,000	5,000	5,000	5,000	5,000	5,000	5,000
V	200	500	200	200	300	150	200
W	<50	50	70	50	100	50	50
Y	2,000	2,000	5,000	3,000	3,000	1,000	2,000
Zn	<200	<200	<200	<200	<200	<200	200
Zr	200	200	200	200	200	100	200
CaF2	7.8	11.1	15.1	11.4	12.9	5.9	13.5

Element	Sample Numbers 837	838	839	840	841	842	843
Fe	7%	7%	10%	5%	1%	2%	7%
Ca	>20%	>20%	>20%	>20%	>20%	20%	20%
Mg	7%	7%	7%	7%	15%	10%	10%
Ag	<1	<1	<1	<1	<1	<1	<1
As	<500	<500	<500	<500	<500	<500	<500
B	30	50	50	50	20	20	30
Ba	>10,000	>10,000	>10,000	>10,000	>10,000	>10,000	>10,000
Be	1,500	3,000	2,000	2,000	500	1,500	2,000
Bi	20	30	20	20	10	30	20
Cd	<50	<50	<50	<50	<50	<50	<50
Co	10	20	10	10	<10	20	10
Cr	150	150	100	150	20	30	30
Cu	20	20	15	15	7	10	10
Ga	10	<10	10	<10	<10	<10	<10
Ge	<20	<20	<20	<20	<20	<20	<20
La	100	100	100	100	50	70	50
Mn	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Mo	2	2	2	2	2	<2	<2
Nb	700	700	500	700	500	700	700
Ni	30	50	50	50	10	10	15
Pb	1,500	700	700	500	500	700	500
Sb	<100	<100	<100	<100	<100	<100	<100
Sc	200	200	150	150	50	100	100
Sn	<10	<10	<10	<10	<10	<10	<10
Sr	10,000	10,000	7,000	7,000	5,000	10,000	10,000
Ti	7,000	5,000	5,000	3,000	2,000	5,000	3,000
V	500	300	200	200	100	200	100
W	50	70	50	50	50	50	<50
Y	5,000	5,000	2,000	3,000	500	5,000	3,000
Zn	300	200	<200	<200	<200	<200	<200
Zr	200	200	200	300	50	300	200
CaF2	15.2	20.1	13.1	24.4	4.1	30.7	18.9

Charles E. Thompson
Chief Chemist

cc. John Carroll
New York, New York

Box 592
Rosiclare, Ill. 62982

V. C. McDonald
Chemist Assayer
Lab. Flotation Research

Telephone 285-6823
(Area Code 618)

December 23rd, 1971

Mr. Joe Porter
Rosiclare, Illinois

RE: RESULTS OF TEN CORE DRILL SAMPLES

Sample No.	CaF_2	SiO_2	Al_2O_3 Fe_2O_3	Total Calcium
533	12.22	17.90	8.80	9.98
557	11.83	18.82	8.80 m	20.36
558	15.06	21.38	10.00	18.08
559	9.44	18.60	9.60	18.93
565	11.83	19.30	8.96	19.38
568	15.06	16.00	12.80	19.38
~~569~~ 570	15.02	16.78	8.44	19.63
~~570~~ 569	10.33	18.40	9.00	10.67
571	9.02	19.20	8.80	9.90

Note- The above fluorides were run by the Willard Winter Distillation method.

V.C.McDonald
Chemist

Box 592
Rosiclare, Ill. 62982

V. C. McDonald
Chemist Assayer
Lab. Flotation Research

Telephone 285-6823
(Area Code 618)

2-15-72

Mr. Joe Porter
Rosiclare, Illinois

Dear Sir:

The following will give you the results of ten core samples submitted to me recently.

Sample No	CaF_2	SiO_2	Total Ca
575	16.77	15.60	16.62
576	20.90	18.00	20.30
577	19.35	15.85	19.41
578	8.80	13.70	19.86
556	7.24	22.18	20.22
567	20.31	16.22	20.51
564	15.30	18.40	19.41
566	16.50	21.02	20.58
561	14.50	20.36	18.96
563	17.51	21.68	20.31

V.C.McDonald
Chemist

V. C. McDonald

Both Broeman and MacDonald used the Willard-Winter method. MacDonald's assays are thought to be the best because of his considerable experience under a wide variety of conditions. By the ordinary Willard-Winter method 200 milligrams are digested. MacDonald, however, when assaying these lower grade samples distills off the fluorine from a one-gram sample. This is thought to contribute substantially to the accuracy and reliability of MacDonald's assays.

Another method used was the specific ion electrode used by Skyline Laboratories. Since they have a proprietary interest in this method they prefer that the procedures used are kept confidential. Generally this method should be rather accurate except that the amount of sample digested is only 25 milligrams. One of the principal advantages of Skyline is that they are very fast and can process a large batch of samples rather promptly.

In the future it will be preferable to split the core and crush the sample here and send a split of the crushed sample to Skyline Laboratories in Golden, Colorado, for the initial CaF_2 assays. Samples of interest will then be submitted to V. C. MacDonald at Rosiclare, Illinois, for additional CaF_2 assay. For zones of interest the samples should be resplit, renumbered and submitted again to either Skyline or MacDonald for check assays.

Reasons for Expecting to Find Ore:

Various geologic, physical and mineralogic factors indicate that there are reasonable expectations of finding commercial ore on the subject properties.

Two holes, the Hamp No. 3 and No. 4, have indicated the possibility of a large vertical thickness of commercial ore containing fluorspar and other products. The holes are located on what is apparently the east flank of the dome and it is likely that additional holes in this area will encounter similar mineralization. The size of this potential ore zone is sufficient to allow for the existence of a very large tonnage ore body amenable to block caving or large room and pillar operations. The drill holes have tested a small area in terms of total extent of the favorable geologic environment. Additional holes have a reasonable chance of intersecting areas which are more intensely mineralized. The favorable zone probably has not been intersected in either its highest or lowest grade area.

Chances for blocking out the necessary tonnage to amortize an operation are improved by the fact that a multimineral operation might be possible. Besides lead and zinc by-products of the fluorspar, considerable potential is indicated for niobium, beryllium, thorium, yytrium and other rare earths. If the minerals containing these elements can be separated they will contribute substantially to the value per ton, thereby reducing the required tonnage or alternatively expanding the tonnage by allowing a lower grade material to be mined.

Presently there is only a limited demand for the exotic elements cited above. Uncertain supply has created high costs and a certain reluctance on the part of designers to utilize these materials. An operation on the scope conceived of here would furnish certain market stability for these commodities as they would be by-products of an operation predicated on the more stable fluorspar market.

(g) Reports: Two copies of the following are submitted under separate cover.

Reports

1. Porter Report on Rose Mine Work.

Maps

1. Exhibit 3-1, Copies of Illinois Geologic Survey maps of subject area.
2. Exhibit 3-2, Copies of 1"-100' showing topography, geology, holes drilled and proposed holes.
3. Exhibit 3-3, Cross Section of drilling.
4. Exhibit 3-4, Composite strip logs.

Return of the above cited material is not required.

Detailed logs of the drill holes are not included because of their bulk. These are available for inspection and can be furnished if required. All pertinent data are reported or shown herein.

4. ACCESSIBILITY OF PROPERTY

(a) Access: In the event an examination by an O.M.E. representative is necessary, the person to contact would be:

Joseph A. Porter
P.O. Box 447
Rosiclare, Illinois 62982
Telephone (618) 285-6685

The map given on the following page shows the location of the property and how it can be reached. Easiest access to the property is by a gravel road, which is located approximately five miles due north of the intersection of Illinois Routes 146 and 34. The properties are then easily reached by following said gravel road for approximately one mile to the east. An all weather gravel road maintained by the County circumscribes the lease-block.

The surface consists of modest hills with a maximum relief of approximately 200 feet. Most of the surface is either pasture land or timber. Access to any point is relatively easy but some dozing is usually required to shape and maintain access roads to the actual drill sites.

Electric power, water, labor and industrial service and supplies are easily available.

There are no mine workings.

(b) Shipping and Supply Points: These facilities are shown on the map on the preceding page. A paved concrete slab highway, Illinois Route 34, passes within approximately one mile of the property. Nearest rail shipping point is approximately eight miles south of the property at Shetlerville, Illinois, or ten miles to the south and east at Rosiclare, Illinois. Both of these shipping points are on the Ohio River, and barge loading facilities are available at each. Additional rail facilities are located in Harrisburg, Illinois, approximately sixteen miles to the north.

5. EXPLORATION WORK

(a) Drill Holes: Work proposed here consists of diamond drilling and the attendant test work on the core. The holes are to be directed at the favorable zones within the main breccia body. Four holes are posposed, each approximately 2,500 feet deep. Total footage will approximate 10,000 feet.

The tentative locations of the proposed holes are given on Exhibit 3-2 and on the following page. They are titled A, B, C and D. Though A and B are interchangeable in terms of sequence, they are to be drilled first. Holes C and D locations may be drastically changed, depending on the results of the first two holes.

Holes A and B are designed to test for continuity of the mineralization in the previously intersected purple breccia zone. Success in either or both holes would give a strike length of over 600 feet.

Holes C and D are designed to test the broader aspects of the dome and to look for favorable areas at other places surrounding the dome. Hopefully the same general condition found in the Hamp No. 3 and No. 4 can be duplicated. This should contribute substantially to the knowledge of the geology and mineralization.

Experience has shown that the most expensive footage on the subject properties is at depths of 0 - 300 feet. This is due to the bedded chert residuum. It is suggested that the first hole will be tried with the prime contractor's core drill and a rock bit. If this is unsuccessful a combination air-water rotary will be tried. Use of the rotary is also conditional on availability. NX casing will be set in the holes through overburden.

An attempt will be made to drill the holes to their total depth with NXWL tools. If bad ground is encountered they can be cased and reduced. NX is preferred because of the larger sample and better recovery. It would also be easier to wedge off for additional intersections if required.

(b) Access Road: Most of the required access road already exists. It will require some rock in muddy places and occasional maintenance work. Location of access road is shown on the previous page.

(c) Work Rate: If an OME contract is issued it should be possible to start work in approximately two weeks. An additional seven months will probably be required to finish the work.

Present schedule calls for two shifts per day, six days per week. This should give an average of about 1,400 feet drilled per month.

6. EXPERIENCE

Direct responsibility for the work will fall to the same people who conducted the previously described work by Industrial Minerals Exploration and Hicks Dome Account.

Direct supervision on the property will be furnished by Mr. Joseph A. Porter. Mr. Porter holds a Master's Degree in Geology and has had approximately thirteen years experience in mining, mine geology and exploration. Of this, approximately five years was spent employed as an engineer-geologist for Minerva Oil Company in the fluorspar mines and district in Illinois and Kentucky. Since 1965 he has been employed by the principals hereto and has conducted a wide variety of projects for a variety of commodities in the U.S. and Canada.

Mr. Porter works under the supervision of Mr. John L. Carroll. Mr. Carroll holds a Master's Degree in Geology and is the Vice President in charge of mining for Antaeus Resources Corporation and President of the Silver Resources Corporation. He was formerly the General Partner for Industrial Minerals Exploration. Mr. Carroll has had the primary responsibility for a wide variety of exploration projects, both domestic and foreign. Like Mr. Porter, he has contributed a substantial amount of time and work to the various problems encountered in the Hicks Dome Area.

In addition to the above cited personnel, liberal use has been made of personnel of the U.S. Geological Survey and the Illinois Geological Survey. In several instances consultants have been employed. Among these have been Mr. E. A. Brecke, who is well recognized as an authority on fluorspar, and Mr. Frank Snyder, who is a recognized authority on structures of this type and on Mississippi Valley type ore deposits.

7. ESTIMATE OF COSTS

(a) Independent Contracts: Bids for the drilling were requested from Boyles Brothers, Joy Manufacturing and Dikor, a local contractor. Dikor declined to bid on the coring but did furnish a bid for rotary or air hammer work if required. Copies of the bids follow.

The bid from Joy Manufacturing is considered the best and serves as the basis for the cost estimation.

Bids were not requested for dozer work. A dozer is available on short notice from a farmer living nearby. When not in use elsewhere he leaves it on the property at no additional cost. The machine is a D-4 and is in excellent shape. Charge is in the amount of $12.50 per hour and includes operator and fuel.

Present plans are to drill one hole at a time. It might be possible to drill either C or D while A or B is being drilled. This would result in some saving.

Cost estimates are itemized by the following. A summary of total project costs is given at the end of this section.

Drilling (per hole)

0'-500'	
Rotary Drilling, (0-300') X $3.90/ft.=	$ 1,170
NX Coring (300-500') X $4.40/ft.=	880
500'-1,000'	
NX Coring, 500' @ $4.80/ft.=	2,400
1,000'-1,500'	
NX Coring, 500' @ $5.40/ft.=	2,700
1,500'-2,000'	
NX Coring, 500' @ $6.30/ft.=	3,150
2,000'-2,500'	
NX Coring, 500' @ $7.50/ft.=	3,750

Costs

Bit Costs, 2,500' @ $0.50/ft.=	$ 1,250	
Reaming, 300' @ $3.00/ft.=	900	
Standby (Survey, etc.), 40 hrs. @ $14.00/hour=	560	
Cementing time, 20 hrs. @ $16/hr.=	320	
Water, 1.5 months @ $300/month=	450	
Casing left in hole, 300' @ $3.50/ft.=	1,050	
<u>Other (per hole)</u>		
Dozing, 15 hours @ $12.50/hr.=	192	
TOTAL CONTRACT COST/HOLE	$18,772	
NO. OF HOLES	X 4	
TOTAL PROJECT CONTRACT COST		$75,088

January 28, 1972

Mr. Joseph A. Porter
Geologist
Post Office Box 447
Rosiclare, Illinois 62982

Dear Mr. Porter:

Quentin Donithan gave us a detailed report on the conditions we might expect to encounter on your drilling program, which will be undertaken on Hicks Dome.

Our prices are based on a minimum of 4,000 feet of drilling in two (2) vertical holes.

Our prices follow:

	Non-Core Rotary	NX Wire Line	BX Wire Line
0. to 500. feet	$3.90/ft.	$4.40/ft.	$4.20/ft.
500. to 1000. feet	- - - - -	$4.80/ft.	$4.60/ft.
1000. to 1500. feet	- - - - -	$5.40/ft.	$5.20/ft.
1500. to 2000. feet	- - - - -	$6.30/ft.	$6.10/ft.
2000. to 2500. feet	- - - - -	$7.50/ft.	$7.30/ft.
2500. to 3000. feet	- - - - -	$9.00/ft.	$8.80/ft.
Standby Time for your convenience			$14.00/hr.
Cementing, if necessary			$16.00/hr.
Reaming, if necessary			$3.00/ft.
Drilling Mud and Additives used			At job site cost.
NX Casing lost or left in place			$3.50/ft.
BX Casing lost or left in place			$2.50/ft.
Weather-Treated Core Boxes holding 10 feet of core			$1.25 each.

Sheet No. 2 To: Mr. Joseph A. Porter, Geologist

January 28, 1972

Diamond Loss in excess of $1.00 per foot	At actual cost.
Water Provision (either trucking or pumping)	$300.00/mo.

Diamond loss in excess of $1.00 per foot will be figured on the basis of the costs encountered over the entire drill hole.

We will expect you to furnish and maintain suitable access roads, drill sites, and necessary permits.

We trust that our prices will receive favorable consideration.

Yours truly,

JOY MANUFACTURING COMPANY

J. M. Murray, General Manager
Drill Division

JMM:rh

DIAMOND CORE DRILLING
DIAMOND DRILLING EQUIPMENT
GROUTING
FOUNDATION TESTING
MINING
QUARRYING
SHAFT SINKING
TUNNEL DRIVING
MINE PLANT DESIGN
AND FABRICATION

Boyles Bros.
DRILLING COMPANY

CONTRACTORS—ENGINEERS—GEOLOGISTS

Industrial Park Samsonite Blvd.
P. O. Box 1158
MURFREESBORO, TENNESSEE 37130
Phone (615) 896-5132

General Offices and Plant
1624 Pioneer Road P. O. Box 58
SALT LAKE CITY, UTAH 84110
Phone (801) 487-3671

BRANCH OFFICES
ARIZONA (PHOENIX)
CALIFORNIA (AUBURN)
COLORADO (GOLDEN)
NEVADA (SPARKS)
TENNESSEE (MURFREESBORO)
WASHINGTON (SPOKANE)
CHILE (SANTIAGO)
CABLE: BOYLESBROS.
MEXICO, D.F.
PERU (LIMA)
CABLE: BOYLESCOP

January 21, 1972

Hicks Dome Account
Sherman & Sterling
53 Wall Street
New York, New York 10005

ATTENTION: Mr. Gilbert Kerlin, Esq.

Re: Core drilling in Hicks Dome Area
Hardin County, Illinois

Gentlemen:

We are pleased to quote on the above drilling program. Prices to cover a minimum of approximately 8,000 feet.

1. Mobilization - $ 800.00

2. a. Overburden and top sections of holes - to be drilled and cased with rotary drill.

   b. Coring

	NX Size	BX Size
0 - 500	$ 5.10 per foot	$ 4.95 per foot
500 - 1000	5.80 " "	5.65 " "
1000 - 1500	6.25 " "	6.10 " "
1500 - 2000	6.75 " "	6.60 " "
2000 - 2500	7.40 " "	7.25 " "
2500 - 3000	8.15 " "	8.00 " "

3. Reaming, if required - $ 3.75 per foot

4. Setting up on holes drilled by rotary drills and cleaning out holes in preparation to core - $ 19.50 per hour.

5. Installing and removal of casing - $ 19.50 per hour.

6. Casing, requested left in hole, damaged or lost in hole -
   NX size - $ 2.92 per foot
   BX size - $ 2.20 per foot

7. Cementing, to include cementing, waiting on cement to set and coring cement - $ 19.50 per hour plus cement and additives at cost f.o.b. jobsite.

8. Drill mud, if needed - At cost f.o.b. jobsite.

9. Delays for customer's convenience - $ 18.50 per hour.

10. Antaeus Resources Corporation agrees to reimburse Boyles Bros. for diamond bit cost in excess of eighty-five cents ($ .85) per foot.

11. Surveying of holes - $ 19.50 per hour plus rental on instrument.

12. Suitable roads and drill sites, if needed, to be provided by Antaeus Resources.

13. Directional wedging - $ 19.50 per hour plus wedges, bits, surveying instrument, setting over previously drilled holes, cleaning out holes and any materials or time required to accomplish this work.

We thank you for the opportunity of submitting this quote and will look forward to working for your company again.

Very truly yours,
BOYLES BROS. DRILLING COMPANY

Wallace Woodcock
Wallace Woodcock
Eastern District Manager

WW:dh

cc: Boyles Bros.-Salt Lake City

PHONE 618/382-4184

P. O. BOX 389

DiKor

a division of serw-kor, inc.

CARMI, ILLINOIS 62821

March 3, 1972

Hicks Dome Account
c/o Joe Porter
Box 506
Rosiclare, Ill. 62982

Re: Drill Rig Quote

Dear Joe:

DiKor would like to quote the following equipment, tools and services for your consideration with regard to drilling holes to 800' - 1000' level before continuous coring (by others) would begin:

1 - CP-650 Reichdrill - 2 man crew, pusher, water truck, extra mud pump (if needed) - All hours, with crew	$ 45.00
Air Hammer for 6-1/4" Hole - per foot	.25
Air Hammer for 4-7/8" Hole - per foot	.15
Bits for Hammer Drill or regular tri=cone bits - DiKor cost plus 10%	
Transportation - Rig @ 50¢ per mile	
Truck and float trailer @ 50¢/mile	
Truck without float trailer @ 30¢/mile	
Mud, or any other services - DiKor cost plus 10%	
7" Used Casing - per foot	1.60
5½" Used Casing, per foot	1.35

Joe, we would recommend drilling 8-3/4" hole to rock, setting 7" OD casing (good used), drilling 6-1/4" hole with hammer drill as far as possible; reducing to 4-7/8" hammer, if necessary; or using tri-cone bits and reducing hole as required to the coring depth. Believe we can end up with hole large enough for your use at the 800 - 1000' depth. Use of air hammer drill as much as possible would help control vertical deviation.

Talk to Gene Graddy about any of this; I'll call you about the 15th when I get back.

Regards,

DiKor

B. G. Harmon

B. G. Harmon

BGH:db

(b) Personal Services: Cost for personal services cited herein are all based on a seven month period.

1 - Geologist Supervisor @ $1,250/month	$8,750
1 - Geologic Assistant @ $500/month	3,500
1 - Secretarial (part time) @ $100/month	700
TOTAL COST, PERSONAL SERVICES	$12,950

Above cited services are available.

(c) Operating Material and Supplies: The following are the material and supplies necessary for the proposed work.

200 tons Road Rock @ $2.00/ton	$ 400.00	
Core boxes - 880 boxes @$1.25	1,100.00	
Sample bags - 300 @ $0.30	90.00	
TOTAL		$1,590.00

(d) Operating Equipment: Not applicable.

(e) Initial Rehabilitation and Repair: Not applicable.

(f) Building, Fixtures, Installations: Not Applicable.

(g) Miscellaneous: Miscellaneous costs will consist principally of analytical work. Estimated costs are as follows:

Wet Assays (CaF_2, some Pb, Zn and other) 400 at $4.00 each=	$1,600.00	
Specific ion electrode 400 @ $2.50 each=	1,000.00	
Spectrographic Analyses 100 at $10=	1,000.00	
TOTAL		$3,600.00

Summary of Estimate of Costs:

Total cost of the proposed project is as follows:

(a)	Contract Costs	$75,040
(b)	Personal Services	12,950
(c)	Operating Material and Supply	1,590
(d)	Operating Equipment	None
(e)	Rehabilitation	None
(f)	Buildings	None
(g)	Miscellaneous (Assays)	3,600
	Total Project Cost	$93,180
	Government Share	$46,590

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1. Baxter, J. W., et al., "Areal Geology of the Illinois Fluorspar District, Part 1--Saline Mines, Cave in Rock, Dekoven, and Repton Quadrangles," Illinois Geological Survey Circular 342, 1963, 43 pp.

2. Baxter, J. W., and Desborough, G. A., "Areal Geology of the Illinois Fluorspar District, Part 2--Karbers Ridge and Rosiclare Quadrangles," Illinois Geological Survey Circular 385, 1965, 40 pp.

3. Baxter, J. W., et al., "Areal Geology of the Illinois Fluorspar District, Part 3--Herod and Shetlerville Quadrangles," Illinois Geological Survey Circular 413, 1967, 41pp.

4. Brown, J. S., et al., "Explosion Pipe in Test Well on Hicks Dome, Hardin County, Illinois," Economic Geology, Vol. 49, 1954, pp. 891-902.

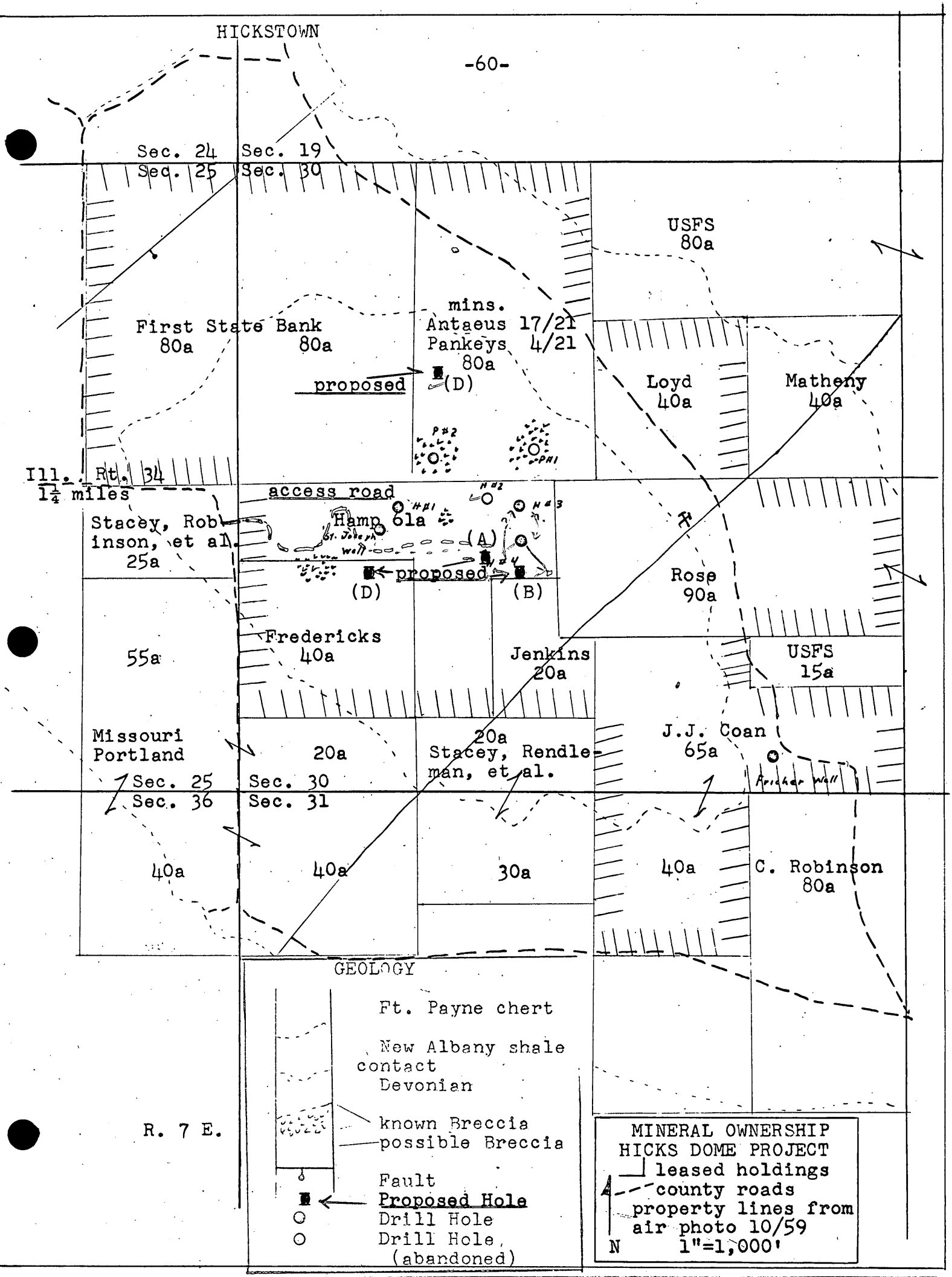
5. Grogan, R. M., and Bradbury, J. C., "Fluorite-Zinc-Lead Deposits of the Illinois-Kentucky Mining District," Ore Deposits in the United States, Ridge, J. D., ed., AIME, New York, 1968, pp. 370-399.

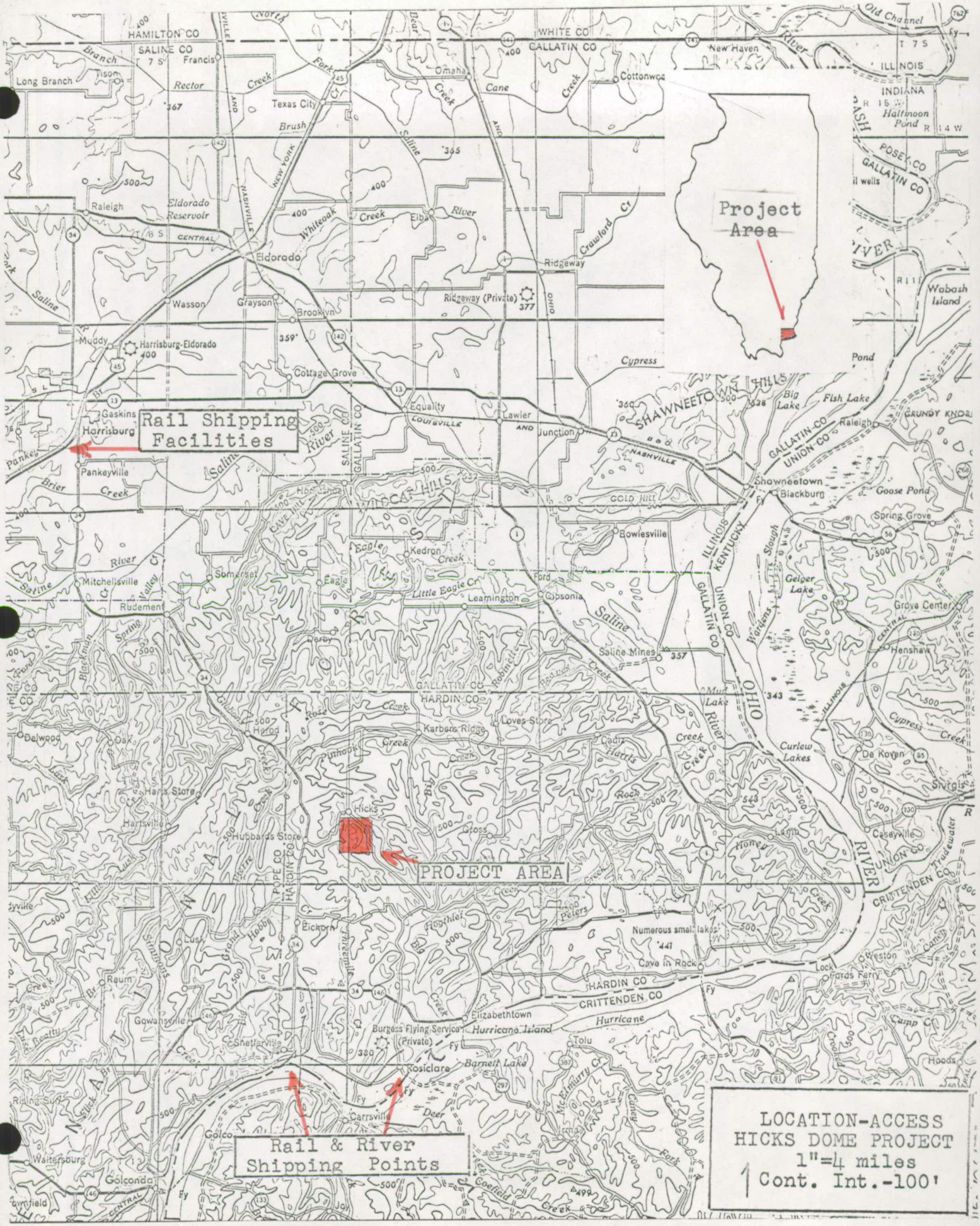
6. Heyl, A. V., et al., "Regional Structure of the Southeast Missouri and Illinois-Kentucky Mineral Districts," U. S. Geological Survey Bulletin 1202-B, 1965, 20 pp.

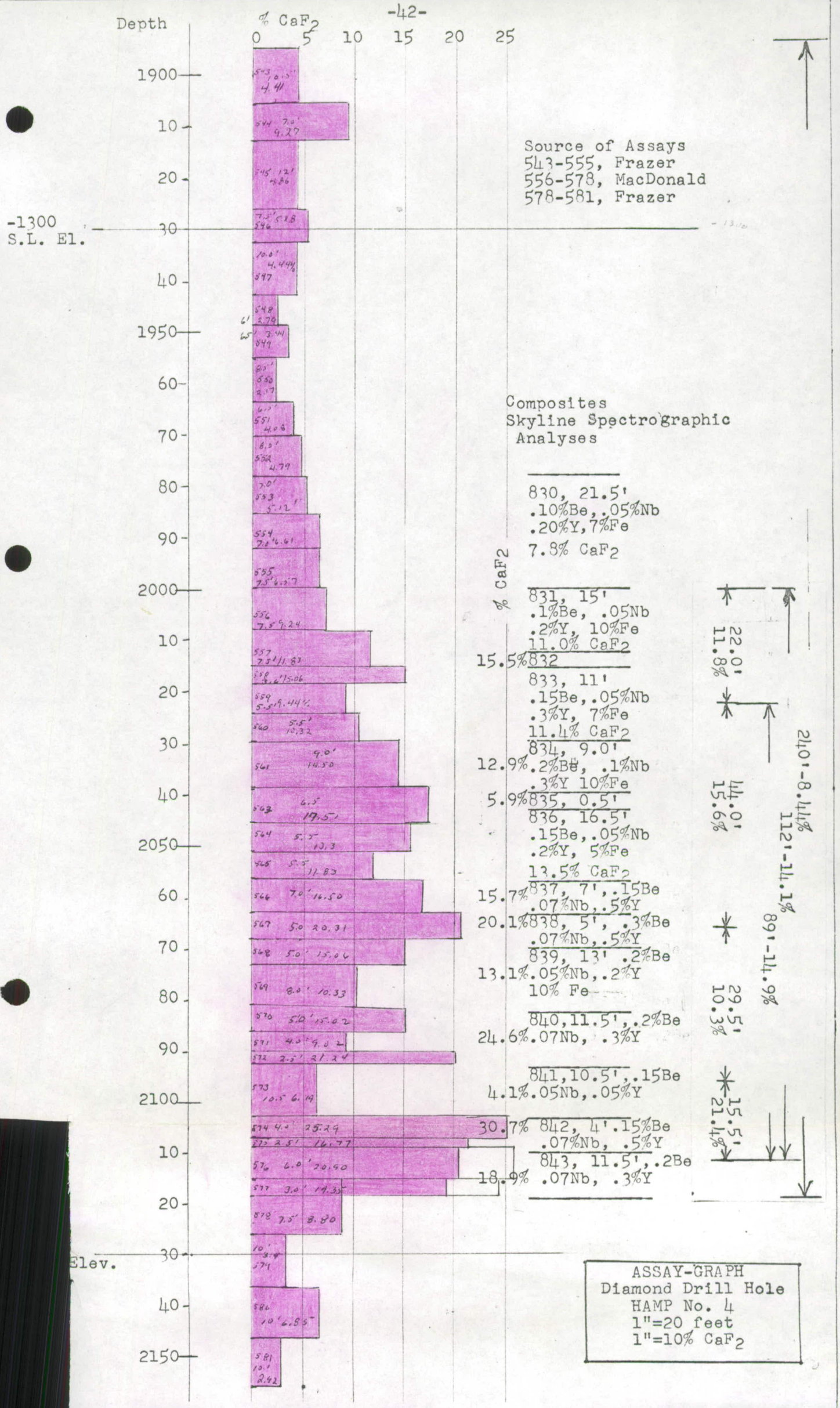
7. Heyl, Allen V., "The 38th Parallel Lineament and Its Relationship to Ore Deposits," Economic Geology, Vol. 63, Jan.-Feb. 1968, p. 88.

8. Snyder, F. G., and Gerdemann, P. E., "Explosive Igneous Activity Along an Illinois-Missouri-Kansas Axis," Amer. Jour. Science, Vol. 263, June 1965, pp. 465-493.

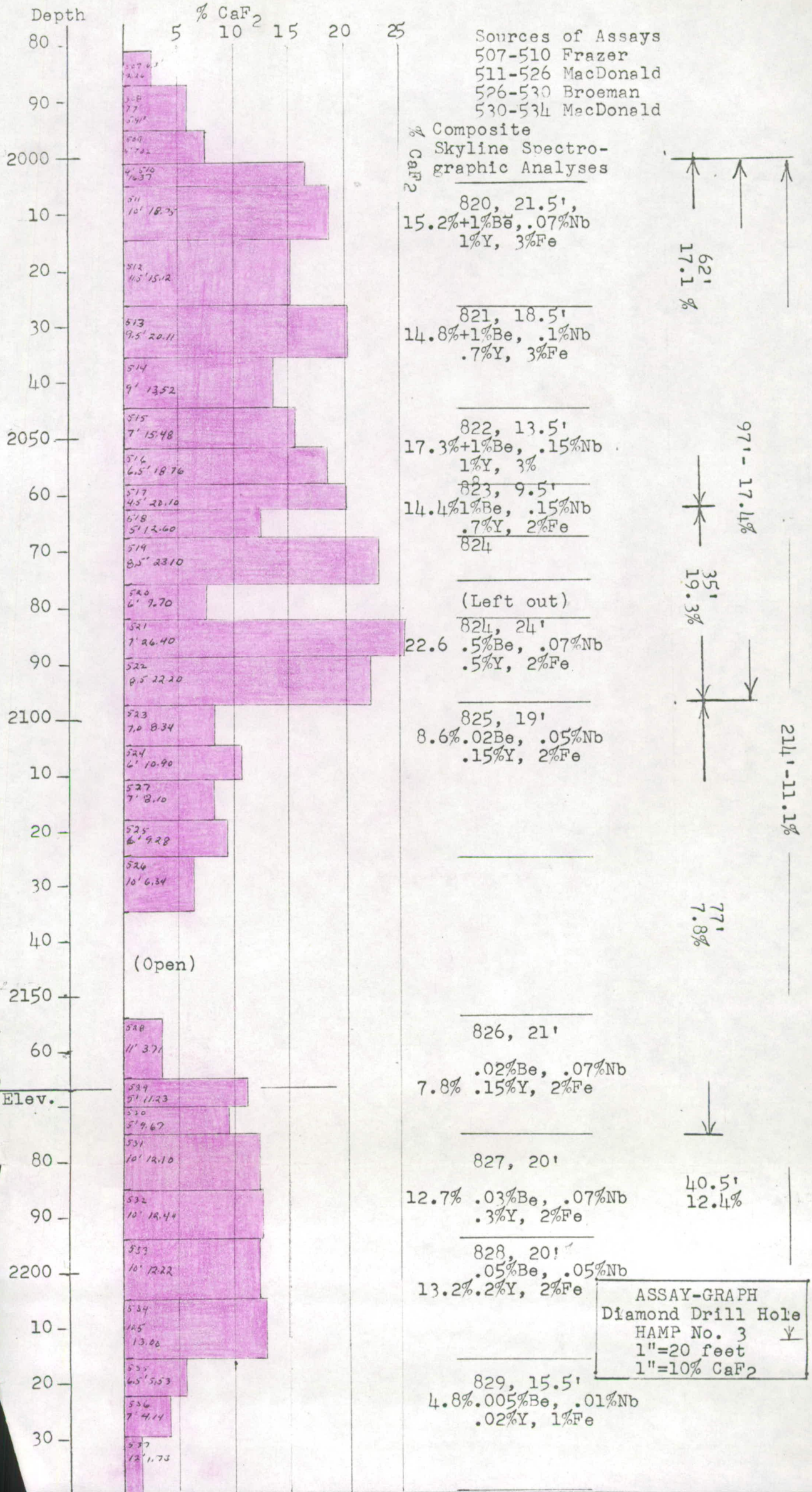
9. Trace, R. D., "Significance of Unusual Mineral Occurrence at Hicks Dome, Hardin County, Illinois," U. S. Geological Survey Professional Paper 400-B, 1960, pp. 63-64.

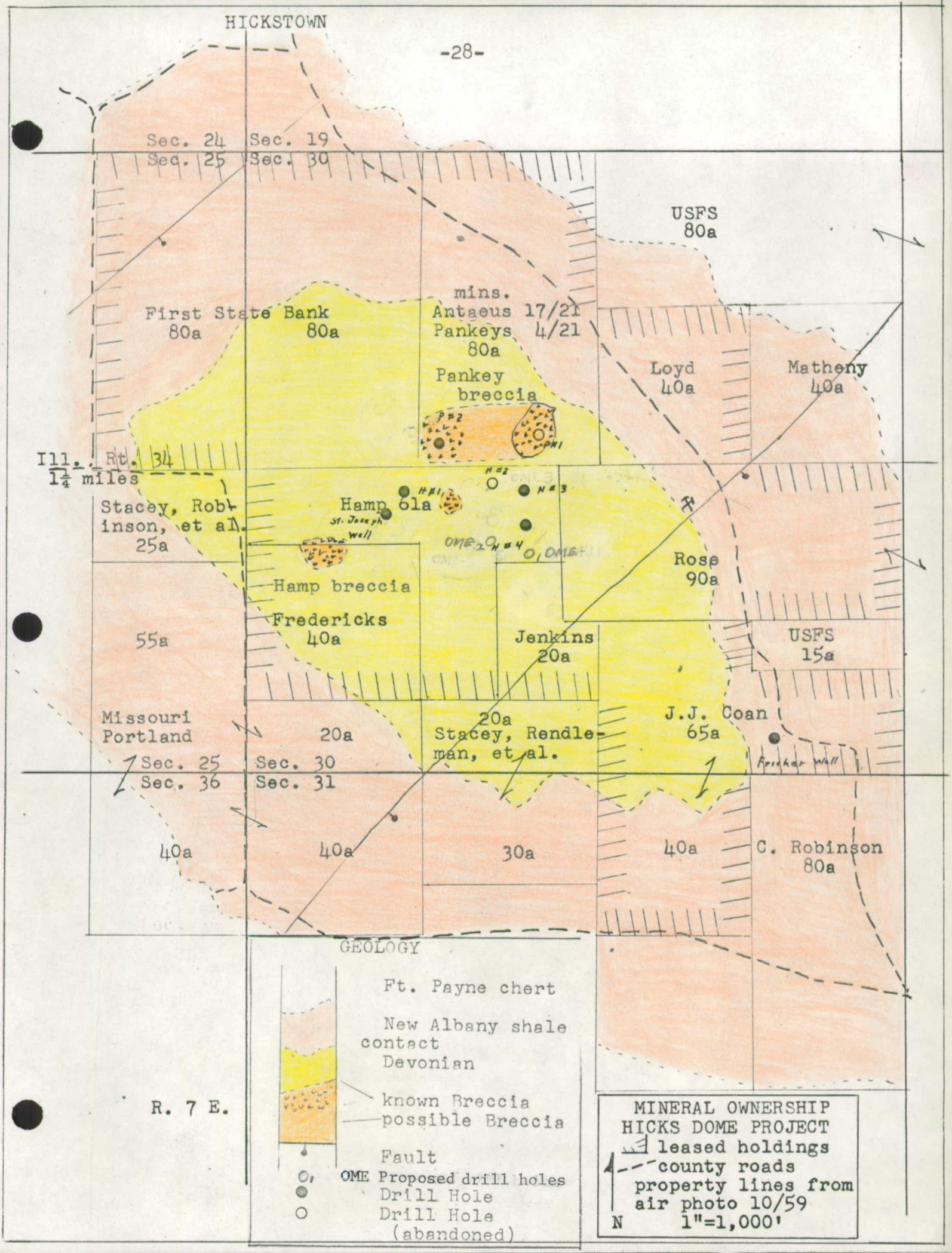

HICKSTOWN
Sec. 24
Sec. 25
Sec. 19
Sec. 30
USFS
80a
First State Bank
80a
80a
mins.
Antaeus 17/21
Pankeys 4/21
80a
proposed
(D)
Loyd
40a
Matheny
40a
Ill. Rt. 34
1¼ miles
access road
Stacey, Robinson, et al.
25a
Hamp 61a
(A)
proposed
(D)
(B)
Rose
90a
55a
Fredericks
40a
Jenkins
20a
USFS
15a
Missouri
Portland
20a
20a
Stacey, Rendleman, et al.
J.J. Coan
65a
Sec. 25
Sec. 36
Sec. 30
Sec. 31
40a
40a
30a
40a
C. Robinson
80a
GEOLOGY
Ft. Payne chert
New Albany shale contact
Devonian
known Breccia
possible Breccia
Fault
Proposed Hole
Drill Hole
Drill Hole (abandoned)
R. 7 E.
MINERAL OWNERSHIP
HICKS DOME PROJECT
leased holdings
county roads
property lines from air photo 10/59
N
1"=1,000'

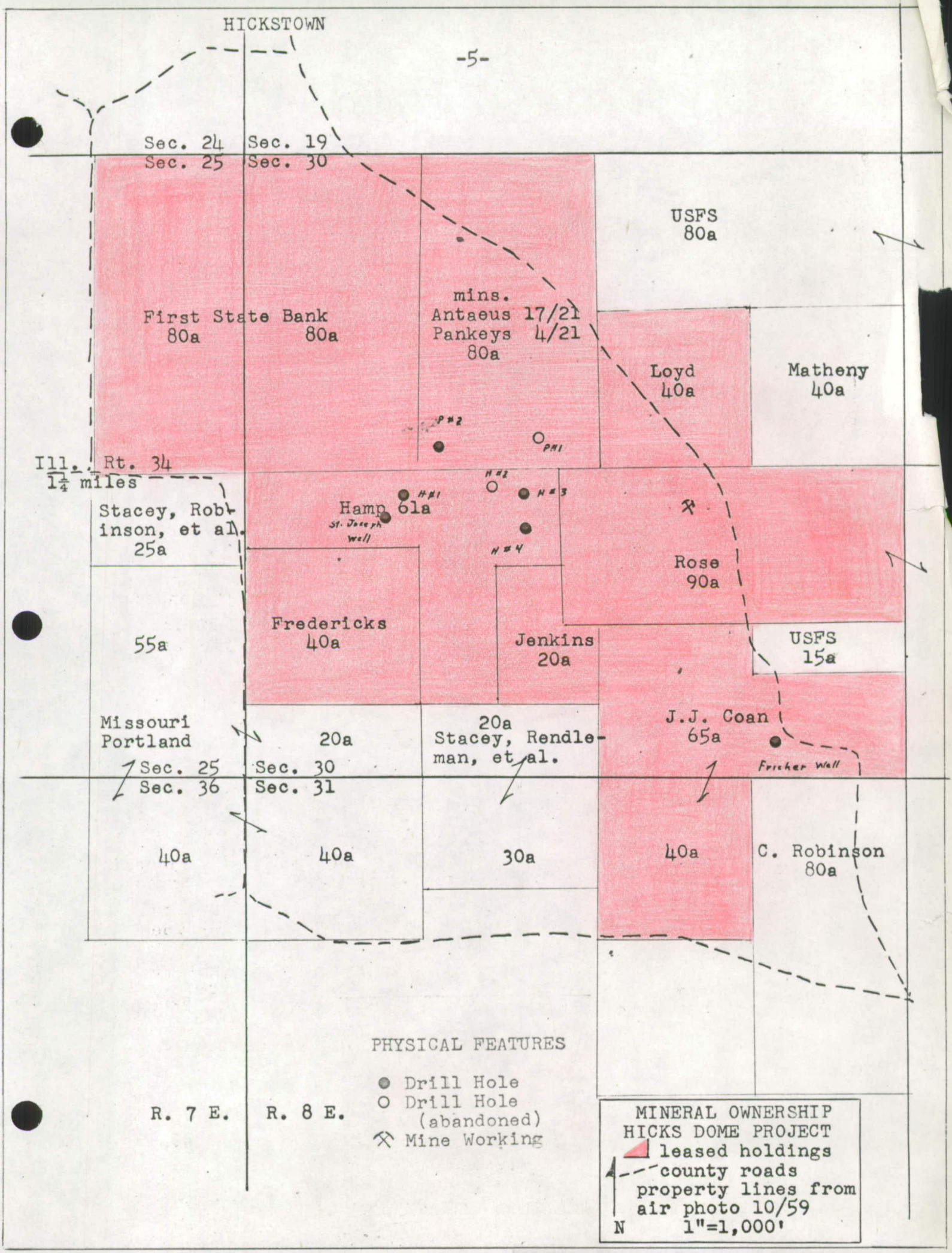

Project Area
Rail Shipping Facilities
PROJECT AREA
Rail & River Shipping Points
LOCATION-ACCESS
HICKS DOME PROJECT
1"=4 miles
Cont. Int.-100'
HAMILTON CO
SALINE CO
WHITE CO
GALLATIN CO
HARDIN CO
CRITTENDEN CO
UNION CO
POSEY CO
ILLINOIS
INDIANA
KENTUCKY
Harrisburg
Eldorado
Raleigh
Eldorado Reservoir
Wasson
Grayson
Brookyn
Ridgeway
Ridgeway (Private)
Harrisburg-Eldorado
Cottage Grove
Equality
Lawler
Junction
Pankeyville
Mitchellsville
Rudement
Somerset
Kedron
Bowlesville
Leamington
Gibsonia
Saline Mines
Shawneetown
Blackburn
Goose Pond
Spring Grove
Grove Center
Henshaw
Gelger Lake
Curlew Lakes
De Koven
Casseyville
Delwood
Harris Store
Hartsville
Hubbards Store
Hicks
Karbers Ridge
Loves Store
Eickorn
Cave in Rock
Numerous small lakes
Elizabethtown
Burgess Flying Service (Private)
Hurricane Island
Rosiclare
Barnett Lake
Carrsville
Golconda
Waltersburg
Tolu
Hoods
Weston
Fords Ferry
Raum
Gowanesville
Shetlerville
Rising Sun
Lusk
Omaha
Cottonwood
New Haven
Texas City
Francis
Long Branch
Tisom
Fishing Lake
Big Lake
Grundy Knob
Wabash Island
Hallmoon Pond
Old Channel
Shawneetown Hills
Wildcat Hills
Cave Hill
Gold Hill
Ohio River
Wabash River
Saline River
Cypress Creek
Little Eagle Cr
Eagle Creek
Rose Creek
Pinhook Creek
Big Creek
Harris Creek
Rock Creek
Honey Creek
Floyd Creek
Peters Creek
Hurricane Creek
Deer Creek
Goeffield Creek
Camp Cr
Cypress
Brier Creek
Pankey
Mud Lake
Pond
Fy



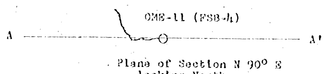
ASSAY-GRAPH
Diamond Drill Hole
HAMP No. 4
1"=20 feet
1"=10% CaF_2


Depth
% CaF_2
5 10 15 20 25
80
90
2000
10
20
30
40
2050
60
70
80
90
2100
10
20
30
40
2150
60
-1500
S.L. Elev.
80
90
2200
10
20
30
(Open)
Sources of Assays
507-510 Frazer
511-526 MacDonald
526-530 Broeman
530-534 MacDonald
% CaF_2 Composite
Skyline Spectro-
graphic Analyses
820, 21.5',
15.2%+1%Be, .07%Nb
1%Y, 3%Fe
821, 18.5'
14.8%+1%Be, .1%Nb
.7%Y, 3%Fe
822, 13.5'
17.3%+1%Be, .15%Nb
1%Y, 3%
823, 9.5'
14.4%1%Be, .15%Nb
.7%Y, 2%Fe
824
(Left out)
824, 24'
22.6 .5%Be, .07%Nb
.5%Y, 2%Fe
825, 19'
8.6%.02Be, .05%Nb
.15%Y, 2%Fe
826, 21'
.02%Be, .07%Nb
7.8% .15%Y, 2%Fe
827, 20'
12.7% .03%Be, .07%Nb
.3%Y, 2%Fe
828, 20'
.05%Be, .05%Nb
13.2%.2%Y, 2%Fe
829, 15.5'
4.8%.005%Be, .01%Nb
.02%Y, 1%Fe
62'
17.1 %
97'- 17.4%
35'
19.3%
214'-11.1%
77'
7.8%
40.5'
12.4%
ASSAY-GRAPH
Diamond Drill Hole
HAMP No. 3
1"=20 feet
1"=10% CaF_2


HICKSTOWN
Sec. 24
Sec. 25
Sec. 19
Sec. 30
USFS
80a
First State Bank
80a
80a
mins.
Antaeus 17/21
Pankeys 4/21
80a
Pankey
breccia
Loyd
40a
Matheny
40a
Ill. Rt. 34
1¼ miles
Stacey, Robinson, et al.
25a
Hamp 61a
St. Joseph well
Hamp breccia
Rose
90a
55a
Fredericks
40a
Jenkins
20a
USFS
15a
Missouri
Portland
20a
20a
Stacey, Rendleman, et al.
J.J. Coan
65a
Sec. 25
Sec. 36
Sec. 30
Sec. 31
40a
40a
30a
40a
C. Robinson
80a
GEOLOGY
Ft. Payne chert
New Albany shale
contact
Devonian
known Breccia
possible Breccia
Fault
OME Proposed drill holes
Drill Hole
Drill Hole
(abandoned)
R. 7 E.
MINERAL OWNERSHIP
HICKS DOME PROJECT
leased holdings
county roads
property lines from
air photo 10/59
N
1"=1,000'


HICKSTOWN
Sec. 24
Sec. 25
Sec. 19
Sec. 30
First State Bank
80a
80a
mins.
Antaeus 17/21
Pankeys 4/21
80a
USFS
80a
Loyd
40a
Matheny
40a
P #2
P #1
Ill. Rt. 34
1¼ miles
Stacey, Robinson, et al.
25a
Hamp 61a
H #1
St. Joseph Well
H #2
H #3
H #4
Rose
90a
55a
Fredericks
40a
Jenkins
20a
USFS
15a
Missouri Portland
20a
20a
Stacey, Rendleman, et al.
J.J. Coan
65a
Fricker Well
Sec. 25
Sec. 36
Sec. 30
Sec. 31
40a
40a
30a
40a
C. Robinson
80a
R. 7 E.
R. 8 E.
PHYSICAL FEATURES
Drill Hole
Drill Hole (abandoned)
Mine Working
MINERAL OWNERSHIP
HICKS DOME PROJECT
leased holdings
county roads
property lines from air photo 10/59
N
1"=1,000'

PLAN



Plane of Section N 90° E
looking North

SECTION

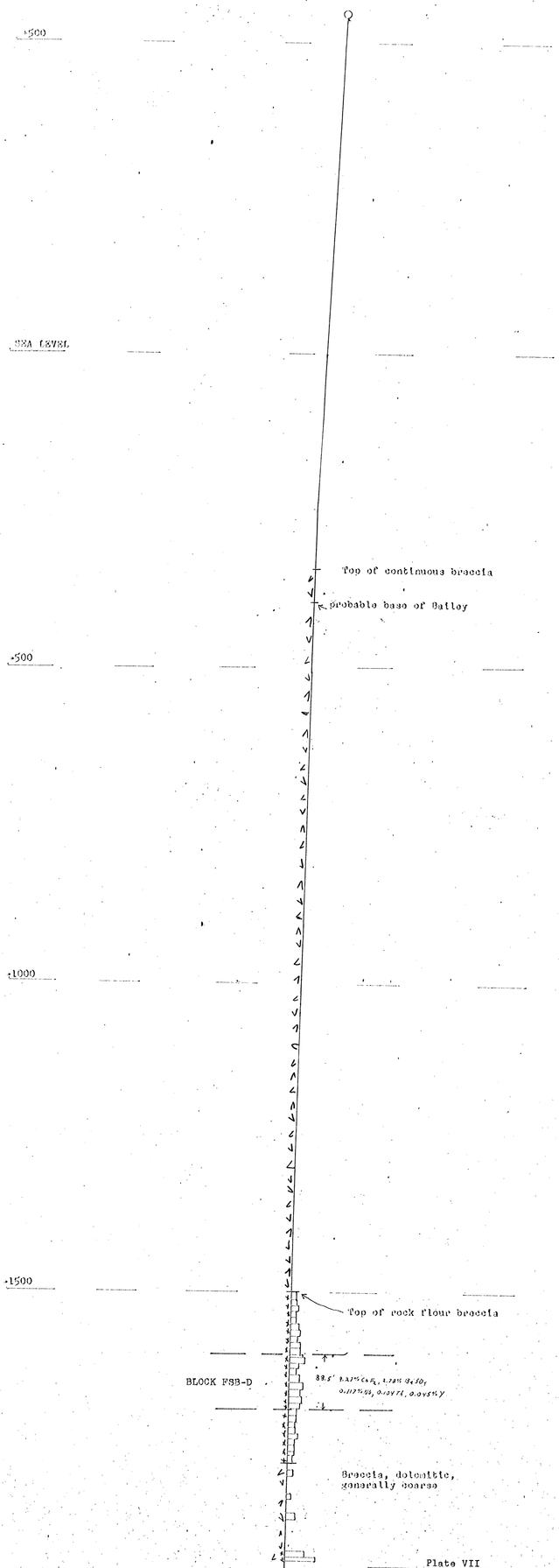


Plate VII

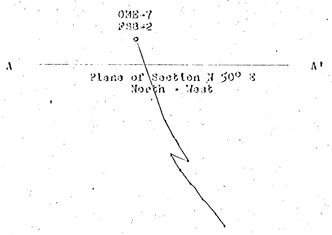
OMS-HDA
PLAN-SECTION
Showing Values in Hole
OMS-11

zone used to
calculate resource

1" = 50% CaF_2

Scale 1" = 100'

PLAN



SECTION

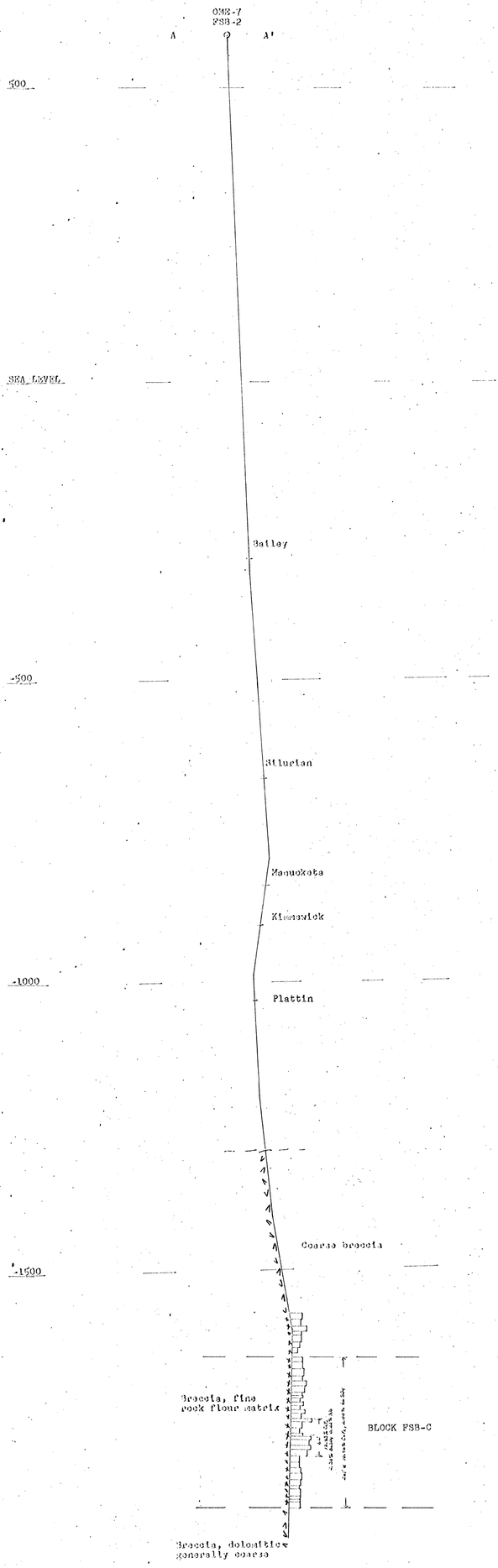


Plate VI

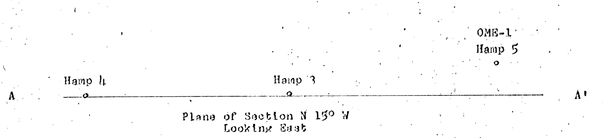
OMS-HOA
PLAN-SECTION
Showing Values in Holes
OMS-7

zone used to
calculate resource

1" = 50% CaF2

Scale 1" = 100'

PLAN



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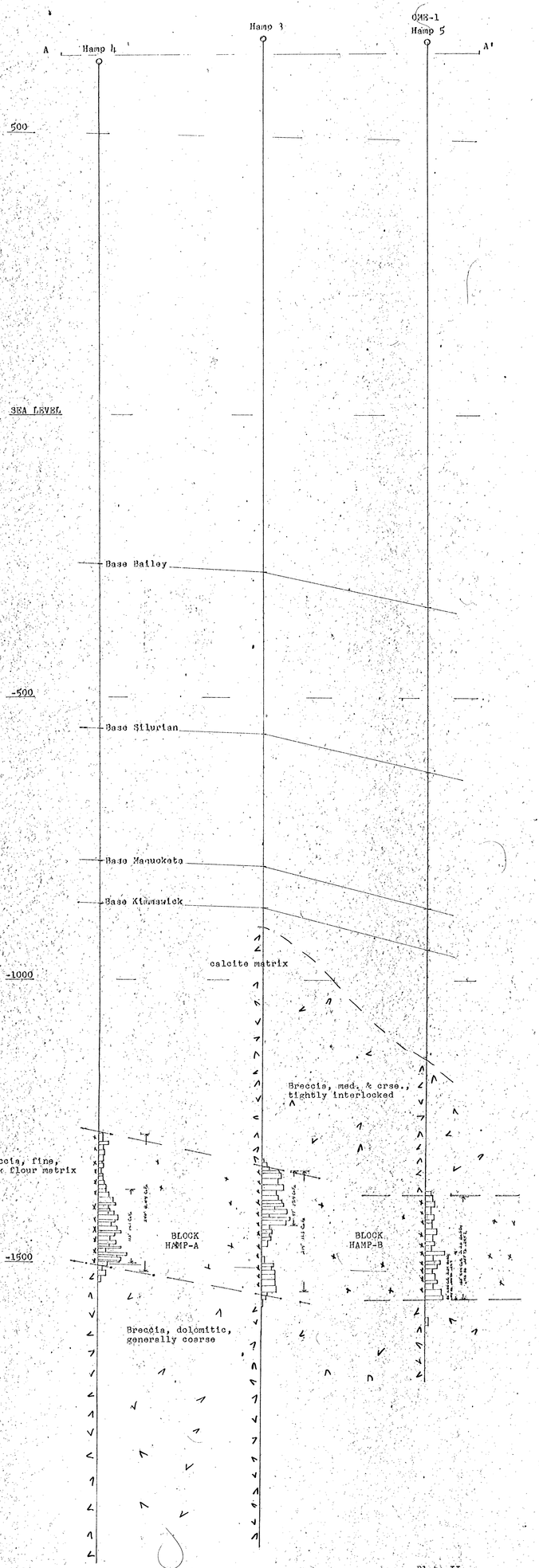


Plate II

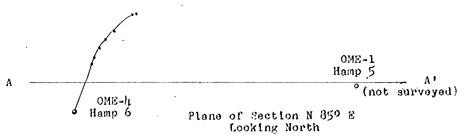
OMB-HDA
PLAN-SECTION
Showing Values In Holes
Hamp 3, Hamp 4, OMB-6

zone used to calculate resources

1" = 50% CaF_2

Scale 1" = 100'

PLAN



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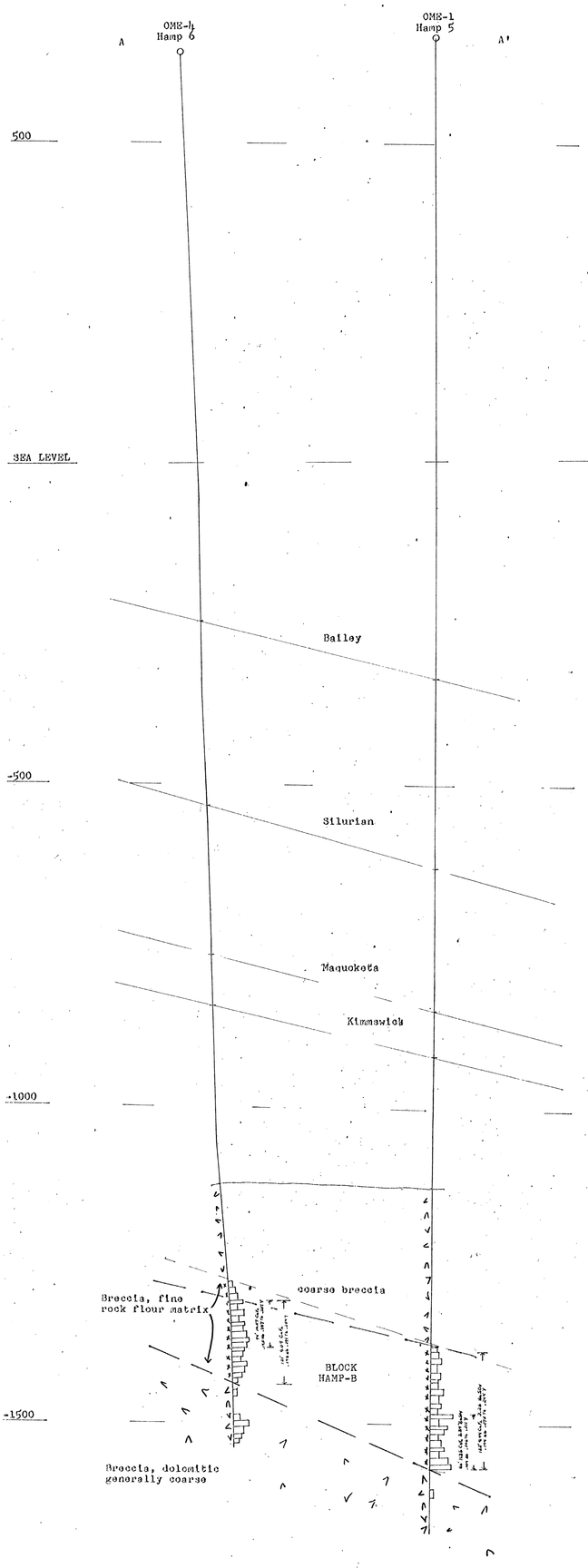


Plate IV

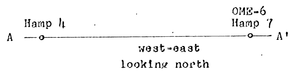
OME-HDA
PLAN-SECTION
Showing Values In Holes
OME-4, OME-1

zone used to
calculate resource

1" = 50% CaF_2

Scale 1" = 100'

PLAN



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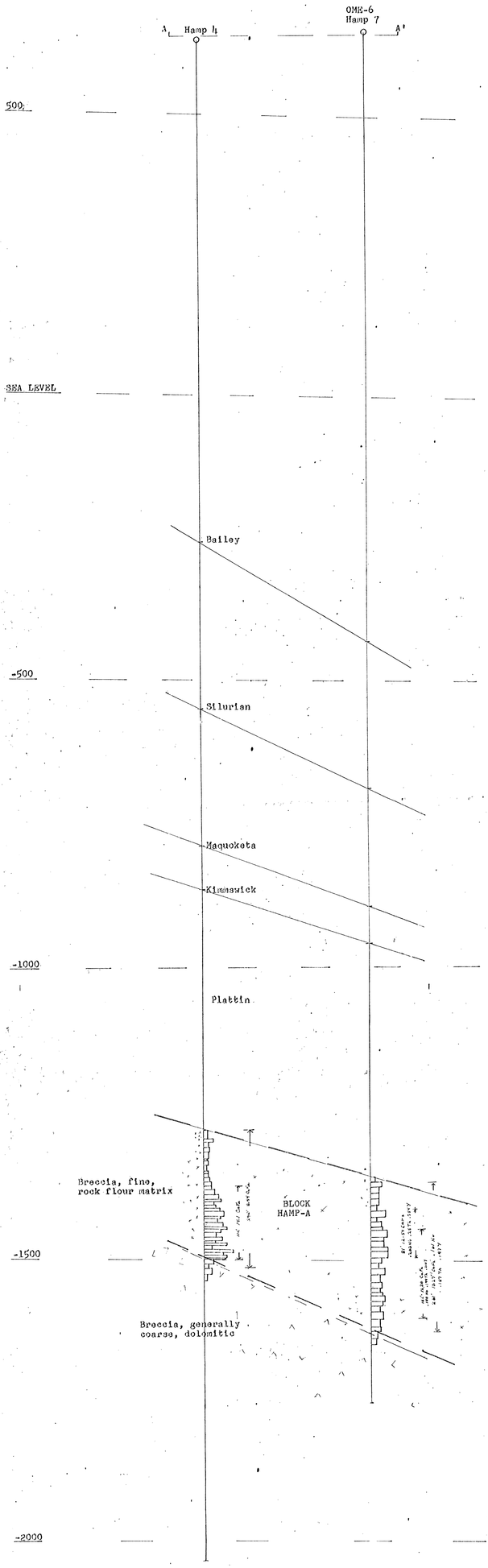


Plate III

OME-HDA
PLAN-SECTION
Showing Values in Holes
Hamp 4, OME-6

zone used to
calculate resource

1" = 50% CaF_2

Scale 1" = 100'

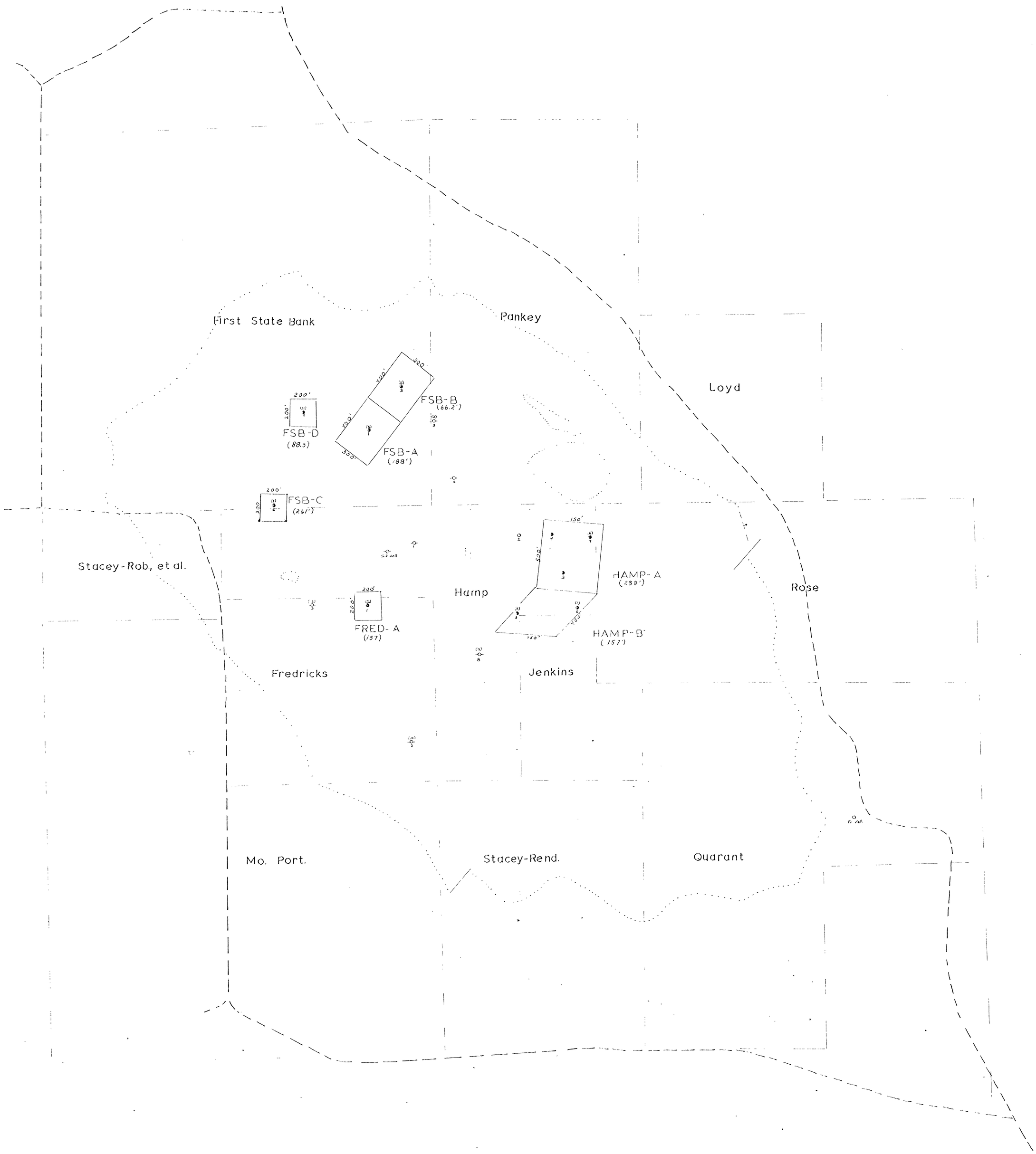
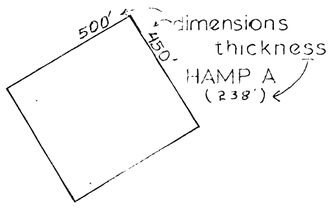


PLATE I

Resource Blocks



SUMMARY OF TONNAGE AND AVERAGE GRADE

BLOCK	TONS	% CaF_2	% $BaSO_4$	% Nb	% Th	% Y
based on or influenced by more than one hole						
Hamp A	4,462,500	9.90	NA	.159	.239	.193
Hamp B	2,649,375	9.36	3.26	.159	.239	.193
FSB-A	1,880,000	15.30	5.36	.119	.147	.157
FSB-B	662,000	22.22	2.89	.250	.180	.176
based on one hole						
FSB-C	870,000	10.67	2.00	.149	.144	.114
FSB-D	295,000	9.27	2.78	.117	.104	.045
Fred-A	523,333	10.33	3.57	.133	.232	.214
TOTAL	11,342,208	11.45	3.64[1]	.155	.209	.177

1. Block Hamp A not included in weighted average

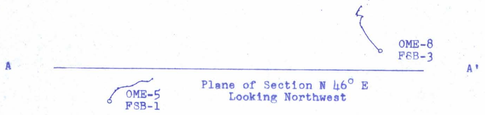
HICKS DOME ACCT - OME
DIAMOND DRILL HOLES

- • significant mineralization
- ◇ "show" hole
- ✧ barren
- (1) OME hole number
- 5 property hole number
- — — property line
- —— road
- breccia outcrop
- base, New Albany shale

N 1" = 400'

Map based on air photo
Dated 10-28-71

PLAN



SECTION

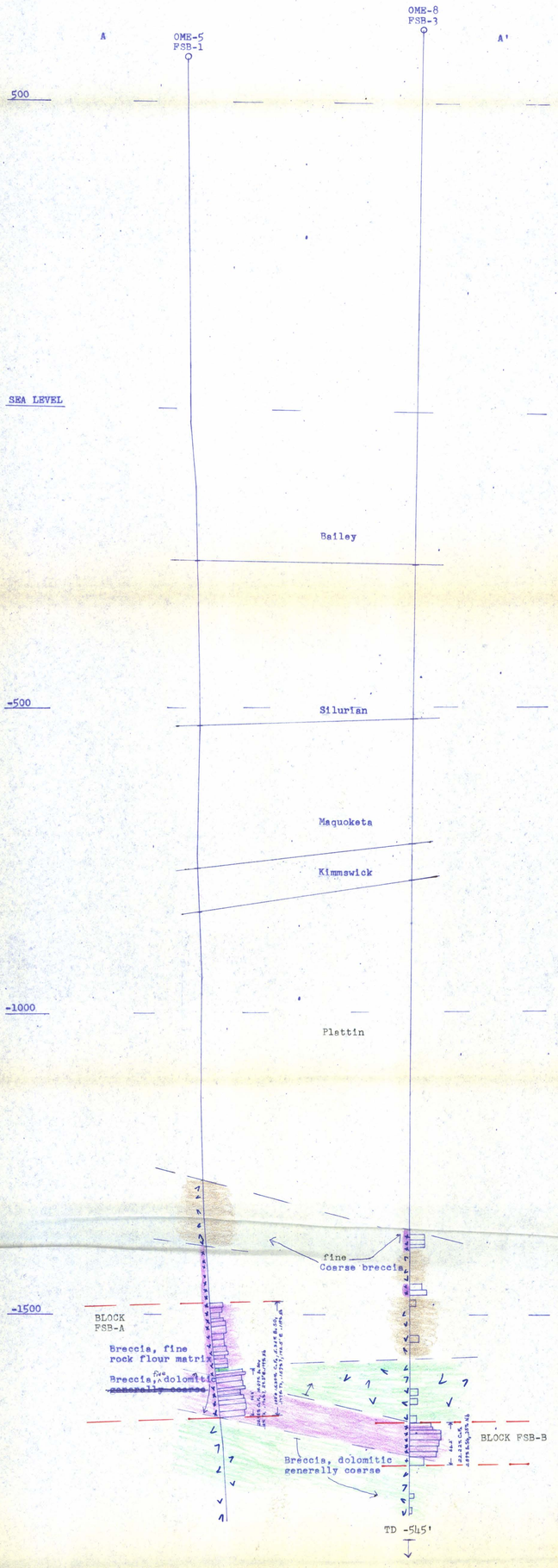


Plate V

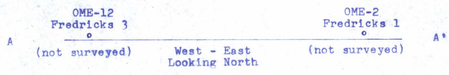
OME-HDA
PLAN-SECTION
Showing Values In Holes
OME-5, OME-8

zone used to
calculate resource

1" = 50% CaF_2

Scale 1" = 100'

PLAN



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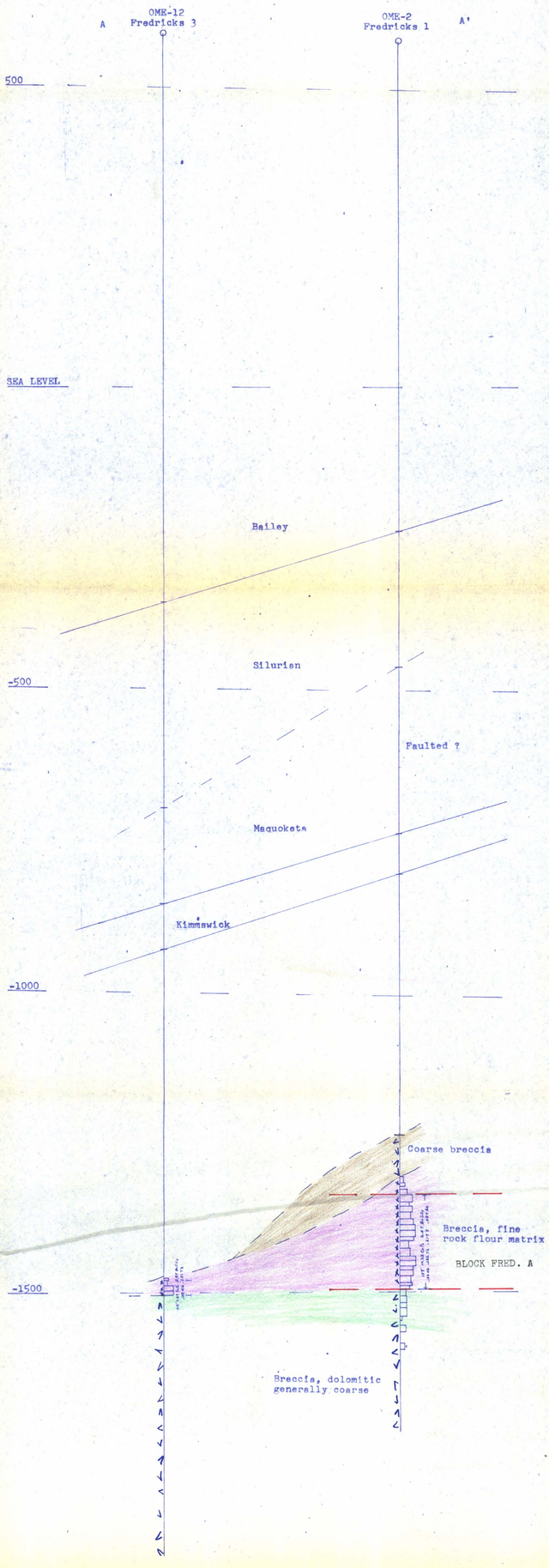

Plate VIII

OME-HDA
PLAN-SECTION
Showing Values In Holes
OME-12, OME-2

zone used to
calculate resource

1" = 50% CaF_2

Scale 1" = 100'