CONTACT INFORMATION
Mining Records Curator
Arizona Geological Survey
416 W. Congress St., Suite 100
Tucson, Arizona 85701
602-771-1601
http://www.azgs.az.gov
inquiries@azgs.az.gov

F.X.C. Copy

HAZEN RESEARCH, INC.

4601 INDIANA STREET
GOLDEN, COLORADO • 80401
TELEPHONE 303/279-4501

HRI Project 1237
Copy No. 1

PRODUCTION OF METALLURGICAL GRADE FLUORSPAR CONCENTRATE

F.X.C. Copy

for

Nuclear Dynamics, Inc.
P.O. Box 20766
Phoenix, Arizona 85036

October 12, 1972

Prepared by:

Ralph Meyertons
Senior Research Engineer

Approved by:

F. M. Stephens, Jr.
Vice President

HAZEN RESEARCH, INC.

4601 INDIANA STREET
GOLDEN, COLORADO • 80401
TELEPHONE 303/279-4501

October 13, 1972

Mr. Francis X. Cannaday
Nuclear Dynamics, Inc.
P.O. Box 20766
Phoenix, Arizona 85036

Re: HRI Project 1237

Dear Mr. Cannaday:

Enclosed please find four copies of our report entitled "Production of Metallurgical Grade Fluorspar Concentrate."

Yours very truly,

Ralph P. Meyertons
Senior Research Engineer

RPM:mhg

Encls.

HAZEN RESEARCH, INC.

4601 INDIANA STREET
GOLDEN, COLORADO • 80401
TELEPHONE 303/279-4501

October 16, 1972

Mr. Francis X. Cannaday
Nuclear Dynamics, Inc.
P.O. Box 20766
Phoenix, Arizona 85036

Re: HRI Project 1237

Dear Mr. Cannaday:

In our report entitled, "Production of Metallurgical Grade Fluorspar Concentrate," dated October 12, 1972, a line was inadvertently omitted in the Introduction and Summary. Corrected pages are enclosed. Would you please insert these in the proper place in the reports and destroy the replaced pages?

I am taking the liberty to do this since both Mr. Meyertons and Mr. Stephens are out of the office today.

Yours very truly,

A W Lankenau

A. W. Lankenau
Vice President

AWL:mp

Enclosure

INTRODUCTION AND SUMMARY

Mr. Francis X. Cannaday of Nuclear Dynamics, Inc. authorized Hazen Research, Inc. to investigate the production of a metallurgical grade fluorspar concentrate as part of an evaluation of a fluorspar prospect.

A 200-pound sample of five to six-inch rock from the mine was supplied for the test work. This material was crushed to minus 1/2-inch, samples, analyzed, and found to contain 86.7% CaF_2 and 10.0% SiO_2.

Static batch heavy liquid sink-float tests were performed on the plus 65-mesh fraction of crushed ore. The results of this test indicate the limits of separation possible by crushing to minus 1/2-inch. In this test fluorspar recovery of 87.5% (based on whole ore) was obtained in a concentrate analyzing 94.5% CaF_2, or 84.0% effective CaF_2. Recrushing the float product to minus 14-mesh increased recovery to 90.3% at 83.9% effective CaF_2.

Batch laboratory and pilot plant heavy media tests were conducted to determine the practical separations possible under the dynamic conditions imposed by plant processing equipment. Without recrushing, high recoveries were obtained into metallurgical grade concentrates. A recovery of 90.8% of the fluorspar was achieved into concentrate analyzing 75.3% effective CaF_2 at 2.7 specific gravity, while 80.0% recovery was obtained at 79.0% effective CaF_2 at 2.8 specific gravity.

HEAVY LIQUID SINK-FLOAT SEPARATION

Ore crushed to minus 1/2-inch size was concentrated with tetrabromethane at specific gravity 3.0 to determine the degree of separation theoretically possible between fluorspar and silica. The ore was screened at 65-mesh and 14-mesh, and the two coarser size fractions concentrated as shown in the flowsheet of Figure 1. Products from the sink-float separations were analyzed for fluorspar and silica, from which the metallurgical balance (Table 1) was calculated.

The data indicate that sufficient liberation was obtained by simple crushing to permit recovery of 87.5% of the fluorspar into a product which analyzed 94.5% CaF_2, or 84.0% effective CaF_2. Recrushing the plus 14-mesh float to minus 14-mesh and reconcentrating this material resulted in an increase of recovery to 90.3% at 83.9% effective CaF_2.

HEAVY LIQUID SINK-FLOAT CONCENTRATION TEST
TEST 1A

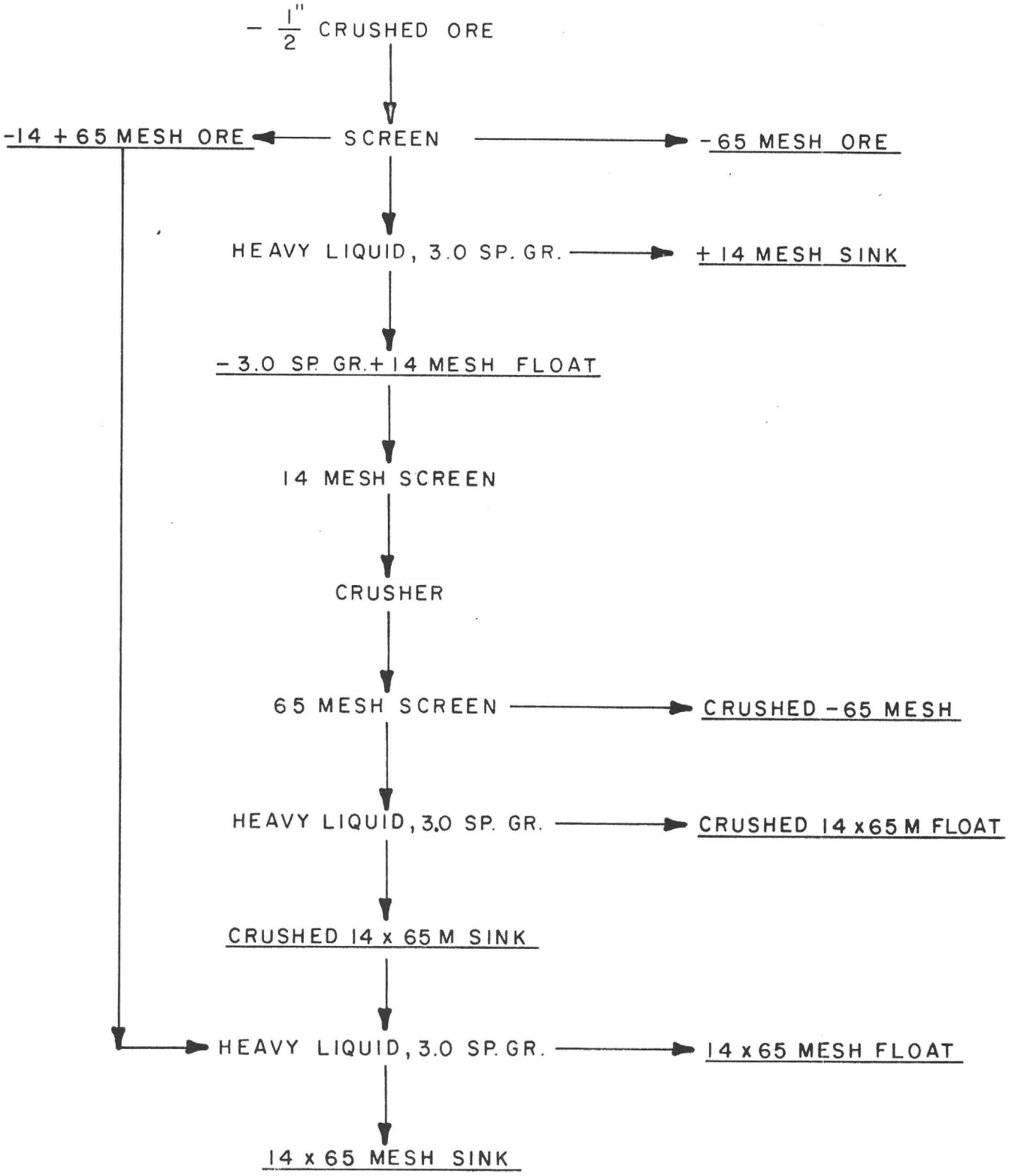


FIGURE 1

Table 1

Heavy Liquid Concentration of Fluorspar Ore
(Test 1A)

Objective: Demonstrate liberation of fluorspar from gangue and determine separations theoretically possible.

Sample: Minus 1/2-inch HRI-4974, fluorspar ore.

Metallurgical Data

Product	% Weight	Analysis, % CaF_2	Analysis, % SiO_2	Analysis, % Effective CaF_2	% Distribution CaF_2	% Distribution SiO_2
Crushed 14 x 65 M float	4.45	14.7	81.2		0.7	38.2
Crushed 14 x 65 M sink	2.70	91.0	3.16	83.1	2.8	0.9
Crushed -65 mesh	2.29	52.2	41.0		1.3	10.0
Calculated 1/2" x 14 M float	9.44	45.6	49.1		4.8	49.1
Minus 1/2" x 14 M sink	68.36	94.1	4.7	82.4	72.5	34.0
14 x 65 Float	2.69	61.2	36.1		1.9	10.3
14 x 65 Sink	13.84	96.3	1.8	91.8	15.0	2.6
Calculated 14 x 65 M ore	16.53	90.6	7.4		16.9	12.9
Minus 65-mesh ore	5.67	90.6	6.61		5.8	4.0
Calculated minus 14-mesh ore	22.20	90.6	7.2		22.7	16.9
Calculated heads	100.00	88.7	9.4		100.0	100.0
Analyzed heads		86.7	10.0			
Total sink products		94.4	4.2	83.9	90.3	37.6
Minus 1/2"+14-mesh sink plus 14 x 65-mesh sink	82.20	94.5	4.2	84.0	87.5	36.6

HEAVY MEDIA CONCENTRATION

Separations in heavy media plants are less precise than the theoretical separations indicated by heavy liquid sink-float tests. Laboratory bucket tests with magnetite-ferrosilicon media were performed to determine the separation possible at several specific gravities, simulating drum concentrator separation of the 1/2" x 6-mesh size fraction. Batch heavy media tests were performed on the 6 x 65-mesh size fraction in a pilot plant D3B Krebs hydrocyclone circuit, thus initiating the cyclone heavy media concentration process. The procedure used is indicated by the flowsheet shown in Figure 2. "Residue" indicates the material remaining in the pump and pipelines at the conclusion of the test run. The metallurgical balance calculated for the overall process is shown in Table 2. Over 90% recovery was obtained in a metallurgical grade concentrate assaying 75.3% effective CaF_2 at 2.7 specific gravity in the bucket test, while only 80% recovery at 79.0% effective CaF_2 was obtained at 2.8 specific gravity. Essentially no recovery difference occurred in cyclone concentration of the 6 x 65-mesh fraction between 2.8 and 3.0 specific gravity, as shown by the data presented in Table 3.

HEAVY MEDIA CONCENTRATION

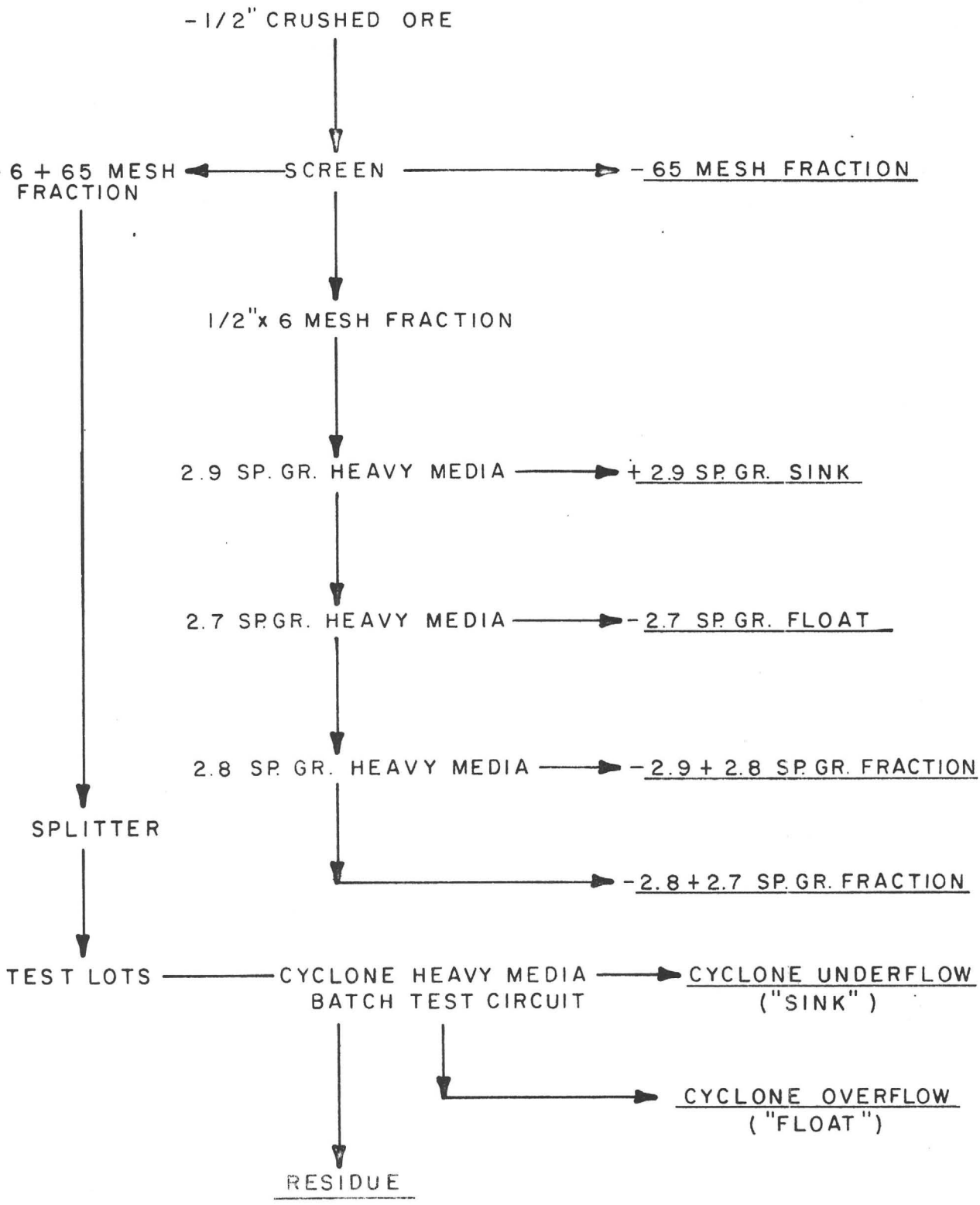


FIGURE 2

lbs out
of 100

6.2

11.2
5.3
22.7

Table 2

Heavy Media Concentration of Fluorspar Ore

Unit Operation Product	% Weight		Analysis, %			% Distribution	
	Stage	Overall	CaF_2	SiO_2	Effective CaF_2	CaF_2 Stage	CaF_2 Overall
Screen Sizing							
+6 Mesh		62.9	86.6	10.8	59.6		62.00
-6 + 65 Mesh		30.9	90.8	7.0	73.3		31.97
-65 Mesh		6.2	85.9	7.0	68.4		6.03
Calculated feed		100.0	87.9	9.4	64.4		100.00
Analyzed feed			86.7	10.0	61.7		
Heavy Media,-1/2" x 6 Size							
+2.9 sp gr	37.3	23.5	95.1	4.6	83.6	40.96	25.4
-2.9 + 2.8 sp gr	36.3	22.9	89.0	6.7	72.3	37.31	23.1
-2.8 + 2.7 sp gr	17.8	11.2	84.4	13.2	51.4	17.35	10.8
-2.7 sp gr	8.5	5.3	44.6	50.8		4.38	2.7
Calculated +6 Mesh	100.0	62.9	86.6	10.8	59.6	100.00	62.0
Cumulative + 2.8 sp gr	73.6	46.4	92.1	5.6	78.1	78.27	48.5
Cumulative + 2.7 sp gr	91.4	57.6	90.6	7.2	72.8	95.62	59.3
Cyclone-Heavy Media							
6 x 65 Mesh size							
+3.0 sp gr Sink	96.1	29.7	93.1	5.0	80.6	98.5	31.5
-3.0 sp gr Float	3.9	1.2	35.3	56.6		1.5	0.5
Calculated 6 x 65 Mesh	100.0	30.9	90.8	7.0	73.3	100.0	32.0
Analyzed 6 x 65 Mesh			90.2	7.3			
Total Concentrate							
+6 Mesh, +2.8 sp gr) 6 x 65 Mesh, +3.0 sp gr)		76.1	92.5	5.4	79.0		80.0
+6 Mesh, +2.7 sp gr) 6 x 65 Mesh, +3.0 sp gr)		87.3	91.5	6.5	75.3		90.8

Table 3

Cyclone Heavy Media Concentration

Feed: -6 + 65-mesh crushed ore.

Metallurgical Data

Cyclone Separation at 2.8 specific gravity

Product	% Weight		Analysis, %			% Distribution, CaF_2	
	Stage 1	Stage 2	CaF_2	SiO_2	Effective CaF_2	Stage 1	Stage 2
+2.8 sp gr Sink	97.7	92.3	90.6	5.8	76.1	98.4	93.7
-2.8 sp gr Float	2.3	2.2	59.8	28.0		1.6	1.5
Calculated total	100.0	94.5	89.9	6.3	74.2	100.0	95.2
Residue		5.5	78.5	15.2			4.8
Calculated -6 + 65-mesh		100.0	89.3	6.8	72.3		100.0
Analyzed -6 + 65-mesh			90.2	7.3	72.0		

Cyclone Separation at 3.0 specific gravity

+3.0 sp gr Sink	96.1	78.0	93.1	5.0	80.6	98.5	81.7
-3.0 sp gr Float	3.9	3.2	35.3	56.6		1.5	1.3
Calculated total	100.0	81.2	90.8	7.0	73.3	100.0	83.0
Residue		18.8	80.5	12.4			17.0
Calculated -6 + 65-mesh		100.0	88.9	8.0	68.9		100.0
Analyzed -6 + 65-mesh			90.2	7.3	72.0		

STATEMENT

CAL-BREA

Geological Services

P. O. Box 254
Brea, California 92621
(714) 528 - 6388

Order #

CB #72090

Rec'd 7-25-72
Ship'd 7-3-72

Date October 22, 1972

To Nuclear Dynamics Inc.

Address 2872 Sky Harbor Blvd.

City Phoenix, Arizona 85036

Ref: F. X. Cannaday

No.		Description	Each	Amount
8		2" x 3" thin sections	$7.00	$56.00
	6	Impregnated	.50	3.00
				$59.00
		RUSH add 50%		29.50
				$88.50
		Postage		9.33
		Total		$97.83
		Thank you for your order.		
		J. R. Souther		

Leon Lennon

Roosevelt Lake Resort

1-467-2276

527-3607

4501 Devon Ave Roosevelt, Okla 73568 Sale 601

Wink, Texas

Cross Roads Motel

Carrizozo

505-648-2363

Just before.

Mile post 288

WRITE IT

VERBAL ORDERS "DON'T GO"

Date July 17, 1972

Mr. FXC

Hawley & Hawley have received fluorspar samples and results as follows: THEIR WRITTEN REPORT WILL BE SENT TO US THIS AFTERNOON.

	CaF2	SiO2
J-1	90.59	8.39
J-2	84.40	14.70
J-3	86.92	11.55

J-1 $90.59 - 2.5 \times \overset{20.9}{8.39} = 69.69$ % eff.

J-2 $84.40 - 2.5 \times \overset{30.68}{14.70} = 53.72$ % eff.

J-3 $86.92 - 2.5 \times \overset{29.0}{11.55} = 57.92$ % eff.

Signed dmh

Form No. 2740

1435 S. 10th AVE.
P. O. BOX 1889

DUPLICATE

Jacobs Assay Office

Registered Assayers

PHONE 622-0813

Certificate No. 58981

TUCSON, ARIZONA 85702 July 13th 1973

Sample Submitted by Mr. Nuclear Dynamics - Mr. F.X. Connolly - Phx. Ariz

SAMPLE MARKED	GOLD Ozs. per ton ore	GOLD Value per ton ore *	SILVER Ozs. per ton ore	COPPER Per cent Wet Assay	LEAD Per cent Wet Assay	~~CaF~~ Per cent Wet Assay	~~SiO~~ Per cent Wet Assay
		$					
J-4						88.05	10.75
J-5						89.00	9.15
J-6						88.75	9.30
			88.05				
	10.75 X	2.5 =	27.00				
			61.05	% eff.			
	~~9.15 X~~	~~2.5~~ =					
	9.15 X	2.5 =	22.7	89.00 -	22.7	= 66.30	% eff
	9.30 x	2.5 =	23.2	88.75 -	23.2	= 65.55	% eff

REGISTERED ASSAYER
CERTIFICATE EXPIRES
1041
BENJAMIN P.
JACOBS
Dec. 31, 19 72
Arizona U.S.A.

* Gold Figured $35.00 per oz. Troy

Charges $ 36.00

Very respectfully,

Ben P. Jacobs

3226 East 46th Street

Phone 624-0049

AMERICAN ANALYTICAL and RESEARCH LABORATORIES

ASSAYERS - CHEMISTS - METALLURGISTS

TUCSON, ARIZONA 85713

SAMPLE SUBMITTED BY Nuclear Dynamics, Inc.

DATE July 14, 1972

SAMPLE MARKED	GOLD OZ / TON	SILVER OZ / TON	PER CENT COPPER	PERCENT LEAD	PERCENT ZINC	PERCENT SiO_2	PERCENT IRON	Percent CaF_2
J-7						2.16		85.93
J-8						0.28		85.68
J-9						0.31		86.10

REGISTERED ASSAYER SOUTHWEST ASSAYERS 7/14/72 Tucson Arizona U. S. A.

Invoice # 7874
26.25

670.4 Yell. flag E

670.7 spar in gulch

670.85 spar - Cut in vein

0.93 Spar. Cut in vein

671.03 Spar Cut in vein

671.17 Spar Cut in vein

(1) 4'

(2) 5' - 1½' 300'

(3) silic. only 2' wide

(4) sacks

(5) sacks 700' 4½'

300'?

N.

2

1

Junior Hirschowitz

684-5688

Dozer - Wickenburg.

5 gal.

Flagging

Drill site map.

Benton

Field jacket

R.E. Billingsley

684-2340

Call from Frank Stevens
Friday Sept. 15 '72

McFadden Fluorspar.

Heavy liquid 3 Fractions

	sink	
$-\frac{1}{2}$ + 14	97% CaF_2	73% of total CaF_2 in heads.
-14 +65	95.5% CaF_2	14.6% of total
-65	90.6%	5% of total CaF_2

Avg. 96.7%
Rec. 90.5
88.5 % Eff

REPLY

September 5, 1972

Mr. Frank Stevens
Hazen Research, Inc.
401 Indiana Street
Golden, Colorado

Dear Mr. Stevens:

Enclosed is the signed agreement on the fluorspar tests.

Sincerely,

Francis X. Cannaday

Francis X. Cannaday
Manager, Base and Precious Metals

FXC:bd

Enc.

The bucket tests on the coarser material will be with heavy liquids with a magnetite ferrosilicon repeat test on at least one size for check.

The cyclone test will be with magnetite ferrosilicon heavy media.

JJSC.

Notes:

I talked with T. Stevens today Sep 5 '72.

The cost will be kept under $700. trying for $500.

The results will be available within 2 weeks

The report will come later.

(over)

HAZEN RESEARCH, INC.

4601 INDIANA STREET
GOLDEN, COLORADO • 80401
TELEPHONE 303/279-4501

August 30, 1972

Mr. Francis X. Cannaday
Manager, Base and Precious Metals
Nuclear Dynamics, Inc.
P. O. Box 20766
Phoenix, Arizona 85036

Dear Mr. Cannaday:

A Professional Services Agreement is attached which covers the metallurgical testing to be performed on your fluorspar ore sample. If this agreement is satisfactory, please execute and return one copy for our files.

I will be performing the work under Mr. Stephens' direction, and you may inquire directly concerning the project in Mr. Stephens' absence.

Sincerely yours,

Ralph Meyertons
Senior Research Engineer

RM/cm
Encl.

NDI copy

PROFESSIONAL SERVICES AGREEMENT

This Agreement, dated the 30th day of August, 1972, between Hazen Research, Inc., a Colorado corporation, 4601 Indiana Street, Golden, Colorado, hereinafter called "Hazen Research," and Nuclear Dynamics, Inc., 2871 Sky Harbor Blvd., Phoenix, Arizona, 85036, hereinafter called "Nuclear Dynamics".

WITNESSETH:

WHEREAS, Hazen Research is willing and able to render services for performance of the work as hereinafter described, and

WHEREAS, Nuclear Dynamics desires to obtain said professional services for said work.

NOW THEREFORE, in consideration of the covenants and obligations hereinafter set forth, the parties agree as follows:

ARTICLE I
SCOPE OF WORK

The work to be performed by Hazen Research under the terms of this agreement consists of metallurgical testing of fluorspar ore.

ARTICLE II
COMPENSATION

Part A:

(1) Charges for services by Hazen Research shall be calculated at labor cost (defined as base pay plus 26% for payroll burden and fringe benefits) plus 100% of this labor cost for hours worked on this project.

(2) Records of hours charged to the project will be kept for each employee and will be available to Nuclear Dynamics upon request.

(3) A statement of charges shall be submitted on a monthly basis. Such statements shall be paid by Nuclear Dynamics within fifteen days after receipt of same.

Part B:

Direct out-of-pocket cost for materials and services obtained external to Hazen Research for this project shall be billed to Nuclear Dynamics at direct cost plus 10%. These costs include such items as:

(1) Long distance calls and telegrams.

(2) Analytical work, reproduction costs and the like when done by others at Hazen Research's order.

(3) Specialized equipment or supplies purchased specifically for this work and at the direction of Nuclear Dynamics.

Should Nuclear Dynamics fail to request delivery of the equipment referred to in Paragraph (3) above within sixty days following termination of this agreement, the same shall become the property of Hazen Research to be disposed of as it desires.

Part C:

Charges by Hazen Research for the work are estimated at $700.00. Should it appear that such amount shall be exceeded, Hazen Research shall notify Nuclear Dynamics in writing in advance, and if Nuclear Dynamics then instructs Hazen Research in writing not to exceed the estimate, Hazen Research shall curtail or otherwise plan the work so that the estimate is not exceeded.

ARTICLE III
TIME

It is anticipated that the program covered by this agreement will require two months for completion.

ARTICLE IV
REPORTS

Hazen Research agrees to prepare a report describing the procedures and results upon completion of the work.

ARTICLE V
NONDISCLOSURE

Hazen Research shall use its best efforts to prevent the disclosure of any information relative to the project to others than Nuclear Dynamics, unless specifically instructed otherwise in writing by Nuclear Dynamics, and represents that it has entered into employment agreements with all employees requiring them not to disclose any such information.

ARTICLE VI
ADVERTISING AND PUBLICITY

Nuclear Dynamics shall not use the name of Hazen Research or of any of its employees in any advertising, publicity or selling material without the prior written approval of Hazen Research.

ARTICLE VII
TERMINATION

Nuclear Dynamics reserves the right to terminate this agreement at any time, but agrees to advise Hazen Research in writing of its intent to terminate fifteen days before the date of termination, with the understanding that Nuclear Dynamics shall pay any charges due Hazen Research up to and including the effective date of termination. In the absence of such notice, this agreement shall automatically terminate on October 31, 1972.

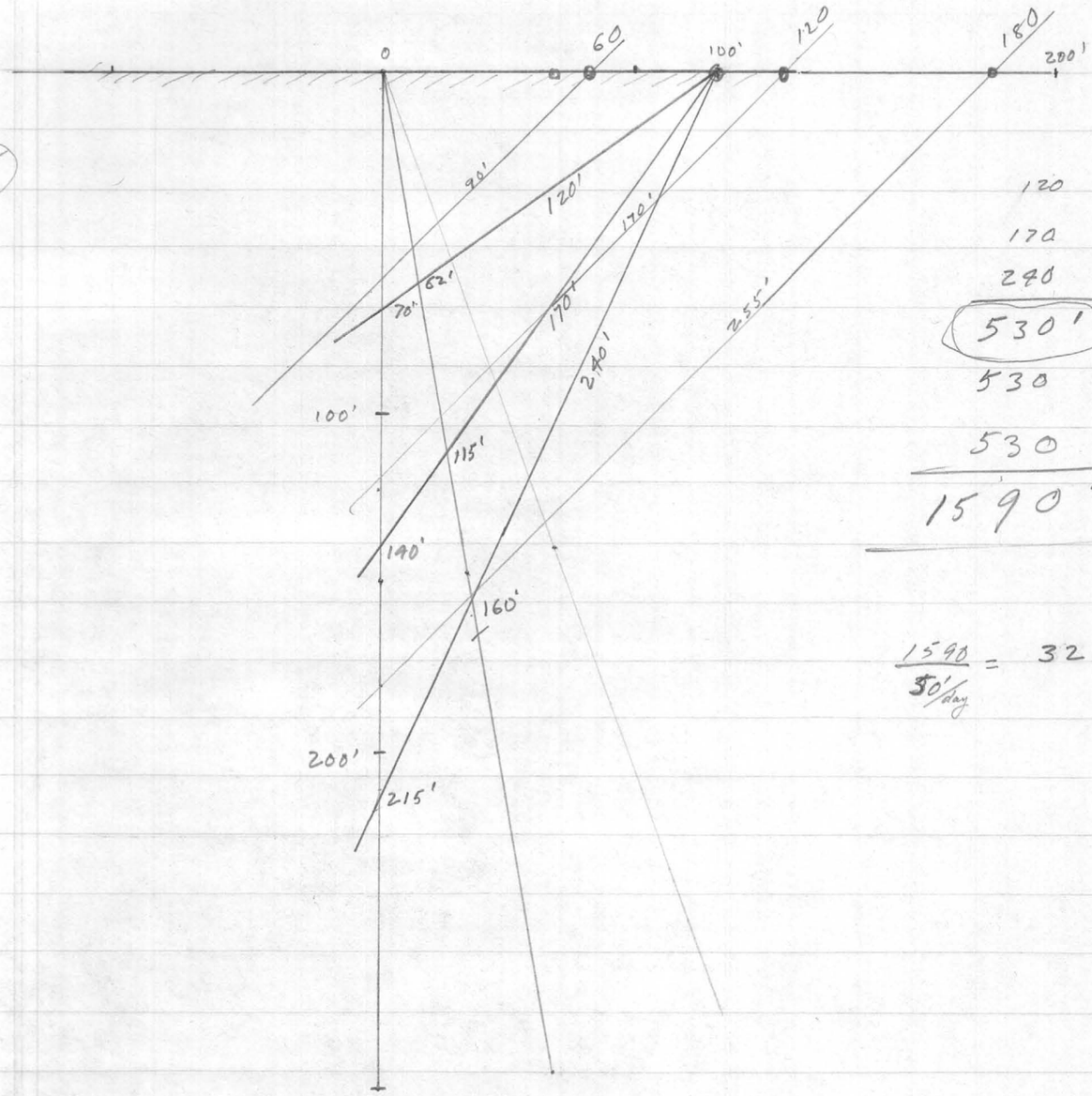
HAZEN RESEARCH, INC.

By Wayne C. Hazen
Wayne C. Hazen, President

NUCLEAR DYNAMICS, INC.

By Sidney S. Batty

515



120
170
240
530'
530
530
1590'

$\frac{1590}{50'/day} = 32$ days

10 cu ft / ton = 283.16 liters / 907 kg.

$\frac{907}{283} = 3.21$ sp. gr.

~~3.5 x~~ Fluorite sp gr = 3.18

---

heads

$\frac{3.5' \times 1000'}{10.5} = 323$ sh. tons / ft. of depth on a 1000' long shoot

Concentrate 70% recovery.

$323 \times 0.70 = 226.1$ sht tons (concentrate) / ft. of depth

100' 22,600

200' 45,200

2000' shoot or equiv. 200' deep. 90,400 tons

.3 (5280) = 1580'

.15 (5280) = 790'

.08 ( ) = 422'

.10

.14 ( ) = 740'

671.17
670.40

.77
4060

671.17
670.70

0.47 × 5280 = 2470

670.04 Yellow flag on E side
1580'

670.7 Spar in gulch - 4' wide - bulk sample taken from material lying about from out of the blasted portion of vein. (3 sacks)
790'

670.85 Spar - cut in vein - 5' wide - horse about 1½ - and 1½' more of spar. on E side of cut - bulk sample taken from material that came out of cut (2 ~~huge~~ sacks)
422'

670.93 Spar - cut in vein - 2' wide - highly siliceous one sack collected but not sent in for analysis - because width is less than minimum mining width.
528'

671.03 Spar - cut in vein - about 4½' wide - bulk sample taken from material out of cut (2 sacks)
740'

671.07 Spar - cut in vein - about 4½' wide - bulk sample taken from material out of cut. (2 sacks)

REPLY

Francis X. Cannaday
Manager, Base & Precious Metals

No date
Should be Aug 21st 72

Mr. Frank Stevens
Hazen Research, Inc.
4601 Indiana St.
Golden, Colorado

Dear Mr. Stevens:

With reference to our telephone conversation some ten days ago dealing with a sink and float test on fluorspar, we are sending you via REA Air Express a 200 pound lot bulk sample of the material.

As we discussed, the main objective of the test is to find out if metallurgical grade spar can be made through heavy media process.

I suspect that a separation may be made into a concentrate 70% plus effective CaF_2 and a middling product.

Fundamentally we would like to know (1) how much (70% minimum effective) concentrate can be produced from each of several suitable batches of ore, each batch crushed to a different size range, and (2) upon regrinding each middlings to a suitable size, if a further separation by sink-float methods can result in how much concentrate of 70% plus effective CaF_2, or otherwise.

As usual we will expect a report describing procedure and results.

Sincerely,

Francis X. Cannaday

Francis X. Cannaday
Manager, Base & Precious Metals

FXC/pf

Talked with F. Stevens Aug. 21st OK.

Sept. 1st
Ralph Light; Talked w. R. Meyerton - Test in progress - 10 days more; didn't start sooner because the operator was out on vacation I presume. Letter of agreement on its way here.

- minus $\frac{1}{2}$" separate 14 mesh

fines to cyclone
+ 65

August 9 '72

Talked to
FRANK STEVENS

Get a 250 lb
bulk sample.

INVOICE

No. 7874

3226 East 46th Street

AMERICAN ANALYTICAL and RESEARCH LABORATORIES

ASSAYERS · CHEMISTS · METALLURGISTS

Phone 624-0049

TUCSON, ARIZONA 85713

SAMPLE SUBMITTED BY Nuclear Dynamics, Inc.

DATE July 14, 1972

SAMPLE MARKED	ANALYSIS	CHARGES
J-7 -- J-9	SiO_2, CaF_2	$ 26.25

FXC. called Toni Varesy

at 312-823-1140.

He said contact Bob Evans

at Carrizozo, and make

arrangements with him;

mention Holmes & Varesy.

288

(over)

3/4 mi S. of McFadden Pk.

4000' long 5' wide relief 400'

75% CaF_2 SiO_2 50% CaF_2

Qtzt. 6 samples

7xcuts

Leon Lennox

Roosevelt Resort Lodge

Charlie Nichols

467-2276

1-467-2276

Fri. June 23 '72
10:15 AM

Cliff Holmes called:

Getty to Fluorite

McFadden Pk. Sierra Ancha

Lennox

Bob Evans Crossroads Motel.
Geologist
represents. 505-648-2363
Carrizozo N. Mex.

Tell Bob Evans that
Tony - Varesy
312-823-1140

over

MEMORANDUM DATE: June 23, 1972

TO: FRANK CANNADAY

FROM JOE F. WALTON

C. N. Holmes called 9:45 a.m. 6/23/72 re a fluoride property. The property is located near McFadden Peak, Sierra Mountains. A 5 to 6 foot vein has been kept at a length of approximately 500 feet. 400,000 to 500,000 tons indicated.

Geologist on the job is Bob Evans who can be located at the Crossroads Motel in Carrizozo, New Mexico, Telephone Area 505 #648-3463.

Man on the site to contact is Lenox. We are referred to Evans and Lenox by C. N. Holmes of Phillips Petroleum through a part owner, Tony Barese, Telephone Area 312 #823-1140.

He recommended that Berese be contacted stating that we were referred to him through Holmes in that we have had 3 joint exploration projects with Phillips Petroleum and Holmes knows that we are the General Exploration Partner for Bethlehem Steel west of the Mississippi and would normally look at the property in our own behalf and in behalf of Bethlehem.

Get permission to call Bob Evans and permission to view the property.

We understand that Getty Oil is coming onto the property sometime next week and that Kaiser is coming on a little later.

Holmes has a close connection with the ownership and can give us a first opportunity through the fact that we are associated with Bethlehem.

Visited on Tuesday June 27th 1972
4½' wide - 80° dip S; E-W strike (approx.)
Good walls (Dripping Spring qtzt.) with selvage.
Solid spar throughout 3 cuts; vertically banded.
Sample "J" across vein westernmost cut.

~~###~~ FXC with Leon Lennox

JFXC.

Copper in diabase at copper claims - possibly in contact with silicified Mescal ls.?

Leon Lennox
Box 571
Wink Texas
915- Tel. 527-3607

3226 East 46th Street

Phone 624-0049

AMERICAN ANALYTICAL and RESEARCH LABORATORIES

ASSAYERS - CHEMISTS - METALLURGISTS

TUCSON, ARIZONA 85713

SAMPLE SUBMITTED BY Nuclear Dynamics, Inc.

DATE July 14, 1972

SAMPLE MARKED	GOLD OZ./TON	SILVER OZ./TON	PER CENT COPPER	PERCENT LEAD	PERCENT ZINC	PERCENT SiO_2	PERCENT IRON	Percent CaF_2
J-7						2.16		85.93
J-8						0.28		85.68
J-9						0.31		86.10
			5.42					
	85.93 - 2.5 x 2.16 =				80.51	% effective		
	85.68 - 2.5 x 0.7 0.28 =				84.98	% eff.		
	86.10 - 2.5 x 0.78 0.31 =				85.32	% eff.		

REGISTERED ASSAYER CERTIFICATE NO. 6652 PETE S. FLORES Date Signed 7/14/72 Arizona U. S. A.

Pete S. Flores

Invoice # 7874

CHARGES $ 26.25

ASSAYER - CHEMIST

NUCLEAR DYNAMICS

REPLY
Phoenix

F. X. Cannaday
Manager, Base & Precious Metals

July 5, 1972

Hawley & Hawley Assayers & Chemists, Inc.,
1700 W. Grant Road,
Tucson, Arizona.

Gentlemen:

We are shipping you three fluorspar samples, nos. J-1, J-2 and J-3.
Please analyze (verified) each sample for:

(1) CaF_2 in %
(2) SiO_2 in %

Please send results, bill and rejects to this office.

Yours very truly,

Francis X. Cannaday

Francis X. Cannaday

FXC/dmh

NUCLEAR DYNAMICS

REPLY
Phoenix

F. X. Cannaday
Manager, Base & Precious Metals

July 5, 1972

American Analytical & Research Laboratories,
3226 E. 46th St.,
Tucson, Arizona.

Gentlemen:

We are shipping you three fluorspar samples, nos. J-7, J-8 and J-9.
Please analyze (verified) each sample for:

(1) CaF_2 in %
(2) SiO_2 in %

Please send results, bill and rejects to this office.

Yours very truly,

F. X. Cannaday

F. X. Cannaday

FXC/dmh

NUCLEAR DYNAMICS, INC. PHOENIX, ARIZONA 85036 • P. O. BOX 20766 • 2871 SKY HARBOR BLVD. • 602 : 267-0581
PRESCOTT, ARIZONA 86301 • P. O. BOX 2337 • 100 UNION STREET • 602 : 445-0834

NUCLEAR DYNAMICS

REPLY
Phoenix

F. X. Cannaday
Manager, Base & Precious Metals

July 5, 1972

Jacobs Assay Office,
1435 S. 10th Avenue,
Tucson, Arizona.

Gentlemen:

We are shipping you three fluorspar samples, nos. J-4, J-5 and J-6. Please analyze (verified) each sample for:

(1) CaF_2 in %
(2) SiO_2 in %

Please send results, bill and rejects to this office.

Yours very truly,

F. X. Cannaday

F. X. Cannaday

FXC/dmh

NUCLEAR DYNAMICS, INC. PHOENIX, ARIZONA 85036 • P. O. BOX 20766 • 2871 SKY HARBOR BLVD. • 602 : 267-0581
PRESCOTT, ARIZONA 86301 • P. O. BOX 2337 • 100 UNION STREET • 602 : 445-0834

HAWLEY & HAWLEY
ASSAYERS AND CHEMISTS, INC.
1700 W. GRANT RD. • BOX 50106 • 622-4836
TUCSON, ARIZONA 85703

BRANCHES: DOUGLAS, ARIZONA; HAYDEN, ARIZONA; EL PASO, TEXAS; ST. LOUIS, MO.

IDENTIFICATION	GOLD OPT	SILVER OPT	LEAD %	COPPER %	ZINC %	MO. %	IRON %	CaF_2%	SiO_2%
J - 1								90.59	8.39
J - 2								84.40	14.70
J - 3								86.92	11.55

OK to pay $61.95
Base Met. 09/20.

CC: Nuclear Dynamics, Inc
ADD: Attn: Mr. F. X. Cannaday
CITY: P.O. Box 20766
DD: Phoenix, Arizona 85036
CITY:

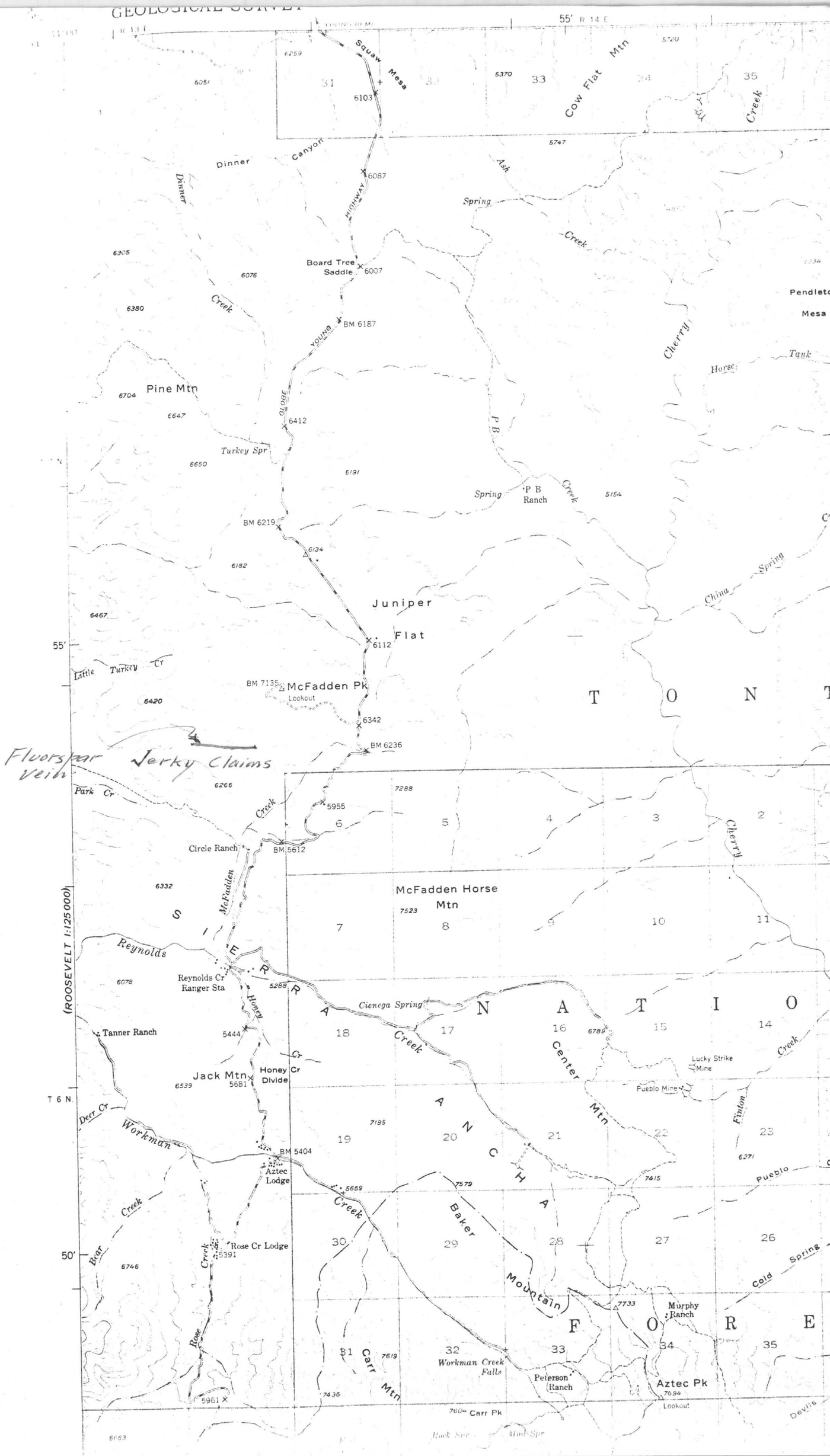
REMARKS:
Verified determination

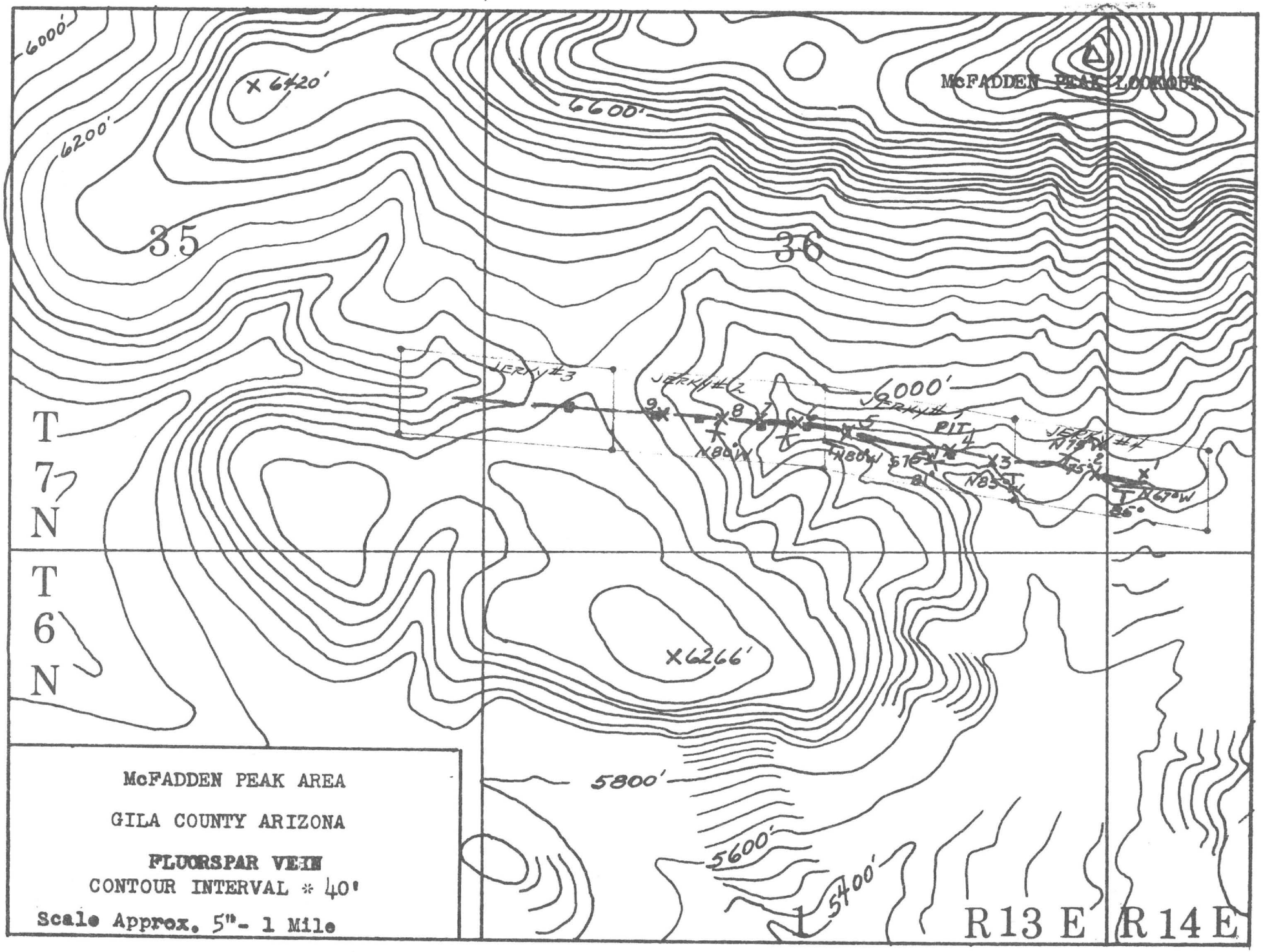
ANALYSIS CERT. BY: H. E. PACHARD

REGISTERED ASSAYER CERTIFICATE NO. 6784 Arizona

PREPARATION $ 2.70
ANALYSIS $ 59.25

HH3A ACC: NUCLEAR DYNAMICS, INC | DATE SPL. RECEIVED 7/7/72 | DATE COMPL. 7/17/72 | PNX 346284 | $ 61.95


GEOLOGICAL SURVEY
55′ R 14 E
Squaw Mesa
Cow Flat Mtn
Dinner Canyon
Dinner Creek
Ash Spring Creek
Board Tree Saddle
YOUNG GLOBE HIGHWAY
Pendleto
Mesa
Cherry Creek
Horse Tank
Pine Mtn
Turkey Spr
P B Creek
P B Ranch
Spring
China Spring
Juniper Flat
Little Turkey Cr
McFadden Pk
Lookout
T O N T
Flourspar Veins
Jerky Claims
Park Cr
Circle Ranch
McFadden Creek
McFadden Horse Mtn
S I E R R A N A T I O
Reynolds Cr Ranger Sta
Reynolds Cr
Honey Cr
Tanner Ranch
Cienega Spring Creek
Center Mtn
Lucky Strike Mine
Pueblo Mine
Finton Creek
Jack Mtn
Honey Cr Divide
(ROOSEVELT 1:125 000)
T 6 N.
Deer Cr
Workman Creek
Aztec Lodge
A N C H A
Pueblo Creek
Baker Mountain
Bear Creek
Rose Cr Lodge
Rose Creek
Cold Spring
Murphy Ranch
F O R E
Carr Mtn
Workman Creek Falls
Peterson Ranch
Aztec Pk
Lookout
Carr Pk
Devil's
Rock Spr
Mud Spr



McFADDEN PEAK AREA

GILA COUNTY ARIZONA

FLUORSPAR VEIN

CONTOUR INTERVAL = 40'

Scale Approx. 5"- 1 Mile

HAWLEY & HAWLEY

ASSAYERS AND CHEMISTS, INC.
BOX 50106
TUCSON, ARIZONA 85703
1700 W. GRANT RD.,
(602) 622-4836

Registered Assayers
OVER 50 YEARS

BRANCHES
Douglas
Hayden
Morenci
Inspiration
El Paso
St. Louis

IDENTIFICATION	Gold OPT	Silver OPT	~~XXXX~~	~~XXXX~~	~~XXXX~~	~~XXXX~~			
			CaF_2 %	SiO_2 %	CO_3 %	$BaSO_4$ %			
Gila County, Arizona									
# 1			23.10	69.55	0.32	0.20			
# 2			97.21	0.81	0.40	0.33			
# 3			57.44	41.18	0.30	0.41			
# 4			82.47	13.63	0.37	0.84			
# 5			53.45	44.86	0.24	0.14			
# 6			84.74	12.81	0.38	0.29			

The above samples are hand grab from surface outcrops

6	CaF_2 @	$11.00	$ 66.00
6	SiO_2 @	$ 8.75	52.50
6	CO_3 @	$12.00	72.00
6	$BaSO_4$ @	$ 9.00	54.00
			244.50

CC: Mr. Robert H. Evans
ADD: Spar, Inc.
CITY: 1806 Page Avenue
ADD: Mt. Vernon, Illinois 62864
CITY:

REMARKS:

Verified determination

Analysis Cert. By H. E. RICHARD

REGISTERED ASSAYER CERTIFICATE NO. 6784 Date Signed Arizona

Preparation $ 5.40
Analysis $ 244.50
$

ACC:	Date Spl. Received	Date Compl.		
SPAR, INC.	5/30/72	6/2/72	MTV 346191	249.90

MM3

ROBERT H. EVANS
Consulting Petroleum Geologist
1806 PACE AVENUE
MT. VERNON, ILLINOIS 62864
TELEPHONE 242-4370

PRELIMINARY REPORT
McFADDEN PEAK FLUORSPAR PROSPECT

Location

The Fluorspar claims area is situated in the Sierra Ancha Mining District in the SE/4 of section 35 and the S½ of section 36 of T7N, R13E and the SW/4 of section 30 of T7N, R14E in Gila County, Arizona. The eastern outcrop of the vein is about 3/4 mile due south of the McFadden Peak lookout tower and extends westward through the center of the S½ of section 36, a distance of almost one mile.

The claims area can be reached by either one of two routes:

1. Travel south from Young, Arizona on the Globe-Young highway, a good, all-weather gravel road, a distance of 15 miles; or,
2. Take highway 88 north from the Globe-Miami area to the Globe-Young highway, turn off and continue north on the Globe-Young highway a distance of about 30 miles to a point just south of the 288 mile marker where a mine or ranch road junctions with the Globe-Young road. This road must be taken for a distance of about 2 miles to reach the eastern outcrop of the vein. It is suggested that a 4WD vehicle be used. While this mine road is better than most, a conventional vehicle will have difficulty with some of the grades.

General Information

The claims area lies within the Tonto National Forest and is heavily wooded with White Oak, Juniper, Douglas Fir and Pine along with much Manzanita brush. In general the topography is one of rugged mountains, but the claims area is much gentler in grade and relief than the areas surrounding it.

With regard to weather, there is a period of moderate to light snow from November through March and some rain starting in July through August, but, since this is a semi-arid part of the southwest, annual precipitation is modest and it is only the mountain elevation which permits even this accumulation. Temperature range in summer is roughly from 50° to 100° with cooler nights and warmer days. In winter the range will be from 50° to -10° with the colder periods limited to a week or two from Mid-January to Mid-February and again, the evenings, nights and early mornings are prone to be cooler than mid-day.

Roads are generally fair to good, all-weather gravel and blacktop. The nearest railroad facilities are those of the

Southern Pacific Railroad in the Globe-Miami area about 50 miles south of the claims area.

Geology

The immediate area of the Fluorspar deposit consists of Pre-Cambrian quartzite and conglomerate and sandstones of the Apache Group. The vein of fluorspar runs essentially east-west and is almost vertical in attitude.

In a recent field survey, six ore samples were collected from nine stations along the vein starting from east to west with the following results: (see map)

Station	Dip	Strike	Width of Vein	Sample
1	S.85°	N 67° W	total width 21'	#1
2	S 75°	N 75° W	6'	#2
3	about same	N 85° W	12'	no sample
4	(at pit) S 81°	S 77° W	8'	#3
5	near vert.	N 80° W	4'	no sample
6	S 79°	S 85° W	total width 36', used 3'	#4
7	near vert.	E-W	2 veins (split) 4' & 5', total 25'	no sample
8	near vert.	N 80° W	5'	#5
9	near vert.	N 80° W	total 7', pure spar 3'	#6

The above ore samples have been sent to Hawley and Hawley, Assayers in Tucson, Arizona, the results of which are to be included in this report.

Conclusion

In estimating ore tonnage as conservatively as practical the following factors were used:

Average vein width - 4'
Length of Vein - 4000'
Estimated Depth - 400'

Vein width was determined from the average encountered at the nine stations previously mentioned. Over most of the vein, this width varies from 3' to 8' of coarsely crystalline, relatively pure CaF_2. In some places the total vein width reaches 20' to 36' but there is more quartzite gangue material at these locations and the high quality CaF_2 sometimes splits into more than one vein. The length of the vein was determined while chaining the Jerky 1 through 4 claims and 4000' is a fairly accurate footage.

The estimated depth of 400' was arrived at as follows: the lowest surface outcrop elevation is about 5800' and the highest surface outcrop elevation is about 6160' which provided 360' of ore depth. Since most vein deposits are worked to considerable depth (500' is common), the addition of 40' to bring the total to 400' seems a conservative approach.

Using the above factors, the deposit should contain about 500,000 tons of CaF_2 concentrates with a potential of twice this amount if greater depth can be determined at a later date.

The original assays run 6-2-62 by Hawley and Hawley were hand-grab samples from surface outcrops. Sample #1 was taken at the extreme eastern outcrop where the mineralized zone was 21' thick but the high grade section was about 4' thick. Sample #1 did not include any of the high grade section since we were trying to determine the CaF_2 content of the low grade portion of the mineralized zone. Therefore, sample #1 should not be included in determining average CaF_2 percentages. After the first assays were run, it was decided that additional work was needed to open the vein for further evaluation and, to this end, five crosscuts (bulldozer, drilling and shooting) were made and samples sent in for analysis with the following results:

Sample	CaF_2	SiO_2	
West end	87.27	10.20	)
Middle	88.11	9.85	) Analysis by U.S. Steel
East end	82.37	15.30	)
J-1	90.95	8.39	) Analysis by Hawley &
J-2	84.40	14.70	) Hawley for Nuclear
J-3	86.92	11.55	) Dynamics
J-4	88.05	10.75	)
J-5	89.00	9.15	) Jacobs for Nuclear
J-6	88.75	9.30	) Dynamics

The area being offered consists of 32 unpatented claims called the "Mack Group" and 4 unpatented claims called Jerky 1 through 4. An option contract to purchase the "Mack Group" was obtained from Woody Nichols 6-5-72 and, to insure title to the Fluorspar deposit, the Jerky 1 through 4 were overlain along the vein.

Legal opinion indicates that all necessary proof of labor has been carried out and there is no contention regarding these claims.

While the fluorspar deposit is the primary objective, this property also contains a 6' vein of copper ore which has not been evaluated as well as indications of uranium.

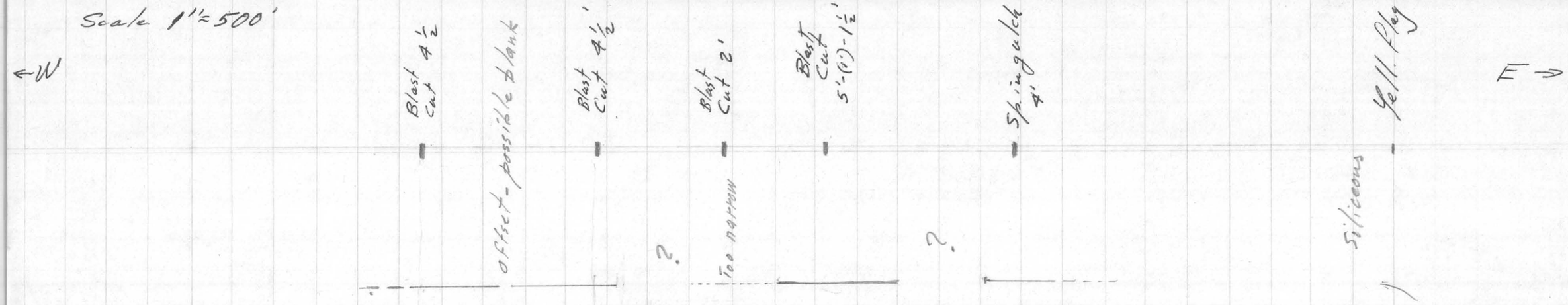
GLOBE

CERTIFICATE OF ASSAY

FOR Bailey Fluorspar Co. DATE July 13, 1972

DESCRIPTION / REMARKS		$CaCO_3$ %	CaF_2 %	SiO_2	EFF. UNITS
EVANS & LENNOX		6.72	82.13	14.20	46.63

Scale 1" = 500'



	1000'	500'	300'	
	Recov. min. 80%	Recov. mining 80%	Recov mining 80%	
	Av. width 4'	Av. width 4'	Av. width 3½'	
	Use 10 cu ft/ton			
	$\frac{1000 \times 4}{10}(.8) = 320$ tons/ft. of depth	$\frac{500 \times 4 \times .8}{10} = 160$ tons/ft of depth	$\frac{300 \times 3.5 \times .8}{10} = 84$ tons/ft of depth	
				Tot.
Depth 100'	32,000 Tons	16,000	8,400	56,400
Depth 200'	64,000	32,000	16800	112,800 tot.
Depth 300				169,2
400'				225,600

INVOICE

HAZEN RESEARCH, INC.

4601 INDIANA ST. TELE. (303) 279-4501
GOLDEN, COLORADO 80401

September 30, 1972
Hazen Research Project 1237
Heavy Media Separation

Nuclear Dynamics, Inc.
P. O. Box 20766
Phoenix
Arizona
85036 F. Cannaday

DESCRIPTION		SUB TOTAL	TOTAL
-- Staff Charges --			
Technicians		245.66	
Mechanics		245.03	
Total Staff Charges			490.69**
-- Analytical Charges --			
16 Fluorine Dist. Solid	@ 10.00	160.00	
8 Silica Grav. Solid	@ 6.00	48.00	
Total Analytical Charges			208.00**
		TOTAL INVOICE ▶	$698.69

OK Exc.

PREVIOUS BALANCE	CURRENT CHARGES	CREDITS		
			AMOUNT DUE ▶	$698.69

INVOICES DUE WITHIN 10 DAYS OF RECEIPT

PAYABLE IN U.S. CURRENCY