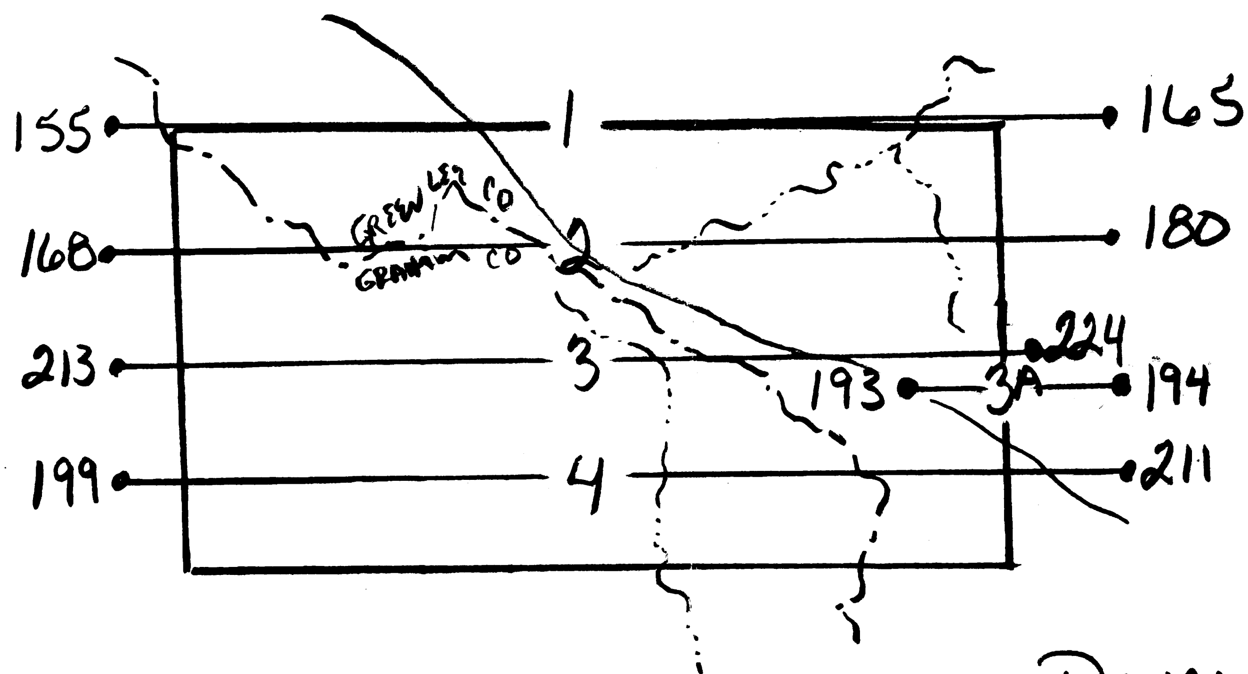
ASH PEAK

ARIZONA

6/84



AREA: DUNCAN, ARIZONA
SCALE: 1:6000
PROJ#: 84105
ROLL#: 3235

IntraSearch

IntraSearch Inc.

Greenwood Plaza
5351 South Roslyn Street
Englewood, Colorado 80111
303/741-2020

Cable INTRADEN

SHIPPING MEMORANDUM

Mr. Hugo Dummett
The Superior Minerals Company
6367 E. Tanque Verde #201
Tucson, Arizona 85715

Date: June 1, 1984
Date Shipped: Same
Shipped by: Gammon
How Shipped: U.P.S.
Project No: 84105

REMARKS

1 Temporary flight line sheet of Duncan area, Arizona

51 color photographs consisting of 1 each of the following:

Roll #	Line #	Exposures	# Prints
3235	1	155-165	11
3235	2	168-180	13
3235	3	213-224	12
3235	3A	193-194	2
3235	4	199-211	13
			51 Total

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			51 Total


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3235 213
KODAK SAFETY FILM


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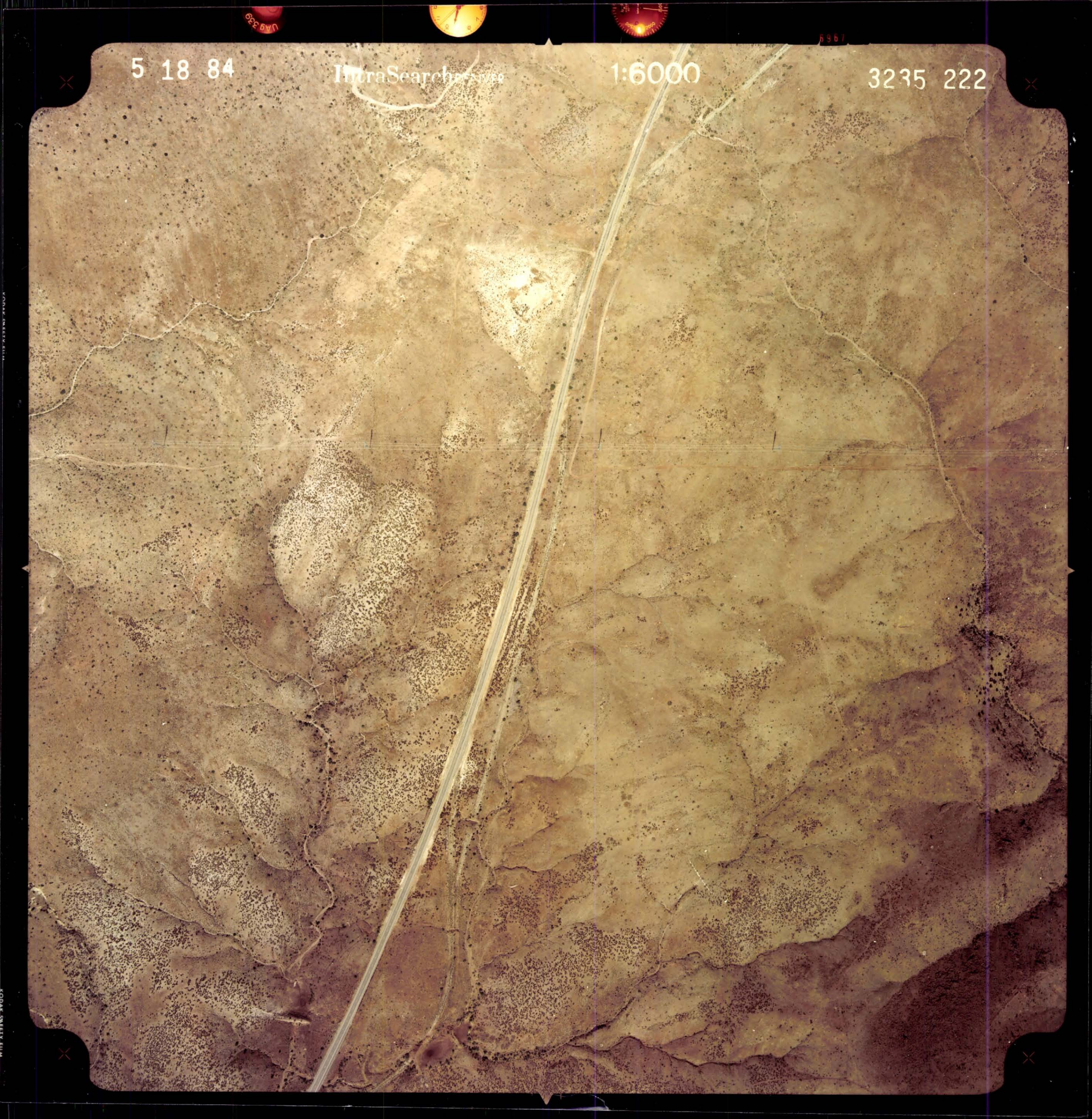
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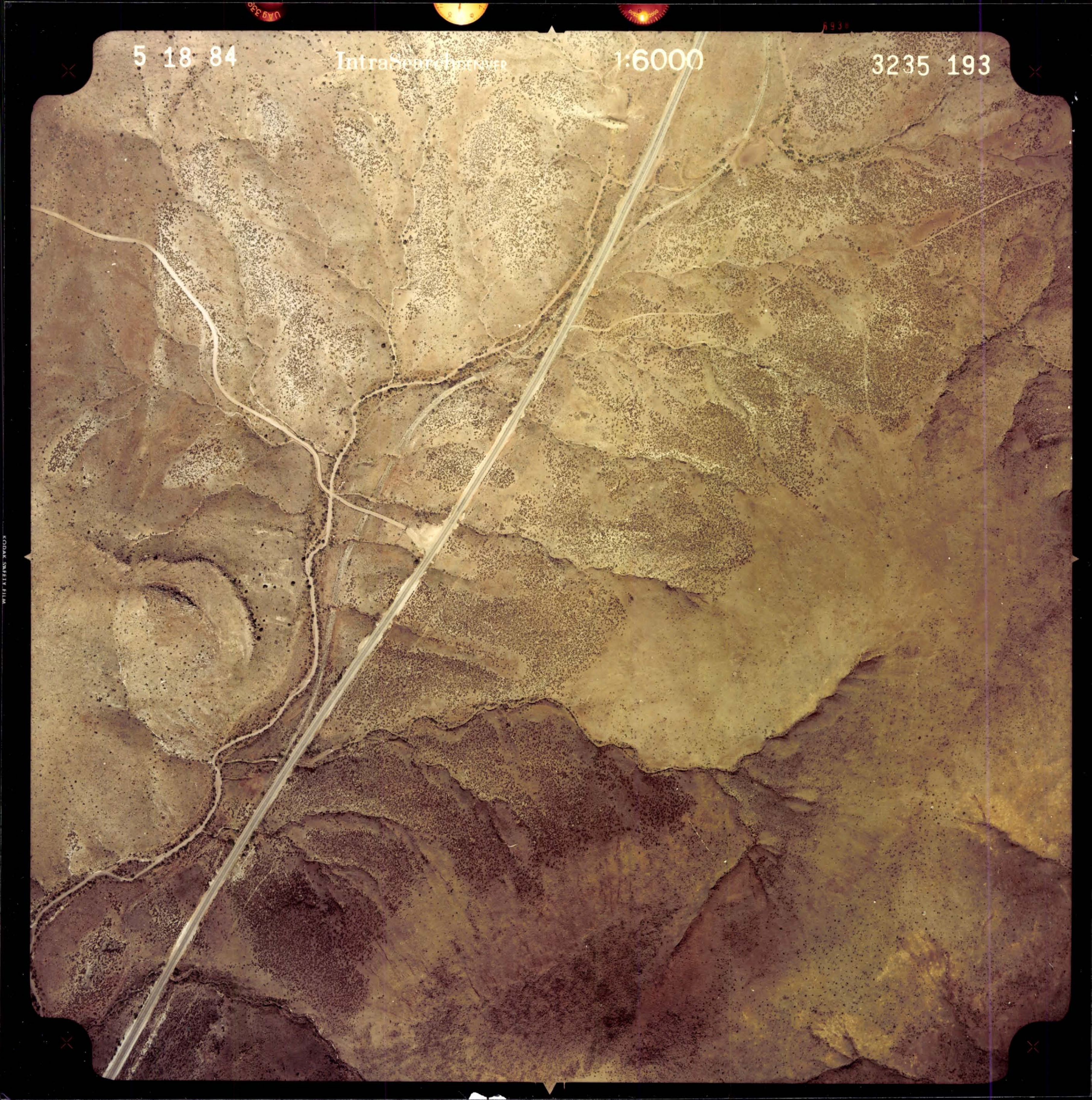
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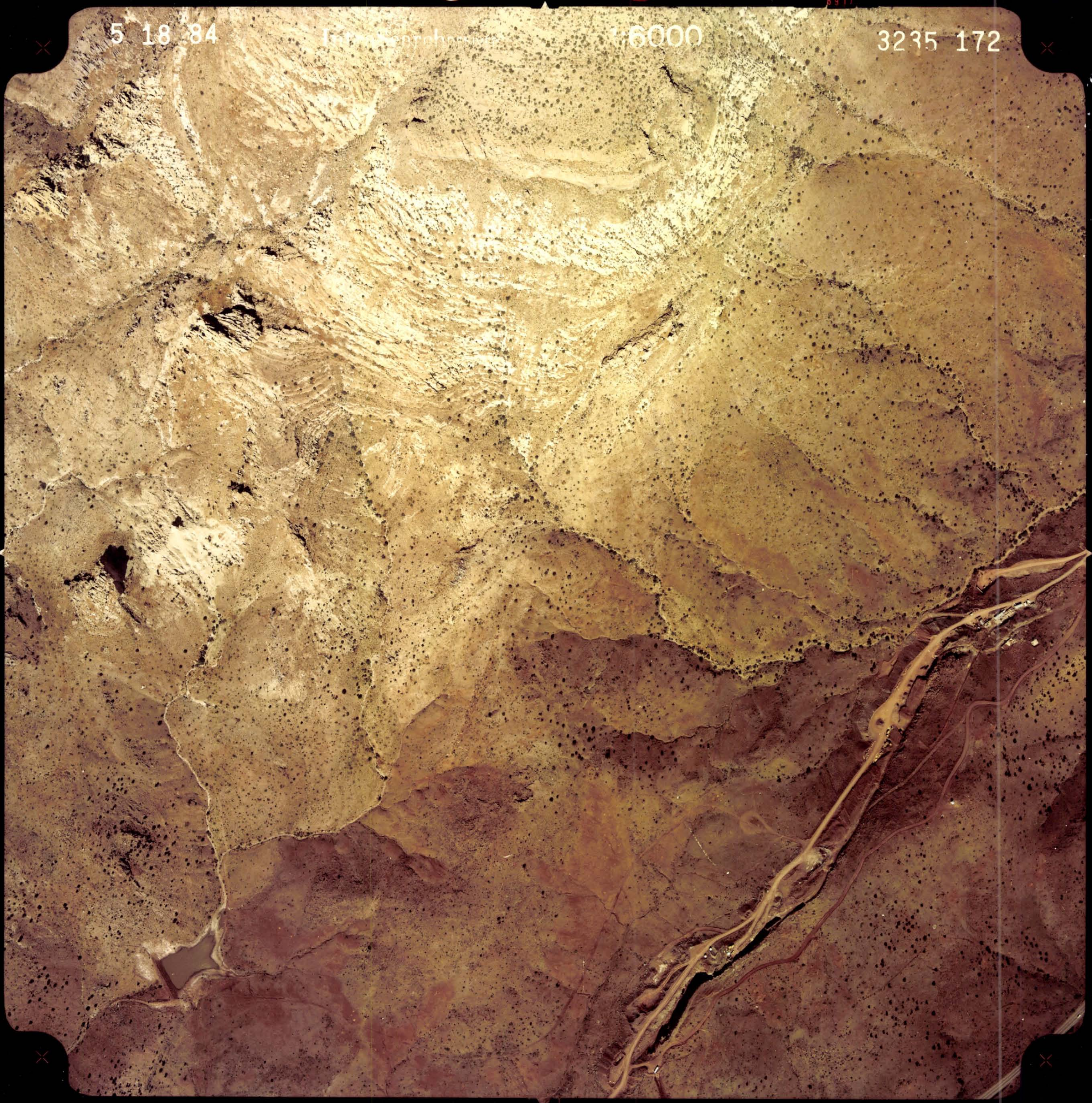
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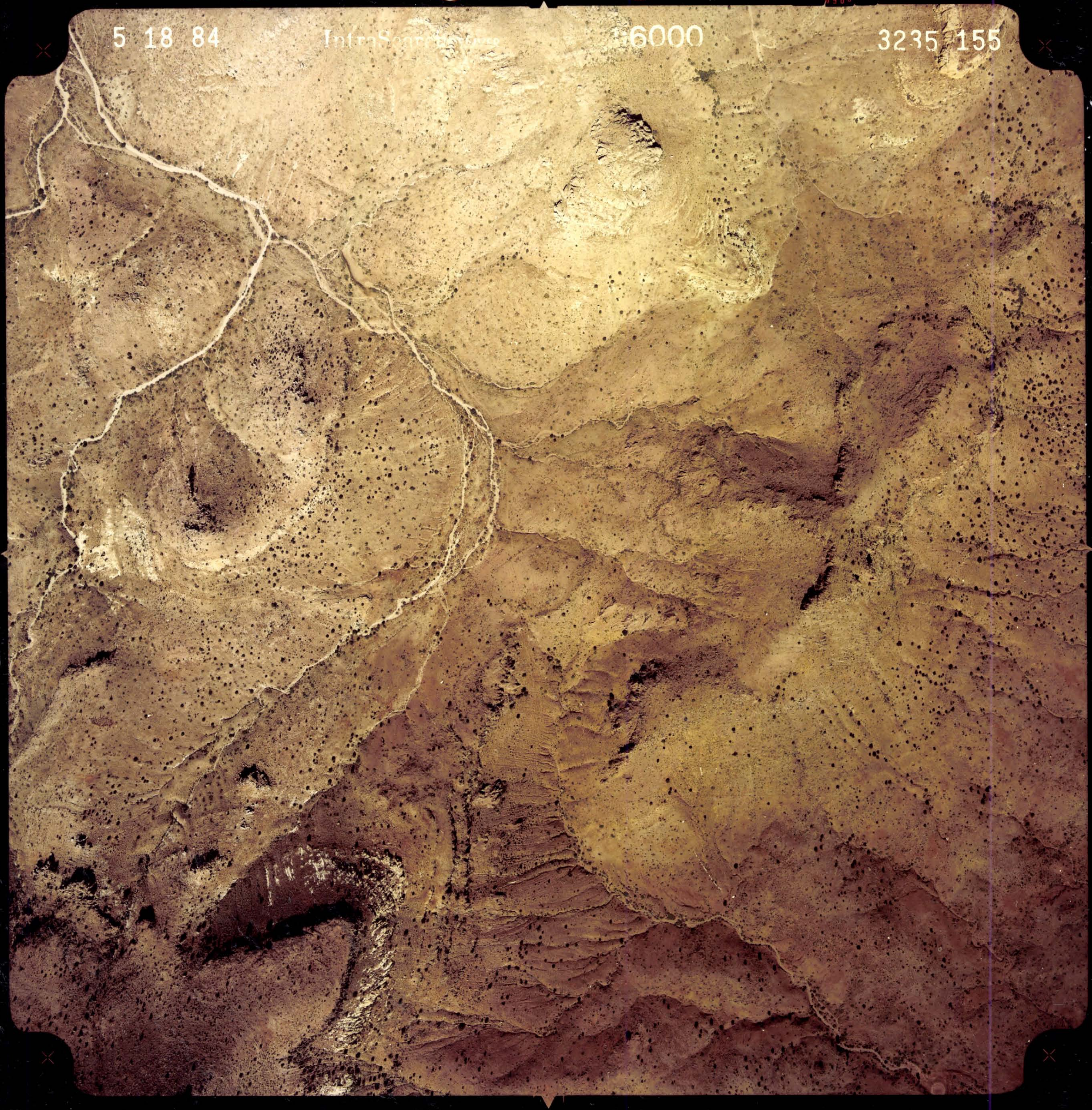
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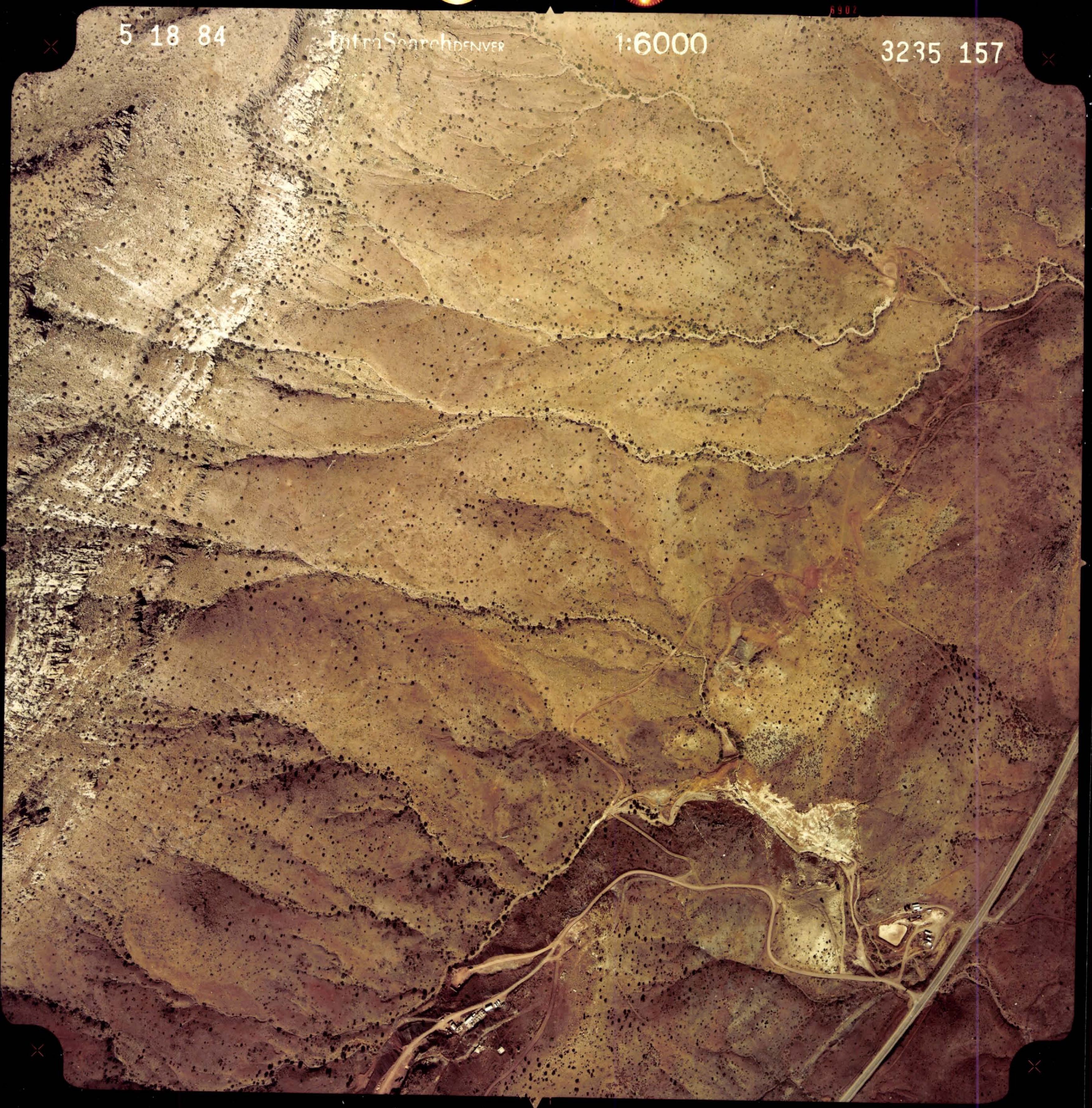
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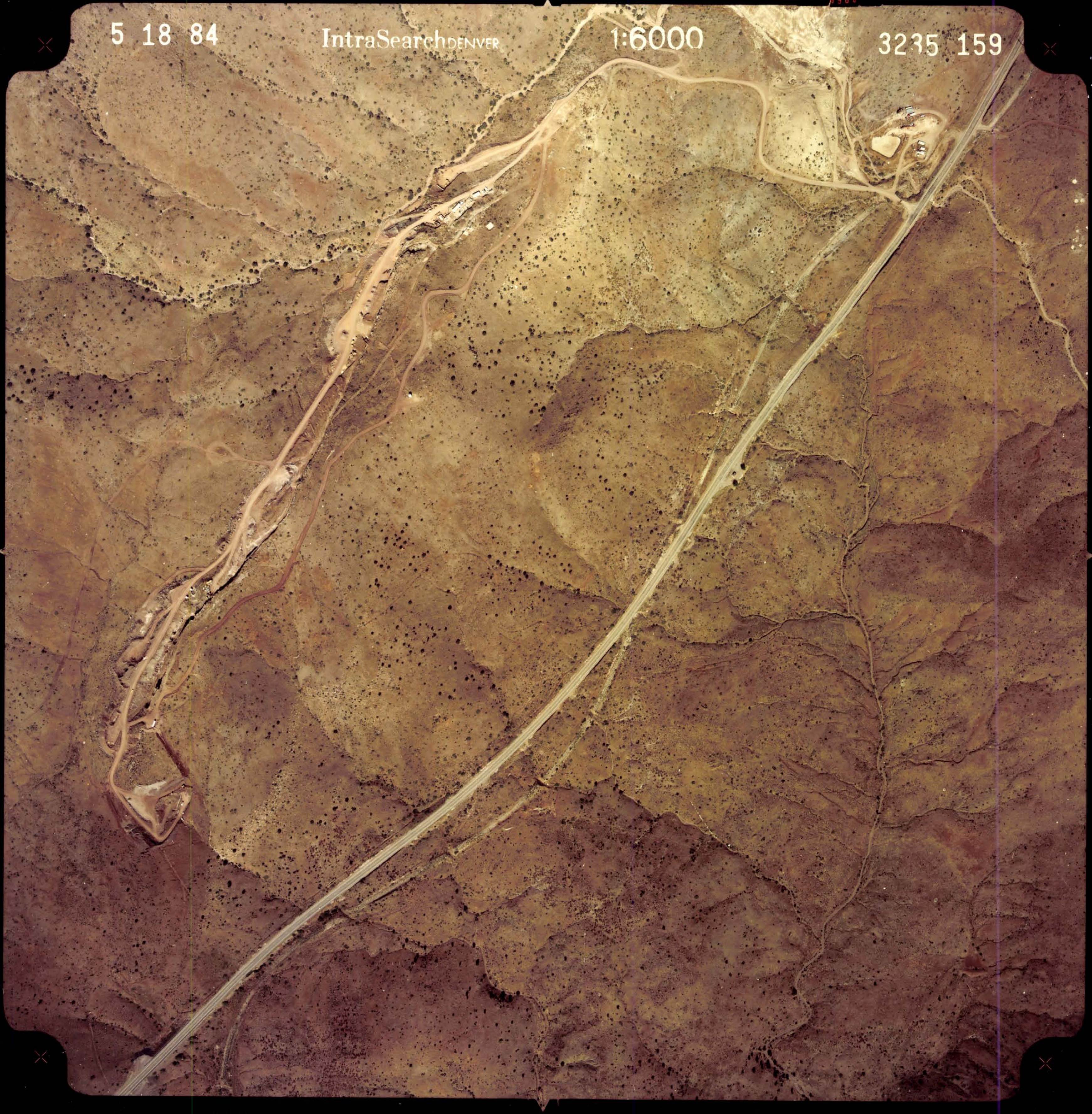
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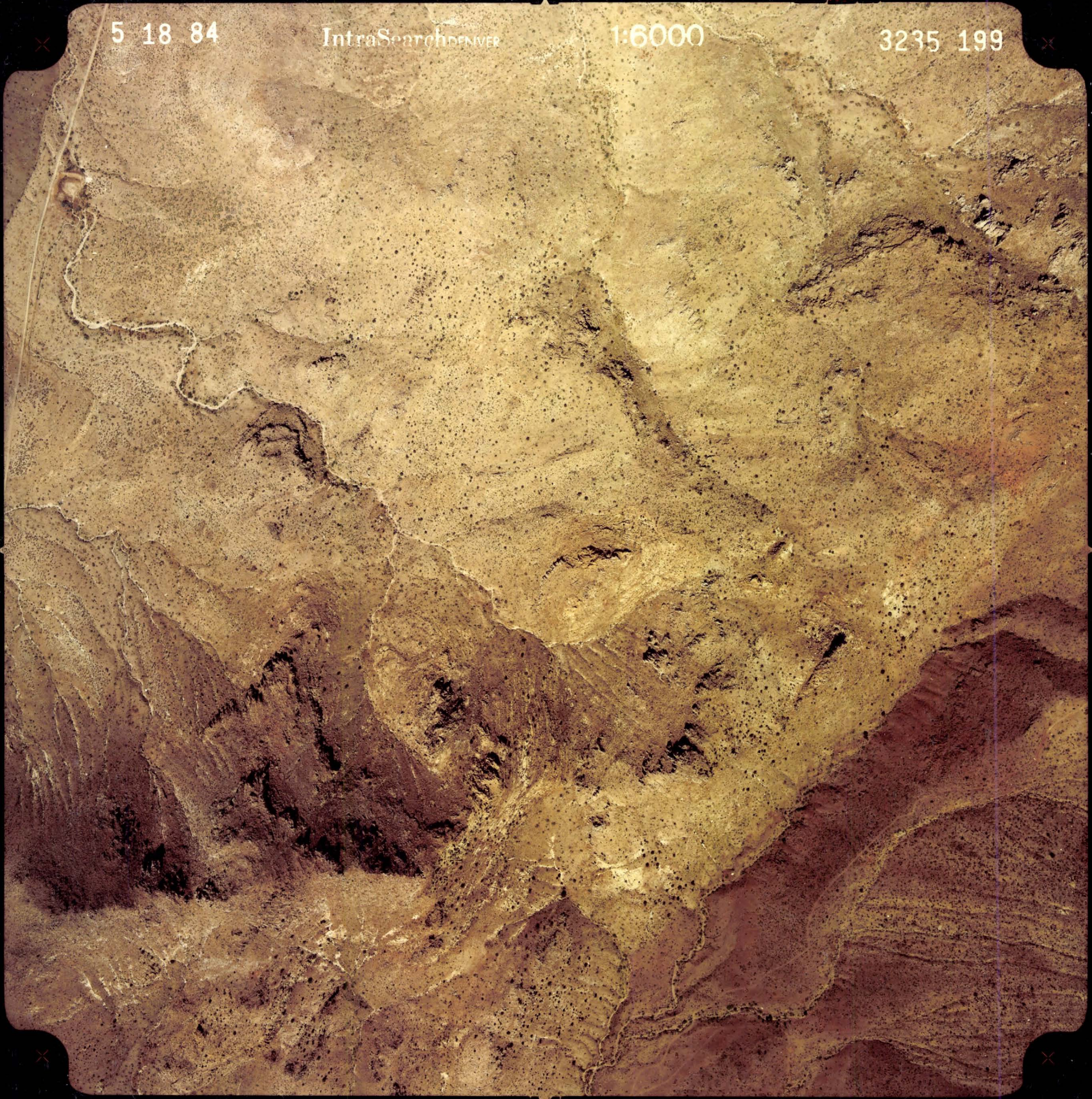
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KODAK SAFETY FILM


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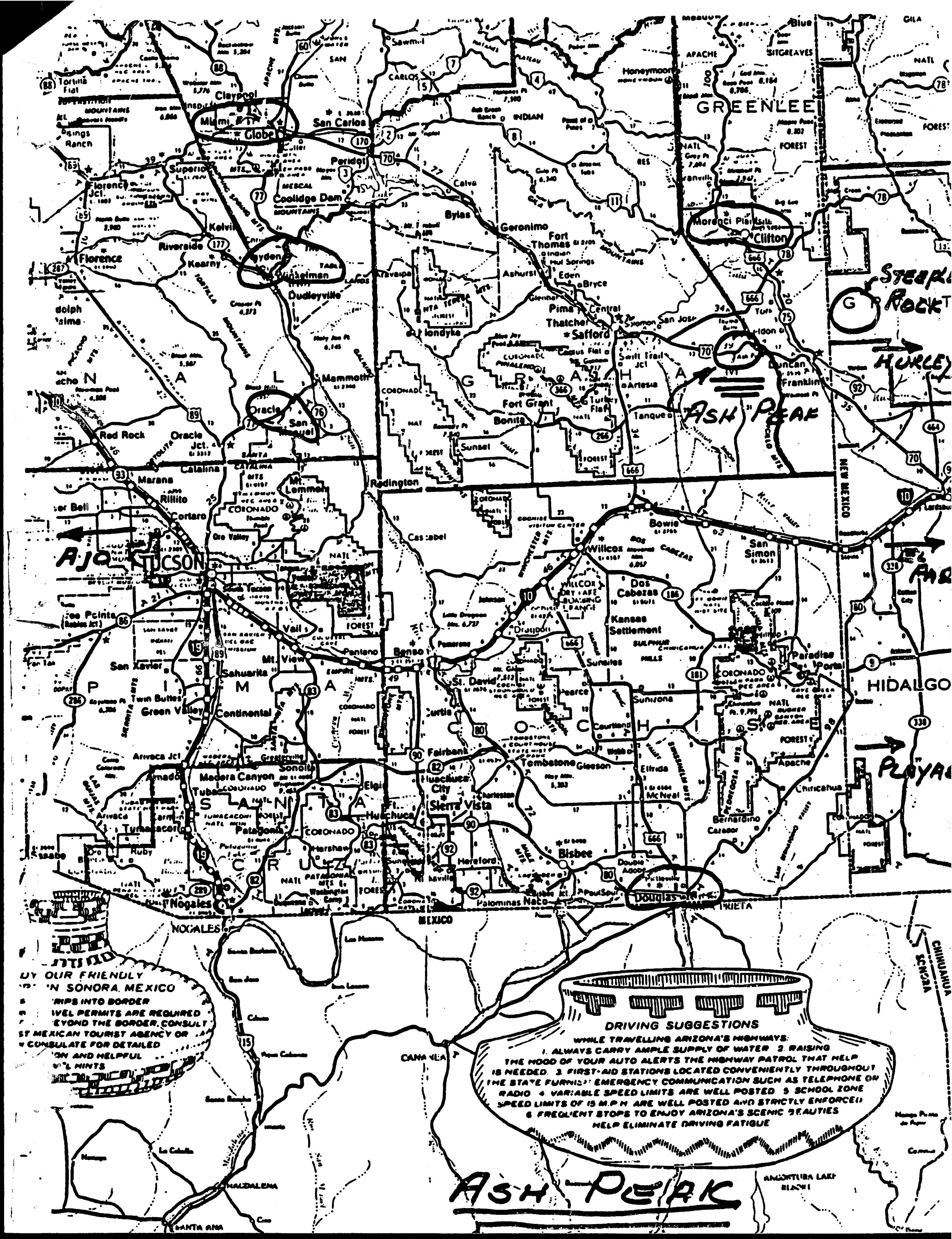

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San Carlos
Peridot
Superior
Florence Jct.
Florence
Coolidge Dam
Kelvin
Riverside
Kearny
Hayden
Winkelman
Dudleyville
Mammoth
Oracle
San Manuel
Oracle Jct.
Red Rock
Catalina
Marana
Rillito
Cortaro
Mt. Lemmon
Redington
TUCSON
Aja
Vail
Pantano
Benson
Mt. View
San Xavier
Sahuarita
Twin Buttes
Green Valley
Continental
Amado
Madera Canyon
Tubac
Sonoita
Elgin
Tumacacori
Patagonia
Nogales
NOGALES
Ruby
Huachuca City
Sierra Vista
Fairbank
Tombstone
Gleeson
St. David
Hereford
Bisbee
Naco
Palominas
Douglas
Elfrida
McNeal
Pearce
Sunsites
Sunizona
Willcox
Bowie
San Simon
Dos Cabezas
Kansas Settlement
Cochise
Dragoon
Portal
Paradise
Apache
Chiricahua
Bernardino
Bylas
Geronimo
Fort Thomas
Eden
Bryce
Pima
Central
Thatcher
Safford
Solomon
San Jose
Swift Trail Jct.
Artesia
Fort Grant
Bonita
Tanque
Duncan
Franklin
York
Clifton
Morenci
GREENLEE
Honeymoon
GRAHAM
PINAL
PIMA
SANTA CRUZ
COCHISE
HIDALGO
NEW MEXICO
MEXICO
SONORA
CHIHUAHUA
CANANEA
MAGDALENA
SANTA ANA
STEEPLE ROCK
HURLEY
PLAYAS
ASH PEAK
DRIVING SUGGESTIONS
WHILE TRAVELLING ARIZONA'S HIGHWAYS:
1. ALWAYS CARRY AMPLE SUPPLY OF WATER 2. RAISING THE HOOD OF YOUR AUTO ALERTS THE HIGHWAY PATROL THAT HELP IS NEEDED. 3. FIRST-AID STATIONS LOCATED CONVENIENTLY THROUGHOUT THE STATE FURNISH EMERGENCY COMMUNICATION SUCH AS TELEPHONE OR RADIO 4. VARIABLE SPEED LIMITS ARE WELL POSTED 5. SCHOOL ZONE SPEED LIMITS OF 15 M.P.H. ARE WELL POSTED AND STRICTLY ENFORCED 6. FREQUENT STOPS TO ENJOY ARIZONA'S SCENIC BEAUTIES HELP ELIMINATE DRIVING FATIGUE
OUR FRIENDLY
SONORA, MEXICO
TRIPS INTO BORDER
TRAVEL PERMITS ARE REQUIRED
BEYOND THE BORDER. CONSULT
MEXICAN TOURIST AGENCY OR
CONSULATE FOR DETAILED
AND HELPFUL
HINTS
ASH PEAK

HISTORY OF THE ASH PEAK MINES

The Ash Peak Mining Claims known as the Great Eastern, Commerce, Fraction, Summit, and Homestead Lodes are located in Sections 2,3, 10, and 11 Township 8 South, Range 30 East G&S.R. M. and were surv surveyed June thry August 1913 MINERAL SURVEY NO. 3076 A&B.

The Ash Peak mines were developed by Gold Fields Consolidated before World War I by sinking the Shamrock shaft, a single compartment shaft with manway to the 800 ft level and driving drifts along the vein in both directions in the ore body at 100 ft intervals. The Commerce shaft located approximately 2000 feet South=East of the Shamrock shaft along the outcrop of the vein was sunk to the 500 foot level with drifts at 100 ft intervals along the vein in both directions. Extensive sampling was done by Goldfields but no ore was extracted.

On January 1, 1936 Veta Mines Inc with Robert H. Sayre as General Manager leased the patented Ash Peak claims from Arthur D.Murphy, and the unpatented claims from Joe Hardy, and simultaneously started to re-open and retimber the Shamrock, Commerce, and 500 ft Hardy shafts. A contract was awarded to Stearns-Roger to build a 200 ton flotation mill and a 1200 KW Diesel power plant. Inasmuch as several thousand tons of ore was blocked out no development work was done by Veta Mines other than to sink the Shamrock shaft to the 975 foot level in a desperate search for mill water and to start a connection from the 600 foot level of the Shamrock with a raise 200 feet to the 500 foot level of the Commerce. This raise was completed late in 1937 and no assay or sampling records are available. It is known however that all development muck was milled as the mill commenced operation in late 1937.

Veta Mines was unable to develop sufficient water to operate the mill (85 gpm) from the Shamrock 975 and the Murphy wells so they installed a 4" pipe line 7 miles in length from the Gila River and pumped water against a 1200 foot head with a Diesel driven triplex pump.

On January 1, 1938 President Franklin Roosevelt cut the Treasury price of silver from 77¢ per ounce to 64½¢ which eliminated the profit margin and forced Veta Mines to shut down the operation after milling all of the broken ore from the shrinkage stopes.

The mine and mill equipment were sold to Morse Brothers and the leases with Arthur D. Murphy were terminated. Veta Mines mined and mdlled 173,282 tons of ore averageing .035 ounces Gold, and 9.5 ounces of silver and left approximately 179,000 tons of tailings which averaged 2.5 ounces of silver which in later years was sold to Phelps Dodge.

At the start of World War II Inspiration Copper Co leased the patented claims from Arthur D. Murphy and opened up the Commerce shaft to produce silica flux for the Inspiration Smelter, at the rate of 80 tons per day.. After mining all of the useable ore in the Commerce they re-opened the Shamrock shaft to the 600 foot level, and mined all of the developed ore left by Veta Mines. The only development work done by Inspiration was to drive a 26 foot croscutt into the hanging wall on the 400 foot level which opened up a parallel vein to the Ash Peak vein. Inspiration developed the hanging wall vein on the 400 and 500 foot levels and mined in at a grade comparable to the Ash peak vein. Inspiration drove crosscuts to the hanging wall on the 600 foot level and drill holes at intervals for a length of 1200 feet bu: no data is available on the assay values. No mining was done below the 500 foot level on the hanging wall vein.. Inspiration found a copper- silica mine nearer to their smelter and' closed down the Ash Peak property, after shipping123,393 tons, Au.035 Ag 9.2

On May 2, 1963, Robert H. Sayre Jr., and A. George Setter negotiated a lease with option to purchase the patented claims with Arizon Title & Trust Co, Agents for the Arthur D. Murphy Estate. They also located the former Joe Hardy claims and 10 other unpatented claims. During 1964 George Morehouse and John Chapman became partners with Sayre and Setter and the claims were held by them until leased to E.E. Lewis, Inc in 1968. E.E. Lewis, a subsidiary of Beaver Mesa Exploration, did considerable sampling along the outcrop of the vein between the Commerce and the Shamrock shafts which resulted in a small open pit operation which produced tons of ore over a width of feet which averaged ounces per ton. This ore was shipped to the Phelps-Dodge Morenci smelter.

E. E. Lewis, Inc installed a hoist and headfaame and re-timbered the Commerce shaft to the 500 foot level. At the 200 foot level NW a block of ore was developed and prepared for stoping and the level was extended to develop additional ore for mining. No ore was extracte

E.E.Lewis, Inc made an application to the D.M.E.A for a government loan on a 25%-75% government participation. The loan was approved to sink the Commerce shaft 200 feet to the 700 foot level with drifts in each direction for 375 feet and for diamond drilling into the hanging and foot walls. A change in management of Beaver Mesa exploration to strictly oil exploration combined with a drop in the price of silver resulted in the termination of the E. E. Lewis lease, and the DMEA project was cancelled.

During 1978 Robert H. Sayre deeded his 10% interest in the partner--ship to A. George Setter. George Morehouse and John Chapman also deeded their interest (45%) to A. George Setter for a small carried interest.

On May 1, 1978 A. George Setter purchased the property from the Arizona Title and Trust Co, who retained a mineral interest until the option price is paid from royalties.

On April 16, 1979 a lease with option to purchase was made between A. George Setter and Paul M. Turney for the patented mining claims.

By Robert Sayer (?)

October 4, 1955.

PRELIMINARY REPORT ON THE ASH PEAK MINES

Property:

The Ash Peak mine proper is owned by the Ash Peak Mines Company, a Nevada Corporation. It consists of 5 patented mining claims — Summit, Commerce, Great Eastern, Homestead, Fraction. They cover the Ash Peak vein for 5,780 feet. The company also owns unpatented claims and mill sites which I have not yet investigated.

The Ash Peak Extension claims are owned by a prospector — Joe Hardy. He has several partners but the record title is in him. This property consists of 14 unpatented mining claims:

Last Chance #1, 2 and 3.
Midway #1, 2 and 3.
By Chance #1 to 7 inclusive.
Water Witch.

These claims cover 4,500 feet on the Ash Peak vein and 5,000 feet on the parallel Green vein. Both groups are shown on the accompanying map.

Location:

The mines are located, as shown on the accompanying road map, 10 miles northwest of Duncan, Greenlee County, Arizona, on the paved highway which leads from El Paso, Texas, through Duncan to Phoenix, Arizona. Duncan is on the Clifton branch of the Southern Pacific Railroad which leaves the main line at Lordsburg, New Mexico. The closest station on the railroad would be Sheldon, 5 miles to the east, but the former road from the mine to Sheldon is washed out. The closest available side track on the paved road is Fox Siding, about 2 miles north of Duncan and 8 miles from the mine.

Altitudes are as follows:

Mine,	4,665 feet
Duncan,	3,536 feet
Sheldon,	3,462 feet.

Duncan, Sheldon and the railroad are on the Gila River, which would furnish unlimited water for milling. The water would have to be pumped 5 miles against a head of something over 1,000 feet. Nearby springs furnish ample water for domestic purposes, and this water might be consolidated and developed to supply a pilot mill of possibly 75 tons capacity. A large mill would have to get water from the river.

The mine is well located in respect to smelters. 150 miles northwest is the Magma copper smelter at Superior. 140 miles south is the Phelps-Dodge smelter at Douglas. 200 miles southeast is the A. S. & R. smelter at El Paso. Each one may be reached by paved highway from the mine. Phoenix, the capitol and largest city of Arizona, is 216 miles distant by paved highway. Transportation from the mine to Duncan or Fox Siding is all down hill, and should cost considerably less than $1.00 per ton. The nearest towns of consequence are Lordsburg, 45 miles S.E., and Safford, 53 miles N.W.

The climate is nearly ideal as the altitude results in cool nights throughout the summer, and the latitude insures very mild winters. The mines are in rolling hills, devoid of trees or any but the most scanty desert vegetation.

Geology:

The Ash Peak vein is covered by the claims for 2 miles, and is possibly traceable another mile. The Green vein is covered by the Hardy claims for 3,000 feet. Both are strong quartz veins cutting Tertiary flows of rhyolite, tuff and andesite. Both veins strike north 60 degrees west, but dip away from each other at about 80 degrees from the horizontal.

The veins are contained in ledges of silicified andesite as much as 60 feet wide, and in places make prominent "hog-backs". In other places the ledges are not reflected in the topography at all. So far, ore shoots have been found only in these strong outcrops, but if the shoots are like those found in an area of similar geology at Oatman, Arizona, further development may well discover other shoots in areas not characterized by outcrops. The veins give evidence of several periods of faulting and silicification, followed by mineralization resulting in a peculiar "en echelon" arrangement of subsidiary lenses in the main ore shoots, which may have an important effect on the system of mining.

The veins (that portion of the ledge containing commercial values) usually follow the hanging wall of the ledge, and vary from 3 to as much as 18 feet wide. Stoping width will average at least 6 feet and may run up to 12. In the vein the best values are usually found near the hanging wall. In the Ash Peak proper a narrow diabase dike separates the vein hanging wall from the unaltered country rock, and presents somewhat of a mining problem due to its tendency to slack and slough when opened to the air.

Ores:

The typical Ash Peak ore is a dense chalcedonic quartz showing some flow structure. Silver occurs as clouds of very fine argentite (silver sulphide) or as streaks. There is practically no other sulphide in the ore. Occasionally brecciated andesite cemented by silica carries commercial values. The argentite is nearly always visible to the naked eye, and in fact real acquaintance with the mine should result in the ability to distinguish readily between ore and waste underground, and even to estimate quite closely the silver content.

The graduation of values from hanging to foot wall is important in that a narrower stope and more selective mining could be employed to raise the grade of the ore, should the price of silver or changing economic conditions require such a procedure.

Metallurgy:

Should a war abroad or other conditions push the price of copper up to a point where the nearby copper smelters would again be put into full operation, the smelters would furnish an almost ideal outlet for crude Ash Peak ores without concentration. The copper mines send their copper to the smelters in the form of heavy sulphide concentrates. Properly to flux these ores the smelters must have a proportionate charge of silica. The highly silicious Ash Peak ores would be ideal for this purpose, and possibly the smelters would purchase them, paying not only for the silver and gold but enough for the silica to nearly offset the freight and treatment charges.

If the ore is milled on the ground, water in the proportion of one or two tons to the ton of ore treated must be furnished, and this would require a pumping plant and pipe line from Gila River and would cost in the neighborhood of $25,000.00. The ores are amenable to direct cyanidation, but preliminary tests indicate that it floats beautifully and with a very high ratio of concentration, possibly 40 or 50 to 1. This would furnish a very high grade concentrate for shipment to the smelter, or possibly the concentrates could be cyanided to produce bullion on the ground. The hard quartz and the very fine distribution of the argentite will require expensive fine grinding.

History:

No mill has ever operated at Ash Peak. Production to date has all come from ore shipped direct to the smelters. Probably 1 ton has been shipped for every 20 that is now blocked out or on the dumps. The development of the Ash Peak proper was nearly all done by George Wingfield of Nevada and his Goldfield Consolidated Company. The story, as given to me, is that this company took over the property for an option price of $1,000,000.00. They spent some $250,000.00 in sinking the Commerce and Shamrock shafts, together with the accessory drifting, and then found that they could not afford to pay the purchase price. According to the story, they did offer $500,000.00 for the mine but the offer was refused, and they dropped their option. Under somewhat similar circumstances the Hardy 600 foot shaft was sunk. Since then the mine has been examined many times, and sampled several times, but either the prevailing price of silver or the consistently "hard-boiled" terms of the owners have prevented any deal going through.

Development:

Ash Peak:

Shamrock:

Shaft	800 feet
Levels	3,636 feet

Commerce:

Shaft	500 feet
Levels	2,530 feet

Extension:

Hardy Shaft (Last Chance #1):

Shaft	600 feet
Levels	500 to 600 feet (?)

Last Chance #2:

2 shafts each 40 feet

Green Shaft (By Chance #1):

Shaft	70 feet
Drifts	60 feet

On both properties there are some shallow workings not included in the above tabulation.

Production:

Total recorded production comes to 177 railroad cars, including 25 shipped from the dumps. Unrecorded production, mostly from the Extension property, might raise the total 300 tons or more.

Ash Peak:

Commerce and Shamrock:

	Cars	Tons		Gold		Silver
	122	3,866		.037		18.40
Dumps	25	1,399		.05		13.5
Extension:						
Hardy Shaft:						
	5 (?)	300 (?)		.08 (?)		21.04 (?)
	30	1,298		.08		21.04
		6,863	Average	.05	Average	18.00

Total value at present metal prices, $105,939.55
Average value per ton, $15.61

Ore Reserves:

We have the benefit of a number of reports made by a number of reputable engineers in past years. Several of these reports are substantiated by complete assay maps. Enclosed is a poor print of one of these assay maps showing details of the sampling on the 5th, 6th, 7th and 8th levels of the Shamrock Mine. In this preliminary report this map is presented only to show the type of detailed data available for careful study, checking and correlation. The Crowther report, for instance, figures proven tonnage on the basis of 812 channel samples, a gigantic job in itself in such a hard, wide vein. To reduce these reports to their simplest form, and for the purpose of comparison, the following tabulation gives the essential figures from each report.

Henry F. Crowther Report 1924:

Ore Blocked "A" Method (Selective)

	Tons	Oz. Au	Oz. Ag	Width	Value Au $35 Ag 77¢
Hardy	15,000	0.05	18.57	10.00	$ 240,600
Shamrock	90,000	0.05	~~15.71~~	7.0	1,246,500
Commerce	30,000	0.05	14.28	6.0	382,500
Dumps	20,000	0.05	12.14		222,000
	155,000				$2,091,600

Ore Blocked "B" Method (Straight Shrinkage Stope)

Hardy	19,000	0.05	16.57	13.00	275.500
Shamrock	130,000	0.05	12.86	10.00	1,514,500
Commerce	30,000	0.05	14.28	6.00	382.500z
Dumps	20,000	0.05	12.14		222,000
	199,000				2,394,000
Indicated	300,000	0.05	12.86		3,495,000

TOTAL "A" METHOD $5,586,600
TOTAL "B" METHOD $5,889,000

H. V. Snell Report:

Blocked	150,000	0.05	14.75	1,965,000
Probable	300,000	0.05	13.23	3,579,000
	450,000			5,544,000

J. K. Bible Report:

"A" Method (Straight Shrinkage Stope)

Blocked	152,751	0.05	16.00	2,140,206

"B" Method (Very Selective - To Produce High-grade Shipping Ore)

Blocked	50,000	0.05	26.00	653,100
Dumps	15,000	0.05	13.00	176,250
Probable	270,000	0.05	16.00	3,598,900

TOTAL "A" METHOD $5,924,356
TOTAL "B" METHOD $4,428,250

N. H. Peck Report:

	Tons	Oz. Au	Oz. Ag	Width	Value At $35 Ag 77¢
Blocked	160,000	0.06	15.00		$2,184,000
Probable	270,000	(0.06	15.00 assumed)		3,685,500
	430,000				$5,869,500

Average All Reports and Methods $5,540,284.00
" " " " " Ag 14,276 ounces
" " " " " 448,300 tons
Average Dumps 17,500 Tons @ 12.5 ounces Ag.

In September Setter and I sampled and estimated the tonnages in the Extension dumps. The Hardy shaft is caved in and not accessible, nor do we have assay maps. Presumably all material mined in the workings is either now on the dumps or was shipped to the smelter. We can thus arrive at an approximation of the grade of all material broken, although it must be understood that a considerable portion of this material must have come from nearly barren development outside of the ore shoots. The Hardy shaft, for instance, is supposed to have been started on a surface ore shoot which only persisted to a depth of 20 feet. Hardy states that the next shipping ore was encountered at 200 feet, and followed up on a separate vein from that developed by the shaft for 125 feet. Shipping ore was again encountered at the 450 foot level, and is said to be continuous from there to the bottom of the shaft at 600 feet. Accordingly, it is to be presumed that about 400 feet of the 600 foot shaft is out of the ore shoot. Nevertheless, we measured up only a little over 1,000 tons on the dump, so that 1½ tons of ore were actually shipped out of each 2½ tons broken, and the recorded shipping ore averaged over 21 ounces silver per ton. Calculations to arrive at the average grade of everything taken from this shaft follows:

Shipping record	1,298 Tons	Average Au. 082	Ag	21.04
Estimated excess	300 Tons	Average Au. 082	Ag	21.04 (assumed)
TOTAL	1,598 Tons	Average Au. 082	Ag	21.04
Dump	1,020 Tons	Average Au 0.03	Ag	5.90 (Sayre's sampling)

Average Grade of Ore as Mined

Gold		Silver	
300 x 0.08	24.00	300 x 21.04	6,312.00
1298 x 0.08	103.76	1,298 x 21.04	27,288.88
1020 x 0.03	30.60	1,020 x 5.90	6,018.00
2618	158.36	2,618	39,618.88

Average Gold = 158.36 ÷ 2618 = .06 oz.
Average Silver = 39618.88 ÷ 2618 = 11.31 oz.
Value per ton $10.80

Unfortunately we have no record of the production from the G reen shaft. A careful survey of the underground workings indicate that about 400 tons were raised. Approximately 300 tons are still on the dump assaying gold .04, silver 7.67. In the bin there are 15 tons of sorted ore, which have not been shipped, assaying gold .13, silver 41.42. Hardy has no record of the cars shipped, but thinks they averaged about 35 ounces. Assuming 85 tons shipped at 35 ounces, 15 tons sorted ore still on the dump, plus the dump of 300 tons as sampled, we arrive at a run-of-mine here averaging gold .056, silver 15.03, value $13.49 — total, $5,390.00.

Applying this method to the entire property, using Mr. Murphy's estimate of the amount, and value of the ore on the dumps, and our figure on the Extension dumps, we arrive at a tablustion as follows:

Ash Peak:

Shipping Record	1,339 Tons	Au	.05	Ag	13.5	$16,997.85
	3,666 Tons	Au	.037	Ag	18.4	56,639.70
Remaining on dump	24,000 Tons	Au	.04	Ag	7.0	162,960.00
Extension:						
Shipping Record	1,598 Tons	Au	.08	Ag	21.04	30,362.00
Remaining on dump	1,020 Tons	Au	.03	Ag	5.90	5,701.80
TOTAL	31,683 Tons					$272,661.35

The average value at present metal prices, therefore, of all material broken in both properties, regardless of whether in ore shoots or not, would be about $8.60 per ton, quite a remarkable showing for all development work and from such a wide vein.

Estimated Costs and Profits:

Practically all of the former reports on Ash Peak agree on a mining and milling cost of $4.50 a ton. Personally, I am afraid that the very hard quartz ore will increase the costs of mining and milling above this figure. For the sake of conservatism, I am presenting some figures below based on mining and milling costs at $6.50 per ton. Actually the figure may eventually come somewhere between $4.50 and $6.50. Furthermore, my experience in a good many mines has led me to insert in my costs a large and fairly definite figure to cover the combined costs of mill losses, railroad freight to the smelter, deductions from the gross price of metals imposed by the smelter and smelting charges. The final check from the smelter after making these deductions I call the "economic value", and on this ore I estimate the "economic value" to be 75% of the gross value. Should we eventually be able to ship the ore crude to the smelter, and secure a substantial payment for the silica content, this very large deduction from the gross value would not apply. Also I am inclined to think that a modified system of selective mining is indicated at Ash Peak. In any event, the tabulation below shows the ore as given in the workmanlike Crowther report, both as mined selectively, the A method, and as straight shrinkage stope; the B method, and I show the results of applying the maximum and minimum costs.

Crowther "A" Method

135,000 tons	Blocked Ore - Value	$1,769,600.00	
300,000 tons	Indicated Ore - Value	3,495,000.00	
435,000 tons	VALUE	$5,264,600.00	
	Economic Value @ 75%	3,948,450.00	
Mining and Milling 435,000 tons @ $6.50 per ton			$2,827,500.00
Mining and Milling 435,000 tons @ $4.50 per ton			1,957,500.00

Net @ $6.50 per ton	Net @ $4.50 per ton
$3,948,450.00	$3,948,450.00
2,827,500.00	1,957,500.00
$1,120,950.00	$1,990,950.00

Crowther "B" Method

179,000 tons	Blocked Ore - Value	$2,172,000.00	
300,000 tons	Indicated Ore - Value	3,495,000.00	
479,000 tons	VALUE	$5,667,000.00	
	Economic Value @ 75%	4,250,250.00	
Mining and Milling 479,000 tons @ $6.50 per ton			$3,113,350.00
Mining and Milling 479,000 tons @ $4.50 per ton			2,255,500.00

Net @ $6.50 per ton	Net @ $4.50 per ton
$4,250,250.00	$4,250,250.00
3,113,350.00	2,255,500.00
$1,136,900.00	$1,994,750.00

Crowther Dumps

20,000 tons	Value	$222,000	
Economic Value @ 75%		166,500	
Hauling and Milling @ $3.00 per ton			$60,000

Net on Dumps
166,500
60,000
$106,500

The Deal With the Owners

Ash Peak Mines Company

This company has a well-earned reputation of being very hard to deal with. If we can accept the stories as being true, they turned down the Goldfield

Consolidated in spite of a cash offer of $500,000.00. The price has come down since then, and I understand that the American Smelting and Refining Company turned down a deal for a straight lease on a sliding scale of royalty, from 15% as a minimum to 20% as a maximum. Within the year Murphy has been willing to deal on the basis of a $300,000.00 purchase price, but he required cash payments totaling $90,000.00 during the first year before the operator could expect to get any production at all. The arrangement I have finally closed with him is as follows:

Option price,	$300,000.00	
First payment,	30,000.00	December 11, 1935.

The balance of the purchase price to be paid out of royalty at the rate of 12½%.

Work required:

A. Connect the Shamrock and Commerce Shafts.

B. Install a suitable power plant of at least 250 horsepower, and

C. Work the mine with 500 shifts per month.

Hardy--Ash Peak Extension:

Purchase price,	$100,000.00	
First payment,	5,000.00	January 1, 1936.

The balance to be paid out of royalty at 12½%.

Other terms as to required development and minimum number of monthly shifts yet to be worked out, but I anticipate no trouble in this connection.

Conclusion:

The figures given above are based on the ore actually blocked out in the Commerce, Shamrock and Hardy shafts and probable ore, based on the complete development of these shoots, and an expected shoot which will be developed in making the connection between the Commerce and Shamrock shafts. All former reports on the property and my own preliminary inspection indicate the possibility of still other shoots as yet undeveloped. No tonnage has been estimated from the Green vein. Possible ore shoots in the Great Eastern and Homestead claims of the Ash Peak group, and in the Last Chance #2 claim would raise the total very materially. A possibility not discussed heretofore is only a possibility at present, but should be further investigated. By correlation with Clifton nearby, and exposures on the Gila River, it is indicated that sedimentary beds, particularly limestone, might underlie the Tertiary flows here exposed at a depth of 1,200 feet, or only 400 feet below the bottom of the Shamrock shaft. Such very strong, well-mineralized veins as the Ash Peak and Green might well be responsible for large deposits where they intersect the limestone. Eventually this possibility should be tried out by diamond drilling.

I now have the combined properties under option for $400,000.00, which represents less than 10% of the gross value of the indicated ore. After the first payments of $35,000.00, the balance is to be paid entirely out of royalty and presumably after the mines are in profitable production. It is estimated that $75,000.00 will be required to install the necessary machinery, camp and water supply, and complete the connection between the Shamrock and Commerce shafts. Possibly $50,000.00 more should be allotted to development from the Hardy shaft, and the necessary raises and other work required to put the mines in actual shape for production. On top of this, the first payment of $35,000.00 must be met, or a total of $160,000.00. Should the copper smelters then be in operation, and favorable contracts made for the sale of Ash Peak ores in the crude form, no further capital would be required to go into immediate profitable production for many years to come. Should a mill be required, the water supply from the Gila River must be developed and a mill erected at a cost of $150,000.00 to $200,000.00, making a total capital investment of $360,000.00.

All the above figures and estimates are based on my preliminary investigation made during September. We have 3 months to complete a thorough investigation before the first payment or a decision must be made. My immediate plans are to carry on with a thorough examination, which will include the repairing of the Hardy shaft and sampling its workings. So thoroughly has the Ash Peak proper been sampled and resampled that I anticipate checking this by only a little additional work. The question of titles and water supply must yet be investigated, and a more careful study made of all existing reports and maps, together with a correlation of all this data.

So far, Ash Peak looks like a really large silver deposit which can be secured on very reasonable terms, and put into production for very reasonable capital expense, considering the amount of ore which is indicated. Our 3 months examination period may also bring fresh developments, either favorable or unfavorable, in the silver situation, together with the outlook for copper which has an important bearing on the problem. Under the contracts we have secured, no decision need be reached about the mill until the development work is all completed, and the mine in shape for production. By this time, certainly, copper's immediate status should be pretty definitely settled.

Respectfully submitted,

December 27, 1955.

SUPPLEMENTARY REPORT ON THE ASH PEAK MINES

Forewords:

This report supplements my preliminary report under date of October 4th, [illegible], and I will not repeat the information therein contained on the location, geology, ore, history, production etc.

From that date to this we have carried on an examination of the property under the direct supervision of Mr. H. P. Nagel, Jr. and I have put in a considerable part of my time at the mine. Under Mr. Nagel have been six to eight men. Our resampling of the Shamrock in various spots chosen at random has checked former sampling close enough so that we feel justified in accepting the assay maps in our possession as being substantially correct. Reopening of the Hardy Shaft proved to be a much more difficult and lengthy proposition than we had anticipated and we have just within the last few days come to the bottom of the shaft. I am accordingly unable to submit complete data about this showing. Further study indicates that my former estimate of costs may have been a little high and my former estimate of economic recovery a little low.

As a whole the examination has resulted very favorably. Ash Peak is a developed mine to the extent of over 6500 feet of underground workings, nearly all of which is in ore. Only a few small stopes near the surface in the Shamrock and Commerce and one at the 300 foot level in the Hardy have been taken out. As proof of the values in the ore we have not only complete assay maps made with the expenditure of a great deal of time and money but we have the record of shipments produced during the development. Ash Peak represents in my opinion the best-proven deposit of silver ore in the Southwest, if not one of the best in the country today. We have an exceptionally favorable deal and the mine may be put into production at very reasonable expense considering its potentialities. We have one uncertain factor; the price of silver. Even here the Ash Peak deposit is remarkable in its "elasticity". The occurrence is such that the grade of ore mined can be kept at almost any desired point. At the sacrifice of tonnage a campaign of very selective mining would produce such a high grade ore that even on a falling silver market a large part, if not all of the preliminary investment, could be recovered.

Property:

Beside the five patented claims listed in my preliminary report the Ash Peak Mines Company owns, and we have secured under lease and option, the following additional claims:

Patented

Commerce Mill Site
Summit Mill Site

Unpatented

Bender
Arion
Isabelle
Queen
Defender
King
Tomboy
Yankee
Queen Mill Site
Arion Mill Site
Bender Mill Site
Defender Mill Site
Tomboy Mill Site
Isabelle Mill Site
Yankee Mill Site
King Mill Site
Great Eastern Mill Site
Homestead Mill Site
Fraction Mill Site

The approximate disposition of these claims is shown on the accompanying map.

Examination:

Certain 50 foot lengths and certain cross cuts on various levels of the Shamrock Mine were chosen at random for check resampling. A number of shallow surface workings were entered and sampled. All samples were channel cuts with hammer and moil. Samples were sent to Charles O. Parker & Company of Denver who did the assaying.

The Hardy Shaft proved to be in very bad condition from top to bottom. All former timbering had rotted away, the walls in many places were caving in and muck was hung up at a number of places in the shaft. We installed a gasoline hoist, hoist house and a new head frame. The upper 35 feet of the shaft was completely retimbered and new temporary timbering, ladders and skids were installed to the bottom. All available former reports and maps were checked over. We made a preliminary investigation of the local water supply. The road to the Hardy Shaft has been put into excellent condition and roads to the Shamrock and Commerce made passable. A camp site has been located. We have made preliminary inquiries regarding the availability of secondhand machinery and equipment in the general district.

Sampling:

The most thorough former job of sampling was done by the Arizona-Anaconda Mines Company which, as I understand it, was the name under which George Wingfield and Goldfield Consolidated Mining Company operated at Ash Peak. A photostat of their assay map showing 812 samples, and reduced about one-half in size, is submitted herewith. Also on this map are shown the location and results of our own check sampling.

On the following page is a tabulation showing a comparison of our samples with the former or Crowther samples.

The hard quartz ore contains its silver in the form of little streaks and clouds of argentite. There is no possibility with this type of ore of checking individual channel cuts nor can it be expected that even restricted areas in the mine will check closely. While our gold results were consistently higher than the former sampling ~~it will~~ be noted that our silver results average somewhat lower. ~~On the 500 east~~ and on the 400 we got higher silver results. By a rather ~~remarkable~~ coincidence the grand total of all Shamrock samples worked out into dollars and cents checked former sampling within one cent.

There is no question in my mind that the Arizona-Anaconda sampling was honestly done. We have run into no discrepancy which could not be expected in this character of ore. It would have been a foolish waste of time and a great deal ~~of money~~ for them to carry on any such campaign as cutting 812 samples unless they did the very best job they knew how. I think we are justified in accepting the former sampling and assay maps as substantially correct.

The surface and shallow workings sampling which we did did not show up anything of very great value other than to indicate certain areas along the vein where silver values were starting to come in.

Proven Ore:

In the Shamrock Mine, due to the nature of the deposit, there is some difficulty in translating even the most complete assay map into an exact estimate of tonnage by grade. The 500, 600, 700 and 800 foot levels are presumably driven the length of the ore shoot. The 50 foot and 100 foot levels are short; the 200, 300 and 400 foot levels are mere stubs. On the 500 foot level, due to the expense and time involved in driving on the hard quartz vein, the level was driven entirely in the soft hanging wall dyke. Crosscuts at 50 foot intervals penetrated the vein but did not give the more complete showing which is available in the levels below. The result has been also to have the level cave in badly and it is now only partly accessible. In the 600 foot level the drift has been driven rather crooked; in places it reached the hanging

Comparison of Samples - Shamrock Shaft

	Number Sample Taken Crowther	Number Sample Taken Nagel	Average Width Crowther	Average Width Nagel	Ounces Silver Crowther	Ounces Silver Nagel	Ounces Gold Crowther	Ounces Gold Nagel	Value per ton Crowther	Value per ton Nagel
700 W - Drift from 25 ft. to 75 ft. CC	10	10	-	3.63	12.235	10.76	.048	.127	11.14	12.73
700 W - Drift CC at 75 ft.	3	5	15.2	13.7	4.24	3.34	.011	.0225	3.93	3.82
700 W - CC at 25 ft.	3	3	14.2	14.4	14.71	6.255	.049	.104	13.04	8.46
600 E - Drift from 100 ft. to 150 ft. CC	11	11	-	4.54	18.66	170.25	.035	.063	16.59	15.21
600 E - CC at 100 ft.	5		13.9		10.66		.035		9.43	
	5	3	14.4	14.0	12.43	10.53	.045	.049	11.32	9.82
600 E - CC at 150 ft.	4		17.2		10.77		.067		10.64	
	4	3	17.1	17.3	10.52	15.03	.058	.104	9.39	15.21
400 E Drift	7	7	-	3.13	10.57	11.74	.028	.047	9.12	10.48
100 W - Drift	8	8	-	5.64	14.25	9.02	.03	.041	12.02	8.38
Total	56	48			13.02	11.59	.040	.072	Ag10.05 Au 1.40 11.45	Ag 8.32 Au 2.52 11.44

wall dyke and in other places it strays out into the quartz ledge. The 700 foot level follows the ore more closely but as the mineable width is considerably greater than the width of the drift, we have used sampling at the crosscuts as giving more reliable evidence than depending entirely on the drift samples. We have not succeeded in getting down to the 800 foot level; the ladders and timbering below seven are rotten and it is practically out of the question to get at the necessary repairs until the shaft is equipped to hoist.

Our analysis of all the available information would indicate the following blocked out ore:

Shamrock -	102,200 tons at 13.50 oz. silver -	.05 oz. gold
Commerce -	24,300 tons at 12.8 oz. silver -	.05 oz. gold
Hardy -	10,000 tons	
Dumps -	15,000 tons	

Our difficulties at the Hardy shaft have not only delayed our sampling and study of this property, so as to give definite figures, but we have had to put our entire crew on two shifts work there so as to get the job done and this prevented our checking over the quantity and grade of ore available in the dumps. We have come so close, however, to checking former estimates on the Shamrock and Commerce that I feel we are safe in cutting down the amount formerly estimated as available at the Hardy Shaft and the dumps to the figures given above.

My estimate on the total assured ore, therefore, would be as follows:

150,000 tons at 13 ounces silver and .05 gold.

A study of the assay map indicates how easily the mine-run grade could be raised. Nearly all of the 7th level for the entire width of the vein should produce an ore averaging better than 15 ounces. In other levels mining a narrower width and stoping only the better areas would also produce a higher grade ore. Possibly 75 per cent of the 150,000 tons estimated above could be mined to keep an average grade of 15 ounces or better.

Possible Ore:

Former reports have classified as "indicated" or "probable", 270,000 to 300,000 tons of ore. It is my thought that Ash Peak will eventually produce more than this total but I am inclined to class this as "possible" rather than "probable" ore in the restricted engineering sense.

If further development were to prove that the area outlined in brown on the Shamrock assay map contained ore and if we project the Commerce ore shoot down to the level of the bottom of the Shamrock Shaft we would add to our ore reserves as follows:

Possible Ore:

Shamrock	44500	tons
Commerce	57000	tons

Except for the Hardy Shaft 525 feet deep, accompanied by practically no lateral drifting, there is no serious development on any of the other indicated ore shoots. The proven and possible ore in the Shamrock amounts to 150,000 tons. The proven and possible ore in the Commerce amounts to 60,000 tons. If we assume as "possible" ore shoots as good as the Commerce the various places on the property which have surface indications of ore, we might tabulate as proven and possible ore the following:

Shamrock	150,000
Commerce	60,000
Hardy	60,000
Green	60,000
Last Chance #2	60,000
Fraction	60,000
Great Eastern	60,000
Grand Total	510,000 tons

Metallurgy:

Ash Peak ore presents, from first examination, only one serious metallurgical problem. This is the combination of silver in the form of very minute grains of argentite in a dense chalcedonic quartz. Grinding this ore will be expensive on account of its hardness. It will have to be ground very fine to release the particles of argentite. Once ground the balance of the treatment should be simple. The argentite will float readily and we should be able to make a high recovery with a very high ratio of concentration. Murphy of the Ash Peak Company insists that former flotation tests showed a ratio of concentration as high as 150 to 1. Should this prove to be the case it is readily apparent that a 150 ton mill would reduce a days run of ore to one ton of concentrates. To cyanide one ton of concentrates would require a strong cyanide solution but the tanks, buildings etc. which make up so large a part of the cost of the cyanide installation would be reduced to a very small size and all of that end of the operation could be handled by one man. Marketing the product in the form of an impure bullion containing both the gold and silver would probably cost less than the transportation and treatment charges on concentrates. Economic recovery (that is the actual check received for our product as compared to its gross metal content) should be higher - possibly as high as 85%.

We are starting work on the ore at once at the Colorado School of Mines Metallurgical Research Plant under the very able supervision of Mr. A.

J. Weinig, an outstanding expert in his line. Ash Peak ore is very similar to the Tonopah ores and many Mexican ores so that we have the benefit of proven metallurgical practice as a guide to our problem.

Water:

In the rolling country east of and between the mine and the Gila River we feel confident we can develop enough water for domestic purposes and for a mill of 100 tons capacity. The Ash Peak Mines Company owns two patented claims covering the drainage directly to the east of the mine, about one and a half miles away, and approximately 600 feet below. The upper well here, according to previous tests, makes about 8 gallons a minute. The lower well, below the junction with another gulch, makes 16 gallons a minute. The two wells could be joined by 1800 feet of one inch pipe with 150 feet of drop. Syphoning from the upper well and combined they should make 24 gallons a minute. Water would be pumped from the lower well to the mine. About two miles to the northeast is another well in still another drainage area, which might possibly be combined with the Ash Peak wells if the supply there was insufficient. Water from this last well would have to be pumped over a 75 foot divide, whence it could be piped by gravity to the Ash Peak lower well. There have been no tests on the actual capacity of this well but it is stated that the present pump and two inch pipe used to water stock has never lowered the water materially.

A larger operation and a larger mill will require either a pumping plant on the Gila River, or there is a possibility that permanent water level is not more than 100 to 400 feet below the bottom of the Ash Peak shaft. It is proposed to do some diamond drilling from the 800 foot level of the Shamrock shaft as soon as the shaft is equipped. If the drilling indicates water level a reasonable distance below us it would be quite possible to combine the development of sinking on the main Shamrock orshoot with the development of our water supply right at the property.

Title:

Abstracts of all of the property under lease have been prepared and have been examined by our attorneys Grant, Ellis, Shafroth & Toll. While there is no complete filing of notices of assessment work on the unpatented claims nor have the notices of "intention to hold" been filed during the recent years when assessment work has not been required, no outsiders to our knowledge, have come into the district. In the absence of any conflicting claims it is always easy to rehabilitate title to unpatented property. Taxes on the patented claims have been paid up. As to the chain of title on both properties there are some flaws but nothing of apparent serious moment. Mr. McHendrie, from Mr. Ellis' office, is leaving for Arizona tonight to clean up the odds and ends, both in the title situation and in the inception of our lease and option contract.

Costs:

No two mines have quite the same operating problems. At Ash Peak there is no history of operation or stoping, and, accordingly, no past operating costs upon which to base future estimates. Under these conditions estimates of costs must be approximate, Subject probably to considerable change in actual practice, I itemize our costs as follows:

Mining:

Development	1.00	
Stoping	1.40	
Timbering	.10	
Tramming	.20	
Hoisting	.15	
Overhead and miscellaneous	1.15	
		$4.00
Milling:		2.50
Total		$6.50

The first item of $1.00 for development would not apply to already developed ore. I think we are safe in estimating mining and milling costs of $5.50 on the 150,000 tons now developed. The milling charge of $2.50 is high but probably cannot be beaten with our pilot mill, or until we go into operation on a larger scale. If we proceed at once with a development campaign on the outlying ore shoots, our costs would include the $1.00 for development, although it is not really applicable to the ore we expect to mine at first.

Plan of Operation and Financial Requirements:

It is proposed to start at once upon the following campaigns:

1. Erection of camp and assay office.
2. Install water supply.
3. Install Power Plant.
4. Repair and equip Shamrock, Commerce and Hardy Shafts.
5. Connect the Shamrock 600 East with the Commerce 500 Feet. This involves 1250 feet of driving and 200 feet of raising.
6. Diamond drilling.

6A. Depending on the results of drilling-sinking the Shamrock Shaft.

7. Erection of pilot mill.

Details of this equipment and development with estimated costs are shown on the following tabulation:

Estimate of Equipment etc.

Camp	Office, Boarding House, Living Quarters		10000.00
Water Supply -	Clean out 3 wells	200.00	
	1 1/2 miles 2" pipe line	2800.00	
	Siphon - 3000 ft. 1" pipe	500.00	
	Pump - 25 gals. per min.	500.00	
	Buildings over wells	500.00	
	Installation	500.00	5000.00
Assay Office -			3000.00
Power Plant -	250 HP Diesel engines with Generator & Switchboards	15000.00	
	Building, Installation	5000.00	20000.00
Shaft Repairs -	Shamrock		
	Retimber - track & guides for skids and counterbalance, $10.00 per ft.	8000.00	
	Head Frame & Sheave Wheels	700.00	
	Skip Pocket on each level 8 at $100 each	800.00	
	3" Air Line 800 ft. at 50¢	400.00	
	3/4" Water Line 800 ft. at 12 1/2¢	100.00	10000.00
	Commerce		
	Retimbering where necessary	500.00	
	New Head Frame & Sheave	200.00	
	Ore Pockets 2 at $50	100.00	
	2" Air Line 500' at 35¢	175.00	
	1/2 " Water Line 500 at 12 1/2	65.00	
	Ventilator Line 500' at 20¢	100.00	1140.00
	Hardy		
	Timbering where necessary	300.00	
	Ore Pockets 2 at $50	100.00	
	2" Air Line 600 at 35¢	210.00	
	1/2" Water Line 600 at 12 1/2¢	75.00	
	Ventilator line 600 at 20¢	120.00	805.00
			49945.00

		49345.00
Shaft Equipment - Shamrock		
Electric Hoist and Motor	4000.00	
Compressor & Motor 260' 50 HP	1400.00	
Skip	250.00	
Blacksmith Shop	200.00	
Sharpener	1500.00	
Oil Furnace	200.00	
Forge	100.00	
3 Mine Cars	150.00	7800.00
Commerce		
Hoist & Motor	1000.00	
Compressor & Motor	1400.00	
2 Mine Cars	100.00	
Blower & Motor	150.00	2650.00
Hardy		
Compressor (gas driven) rent		
Compressor & Motor	1400.00	
Receiver	100.00	
Blower	75.00	1575.00
Portable Equipment-		
4 Machine Drill Outfits (drifters)	2000.00	
Rail, Pipe, Ventilator to surface	800.00	
Drill Steel	500.00	
Shovelling plate, picks, shovels, hammers, saws, axes	40.00	
Truck - station wagon or pickup	800.00	4140.00
Development - Shamrock		
Drift W - 600 ft. level 650 ft. at $12	7800.00	
Drift E 600 ft. level 1000' @ $12	12000.00	
Raise 600 E to connect Commerce 200' at $18	3600.00	23400.00
Commerce		
Drift W 500' Level 600' at $12	7200.00	7200.00
Hardy		
Drift E 600' level 1000' at $12	12000.00	
Raise to connect Shamrock 100 ft. at $18	1800.00	13800.00
		110510.00

		110,510.00
Sinking -	Shamrock	
	300 ft. at $50.00	15,000.00
Diamond Drilling -		
	1,000 ft. at $2.00	2,000.00
Payment on Properties		25,000.00
Mill -		50,000.00
Overhead & Miscellaneous -		17,490.00
		220,000.00

The closest present estimate of the time element in our financial requirements would be as follows:

December, 1935,	$50,000.00	(Already in hand)
January, 1936,	50,000.00	
February,	20,000.00	
March,	25,000.00	
April,	25,000.00	
May,	25,000.00	
June,	25,000.00	

Conclusion:

The above estimates contemplate a pilot mill of 60 to 75 tons daily capacity. As a matter of fact, we are just starting our metallurgical research work, and I am already inclining to the advisability of an 100-ton mill at the start. Should we decide on the larger mill, the total budget would have to be increased about $25,000.00, and these additional funds would be required during February, March and April, 1936. The entire matter of estimating the cost of our equipment is one of considerable difficulty. It is very fortunate for the Ash Peak operation that within a radius of 100 miles there have been within the past few years several ill-fated large mining enterprises. These have been stock-selling ventures, initiated without any real knowledge of the mining business or of their particular mine. Operations have lasted long enough to erect a big expensive surface plant, and then the whole enterprise has failed. At Dos Cabezas, 50 miles south of the mine, a recent venture of this kind "blew up" after purchasing and installing a new power plant, consisting of a series of large new Diesel engines, a mill and a complete layout of standard mining equipment. It is my understanding that these practically unused Diesel engines, of 280 HP each, and costing in the neighborhood of $25,000.00 apiece, can now be purchased for $6,000.00 or $7,000.00 apiece. The entire mine equipment and the grinding end of the mill and the flotation units might well fit in with our requirements. A similar enterprise at Stein's Pass, only 30 miles from the mine, has Diesel equipment and a 100-ton mill. The equipment was merely used to sink one lift of the shaft, as I understand it. One of our first jobs is to put a man in the field investigating every one of these situations, and we have every expectation of securing almost new suitable equipment at one-half to one-third of the new cost.

Under the circumstances it can be realized how difficult it is even to approximate our total investment in equipment. Also, in the purchase of this equipment, it is difficult to estimate how much will have to be paid for in cash and how much can be spread out over a series of months.

As a matter of efficient mining, and as required by Arizona law, actual stoping operations must be deferred until two separate exits from the mine are provided. The connection between the Shamrock and Commerce Shafts, involving 1,100 feet of drifting and [illegible] feet of raising must precede our going into production on a large scale. The installation of camp, water supply, power and rehabilitation of the Shamrock and Commerce Shafts must precede the starting of this development. The entire program will require four to six months. Careful metallurgical testing, the actual designing of the mill, and the purchase and assembly of the equipment must precede erection. If the mill should be completed before the connection is finished, it could start immediately on dump ore and ore produced from development, if we are in ore.

Once a pilot mill or half-size mill is installed, we are in a rather fortunate position to meet the exigencies which may arise from a fluctuating silver market. Should the market break, unless it crashes altogether, we can take advantage of our 6,500 feet of development, restrict mining to high grade occurrences only, and the ore already mined on the dumps, and carry on a strictly "salvage" operation. If we are uncertain even then about the silver market, the present blocked out ore would last a 100-ton mill for practically 5 years, and make an estimated profit of over $150,000.00 a year. Depending on the market, we can go to either a 200-ton or 300-ton operation, stepping up the returns accordingly, and lowering our costs.

There are still uncertain items in our cost estimates, but assuming that we can reach an 95% economic recovery, and total mining and milling costs of $5.50 without development, we can pay royalty, and still make a net operating profit of $4.40 a ton on a 15-oz head. We can net $[illegible].68 per ton after paying royalty on a 12-oz head. To give some idea of the possibilities if silver goes to $1.29 an ounce, we could mine a 13-oz head, pay royalty, development at $1.00 a ton, and still net $9.71. Royalty should quickly pay the purchase price, and profit would then step up to $12.00 a ton.

In spite of our inability to estimate in advance accurately what our costs or recovery are going to be, and in spite of the uncertainties surrounding the whole silver situation, we have the safe-guard of a mine developed at a cost approximating our purchase price. We are purchasing it practically on a royalty basis. The vein is wide; the values are commercial; there is little chance of losing our preliminary investment under any conditions, and we can look forward to a successful operation if silver stays at its present price, and to a very profitable operation should the price of silver rise.

Respectfully submitted,

Robert H. Seyre

Dear Sir:

Because of the urgent need of the Miami Smelter for a steady source of supply of 50 to 80 tons daily of siliceous flux, an examination has been made of the Ash Peak Mine, special attention having been given to the Commerce workings as they present the best opportunity of starting production with a small initial investment. Shipments to Miami of over 15,000 tons from the Commerce during the past four years have shown the ore to be ideal as a smelter flux and have averaged over $9.00 in silver and gold, giving a better margin for the smelter than is readily obtainable at present from other siliceous ores in Arizona. Although siliceous ores offering a better margin might be discovered by detailed study of other mining districts, adequate investigation of the possibilities would consume several months, and the problem for the Miami Smelter must be solved immediately. Since the Commerce Mine appeared to offer the best solution to the present emergency, this examination was made.

CONCLUSIONS:

9,100 tons of positive and probable ore, averaging 4.7 feet in width and $8.40 in value, has been estimated in the Commerce Mine. This is ore which has been exposed and sampled on at least one side in drifts or raises. It may be considered as "ore in sight" and can be mined without undue difficulty by shrinkage stoping. The ore blocks range from a low of $7.20 to a high of $9.80. This grade of ore is considered satisfactory by Mr. Honeyman.

600 feet of new development is quite likely to uncover 6,000 to 15,000 more tons of commercial ore. Thus, if there was a foot of development for every 15 tons mined, the present reserves of over four months would probably be supplemented by an extra three to nine months' supply. Further prospecting might discover additional ore.

LOCATION:

The Ash Peak Mine is located on the western edge of Greenlee County in eastern Arizona. It lies just south of the paved highway connecting Lordsburg with Safford and is 9 miles west of Duncan and 25 miles east of Solomonsville, the rail point to which the ore is trucked.

PROPERTY:

The Ash Peak vein has been prospected by three main shafts. At the northwest end is the Hardy, the principal development being on the 500 and 600 levels. This mine is owned by Joseph Hardy and partners, is leased to Arthur Murphy, and is subleased to Robert Williams, who is mining it at present. About 2500 ft. to the southeast along the vein is the Shamrock shaft with extensive workings on the 500, 600, 700, 800 and 975 levels. About 1900 ft. southeast of the Shamrock is the Commerce shaft with extensive development down to the 500 level. The Shamrock, the Commerce, and the ground between and for some distance on each side is owned by the Ash Peak Mines Company, a corporation controlled by Arthur Murphy.

HISTORY:

Previous to 1916 Murphy and others sank the three shafts a few hundred feet and shipped some ore from this and other minor development. About 1916, Goldfields Consolidated took a working option on the Shamrock and Commerce and performed most of the development work done to date in both mines. In 1918 they stopped work, taking a minority share of the stock for the money spent.

In 1937, the Veta Mines, Inc., commenced stoping in all three mines and had produced by the time they shut down nearly three years later about 200,000 tons, the greater part of this having come from the Shamrock. About 170,000 tons of this was put through a flotation mill, and it is claimed the heads ran $9.36. The direct-shipping ore is supposed to have run better. The principal reason given for the closing of operations is the poor recovery obtained in the mill. In order to check this report, five samples were taken at 50-foot intervals across the tailings dump. These averaged 3.4 ounces silver and 0.01 ounces gold. Thus, with $9.36 heads, the Veta mill was losing over $2.75 in the tails. This is enough of a loss to have been an important factor in the failure of Veta's operation at Ash Peak.

After Veta shut down the mine, Arthur Murphy worked two stopes in the Commerce for a few months and shipped to Miami 3,400 tons of $8.61 ore. From the Hardy Mine Williams has shipped 1,095 tons of ore averaging $20.25.

FACILITIES:

The Commerce shaft is in fairly good condition and has a headframe and adequate water in the bottom for drilling needs. A good road leads from the paved highway to the ore bin. There is no pipe or track in the mine.

GEOLOGY:

The Ash Peak vein is continuous structurally in a northwest-southeast direction from the Hardy shaft to the Commerce and for some distance beyond in each direction, but much of it is too narrow or too low in silver to be ore. Over a considerable part of its extent the vein is marked by a prominent quartz outcrop. The vein dips southwesterly from 70 degrees to nearly vertical and cuts across flat-lying andesites.

Along the hanging wall of the vein from the Hardy to the Commerce is a dike a few feet wide of augite-andesite, locally called diabase. This dike is closely parallel to the vein but is later than the vein and cuts into it in places. In the Commerce workings the first foot of hanging-wall rock above the vein is commonly fine grained like the footwall andesite. Apparently this rock is a chilled border of the dike.

The vein minerals are, in the order of abundance, white, brown and green chalcedony, quartz, white to black calcite, rhodochrosite, argentite, pyrite, and gold. Secondary minerals are found in spots and include cerargyrite, malachite, and gypsum.

Good ore is recognized by clouds of argentite and in places is associated with rhodochrosite and copper stain. Calcite is more abundant near the footwall than near the hanging wall, and values are low where calcite is prodominant. In ore of commercial grade, there is commonly three to six feet of chalcedony and quartz grading off in the footwall into two to ten feet of calcite. Although all of the quartz in the hanging-wall half of the vein may be silver-bearing, it is sometimes found that there is a streak a foot or two wide which is considerably richer than the rest. The footwall of the vein is, in most places, indefinite with calcite and quartz stringers penetrating fractured andesite for some distance.

Banding, particularly of chalcedony, quartz, and rhodochrosite is common, and there is much brecciation of the vein material and the footwall andesites. Brecciated vein matter is commonly recemented by later mineralization. In places the dike is brecciated. Narrow, nearly vertical cross fractures and veins are numerous, but apparently bear no particular relation to ore shoots. Nodules and vugs are common.

Slips and faults are uncommon near the vein except along the hanging-wall dike, where they are numerous but apparently of small magnitude and no importance, except in the Hardy Mine. In the Commerce these slips and fractures are closely parallel to the contact between the vein and the dike. They are accompanied by a little thin gouge, hematite, and kaolin. In many parts of the Commerce, the sheeting and slipping in the dike is a foot or more above the hanging wall of the vein and possibly marks a zone of weakness between the "chilled border" and the medium-grained core of the dike.

In mining the Ash Peak vein in the Commerce section, two geologic factors must be watched. First, the values are best near the hanging wall, and even where there is eight feet of vein, predominantly quartz, it is usually uneconomical to take more than five feet. Secondly, the sheeted dike offers a hanging wall which, when once started running into a stope, is difficult to stop. To avoid dilution and caving, therefore, it is good practice to try to leave a shell of solid rock between the sheeted dike and the stope. Where the sheeting and slipping is within the dike and a foot or two removed from the vein, it may be possible to mine clean to the dike. Where it is along the vein-dike contact, it is wise to try to leave 12 to 18 inches of the vein as a protective shell, even though in some cases this may result in a serious reduction in grade of ore mined. On the deeper levels where there is more moisture in the rock and at those points where the dike is much altered, the problem of sloughing, and consequent dilution, is more serious.

SAMPLING:

Fifty-three channel samples, weighing five pounds to the foot, were cut in the Commerce workings during the present examination. Sampling was limited to areas that gave promise of ore, although numerous footwall samples were cut. On the 50 and 200 levels, eight samples were cut as close as possible to old channels for which assays were available on an assay plan in Murphy's possession. The comparative results are given in the following table:

	No.	Ag	Au	Width	
Old Assay	5180	17.50	.07	5.0'	50 Level
New "	1	33.26	.06	4.6'	"
Old "	5181	9.70	.055	5.0'	"
New "	2	4.46	.015	3.7'	"
Old "	5182	4.60	.025	3.4'	"
New "	3	6.48	.02	3.8'	"
Old "	5189	3.78	.02	4.5'	"
New "	4	14.49	.11	3.5'	"
Average Old		9.42	.044	4.5'	$ 8.17 for 30' stretch
Average New		15.63	.051	3.9'	$12.80 " "
Old Assay	5261	5.02	.05	4.5'	200 Level
New "	20	8.59	.03	4.5'	"
Old "	5260	11.48	.055	4.4'	"
New "	19	7.76	.02	3.8'	"
Old "	5259	6.56	.045	4.0'	"
New "	18	14.57	.05	3.3'	"
Old "	5258	13.11	.05	4.4'	"
New "	17	11.44	.04	4.2'	"
Average Old		9.1	.05	4.3'	$ 8.15 for 25' stretch
Average New		10.4	.034	3.9'	$ 8.52 " "

Part of the discrepancy in the two averages may be attributed to the difference in width. These results and the results of other assays have led to the following conclusions: (1) the vein is very spotty, and numerous assays, closely spaced, are necessary to gain a representative average for a stretch of ore; (2) Murphy's assay map does not give too high a grade for the ore.

In Botsford's report of 1919 on Ash Peak is included a section with assays by Goldfields Consolidated. These check in a general way our sampling and Murphy's assays, but are so widely spaced as to be of no practical use in the present connection. Murphy's assay plan, however, gives assays every ten feet or closer over most of the mine, and has been used extensively in the present computation of ore reserves. Much of the sampling done in this examination was in drifts and raises run since the plotting of Murphy's map.

The present sampling and a study of the old and new assays lead to the following conclusions:

(1) Values are commonly in the first five feet of vein under the hanging wall, but where the vein is very wide, the best values occasionally are in the footwall of the vein, and the hanging wall is lean.

(2) Along strike the vein is very spotty, and a commercial stope will in most cases include a certain amount of low-grade ore.

(3) There is insufficient evidence on which to base conclusions as to the pitch or distribution of ore shoots in the Commerce.

(4) Occasional portions of the vein, which contain numerous horses of andesite are, nevertheless, good ore.

(5) Six-ounce ore cannot be distinguished with any certainty by eye from twelve-ounce ore.

(6) In a few places in the Commerce, drifts leave the ore in the walls.

(7) The relationship between average assay values obtained from channel sampling and the grade of ore mined from shrinkage stopes is not known with certainty.

ORE RESERVES:

In calculating ore in sight "positive ore" has been allowed to 25 feet above a drift which shows ore, and "probable ore" extends for the next 25 feet. Where there is any doubt as to the grade of a block or as to whether it will be mined, it has been made probable. No ore has been figured closer than 20 feet from the shaft or 20 feet below a level, or closer than 15 feet from a stope. No ore has been figured below the 500 level. The sole basis for calculating grade has been the assays from our sampling and from Murphy's plan. Blocks as low in average value per ton as $7.20 were figured because Mr. Honeyman believes such ore to be within the economic limit.

Following is a list of the individual ore blocks:

	POSITIVE					PROBABLE				
Place	Tons	Width	Ag	Au	Value	Tons	Width	Ag	Au	Value
50SE	520	4.2'	11.5	.045	$9.65	320	4.2'	11.5	.045	$9.65
"	550	5.9'	10.7	.034	8.73	330	5.9'	10.7	.034	8.73
200SE	1070	4.6'	11.9	.043	9.80	365	4.6'	11.9	.043	9.30
200NW						700	4.2'	10.3	.042	8.70
400SE						1060	5.1'	8.9	.027	7.20
400NW						570	5.3'	9.5	.038	8.00
500SE	840	4.5'	9.5	.036	7.95	1650	4.5'	9.5	.036	7.95
500NW	390	4.5'	8.2	.048	7.45	735	4.5'	8.2	.048	7.45
Totals	3370	4.7'	10.6	.041	$8.90	5730	4.7'	9.6	.038	$8.09
Positive						3370	4.7'	10.6	.041	8.90
Grand Total						9100	4.7'	10.0	.039	$8.40

The blocks listed above are shown on the section accompanying this report. Lack of satisfactory evidence as to grade has prevented the inclusion of the following probable blocks of ore:

Location	Probable Length	Probable Tonnage	Probable Grade
100 level-130' NW of Shaft, in FW	40'	1000	$8.00
300 " -120' " " " , above stope	50'	1000	7.50
400 " -250' " " " , " "	50' (plus)	1000	9.00
500 " - 90' " " " , below 400 stope	60'	1500	7.50

RECOMMENDATIONS FOR MINING ORE BLOCKS:

(1) 50 Level

The two shoots of ore on this level are of good grade and could be made ready for mining as quickly as any in the Commerce and probably could be mined right to the surface, taking as much of the outcrop as economical. Before stoping begins, the raise between the two shoots should be sampled every eight feet on each side to see if a single stope could be made of the 50-level ore. Also a few rounds should be taken in the southeast face to see if the ore extends in that direction any farther.

(2) 200 Level southeast

This stope has chutes and is one of the first that should be mined. The grade is good, but it is probable that the ore will not extend to the 100 level. Some pillars of leaner material may have to be left in this stope. A prospect raise on the best ore might be run up to the 100 level ahead of this stope.

(3) 200 Level northwest

This block should not be mined until the northwest face of the 200 level is advanced at least 140'.

(4) 400 Level southeast

The drift does not follow the best ore in all places under this block. Before mining starts, a drift should be advanced at least 40' southeast on the best ore from the southwest end of the crosscut. This block will be difficult to mine because of the brecciated hanging wall, the low grade, and the migration of values over a 20-foot width from footwall to hanging wall and back.

(5) 400 Level northwest

The northwest face should be advanced at least 40 feet before this ore is stoped.

(6) 500 Level southeast

This ore can be stoped long, as shown, and the grade kept at about $8.00, or it can be restricted in length and the grade raised to $9.00 or $10.00. It might be well to determine the extent of the shoot on the 400 level southeast before starting this stope.

(7) 500 Level northwest

This shoot, though low in grade, is better in gold than any of the others. It is very apt to lengthen out going up and produce much greater tonnage than shown.

POSSIBLE ORE:

In addition to the ore reserves of 9100 tons, there is apt to be developed by stoping and an adequate development program of say 5 to 10 feet a day, the following tonnage:

Location	Method of Development	Possible Tonnage	Probable Grade
Various	Stoping	3000	$7.00-$ 8.50
" (discussed under ore reserves)	Raises & Crosscuts	4500	$7.50-$ 9.00
"	Drifts 2,3,4 & others	5000	$7.00-$10.00
250' NW of shaft above 300	Drift 1	3500	$9.00
" " 200	" 5	2500	$9.00
300' or more SE of shaft (200L)	" 6	?	?

To obtain this additional tonnage, at least 800 feet of development may have to be done.

RECOMMENDED PROSPECTS:

Without attempting to describe all the possible prospects which are suggested above by the discussion of location of probable and possible ore shoots, six specific recommendations will be made. These are not necessarily the first six development faces to run, but they should be given consideration. They are indicated on the section in the order of preference from the point of view of developing good ore quickly.

(1) 300 drift northwest

By advancing the face 120' or more, it is very likely that a good stope above the 300 can be developed on the upward extension of the ore shoot in the northwest half of the northwest stope on the 400. Reports indicate this to be very good ore, and samples in the raise along the edge of the stope support this.

(2) 200 drift northwest

This face should be advanced at least 40 feet to see if there is a shoot of sufficient length to make a good stope. It should then be advanced another 100 feet to see if the ore stoped at the northwest end of the 300 level comes up to the 200.

(3) 400 drift northwest

This face should be advanced to the limit of ore, and at least 40 feet, to see if there is a sizeable shoot to stope here. Prospect #1 on the 300 might give some clue as to what to expect.

(4) 400 drift southeast

This face should be advanced out of the crosscut to see if there is a shoot of sufficient length, uniformity, and grade to be mined.

(5) 200 level northwest

Depending to a certain extent upon the findings of prospect #1 on the 300 northwest, this face should be advanced 200 to 400 feet from the shaft to look for the ore shoot below and as a general prospect.

(6) 200 level southeast

Surface indications suggest the possibility of a shoot to the southeast of the Commerce workings. By advancing this face 200 feet, this ground could be prospected, and the low-grade shoot known on the 400 southeast could be investigated.

THE SHAMROCK AND HARDY MINES AS POSSIBLE SOURCES OF FLUX FOR THE MIAMI SMELTER:

As compared with the Commerce, the Shamrock and Hardy mines have the following disadvantages for turning over to a sub-leaser to supply the Miami Smelter with siliceous flux:

Shamrock

(1) Bad condition of shaft.
(2) No head frame
(3) Greater depth
(4) No ore blocked out
(5) Warm air

Hardy

(1) Mine inspector requires 500 ft. surface connection before doing any more development.
(2) No ore blocked out.
(3) Short shoots on numerous vein splits.
(4) Faulting
(5) Complicated ownership and lease.
(6) Ore below 500 must be handled twice.

It is quite possible that Williams, who is operating the Hardy, will be unable to continue because of the ruling of the mine inspector. Since the Hardy ore is of good grade, it might possibly be desirable to advance Williams small amounts against shipments to help him put through a raise on ore to the surface. This should not be done, however, without careful geologic and engineering supervision.

Respectfully submitted,

[illegible]

TAD:CW

cc-Messrs. [illegible]

HISTORICAL REPORT ON OPERATIONS
of the
ASH PEAK MINES

January, 1968

Report on Ash Peak Mines, Greenlee County, Arizona
TS 8S, R 30E, Sections 2, 3, 10, 11
Mineral Survey No. 3076 A & B

The Ash Peak Mines were discovered in 1899 and five claims were patented October 14, 1913. The history of the early development work done by Goldfield Consolidated is documented in the Preliminary Report on the Ash Peak Mines of October 4, 1935, and Supplementary Report of December 27, 1935, by Robert H. Sayre, Sr.

Following is a summary of the history of this property after that time:

On January 1, 1936, Veta Mines, Inc. took over the operation of the Ash Peak Mine and the Hardy Group of claims. The Commerce, Shamrock, and Hardy shafts were rehabilitated. The Commerce and Hardy shafts were equipped with gasoline powered hoists, the Shamrock shaft was equipped with an electric hoist. The shaft was reconditioned and a skip with approved safety guides was installed to the 800 ft. level. Stearns-Roger Manufacturing Company were awarded a contract to build a 200 ton flotation mill and a 1000 KW power plant. Development work was started to drive the 600 ft. level of the Shamrock toward the Commerce and the 500 ft. level of the Commerce toward the Shamrock. These two levels were eventually connected by means of a raise, and ventilation established. Stoping was started on the 600 ft. level, and the mill went into production about September, 1936, and operated continuously on a 200 ton per day basis until January, 1938. The property was shut down due to a drop in price of silver from \$0.775 to \$0.645. The mining and milling equipment was sold and the entire property was dismantled. Veta removed 173,282 tons of ore during this period as shown on U. S. Bureau of Mines records.

On June 24, 1941, the property was re-opened as a silica flux mine by Inspiration Consolidated Copper Company smelter under the direction of Clifton H. Smith, and a lease was given to Howard Mottier of Duncan, Arizona, to operate the property. Ore was mined, trucked to Safford, Arizona, and then shipped by rail to the Inspiration smelter at Miami, Arizona. It is estimated that during this period of time, 50,000 tons of ore were mined from the Commerce workings above the fifth level and 74,000 tons from the Shamrock shaft above the 5th level. The U. S. Bureau of Mines records show a total of 123,917 tons were mined from 1946 thru 1953.

The following data on the 1951 operation was furnished to me by Harold Foard, Superintendent and ore buyer of the Inspiration Consolidated Copper Company on March 1, 1966:

Tons Mined		19,842
Values: Gold	.032 oz. @	
Silver	9.7 oz.	
Mining Costs		\$139,031.00
Trucking to Solomon		22,029.00
Royalty to Arthur Murphy		12,444.00

Royalty was based on \$0.50 per ton minimum or 5% on values over \$10.00.

Harold Foard stated that this was a typical year toward the latter part of the operations which was finally closed down in June of 1954 and has remained idle ever since.

I obtained the following information from Cliff Smith, former Superintendent for Inspiration Copper Company, now living in Phoenix, Arizona, when I visited him on March 1, 1966.

On about the 50 ft. level of the Shamrock shaft there is a crosscut which goes from the shaft to the bottom of the creek bed. In this crosscut a quartz vein approximately two feet wide was evident and Smith decided to drive a crosscut on the 400 ft. level a distance of 24 ft. plus one round to see if this vein persisted in depth. At 26 feet he encountered this vein and it turned out to have better width and equal values to the Ash Peak vein developed by Goldfield Consolidated. Therefore, stoping was accomplished on both veins by Inspiration Copper and subsequently a crosscut was driven on the 500 ft. level, and this ore developed and mined and later a crosscut was driven on the 600 ft. level to the vein which at this point is 50 ft. in width and averages 5.6 oz. silver, according to Smith. The 600 ft. level on the Ash Peak vein is driven out 1100 feet to the west toward the Hardy shaft and a long hole drill hole was put every 100 feet from the Ash Peak vein to the Hanging Wall vein and it was found to persist for the entire 1100 feet.

No information was given on the width of the vein other than it was very wide, nor on the values of these long hole drill holes. According to Smith the Veta Mines operation used the Shamrock shaft below the 600 ft. level to "gob" their waste rock and the shaft is, therefore, filled up below this point and Inspiration never cleaned it out.

In May of 1962 additional information was obtained from the offices of Inspiration Copper Company from the retiring chief geologist, Mr. E. F. Reed, and at this time various maps were inspected and a copy of their vertical projection was obtained. From this it was determined that most of the ore developed by Goldfield Consolidated above the 700 ft. level has been mined out as well as one stope on the 800 ft. level and two stopes on the 975 ft. level. The lower workings were undoubtedly mined out by Veta Mines, Inc. Inspiration did not mine any of the ore below the 500 ft. level in the Hanging Wall vein; so it can be assumed that the Hanging Wall vein is definitely proved for a length of 1000 feet and a height of 100 feet from the 600 ft. to the 500 ft. levels. Width and value are unknown. There has been no mining of the Hanging Wall vein below the 500 ft. level and, therefore, exploration might prove a considerable tonnage.

In June of 1966 records were obtained from the United States Bureau of Mines at Denver on the Ash Peak property showing production records from 1934 to 1954. Summary of this is as follows:

Tons mined by Veta Mines, Inc., 173,282. Production 3,613 oz. gold, 933,643 oz. silver.

Inspiration Consolidated Copper mined 123,393 tons of ore with production of 4,388 oz. of gold and 1,139,201 oz. silver.

Production

Company	Tons	Gold Total Oz.	Gold Oz/Ton	Silver Total Oz.	Silver Oz/Ton
Veta Mines Inc.					
Mill	173,382	4,404	.025	1,212,693	7.0
Mill Tails	173,200	1,732	.01	433,000	2.5
Calculated Mill Heads	173,382	6,136		1,645,693	9.5
Commerce Dump Direct Shipping Ore	6,551	193	.029	50,074	7.6
Inspiration Consolidated Copper					
Direct Shipping Ore	123,393	4,388	.035	1,139,201	9.2
Total and Average	303,226	10,717	.035	2,834,968	9.3

Base metal production is minor and only the Veta Mines concentrates were assayed. Records show a total production from 173,282 tons of ore of 55,000 pounds of copper or .02%, and 118,000 pounds of lead or .03%.

Respectfully submitted,

A. George Setter, E.M.

June 1940

UNITED STATES
DEPARTMENT OF THE INTERIOR
Harold L. Ickes, Secretary

BUREAU OF MINES
R. R. Sayers, Acting Director

INFORMATION CIRCULAR

MINING AND MILLING METHODS AND COSTS AT THE ASH PEAK MINE OF THE VETA MINES, INC., DUNCAN, ARIZ.

BY

Herbert L. Lines

I.C. 7119,
June 1940

INFORMATION CIRCULAR

UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

MINING AND MILLING METHODS AND COSTS AT THE ASH PEAK MINE OF THE VETA MINES, INC., DUNCAN, ARIZ.1/

By Herbert L. Lines2/

CONTENTS

1/ The Bureau of Mines will welcome reprinting of this paper provided the following footnote acknowledgment is used: "Reprinted from Bureau of Mines Information Circular 7119."

2/ One of the consulting engineers, Mining Division, Metal Mining Methods Section, Bureau of Mines, and general superintendent, Veta Mines, Inc.

CONTENTS (Cont'd)

ILLUSTRATIONS

INTRODUCTION

This paper is one of a series on mining and milling methods and costs published by the Bureau of Mines.

The Ash Peak mine of the Veta Mines, Inc., Duncan, Ariz., is of particular interest in that the only metal of commercial value in the ore is silver. The silver is concentrated by flotation; the concentrate is shipped to a smelter for treatment.

ACKNOWLEDGMENTS

The writer is especially indebted to R. H. Sayre, president and general manager of Veta Mines, Inc., through whose courtesy this paper was made possible. Grateful acknowledgment is also extended to Harry E. Davis, mine superintendent, and Ralph Shiminin, mill superintendent, who kindly supplied details of operation. M. E. Volin, assistant engineer of the Bureau of Mines, assisted in preparing the paper.

SITUATION AND ACCESSIBILITY

The Ash Peak mine and mill are at the foot of Ash Peak in the Ash Peak mining district, Greenlee County, southeastern Arizona; it is 12 miles west of Duncan, a station on the Arizona & New Mexico Railroad, a subsidiary of the Southern Pacific Railroad running from Lordsburg, N. M., to Morenci, Ariz. Paved highway 70 goes through Duncan and passes within 1/4 mile of the mine, which is reached from the highway by a dirt road with an average 12-percent grade.

CLIMATE

Duncan has climatic conditions similar to those at the Ash Peak mine. According to the Weather Bureau,[3] the average daily temperature at Duncan over a period of 23 years was 65.9°, with a low average daily temperature of 44.5° in December and a high average of 85.2° in July. The lowest temperature recorded in 6 years was 4° in January and the highest temperature in the same period 112° in July.

The average annual precipitation in 8 years was 11.17 inches. The greatest average amount was 1.86 inches in August and the least, 0.25 inch in May.

The altitude of Duncan is 3,645 feet and at the mine 4,200 feet.

HISTORY

The early history of the Ash Peak mine is not known to the writer. According to a geological report made by Grant[4] in 1918, Goldfield Consolidated Mines Co. held an option on five lode claims and two millsites for which an application for patent had been made.

Development by the Goldfield company in 1918 and 1919 comprised an 800-foot shaft, the Shamrock; a 500-foot shaft, the Commerce; 110 feet of shallow shafts; and 6,167 feet of drifts and raises. Improvements to the property comprised roads, a water-supply system with its source at Ash Springs, living quarters, office and store buildings, and buildings for housing the mining equipment that was installed to develop the property.

The Veta Mines, Inc., took over the property in 1936 in substantially the condition described and commenced stoping in March 1937. There is no record of any silver concentrates being produced by milling ore from the Ash Peak mine until the present company began operations.

GEOLOGY

There are no sedimentary rocks in the vicinity of the Ash Peak mine except a little Gila conglomerate and recent wash. According to Grant, the formation consists of a series of surface flows and tuffs which have gentle southerly dips ranging up to 10°. There are also numerous dikes and volcanic plugs.

The Ash Peak vein occurs along a strong fault fissure of considerable displacement which shears the tertiary tuffs and flows of rhyolite and andesite; it is continuous for over 2 miles, forming hogbacks in places.

3/ Weather Bureau, Climatic Summary of the United States, Section 26, Southern Arizona: Pp. 11, 22-24.

4/ Grant, Wilbur H., Geological Report on the Ash Peak Mine, Duncan, Greenlee County, Ariz.: November-December, 1918.

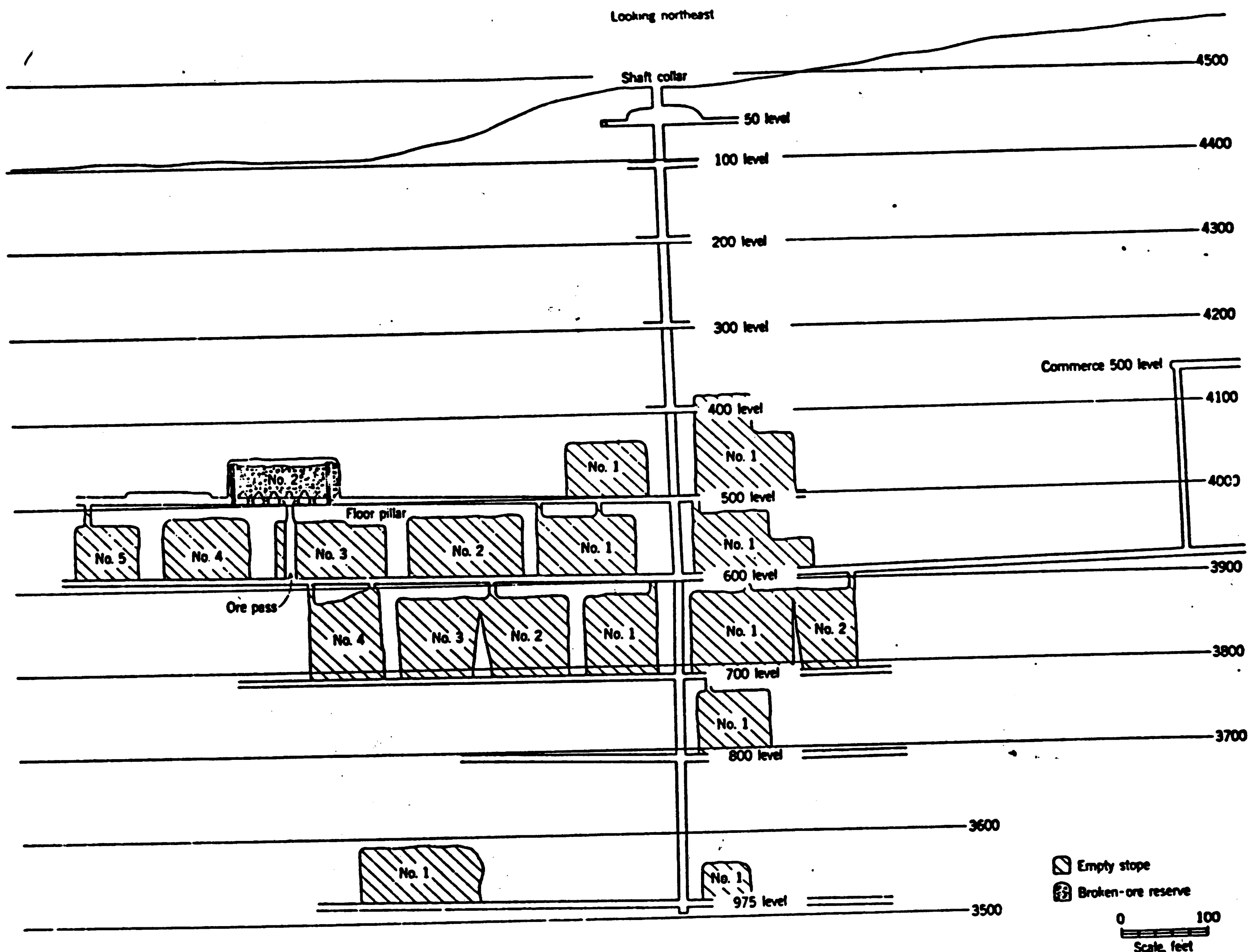


Figure 1.–Vertical projection, Shamrock mine, Veta Mines, Inc., June 10, 1939.

The vein strikes N. 60° W. and dips 80° N. Vein matter occupies the footwall side of the fissure.

A diabase dike, which possibly was a feeder to basalt surface flows now eroded away, separates the vein matter from the hanging wall of the fissure. This feature presents a complication in that the diabase sloughs and fractures easily, making it difficult to mine the ore clean.

The ore ranges from 3 to 18 feet in width, averaging 7 feet. It decreases in grade from the dike toward the footwall. Typical Ash Peak ore is made up of abundant dense banded chalcedonic quartz and a silicified andesite showing some flow structure, varying amounts of calcite, rhodochrosite, and pyrite, and small amounts of silver occurring as clouds of fine argentite or as streaks associated with the quartz, evidenced by their unusual hardness. The argentite is readily recognizable. The calcite occurs in various sizes of crystals in colors ranging from grayish white to deep black.

MINING

Physical Characteristics of Ores and Enclosing Rocks

The physical characteristics of the wall rocks and of the ore in the upper levels of the Ash Peak mine are well suited to shrinkage stoping. Below the 800-foot level the presence of excessive water may cause a change to a cut-and-fill method owing to sloughing of hanging-wall gouges and the diabase.

The vein is narrow, tabular, and nearly vertical; the walls are silicified andesite that stand well unsupported. The footwall of the ore body is an economic rather than a structural one. The hanging wall is kept within the limit of the ore to prevent dilution by the diabase. Drawing of ore in stopes must be done evenly to prevent piping through of the diabase, which sloughs to some extent in the partly emptied stopes.

Ore shoots are fairly continuous and consistent in grade. The hard, dense ore is difficult to drill, but it breaks into small fragments requiring no secondary blasting in stopes. In the relatively dry upper levels of the mine, broken ore flows readily from closely spaced chutes.

Prospecting and Exploration

Exploration comprises drifting on the vein and at intervals determining its width by crosscutting for short distances into the hanging and foot walls. The drifts and crosscuts are sampled by the usual methods; however, close sampling is not required, as the ore is uniform and easily identified.

Some prospecting is done by diamond drilling. Three thousand feet of diamond core drilling was done during 1938 at a cost of $1.89 a foot, and from January to June 1938, 868.0 feet of diamond core-drilling was done, at a total cost of $1,582.16, or $1.82 a foot. At present (1939) all diamond drilling is contracted for at a rate of $1.25 a foot for holes up to 150 feet deep and $2.50 a foot for holes over 150 feet deep. A 5/8-inch core is recovered in shallow holes and a 7/8-inch core is obtained from the deeper holes.

Development

Figure 1 shows a vertical projection of development workings at the Shamrock mine. There are two groups of workings from which ore is mined, the Shamrock and the Commerce; the shafts are 2,000 feet apart on the surface. The 600 level of the Shamrock is connected to the 500 level of the Commerce to provide ventilation and outlets to the surface. The Shamrock has supplied about 75 percent of the ore and has been developed most extensively.

Entry to the Shamrock workings is by means of an 80° incline shaft in the vein footwall. The shaft is 975 feet deep; and the 10 levels, connected to the shaft by short crosscuts, are at 100-foot intervals, except for the 50 and 975 levels. The drifts driven on the vein for exploration are used as haulage levels. The present company has done most of its development on the 500, 600, and 700 levels.

The Commerce workings are opened by a two-compartment shaft 575 feet deep. The shaft is on an 80° incline in the footwall of the vein. The level interval is 100 feet, and crosscutting and drifting practice is similar to that in the Shamrock.

Development details

Shafts. - The Shamrock shaft is 9 feet, 6 inches, by 4 feet, 6 inches, in cross section inside the lining. It has three compartments, a 4-foot hoisting compartment, a 2-foot, 1-inch manway, and a 1-foot, 5-inch pipeway. The shaft is timbered with 6- by 8-inch Douglas fir sets throughout most of its depth. Where sets are not necessary, stulls of the same size are used. Lining is of 2- by 12-inch Douglas fir. Between compartments are full partitions of 2- by 12-inch Douglas fir hung on 4- by 6-inch fir dividers of the same. Manway landings are 18 feet apart, and ladders are staggered to conform to safety regulations.

The pipeway carries a 3-inch air line, a 1-inch water line, a water column, and electric conduits. The water line and a 2-inch air line extend to the various levels. Telephones are provided at each station.

The Commerce shaft has a hoisting compartment and a manway; the latter also serves as a pipeway. The full partition of 2- by 12-inch Douglas fir is hung on 6- by 8-inch stulls. The shaft is lined only where necessary. Hoisting is by bucket riding on skids.

Drifts and crosscuts. - The drifts driven in the vein along the footwall for exploration purposes also serve for development and ore extraction, the vein having no sharp turns. Most of the drifts are 5 by 7 feet in cross section. No support is required, as there is little pressure from the walls or back.

One-hundred-and-twenty-five-pound and 145-pound drifters mounted on 3-inch columns are used for drilling. Drill steel of 1-1/8-inch, round stock with lugged shank is hand sharpened. As loss of gage is excessive in drilling the abrasive silicified andesite, the steel is sharpened with 1/4-inch changes in gage. Starting bits have a gage of 2-3/8 inches and finishing bits a gage of 1-3/4 inches. Generally, a complete change is required for each 6-foot hole, using 18-inch changes. Detachable bits were tried but were unsuccessful because of the quick loss in gage. Used bits are ground to 1-3/4-inch gage and used with jack rods on the last change of drill steel for finishing up a hole. The purpose of this practice is to use up the supply of detachable bits on hand.

The average advance for a drift round is 4 feet. A standard round is not used as the holes are placed to take advantage of conditions at the face. Generally 18 to 20 holes are drilled and about 75 1-1/8-inch cartridges of 40-percent gelatin dynamite loaded for each round. All blasting is done at the end of the night shift.

Broken rock is loaded into cars by hand, except on the 500 level, where a mechanical loader is used in widening the drift in preparation for stoping. Tramming is done by hand.

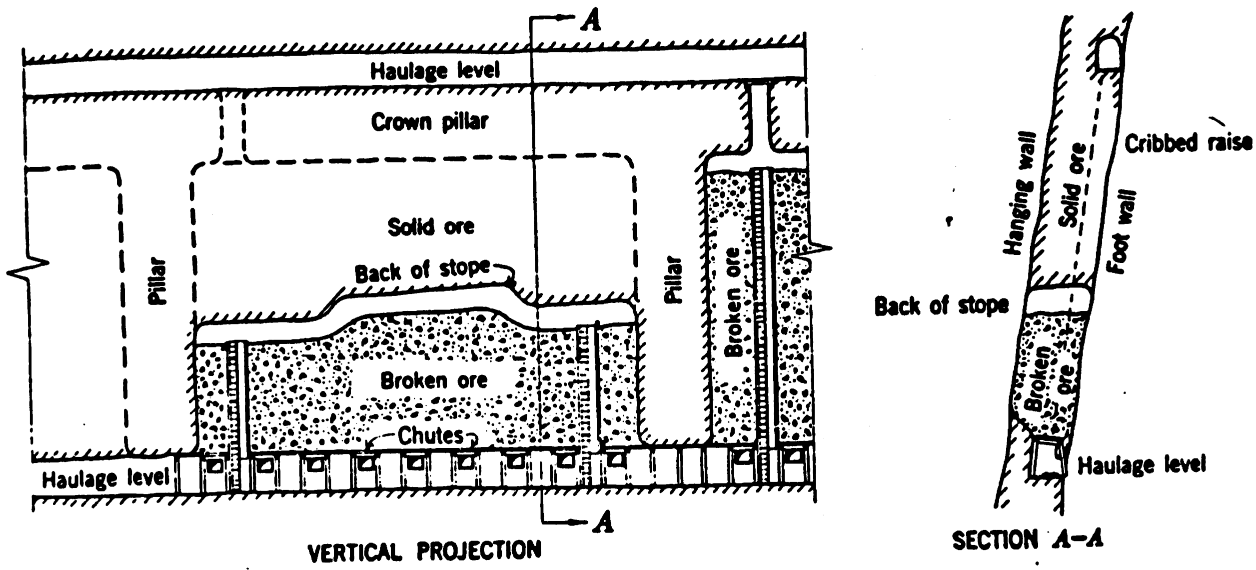
Most drifts are driven on contract at $8.00 a foot with a four-man crew, comprising a machineman and helper on one shift and two muckers on the opposite shift. The company supplies tools and compressed air.

Raises. - A raise was put up to connect the 600 level of the Shamrock workings to the 500 level of the Commerce workings. Short finger raises are put up to an undercutting level in beginning some stopes, but no raises are extended ahead of stoping.

Stoping

Ore is mined by shrinkage stoping. Stoping was begun in March 1937. In June 1939 ore was being drawn from two stopes on the Shamrock at the rate of 130 to 140 tons daily; one of the stopes was being drawn empty, while the swell was being drawn from the other. About 60 tons a day was being mined from the Commerce. A third stope filled with broken ore was held in reserve.

Formerly most of the ore was stoped on timbered-drift backs; the present practice is to stope on arch pillars, particularly in the wider ore bodies. Figure 2 illustrates the two practices. Maintenance and repair costs were found to be higher when stoping was done on timbered-drift backs in wide ore shoots with a bad hanging wall than on arched pillar backs.



SHRINKAGE STOPING ON TIMBER-DRIFT BACK

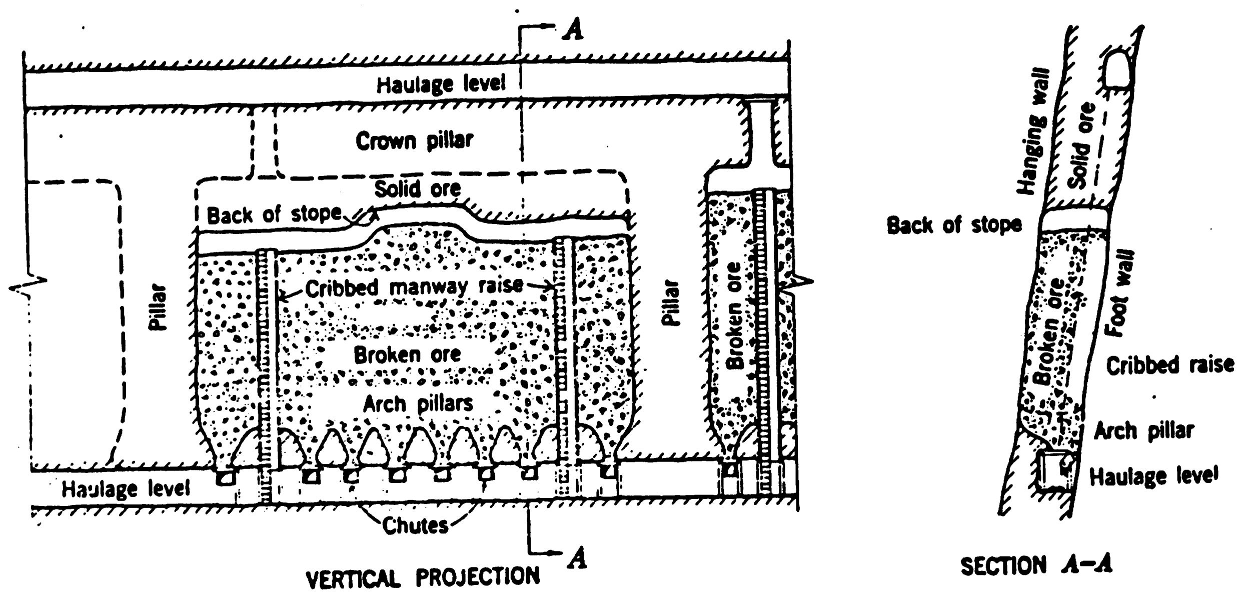


Figure 2.–Shrinkage stoping on arched-pillar back.

Stopes range in length from 100 to 130 feet. Pillars 10 to 20 feet thick, depending on the condition of the hanging wall, are left between stopes. Crown pillars 20 feet thick are left to support the haulageway on the next level above. No provision has been made to mine these pillars. Stopes are carried up on the width determined by sampling to be ore.

In narrow veins where the back of the development drift is in good ore, the drift is slabbed to the full width of the ore, and then a cut is taken out of the back. After the broken material is cleaned out, drift sets are put in on 4- to 5-foot centers, with chutes on 12- to 15-foot centers on the footwall side. The close spacing of chutes is necessary because the ore is damp enough to hang up in drawing. Drift sets are made up of 8- by 8-inch vertical posts, with 8- by 10-inch caps 8-1/2 feet above the track. Round lagging 4 to 5 inches in diameter supports the broken ore. Double posts are used where necessary. Plank spreaders are used instead of dapping the caps. Chutes are made of 3- by 12-inch material, and gates are 36 inches wide by 30 inches high. A feature of the chutes is the use of two lengths of 2-inch pipe, one on each side of the chute gates, to hold the gate boards. Timbered manways are carried up at each end of the stope along with stoping. These are 5 by 5 feet inside and have two compartments, one a manway and the other a timber slide. In wide stopes the manways are cribbed with 3- by 12-inch timber, and in narrow stopes stulls are used. A tight partition separates compartments in both types. There are 18-foot landings in the manways with staggered ladders.

To keep mining costs at a minimum, raises are not driven to the level above until the stope is nearly completed. This practice is permissible as the rock temperature is not high and natural ventilation is good.

Wide portions of the vein where the ore is lean above the back of the drift are mined by stoping on arch pillar backs. A pair of finger raises is begun at 12- to 15-foot intervals along the drift where the chutes are to be situated and driven in opposite directions in the plane of the vein on about 60° inclines. Raises from adjoining chutes intersect 15 feet above the back of the drift to form arch pillars for supporting broken ore. Chutes are installed in the footwall side of the stope on 6- by 8-inch vertical stulls or drift sets, depending on the width of the vein. The undercutting level is completed by slabbing down the ore in the V-shaped part of the stope above each chute.

Drilling is done with 120-pound automatic stopers, using 1-inch quarter-octagon hand-sharpened steel. Holes are drilled 7 feet deep, using 16-inch changes of steel.

The stope is advanced by taking a V-cut out of the center and then taking vertical slices advancing first toward one end of the stope and then toward the other. The miners stand on the broken ore to drill, and enough is drawn after each blast to leave 7 feet of headroom between the broken ore and the back. The rock breaks into small pieces, and no blockholing or bulldozing is necessary in the stopes. In 1938, 2.45 pounds of powder was consumed per ton of ore broken.

Stoping is contracted to a crew of eight men, four working on each of the two shifts. The usual arrangement is for a machineman and his helper and a timberman and his helper to work on one shift, and for another machineman and his helper and two trammers to work on the opposite shift. The day drilling-crew leaves the drill set up at the end of the shift; and the night drilling-crew completes the round, takes down the equipment, and loads and blasts the holes.

Depending on the tramming distance, the contract price for stoping is 80 to 90 cents a ton of 12 cubic feet measured in place. The contractors do all the drilling, carry up the manways, and tram all the swell. They also furnish their own explosives and pay their own compensation insurance.

All blasting is done at the end of the night shift, about midnight. From 30 to 60 holes are blasted in each stope, using 1-1/8-inch 40-percent gelatin dynamite. Air valves are left open to clear the stopes of fumes.

Underground Transportation

All tramming is done by hand with 16-cubic-foot cars, running on 18-inch gage track of 12-pound rails. The broken ore is drawn from the stopes and trammed to 25-ton ore pockets at the shaft. In 1938 the average tramming distance was 300 feet and in 1939, 500 feet. In the Shamrock workings, the ore pockets are situated on the 600,700, and 975 levels. Ore drawn on the 500 level is trammed to an ore pass in No. 3 stope and dropped through to the 600 level. Grizzlies made of 4-inch-diameter stamp stems spaced with a clear opening of 6 inches are situated over the pockets. One man for each two trammers breaks the oversize with a 16-pound hammer.

Ore is loaded into a 1-1/2-ton skip through air-operated gates and hoisted to the surface, where it is dumped automatically onto the pan conveyor leading to the coarse-ore bin. The skip serves all underground activity, including hoisting of men, supplies, and equipment. There is one skip tender on each shift to load the ore from the ore pockets, handle the supplies, and in general attend to proper operation of the skip.

Ore at the Commerce workings is hoisted in a bucket of 1,600 pounds capacity and dumped into a bin on the surface. It is loaded by gravity into a 4-ton truck and hauled one-half mile to the coarse-ore bin at the crushing plant. Truck haulage is done on contract at the rate of $0.20 a ton.

Percentage of Extraction

Nearly all the ore broken is recovered with little dilution in grade if the stopes are drawn completely empty in one operation and drawing is done evenly. No waste is sorted, either underground or on the surface. Where development or other workings are driven in country rock the broken material is loaded as waste and dumped into empty stopes if possible.

The total extraction of ore is about 85 percent where stoping is done on timbered-drift backs and about 75 percent where stoping is done on arched pillar backs.

Drainage

Underground water at the Shamrock workings is intercepted on the lower levels and collected in the shaft sump. About 30,000 gallons a day is collected under normal conditions. A duplex reciprocating pump with a capacity of 250 gallons a minute, driven by a 40-horsepower motor, handles the excess water in about 2 hours each shift.

Ventilation

A connection between the 600 level of the Shamrock workings and the 500 level of the Commerce workings provides good natural ventilation for both. Dead-end drifts are ventilated by means of electrically driven auxiliary blowers. The air is directed to the face through 8-inch canvas ventube. Raises and stopes are cleared by opening the compressed-air valves before blasting at the end of the night shift.

Mine Labor

As much of the mining as practicable is done on contract. It has been found that this practice attracts the best class of miners to the camp. The contractor pays compensation insurance and pays for his explosives. Contracts are made at the following rates:

Drifts, 5 by 7 feet in section	$ 8.00 per foot
Drifts, 7 by 9 feet in section	11.00 per foot
Raises, the company doing all loading and ore-drawing	6.00 per foot
Timbering for stope preparation	25.00 per chute
Timbering straight back stopes	2.00 per foot
Stopes - $0.60 to $0.80 per measured ton of 12 cubic feet. The $0.80 contract rate is made to a crew of 8 men, who do all breaking, tramming of swell, and timbering of manways.	
Tramming from stope and ore pass	0.30 per ton

Surface workmen and part of the men working underground are on straight company time. Two 8-hour shifts are worked for 6 days a week. Time is figured on the basis of a 6-hour shift, with the two extra hours as overtime at one and a half times the hourly rate.

The number of man-hours worked during 1938 in mine leasing, exploration, development, and ore extraction follows:

Breaking	-	15,275
Timbering	-	12,580
Tramming and loading	-	40,450
Total		68,305

The following table shows the average distribution of employees in June, 1938, in the mine and on the surface, including the mill.

Average distribution of employees in June 1938 in the mine and on the surface, including the mill

Shamrock Mine	
Underground	23
Surface, including hoisting	3
Commerce Mine	
Underground	9
Surface (hoisting)	2
General	
Diamond drilling	1
Mill (including crusher)	8
Powerhouse	4
Shops (including steel sharpening	7
Warehouse	1
Assaying	1
Superintendence	2
Engineering	1
Truck transportation	3
Tailings dam	1
Water supply	3
Daily average for June	69

The wage rates in effect in June 1939 are shown in the following table:

Classification	Rate per 8-hour shift	Hourly rate for 6 hours	Hourly rate for overtime
Surface labor	\$ 3.50 3.60 4.00	\$ 0.38 .39 .44	\$ 0.61 .63 .68
Muckers, trammers, and mill helpers	4.05	.44	.705
Hoistmen	4.28	.46	.76
Miners and timbermen	4.50	.48	.81

Safety, First Aid, and Fire Protection

The regulations set forth in the Arizona State Code of Mining Safety are observed and practiced. All manways have staggered ladders with landings, and full partitions are installed between the manways and timber slides.

As a means of promoting safety and efficiency, electric cap lamps are used for individual illumination underground. Sixty lamps are available for renting to the employees at $1.00 a month, which takes care of charging, maintenance, and repairs. The greatest repair items are lenses and globes. Lamps are checked out at the beginning and checked in at the end of each shift. A special room off the change house is provided for storage and charging of the lamps. The capacity of the charger is 50 lamps each 6 hours. A surface employee is responsible for proper maintenance of the lamps; he also cleans up the change room, makes primers, and trams the waste hoisted.

No trained first-aid teams have been developed up to the present, but many of the miners have had first-aid instruction.

There is little danger of fire underground because of the natural dampness. The connection between the Shamrock and Commerce workings provides an exit in case of fire. Water is available from taps into the waterlines at intervals on the levels. Two fire-fighting helmets are part of the standard mine equipment.

The housing of surface equipment is in nearly all instances wood framework covered with corrugated-steel sheeting. Dwellings, the office building, and the dining room and commissary building are the chief fire hazards, as they are of wood finished with stucco.

Mining Costs

Direct stoping costs per ton mined and milled, in units of labor, lumber and timber, power, water, explosives, and other supplies, are shown in the following table for 1938, when 54,709.8 tons of ore was mined and milled at the Ash Peak mine.

Direct stoping costs per ton mined and milled in units of labor, explosives, lumber and timber, power, water, and other supplies for 1938

	Cost per ton mined and milled
Labor	$ 1.1174
Explosives	.2042
Lumber and timber	.0978
Power	.1179 1/
Water	.0075 1/
Other supplies	.1439
Miscellaneous	.1749
Total stoping cost per ton mined and milled	$1.8636
Total operating cost, 1938, per ton mined and milled	$ 4.9394 2/
Percent stoping cost of total cost	37.7 percent

1/ Percentage of total consumption estimated.
2/ Includes leasing, exploration, development, ore crushing and milling, handling and hauling concentrates, administration, and overhead per dry ton mined and milled (see "Combined Costs" p. .)

The cost of development work from January to June 1938, inclusive, was $16,665.36 for 1,038.8 feet of drifting, crosscutting, and raising, or $16.04 a foot. The cost of development work for the entire year 1938 was $15.94 a foot; the cost per ton mined and milled was $0.26.

The cost of principal mine supplies follows:

Explosives:

40-percent gelatin dynamite, 1-1/8 by 8-inch cartridges, per 100 pounds, delivered	$ 11.75

Timber:

Native, sawed, per 1,000 board feet	28.00
Douglas fir, not sawed:	
Stulls, 12-inch diameter small end, per foot delivered	.12
Stulls, 8-inch diameter small end, per foot delivered	.10
Stulls, 6-inch diameter small end, per foot delivered	.08

MILLING

The crushing plant and mill are situated at the mine near the Shamrock shaft. Gravity flow is used in the design, except that the ore discharged from the crushing plant is elevated by conveyor to the fine-ore bin.

The buildings housing the crushing plant and mill are of conventional wood-frame construction covered with corrugated-iron sheeting. Milling operations were begun in March 1937. In June 1939, about 190 tons of ore was being treated daily by flotation, producing 1.7 tons of silver concentrate.

The combined flow sheet of the crushing plant and mill is shown in figure 3.

Crushing and Grinding

Ore from the Shamrock is delivered to the crushing plant by a 1-1/2-ton self-dumping skip. The skip discharges into a trough loading a 20-inch pan conveyor, which carries the ore up a 25 foot, 10-percent slope to a 40-ton, wood coarse-ore bin. Waste can be by-passed from the discharge end of the pan conveyor to a 20-ton, wood waste bin, from which it is loaded by a hand-operated chute into a 16-cubic-foot car and trammed by hand to a waste dump. A 25-ton wood bin beside the main coarse-ore bin has a common opening with it. Trucks hauling ore from the Commerce shaft dump through a grizzly with 10-inch spacings into this bin. The grizzly bars are old stamp stems, 3-1/2 to 4 inches in diameter. Oversize is broken manually.

The coarse ore is discharged through a hand-operated gate onto an inclined grizzly with 2-inch spacings which by-passes undersize, the oversize being fed into a 12- by 16-inch Buchanan jaw crusher driven by a 25-horsepower motor. The discharge is set at 2 inches, but the majority of the crushed product is 3/4 inch in size. The crusher jaw plates are of manganese steel. They are changed each week and the worn ones built up by welding on a hard-facing metal. The ore is very abrasive.

The crushed ore and grizzly undersize discharge onto an 18-inch conveyor belt 40 feet long, running up a 20-percent incline. It is driven by a 2-horsepower motor, at a belt speed of 150 feet per minute. The magnetic head pulley picks tramp iron from the circuit. The conveyor discharges onto a 30- by 48-inch single-deck vibrating screen with 1/4-inch openings, driven by a 2-horsepower motor. The oversize from the screen discharges into a 3-foot, short-head, Symons cone crusher driven by a 60-horsepower motor. The crusher is set at 3/4 inch, but the majority of the product is about 1/4 inch in size. Liners last about 6 weeks. The discharge from the crusher and the undersize from the screen drop onto a 16-inch horizontal conveyor belt 20 feet long, driven by a 1-1/2 horsepower motor, which discharges onto a 16-inch crossbelt driven by a 5-horsepower motor. The second belt conveys the ore up a 30-percent incline 175 feet to the fine-ore bins. A flap of discarded rubber belting is arranged near the loading end of the second conveyor belt to close an electric circuit and sound an alarm if there is no ore on the belt. A similar arrangement is placed on the feed end of the Symons crusher to sound a warning if the crusher becomes choked with feed.

Two 18- by 20-foot, 200-ton fine-ore bins are situated side by side at the head of the mill building. The 175-foot conveyor discharges directly into one of these bins and by-passes to the other bin by a 16-inch conveyor belt 20 feet long, driven by a chain from the 175-foot conveyor. The by-pass conveyor is supported by a framework mounted on four car wheels running on 30-inch-gage tracks of 16-pound rail. The auxiliary conveyor is moved over by hand to by-pass the ore stream into the second bin when the first is full. Both bins are filled by Saturday night, as the mine is not worked Sundays. The crushing plant operates about 12 hours a day.

Ore discharges from the fine-ore bins onto a continuous flat feeder belt, 20 inches by 35 feet in length, driven by a 5-horsepower variable-speed motor. Discharge is regulated through steel gates arranged in tandem, so that ore can be fed from either or both bins. A flap arrangement of the type described sounds a signal electrically when the belt feeder is empty.

Crushed ore discharges into the feed box of a 6- by 10-foot Stearns-Roger ball mill, driven by a 200-horsepower synchronous motor at 24 r.p.m. and loaded with 30,000 pounds of 3-inch forged-steel balls. Manganese-steel liner consumption is about 0.7 pound and ball consumption 4.2 pounds per ton of ore. Cast-iron balls were tried, but their use was discontinued when it was found that consumption was more than double that of forged-steel balls.

The pulp from the ball mill discharges at 72 percent solids through the trunnion to a Dorr Duplex classifier, Model F, 6 by 24 feet, 3 inches, driven by a 5-horsepower motor. The classifier is in closed circuit with the ball mill. A circulating load of about 800 percent is maintained.

A unit flotation cell was placed in the grinding circuit between the discharge end of the ball mill and the classifier in an attempt to improve recovery. Its use was found to be not applicable to this ore.

The approximate distribution of sizes in the classifier overflow follows:

	Percent
Plus 100 mesh	4
Minus 100 plus 150 mesh	12
Minus 150 plus 200 mesh	16
Minus 200 mesh	68
Total	100

Chips and pulped wood caught on the overflow screen of the classifier are collected and burned periodically. The ash, containing about 80 ounces of silver and 1/2 ounce of gold per ton, is screened, sacked, and shipped to the smelter.

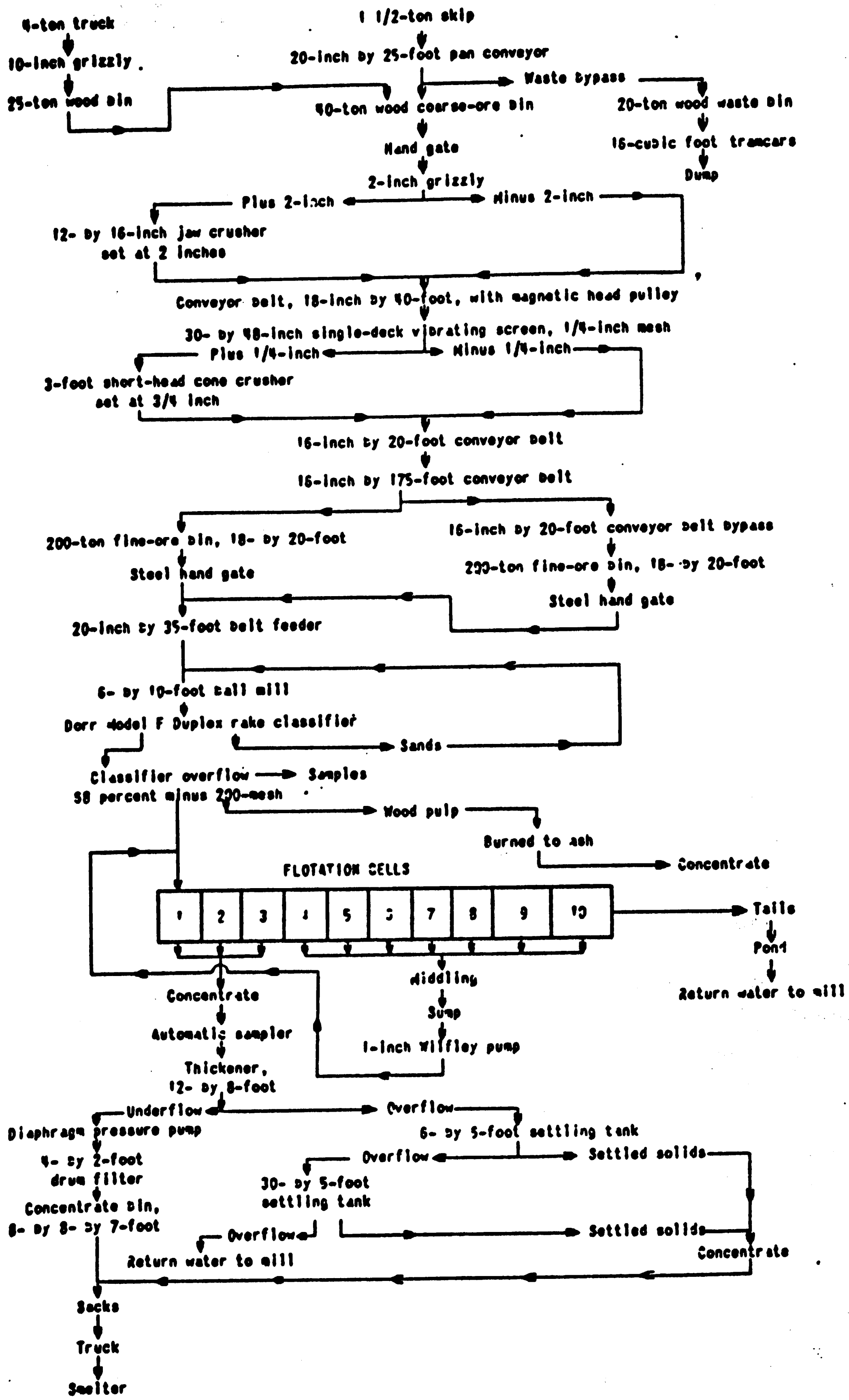


Figure 3.- Flow sheet of Ash Peak mill of the Vega Mines, Inc.; capacity, 100 tons.

Flotation

The classifier overflow passes into the No. 1 cell of a 21-inch, 10-cell Stearns-Rogers flotation machine of the Minerals Separation type. The impeller of each cell is driven by a 5-horsepower motor. A finished concentrate is taken from the first three cells, which are in series. The tailing from these cells is fed to No. 4 cell. The middling concentrate taken from the seven remaining cells, which are in series, is returned by means of a 1-inch Wilfley pump driven by a 3-horsepower motor to the feed into No. 1 cell. Positive aeration is furnished at 2-1/2 pounds pressure by a No. 615 Acme blower driven by a 3-horsepower motor. The pulp density in flotation is low, being only 18 to 19 percent solids. An automatic sampler cuts the concentrate stream from the flotation machine at 15-minute intervals to give a composite sample of the mill operation for each shift.

Reagents are fed to the ball mill, to the classifier overflow, and to the fifth cell of the flotation unit. A two-compartment wet reagent feeder of the disc and-cup type, driven by a 1-horsepower motor through a speed reducer, feeds 0.07 to 0.08 pound of Barrett No. 4 and 0.3 pound of pine oil to the discharge end of the belt feeder. A reagent made up of half pentasol xanthate and half ethyl xanthate is fed at a rate of 0.083 pound for each ton of ore into the feed box of the ball mill from one compartment of a three-compartment wet reagent feeder of the disc and-cup type. The other two compartments feed the same amount of the reagent to the classifier overflow and to No. 5 flotation cell, respectively. The feeder is driven from the classifier drive shaft.

Tailings Disposal and Handling of Concentrate

The tailings from flotation flow by gravity to the tailings pond in a nearby gulch. Tailings are impounded to conserve water, which is returned to the mill circuit.

The concentrate from flotation is washed into a 12- by 8-foot Dorr thickener. The rakes are driven by a 3-horsepower motor at a speed of 1/6 r.p.m. Copper sulfate is fed to the thickener as a settling agent at the rate of 0.03 pound per ton of original feed.

Overflow from the thickener contains 2 to 3 percent solids; it flows by gravity to a 6- by 6-foot steel settling tank and from there to a larger steel 30- by 5-foot settling tank. The overflow from this last tank is returned to the mill circuit. The settled solids are cleaned out of the large tank every 60 days and sacked as concentrate; about 900 sacks is recovered at each clean-up. This material contains about 300 ounces of silver per ton of concentrate. The small tank is pumped out weekly.

The underflow from the thickener at 50 percent solids is pumped by a 2-inch Door pressure diaphragm pump driven by a 3-horsepower motor to a 4- by 2-foot Door drum filter. This filter is driven by a 1-horsepower motor. A 7-1/2 by 6-inch Chicago Pneumatic vacuum pump driven by a 5-

horsepower motor maintains a vacuum of 20 inches of mercury. The cake is blown off the drum by air from the same blower that furnishes air for flotation and falls into sacks hung on racks for the purpose. Filled sacks are stored in the concentrate room. Filtrate is pumped from the receiver back into the mill circuit by a 1-1/2-inch centrifugal pump driven by a 2-horsepower motor.

A 1-inch centrifugal pump driven by a 1-horsepower motor returns waste water collected in the sump.

Metallurgical data

An analysis of the typical mill heads follows:

Ag	ounces per ton	10.97
Ag as chloride and bromide	do	.30
Au	do	.025
SiO_2	percent	85.8
Sulfur	do	.045
Fe_2O_3	do	3.21
Al_2O_3	do	3.28
CaO	do	5.07
Mn	do	.45
Moisture	do	2.1

An anlysis of the average concentrate follows:

Gold	ounces per ton	1.50
Silver	do	550.50
Lead	percent	.3
Copper	do	.18
Zinc	do	.5
Sulfur	do	.3
Alumina	do	1.5
Silica	do	75.4
Iron	do	6.3
Undetermined	do	13.22

The moisture content of the concentrate just after filtering is about 25 percent. During shipment to the smelter the content is reduced to an average of 18 percent.

The ratio of concentration is 110 to 1 and about 65 percent of the silver is recovered. Tests indicate that the recovery of silver can be raised somewhat by finer grinding, but such practice raises grinding costs excessively. The recovery by cyaniding the crude ore or by cyaniding the tailings could be raised to only 80 percent. Efforts to improve recovery by using different amounts and other types of reagents have failed.

Mill Control

An automatic sampler for mill heads was installed with the mill as originally built, but later was discarded. Samples are now taken by hand at the classifier overflow and automatically from the concentrate discharged from flotation.

There is a small metallurgical testing laboratory in the mill. Equipment includes a batch ball mill, laboratory flotation cell, electric hot plates and drying ovens, and an analytical balance.

The mill operator on each shift makes a daily report of the operation of the mill. The form of this report, filled in to show the actual operation on the day shift on June 9, 1939, is shown in the following table.

Form of daily report, showing operation of mill.

Date: 6/9/39 Shift: Day.

Time	Feed	Percent solids		Reagents, c. c. per minute					
		1/ C. O.	2/ B. M.	Z-6 and Z-3 B. M.	Z-6 and Z-3 C. O.	Z-6 and Z-3 No. 5 cell	Barrett B. M.	P. O. B. M.	P. O. C. O.
8	280	19	72	54	50	44	5	8	2
9	276	18	71						
10	276	19	72	54	50	50	5	8	3
11	272	19	72						
12	280	19	73	50	52	54	5	8	3
1	276	18	72						
2	276	18	73	52	54	54	5	8	4
3	276	19	70						
	2,212								

1/ Classifier overflow. 2/ Ball-mill discharge.

Average percent solids:

Wet tons: 66.4
Percent moisture: 2.8
Dry tons: 64.5
Hours run: 8

Concentrate in store: 22
Concentrate sacked: 13
Total sacks: 35

Remarks:

Marketing Concentrate

Concentrates are hauled by truck in 225-sack lots of about 6 tons by way of Lordsburg, N. Mex., to the American Smelting & Refining Co. lead smelter at El Paso, Tex. The freight rate is $6.00 a ton for the distance of 215 miles, making the cost per ton-mile $0.028.

Settlement was made at the following rates in June 1939:

Silver, 97.50 percent of domestic price of 64.64 cents per ounce for concentrate assaying 500 ounces or more of silver per ton; 95.00 percent of domestic price for concentrate assaying less than 500 ounces of silver per ton.
Gold, $32.81 per ounce.

The company attempts to hold the grade of concentrate above 500 ounces of silver per ton.

Deductions were as follows (June 1939):

	Per ton
Base charge	$ 5.09
Handling sacks	.50
Sampling charge, including assaying, $6.00 for each truck-lot of about 6 tons	1.00
Total	$ 6.59

Where an appreciable difference exists between mining company and smelter assays, a sample is taken by representatives of both companies and submitted to an umpire for analysis; the cost of this work is borne by the party whose results are greatest in error.

Until early in 1938 crude ore was shipped to the International Smelting & Refining Co. at Miami, Ariz. Shipments were made by truck to Solomonville, Ariz. The freight cost to this point (24 miles from the mine) was $1.25 per ton. The smelter paid the freight from Solomonville to Miami. The base charge was $3.25 a ton, and there were no penalties. Settlement was made at the following rates:

Silver, all at 95 percent of domestic quotation.
Gold, $32.20 an ounce.

Mill labor

The mill operates three shifts daily for 7 days a week. The following table shows the labor and supervision required to treat 190 tons daily:

Number	Classification	Rate	Total per day
3	Mill operators	$4.50	$13.50
3	Mill helpers	4.05	12.15
2	Crusher men	4.50	9.00
1	Superintendent	6.00	6.00
			$40.65

Mill supply costs

The costs of the principal mill supplies follow:

Item	Cost 1/
Reagents:	
Pine oil..........................	$0.079 per pound
Potassium ethyl xanthate.........	.140 per pound
Potassium pentasol xanthate......	.275 per pound
Barrett No. 4.....................	.075 per pound
Copper sulfate....................	.819 per pound
Lubricating oil...................	.62 per gal.
Manganese-steel crusher-jaw plates	105.00 per set
Manganese-steel cone-crusher liners	380.00 per set
Manganese-steel ball-mill liners...	.125 per pound
Forged-steel balls................	80.00 per ton
Flotation impellers...............	31.00 each

1/ Delivered to mine.

The costs of grinding balls, mill liners, and reagents per ton of ore milled for 30 days in May 1939 is shown in the following table.

Item	Total Cost	Ore milled tons	Cost per ton ore milled
Grinding balls	$970.05	5,295	$ 0.1832
Mill liners	750.00	5,295	.1416
Reagents	510.00	5,295	.0963

POWER

Electric power for the mine and mill is generated on the property. The power plant is near the mill and is housed in a frame building covered with corrugated-steel sheeting. Equipment includes four Union Diesel engines of 250 horsepower capacity each, direct connected to 250-kv. a. alternators of which one unit is a spare.

Electricity is furnished at four different voltages - 2,300 volts for the crusher and ball-mill motors, 440 volts for all other motors rated more than 1 horsepower, 220 volts for large-wattage lamps, and 110 volts for general lighting circuit and fractional horsepower motors. Power distribution is as follows:

	Percent
Mine	57
Mill, of which 20 percent is used in coarse crushing	40
Camp	3
Total	100

Stations and main levels in the mine are lighted electrically. Electric lighting for the mill is provided from ceiling and drop-cord lamps. The automatic sampler is operated from the 110-volt circuit also.

The connected power load for the mill follows:

Motor	Voltage	Horsepower
Ball mill	2,300	200
Ore feeder	440	5
Reagent feeder	440	1
Reagent feeder	440	5
Classifier	440	5
Flotation cells, 5 horsepower on each	440	50
Blower	440	5
Wilfley pump	440	3
Filtrate pump	440	2
Vacuum pump	440	5
Thickener	440	3
Diaphragm	440	3
Filter	440	1
Sump pump	440	1
Total		289

Five men are required to operate the plant on three shifts. Labor cost, including supervision, is $22.50 a day. The cost of Diesel fuel, the principal item of supply, is $0.0625 per gallon delivered to the mine. The cost of operation for 1938 on the basis of 64,709.8 dry tons milled is shown in the following table.

Cost of operating power plant for 1938 in units of labor, supplies, and lumber.

Labor	$ 0.1603
Supplies	.2983
Timber	.0001
Total operating cost	$ 0.4587
Operating income	.0011
Total cost per ton milled	$ 0.4576

Outlying workings have independent power plants.

WATER SUPPLY

All the water supply is pumped from a well at Ash Springs sunk 5 feet by 5 feet in section a depth of 80 feet. A duplex reciprocating pump, driven by a 40-horsepower tractor Diesel engine, delivers the water through 7,000 feet of 3-inch pipe up a rise in elevation of 1,400 feet to a steel tank 30 feet in diameter by 12 feet in height.

The water for the mill is stored in two steel tanks 30 feet in diameter by 10 feet in height situated just above the mill. These act as surge tanks for water returned from the tailings pond. Additional water is drawn from the main supply tank as needed. The mill uses about 5 tons of water per ton of ore; about 50 percent is reclaimed.

An evaporative tower with a capacity of 3,000 gallons a day cools water for the Diesel engines and compressors.

Distribution of the total daily water consumption of 325,000 gallons follows:

	Percent
Mill	80
Mine	18
Camp	2
Total	100

The cost of supplying water for 1938 on the basis of 64,709.8 dry tons of ore milled is shown in the following table.

Cost per ton of ore milled of supplying water for 1938 in units of labor, supplies, and lumber

Labor	$0.0445
Supplies	.0416
Lumber	.0007
Miscellaneous	.0056
Total cost per ton milled	$0.0924

SURFACE PLANT

The surface plant is arranged to provide all the ordinary services required to keep the mine and mill in good operating condition. Buildings are mostly of wood frame construction covered with corrugated-steel sheeting. Besides the power plant already mentioned, the surface plant comprises the Shamrock shaft house, the Commerce shaft house, a machine shop, an electric shop, a change house, a warehouse, an assay office, and the administration office.

At the Shamrock shaft hoisting is done from a 60-foot steel head frame with a 6-foot-diameter drum hoist, driven by a 100-horsepower electric motor at a rope speed of 450 feet per minute. At the Commerce shaft hoisting is done with a 30-inch-diameter drum hoist driven by an automobile engine. The hoisted ore is dropped into a wood ore bin adjacent to the 30-foot wood head frame. Compressed air is supplied by a 400-cubic-foot-per-minute compressor driven by a 60-horsepower tractor Diesel engine.

Compressed air is supplied to the Shamrock workings by a 640-cubic-foot-per-minute compressor driven by a 100-horsepower electric motor and two 360-cubic-foot-per-minute compressors driven by 60-horsepower electric motors. This equipment is in the power house.

Machine-shop equipment includes a 40-volt, 200-ampere portable arc welder, a metal turning lathe with a 6-foot bed and 12-inch swing, a 21-inch drill press, a power cut-off saw, a power grinder, and a drill-steel sharpener remodeled to split diamond-drill core.

In the blacksmith shop are an air-operated drill-steel sharpener, a power grinder, a homemade oil-fired furnace, and a hand forge.

The electric shop is equipped to rewind motors and to do other electric repair work.

The change house is 20 by 40 feet in area and equipped with individual lockers and showers.

The warehouse contains supplies and replacement parts for the mining and milling equipment.

The assay office is equipped to make routine analyses by fire and wet methods for control of the mining and milling operations.

Fuel oil is stored in two steel tanks of 15,000-gallon and 5,000-gallon capacities.

LIVING ACCOMMODATIONS

Living accommodations for company employees comprise 11 four-room dwellings rented to individual families at $10 to $25 a month, two 40- by 60-foot bunkhouses with eight rooms each, and a 40- by 50-foot boarding house with dining room, kitchen, commissary, and storeroom. Board is furnished at the rate of $1.25 a day, and room in the bunkhouse at the rate of $4.00 a month.

ADMINISTRATION

Operations at the Ash Peak Branch are supervised by a general superintendent assisted by three shift bosses, and milling operations are directed by a mill superintendent. Also on the Company staff are a master mechanic, chief electrician, chemist, engineer, purchasing agent, and chief clerk.

SUMMARY OF COSTS

A summary of individual costs is shown in the following table.

Individual costs:

Exploration (diamond drilling) per foot	$ 1.8881
Development workings, per foot	15.9386
Ore extraction per dry ton mined and milled	1.8636

Combined operating costs for 1938 and total operating costs follow:

Combined costs, per dry ton mined and milled	
Leasing, exploration, development, and ore extraction	$ 2.6831
Coarse crushing	.1665
Milling, general	.8074
Handling and hauling concentrate	.0910
Administration and overhead	1.2342
Total cost	$ 4.9822
Income from operation of camp	.0428
Total operating cost	$ 4.9394

Metals production during 1938 and cost per ounce of producing silver is shown in the following table.

Gold	ounces	1,751.86
Silver	do.	527,706.45
Copper	pounds	9,389.32
Lead	do.	26,246.97

Production cost per ounce of silver, $0.60463.

A summary of operating expense per dry ton of ore mined and milled at the Ash Peak mine for 1938 is shown in the following table.

Summary of operating expense per dry ton of ore mined and milled at the Ash Peak mine in 1938.

Dry tons mined: 70,274.8
Dry tons milled: 64,709.8
Dry tons shipped direct to smelter: 5,565.0

Account	Labor	Explosives	Power	Water	Lumber and timber	Other Supplies	Miscellaneous	Total	Percent of Total
Administration overhead and general	$0.4875	—	1/ $0.0283	1/ $0.0009	$0.0006	$0.1475	$0.5694	$1.2342	25.0
Mine leasing	.1611	$0.0336	1/ .0472	1/ .0028	.0111	.0461	.0905	.3924	8.0
Mine exploration	.0296	—	1/ .0159	1/ .0009	.0002	.0139	.0070	.0705	1.4
Mine development	.1391	.0670	1/ .0708	1/ .0046	.0008	.0181	.0562	.3566	7.2
Mine-ore Extraction	1.1174	.2042	1/ .1179	1/ .0075	.0978	.1439	.1749	1.8636	37.7
Coarse crushing	.0472	—	1/ .0377	—	.0002	.0786	.0028	.1665	3.4
Milling, gen'l.	.1961	—	1/ .1510	1/ .0739	.0007	.3556	.0301	.8074	16.3
H. & H. conc.	.0206	—	—	—	—	.0042	.0662	.0910	1.8
Camp	.0058	—	2/1/ .0142	1/ .0018	.0003	.0217	2/ .0532	2/ .0428	2/ .8
Total operating	2.2044	.3048	.4576	.0924	.1117	.8295	.9389	4.9394	100.0
Percent of total	44.6	6.2	9.2	1.9	2.3	16.8	19.0		

1/ Percentage of total consumption estimated. 2/ Operating income.

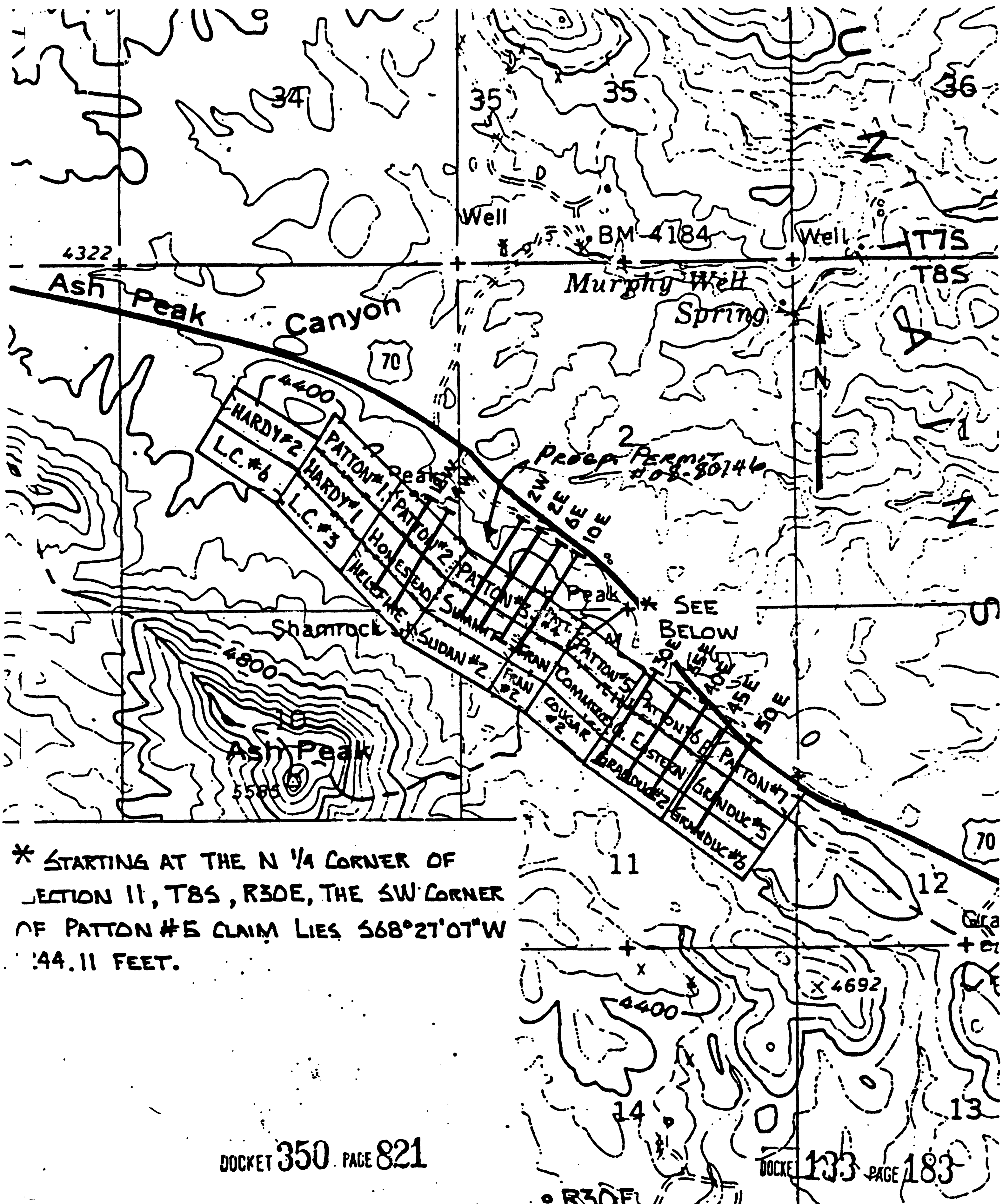
A summary of capital expense at the Ash Peak mine for 1938 follows:

Account	Labor	Explosives	Lumber	Other Supplies	Misc.	Total
Construction	$ 307.84	$ 55.03	$ 18.18	$ 183.10	$ 21.50	$ 585.65
Equipment	523.91	- -	285.96	3,078.21	4,981.06	8,869.14
Total capital	831.75	55.03	304.14	3,261.31	5,002.56	9,454.79

PRODUCTION RECORD
ASH PEAK MINE
From 12/21/68 to 4/28/70
From Phelps Dodge Settlement Sheets

Date of Shipment	Dry lbs.	Dry Tons	Ounces Silver	Ounces Per Ton
12-21-68	368,364	184.182	1,067.78	5.81
1-23-69/ 1-31-69	750,111	375.0555	1,657.54	4.4
2-2-69/ 2-27-69	2,927,026	1,463.5130	8,502.94	5.8
3-1-69/ 3-21-69	2,384,276	1,192.1380	5,905.76	4.9
4-1-69/ 4-30-69	3,402,075	1,701.0375	8,839.93	5.2
5-3-69/ 5-29-69	1,956,153	978.0765	3,410.82	3.48
6-5-69/ 6-28-69	2,351,067	1,175.5335	5,011.84	4.26
7-2-69/ 7-29-69	1,719,439	859.7195	3,620.76	4.2
8-3-69/ 8-14-69	1,312,197	656.0985	2,467.33	3.76
9-8-69/ 9-29-69	2,235,350	1,117.6750	3,284.58	2.93
10-7-69/10-28-69	1,754,096	877.0480	2,994.22	3.41
11-1-69/11-26-69	2,454,086	1,227.0430	3,680.44	2.99
12-1-69/12-26-69	1,990,142	995.0710	3,399.61	3.41
1-2-70/ 1-30-70	2,816.415	1,408.2075	4,203.24	2.98
2-6-70/ 2-27-70	2,114,858	1,057.4290	4,278.35	4.04
3-2-70/ 3-31-70	2,699,097	1,349.5485	5,873.04	4.35
4-2-70/ 4-28-70	1,978,660	989.3300	3,021.65	3.05
		17,606.70	71,219.83	4.045

:led by GEM August 28, 1972



* STARTING AT THE N 1/4 CORNER OF
ECTION 11, T8S, R30E, THE SW CORNER
F PATTON #5 CLAIM LIES S68°27'07"W
:44.11 FEET.

DOCKET 350 PAGE 821

DOCKET 133 PAGE 183

TITLE ASH PEAK CLAIMS T8S R30E EXHIBIT "C"	PHELPS DODGE CORPORATION GEOLOGY DEPARTMENT MORENCI BRANCH DATE 9/81	DRAWN BY DAD SCALE 1"=2000' NO. SK-160

Production

Company	Tons	Gold Total Oz.	Gold Oz/Ton	Silver Total Oz.	Silver Oz/Ton
Veta Mines Inc.					
Mill	173,382	4,404	.025	1,212,693	7.0
Mill Tails	173,200	1,732	.01	433,000	2.5
Calculated Mill Heads	173,382	6,136		1,645,693	9.5
Commerce Dump					
Direct Shipping Ore	6,551	193	.029	50,074	7.6
Inspiration Consolidated Copper					
Direct Shipping Ore	123,393	4,388	.035	1,139,201	9.2
Total and Average	303,226	10,717	.035	2,834,968	9.3

Base metal production is minor and only the Veta Mines concentrates were assayed. Records show a total production from 173,282 tons of ore of 55,000 pounds of copper or .02%, and 118,000 pounds of lead or .03%.

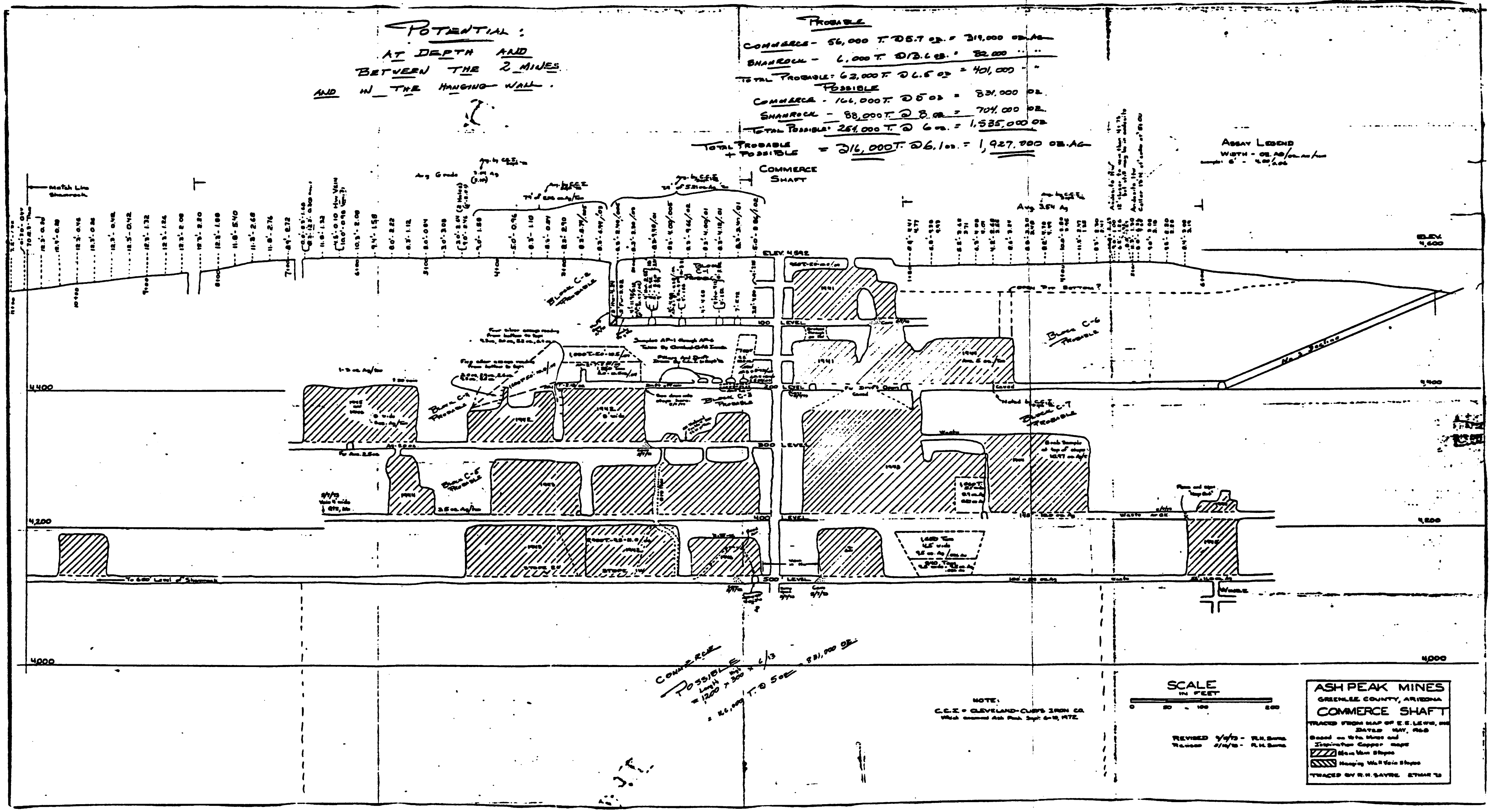
Respectfully submitted,

A. George Setter, E.M.

The following described unpatented lode mining claims situated in the Ash Peak Mining District, Greenlee and Graham Counties, Arizona, Township 8 South, Range 30 East, G&SRB&M, the names of which are set forth below together with the date of location, the date, docket and page of recording with the Greenlee and/or Graham County Recorders, and the Bureau of Land Management serial number.

LODE CLAIMS

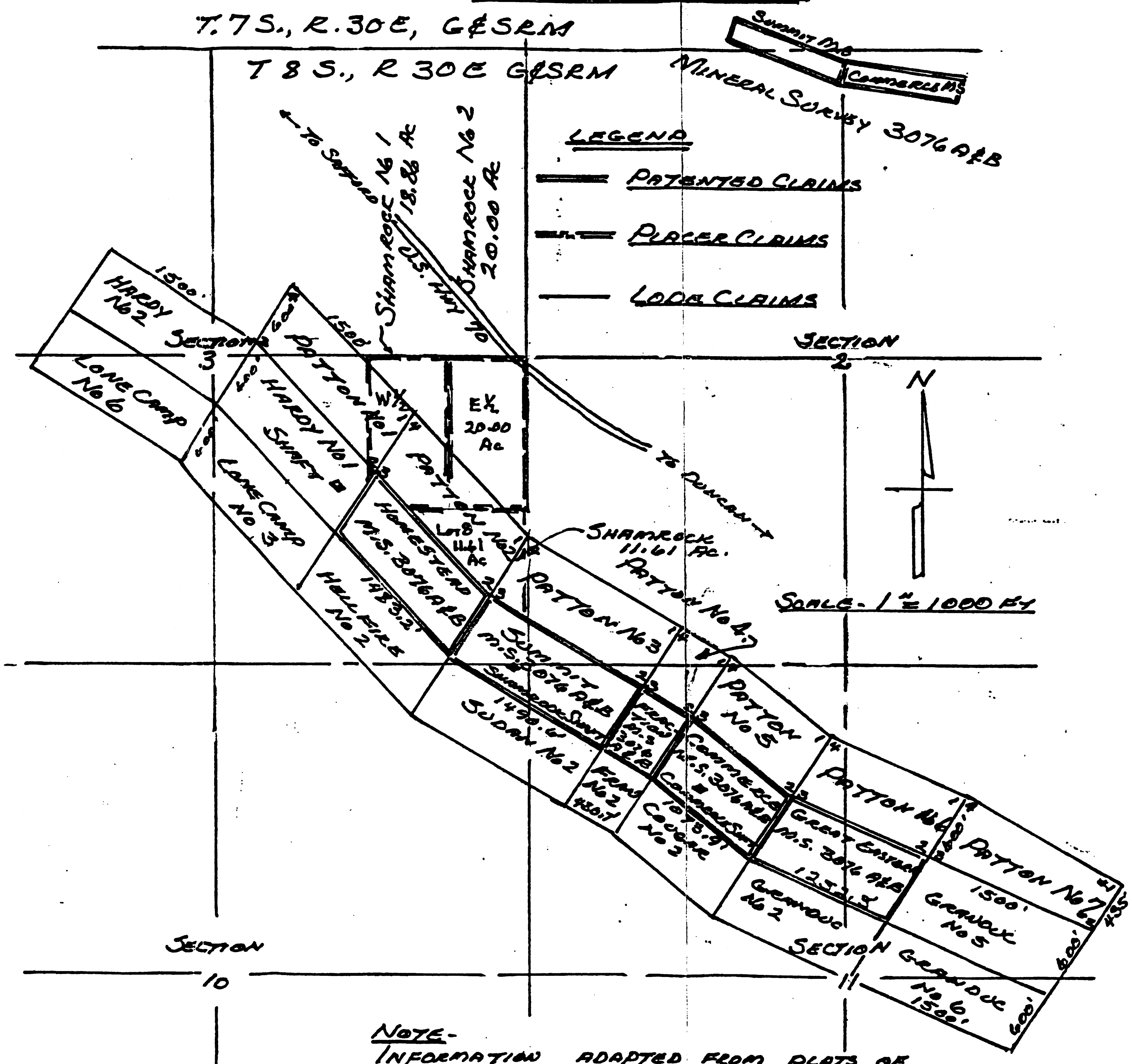
Claim Name	Date Located or Amended	Greenlee County RECORDED Docket	Greenlee County RECORDED Page	Graham County RECORDED Docket	Graham County RECORDED Page	BLM Serial Number AMC
Hardy No. 1	02/09/72	43	339			43676
Relocated	11/21/79	104	383			95371
Amended	11/21/79	108	54			
Amended	07/04/80	111	281			
Relocated	02/24/82	131	434			165062
Hardy No. 2	02/09/72	43	340			43677
Relocated	11/21/79	104	386			95372
Amended	11/21/79	108	57			
Amended	07/04/80	111	283			
Relocated	02/24/82	131	436			165063
Lone Camp No.3	02/09/72	43	361			43679
Relocated	11/21/79	104	377			95373
Amended	11/21/79	108	63			
Amended	07/04/80	111	285			
Relocated	02/24/82	131	438			165044
Lone Camp No.6	02/09/72	43	362			43678
Relocated	11/21/79	104	401			95374
Amended	11/21/79	108	60			
Amended	07/04/80	111	287			
Relocated	02/24/82	131	440			165045
Hellfire No.2	02/09/72	43	363			43680
Relocated	11/21/79	104	392			95375
Amended	11/21/79	108	66			
Amended	07/04/80	111	289			


POTENTIAL:
AT DEPTH AND
BETWEEN THE 2 MINES
AND IN THE HANGING WALL.
PROBABLE
COMMERCE - 56,000 T. @ 5.7 oz. = 319,000 oz. AG
SHAMROCK - 6,000 T. @ 13.6 oz. = 82,000 " "
TOTAL PROBABLE: 62,000 T. @ 6.5 oz = 401,000 " "
POSSIBLE
COMMERCE - 166,000 T. @ 5 oz = 831,000 oz.
SHAMROCK - 88,000 T. @ 8 oz. = 704,000 oz.
TOTAL POSSIBLE: 254,000 T. @ 6 oz. = 1,535,000 oz
TOTAL PROBABLE + POSSIBLE = 316,000 T. @ 6.1 oz. = 1,927,700 oz. AG
COMMERCE SHAFT
ASSAY LEGEND
ELEV. 4,600
4,400
4,200
4,000
ELEV. 4,592
100 LEVEL
200 LEVEL
300 LEVEL
400 LEVEL
500 LEVEL
BLOCK C-6 PROBABLE
BLOCK C-7 PROBABLE
Avg 3.54 Ag
COMMERCE POSSIBLE
NOTE:
C.C.I. = CLEVELAND-CLIFFS IRON CO.
SCALE IN FEET
0 50 100 200
REVISED
ASH PEAK MINES
GREENLEE COUNTY, ARIZONA
COMMERCE SHAFT
TRACED FROM MAP OF E. E. LEWIS, INC
DATED MAY, 1968
Based on Veta Mines and Inspiration Copper maps
Main Vein Stopes
Hanging Wall Vein Stopes
TRACED BY R. H. SAYRE

SUMMARY OF SHIPMENTS BY PHELPS DODGE CORP--SMALL MINES DIVISION from
ASH PEAK MINES TO MORENCI AND HIDALGO SMELTERS 1981-1984

	MORENCI SMELTER Lots M1 thru M80		HIDALGO SMELTER Lots H1 thru H-82		COMBINED SHIPMENTS Lots M-1-80 & H1-82	
TOTAL TONS PAID FOR, DRY WEIGHT	39,353.56		40,240.78		79.594.78	
TOTAL OUNCES SILVER, GROSS	127,578.57	$1,151987.53	208023.34	$2,100969.04	335601.91	$3,252956.57
TOTAL OUNCES SILVER, NET	115,032.92	$1,055813.71	187425.49	$1,100969.84	302458.41	$2,946827.57
TOTAL OUNCES SILVER DEDUCTED	12,545.65	$ 96178.82	20597.85	$ 209955.20	33143.50	$ 306134.02
TOTAL OUNCES GOLD, GROSS	549.25	$ 216632.14	875.60	$ 354606.18	1424.85	$ 571238.32
TOTAL OUNCES GOLD, NET	127.16	$ 56095.02	399.18	$ 166274.60	526.75	$ 222369.62
TOTAL OUNCES GOLD DEDUCTED	422.02	$ 160537.12	477.42	$ 188331.58	899.94	$ 348868.70
TOTAL DOLLARS SMELTER DEDUCTS		$ 256715.94		$ 398286.78		$ 655002.72
DOLLARS PER TON SMELTER DEDUCTS	$ 6.52		$ 9.90		$ 8.23	
AVERAGE GROSS VALUE SILVER PER TON	$29.27		$52.21		$40.88	
AVERAGE GROSS VALUE GOLD PER TON	$ 5.50		$ 8.81		$ 7.18	
AVERAGE NET VALUE SILVER PER TON	$26.83		$46.99		$37.02	
AVERAGE NET VALUE GOLD PER TON	$ 1.42		$ 4.68		$2.79	
AVERAGE GROSS OUNCES SILVER PER TON	3.24		5.17		4.22	
AVERAGE GROSS OUNCES GOLD PER TON	.0143		.0217		.0179	
AVERAGE NET OUNCES SILVER PER TON	2.92		4.65		3.80	
AVERAGE NET OUNCES GOLD PER TON	.0032		.0099		.0066	
AVERAGE PRICE SILVER	$ 9.02		$ 10.09		$ 9.69	
AVERAGE RICE OF GOLD	$394.41		$404.99		$400.91	
DATE OF LASS SETTLEMENT FOR METAL PRICES	Oct 26,1984		Sept 28, 1984			
AVERAGE ROYALTY PER TON	$ 4.73					

7-26-79 ASH PEAK MINING DISTRICT
LODE, PLACER & PATENTED CLAIMS P. M. TURNEY
GREENLEE COUNTY ARIZ



NOTE -
INFORMATION ADAPTED FROM PLATS OF
MINERAL SURVEY No 3076 A & B AND GLO
TOWNSHIP PLAT 8S, R. 30 E G&SRM AND
GREENLEE COUNTY RECORDS

FORM 1006

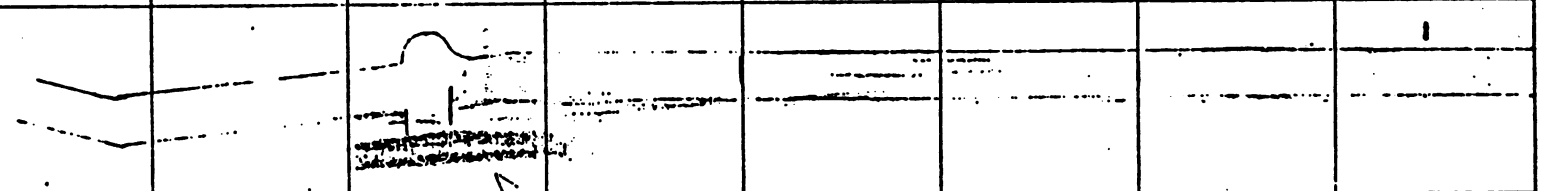
Commerce ...
... Utah, Ariz.
1" = 20'
(T.A.P. - 2/15/12)

COMMERCE- 100'

3' of barren-looking white qtz + calcite

Narrow qtz-vein + stringers in andesite

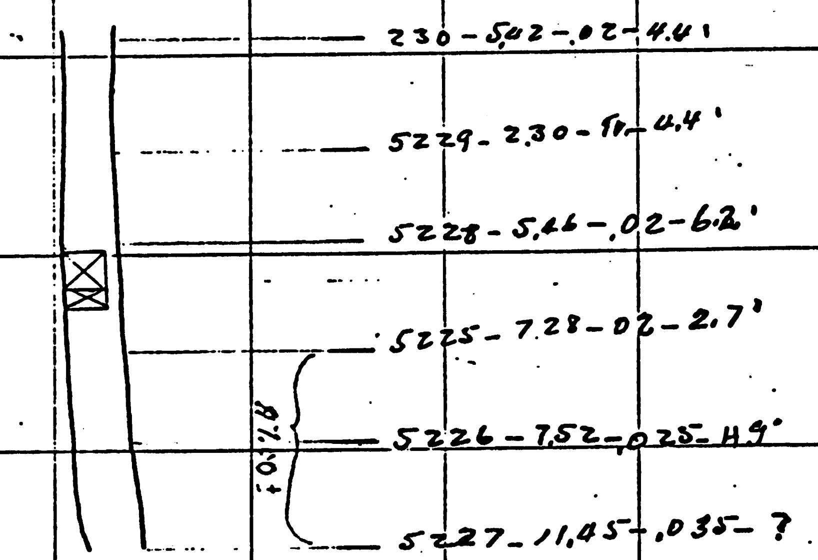
Numerous small narrow calcite stringers ...



First 3' of Vn.

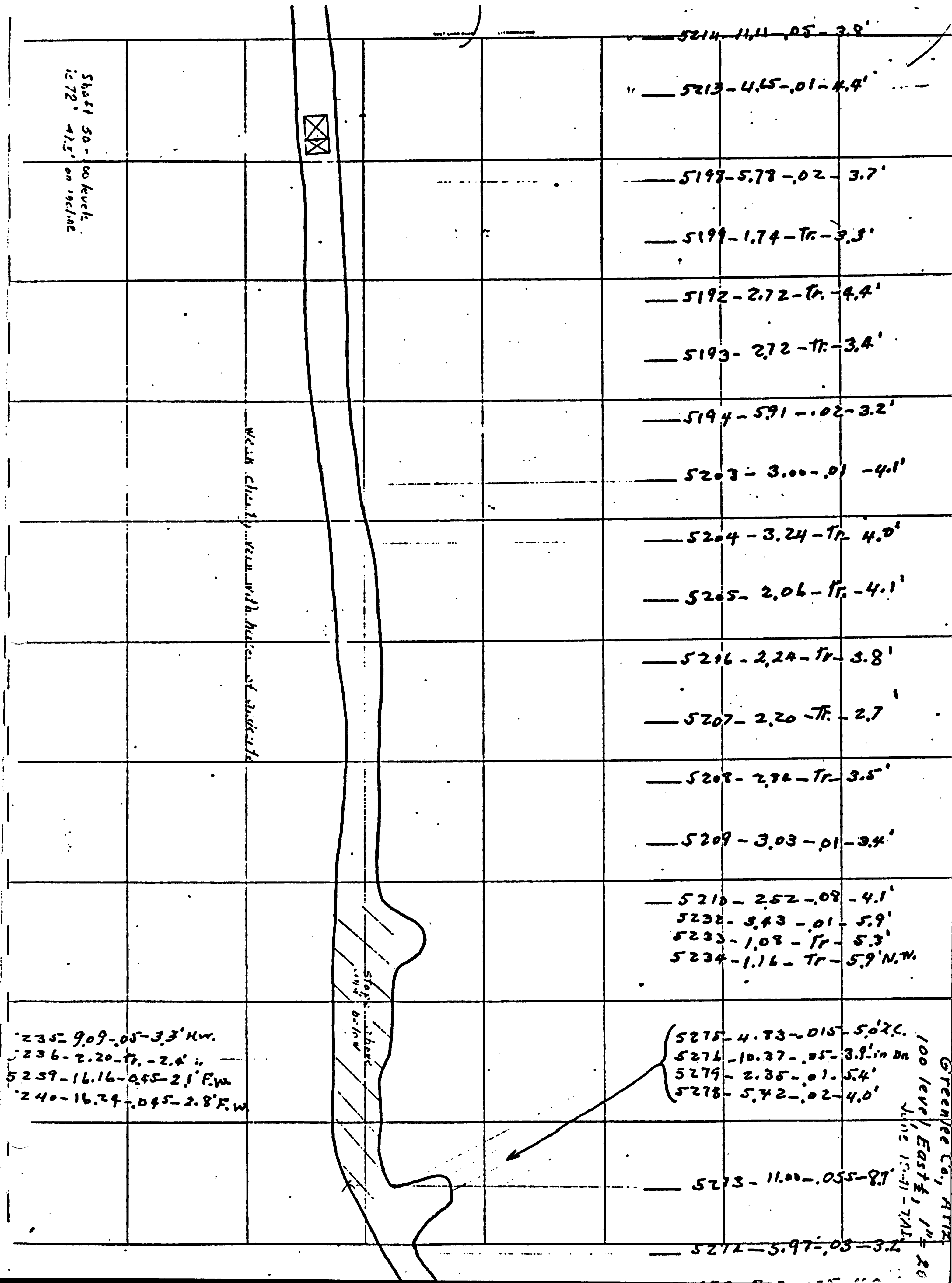
[illegible]	5.91	0.035
[illegible]	.26 (7.26?)	0.038
[illegible] 2'6"	3.94	0.02
Sample #93 ..6"	4.64	0.02

FORM 1006



Shaft 100-150 level
is 70° 50' in incline

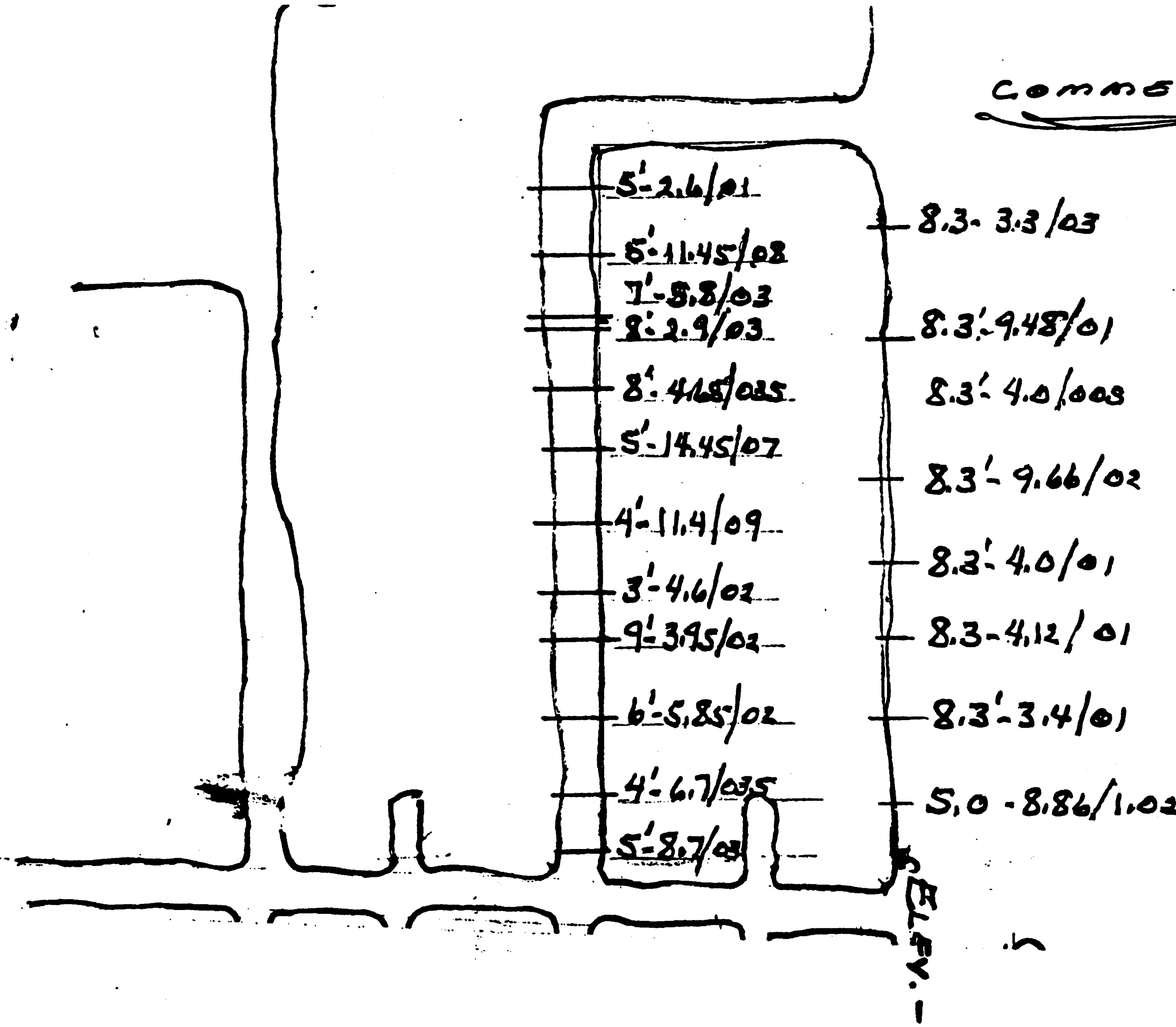
Ash Peak - Commerce Mine
Greenlee Co, Ariz.
150 level. 1" = 20'
June, 1941 T.A.D.



5214-11.11-.05-3.8'
5213-4.65-.01-4.4'
5199-5.78-.02-3.7'
5192-2.72-Tr.-4.4'
5193-2.72-Tr.-3.4'
5194-5.91-.02-3.2'
5203-3.00-.01-4.1'
5204-3.24-Tr-4.0'
5205-2.06-Tr.-4.1'
5206-2.24-Tr-3.8'
5207-2.20-Tr.-2.7
5208-2.84-Tr-3.5'
5209-3.03-.01-3.4'
5210-2.52-.08-4.1'
5232-3.43-.01-5.9'
5233-1.08-Tr-5.3'
5234-1.16-Tr-5.9' N.W.
5275-4.83-.015-5.0' X.C.
5276-10.37-.05-3.9' in Dr.
5279-2.35-.01-5.4'
5278-5.42-.02-4.0'
5273-11.00-.055-8.7'
5272-3.97-.03-3.2
Shaft 50-100 levels is 72° 47.5' on incline
Greenlee Co., Ariz.
100 level, East, 1" = 20'
Stope above

COMMERCE - 108

KEY
WIDTH - SILVER - GOLD
AV. ±7.0 AG.
FIGURE TONNAGE AT 13 C.F/TON



1" = 50'

Ash Peak – Commerce Mine
Green Ice Co., Ariz.
50 level. 1" = 20'

June 15-11
TAD

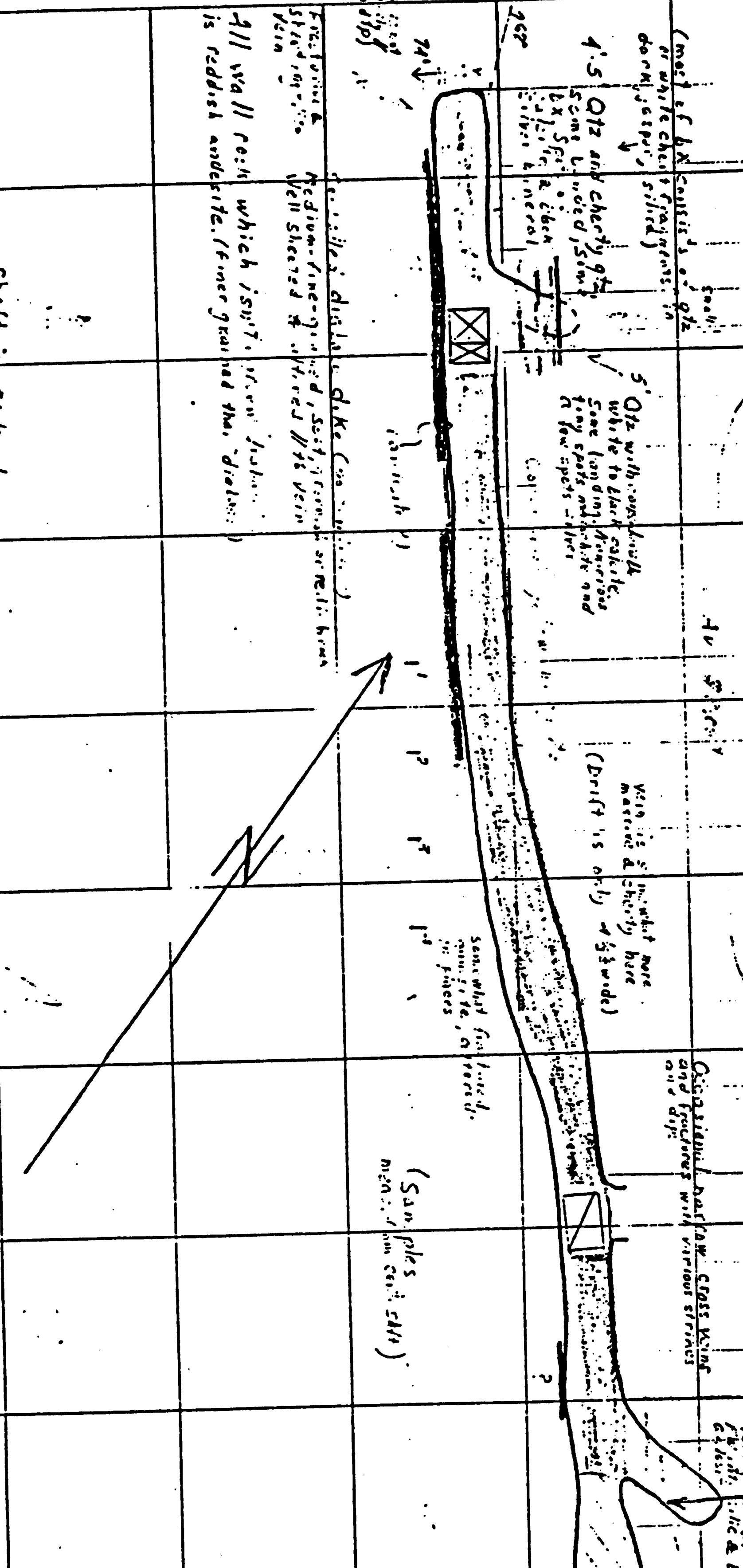
5148 - 7.20 - .02 - 4.9'
5147 - 7.98 - .025 - 3.8'
5146 - 4.15 - .01 - 4.3'
5149 - 0.78 - tr. - 3.4'
5150 - 1.48 - tr. - 7.0'
5176 - 10.36 - .04 - 2.4'
5177 - 19.94 - .06 - 4.6'
5178 - 4.78 - .025 - 3.7'
5179 - 8.11 - .03 - 4.2'
5180 - 17.50 - .07 - 5.0'
5181 - 9.70 - .055 - 5.0'
5182 - 4.60 - .025 - 3.4'
5189 - 3.78 - .02 - 4.5'
14.2
5143 - 11.57 - .05 - 4.1'
5144 - 4.50 - .01 - 3.9'
5145 - 3.72 - tr. - 3.7'
5151 - 1.51 - .01 - 3.2'
5152 - 3.05 - .01 - 4.0'
5154 - 17.42 - .02 - 6.0'
5153 - 3.25 - .015 - 4.1'
5155 - 1.56 - tr. - 6.9
5156 - 3.43 - .02 - 4.4'
2876 - 6.50 - .03 - 5.3'
2877 - 10.40 - .04 - 5.9'
2878 - 11.11 - .05 - 6.8'
2899 - 13.60 - .03 - 4.3'

10.0

Occasional narrow cross veins and fractures with various strikes and dips

Ash Peak – Commerce Mine
Greenlee Co., Ariz.
50 level. 1" = 20'

June 1941
TAL



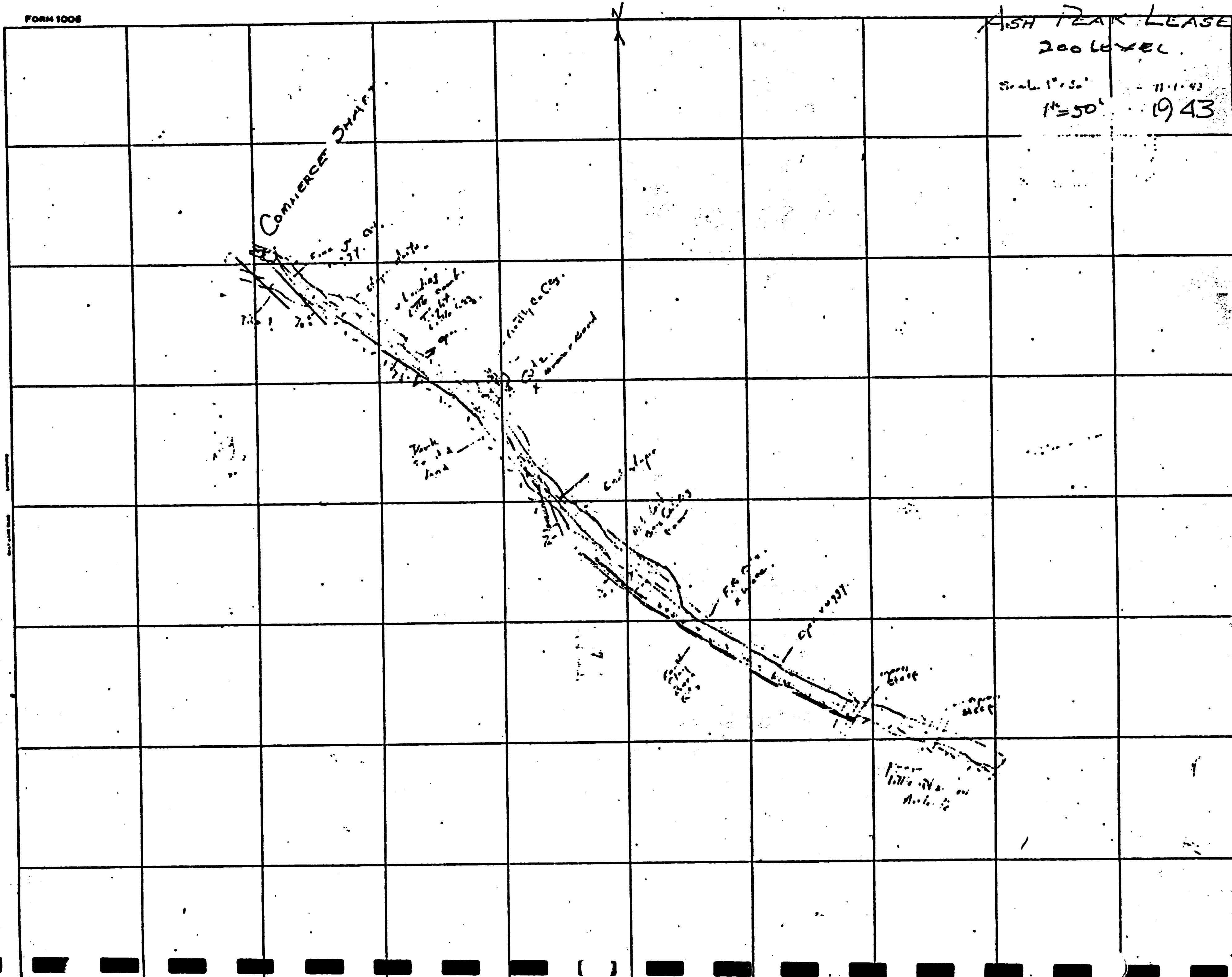
5148-7.20-.02-4.9'
5147-7.98-.025-3.8'
5146-4.15-.01-4.3'
5149-0.78-Tr.-3.4'
5150-1.48-Tr.-7.0'
5176-10.36-.04-2.4'
5177-19.94-.06-4.6'
5178-4.78-.025-3.7'
5179-8.11-.03-4.2'
5180-17.50-.07-5.0'
5181-9.70-.055-5.0'
5182-4.60-.025-3.4'
5189-3.78-.02-4.5'
5143-11.57-.05-4.1'
5144-4.50-.01-3.9'
5145-3.72-Tr.-3.7'
5151-1.51-.01-3.2'
5152-3.05-.01-4.0'
~~5154-17.42-.02-6.0'~~
5153-3.25-.015-4.1'
5155-1.56-Tr.-6.3
5156-3.43-.02-4.4'
2876-6.50-.03-5.3'
2877-10.40-.045-9.8'
2878-11.11-.05-6.8'
2899-13.60-.03-4.3'

:77-1.00-Tr-4.8' To Fe
5280-1.32-Tr-4.0-To Fe
From H.W. two - ze Fe

No.	Dist.
1	37'
2	47'
3	57'
4	67'

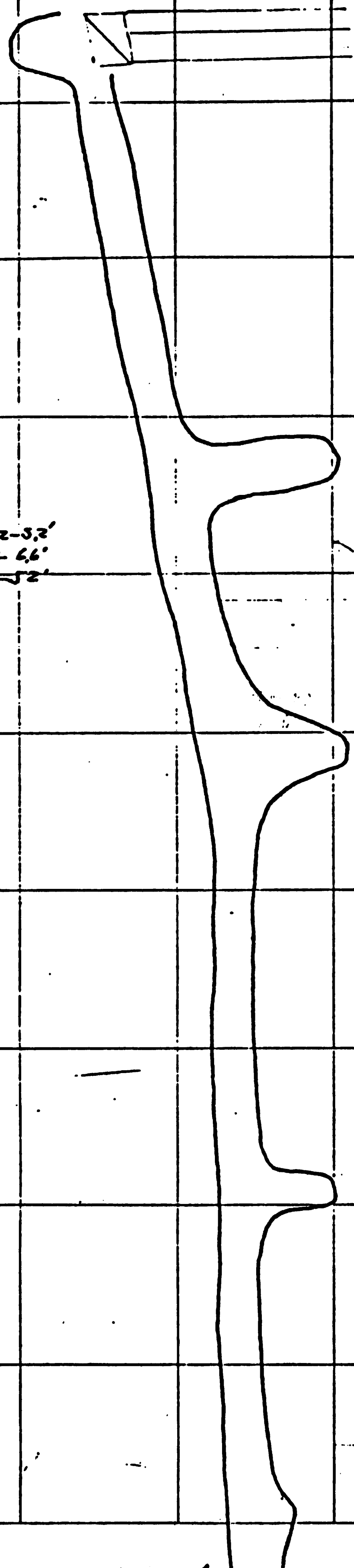
4.6
3.7
3.8
2.5

FORM 1006



2873 - 2.14 - Tr. - 0.'

2870 - 5.19 - .035 - 4.4'
75 - 4.46 - .02 - 4.4'
2866 - 5.27 - .025 - 10.0'



E. Side X.C.
754 - 4.30 - .02 - 3.2'
55 - 1.94 - Tr. - 6.6'
56 = 1.40 - Tr - 52'

2865 - 6.09 - .08 - 5.0'
10.06 - .04 - 4.8'
2853 - 3.25 - .04 - 4.0'
2862 - 17.78 - 1.20 - 3.9'.
2861 - 3.20 - .08 - 5.0'
2857 - 3.85 - .015 - 5.7'
2853 - 3.60 - .01 - 4.4'
2852 - 4.90 - .015 - 4.8'
2851 - 3.86 - .02 - 8.0'
2849 - 3.94 - .02 - 3.6' H.W.
~~2850 - 6.30 - .035 - 4.8'~~
2847 - 6.28 - .04 - 6.6 F.W.
2848 - 1.87 - .06 - 7.5'
H.W. 2847 - 6.60 - .04 - 6.6'
H.W. 2843 - 6.38 - .04 - 2.9'
F.W. 2844 - 8.94 - .045 - 4.7'
2845 - 1.90 - Tr. 7.7' E. side X.C.
2842 - 11.65 - .055 - 5.8'
2841 - 3.85 - .01 - 5.3'
2840 - 8.61 - .035 - 3.9'
2839 - 4.34 - .02 - 3.6'
2838 - 3.43 - .02 - 3.0'
2835 - 5.37 - .08 - 5.0'
2836 - 1.04 - Tr. - 5.3'
~~2832 - 4.26 - .02 - 4.4' DC~~
2833 - 1.28 - Tr. - 6.2'
5160 - 6.48 - .04 - 3.2'
5159 - 16.23 - .055 - 6.3'
5159 - 5.05 - 0.25 - 4.5'
5216 - 4.72 - .025 - 3.3'

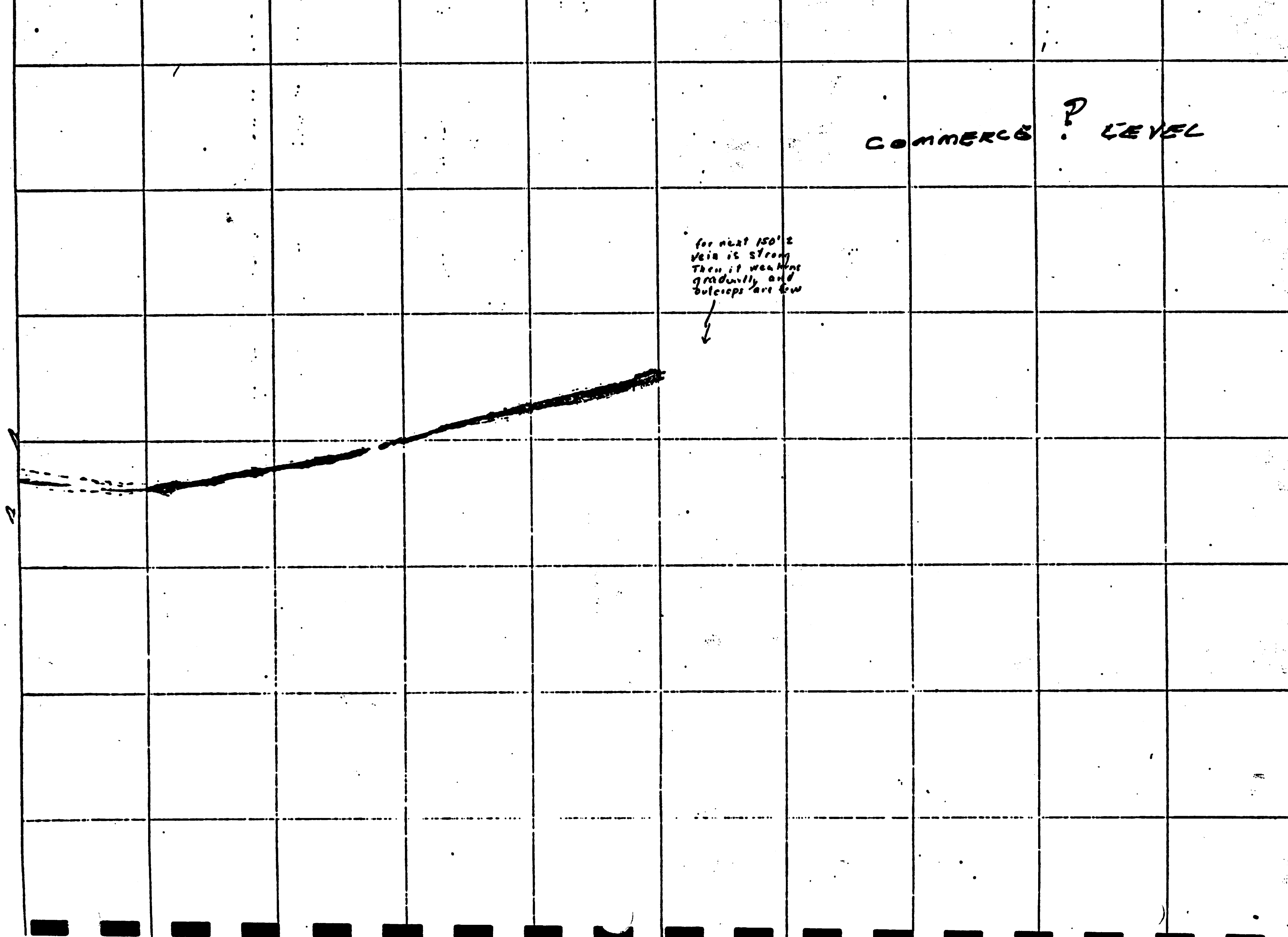
Ash Peak - Commerce Mine
Greenlee Co., Ariz.
100 level, West 1/4, 1" = 20'

Ash Peak – Commerce Section

Greenlee Co., Ariz.

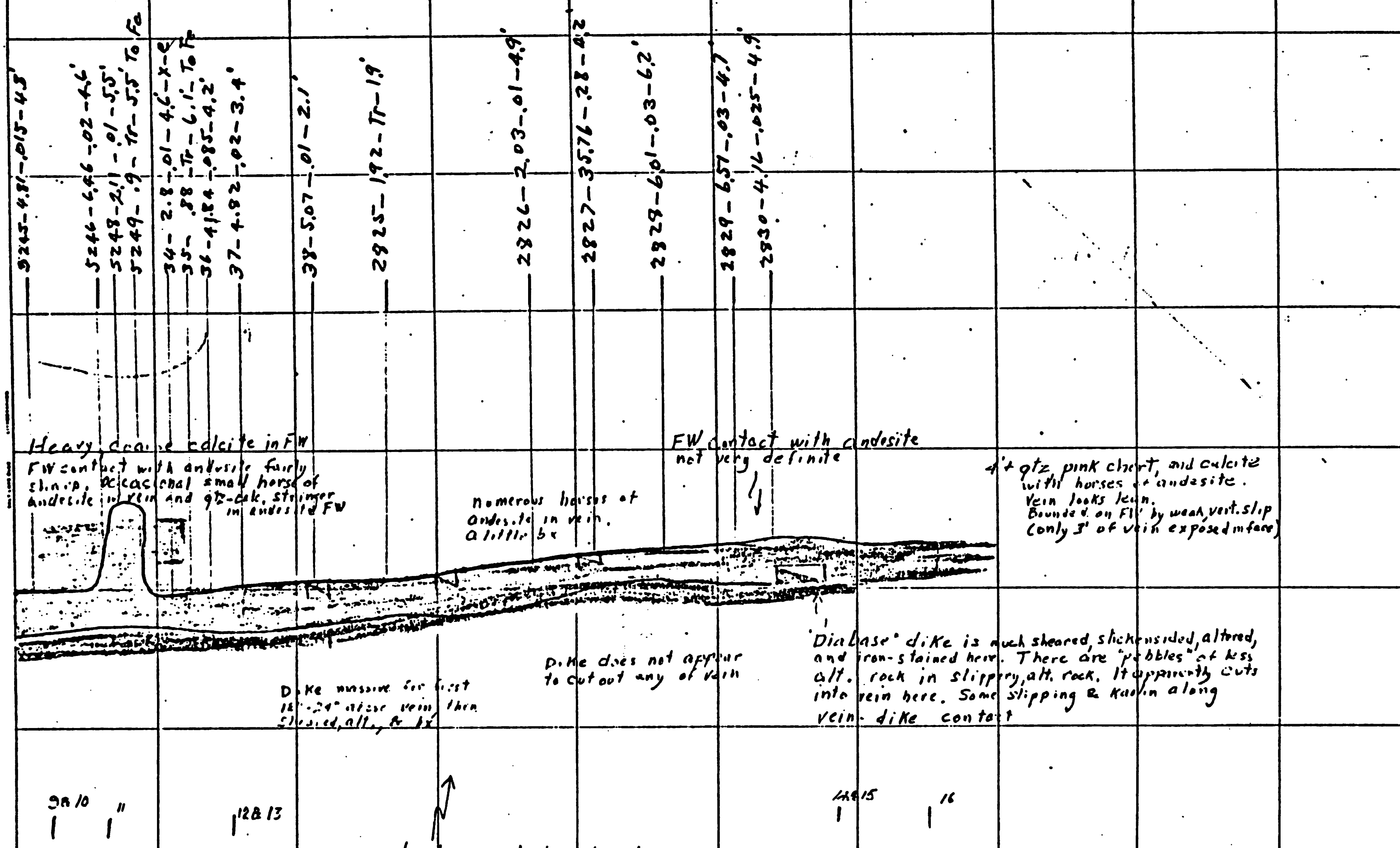
1" = 50'

June 1941 TAD



ASN Pecan – Commerce ...

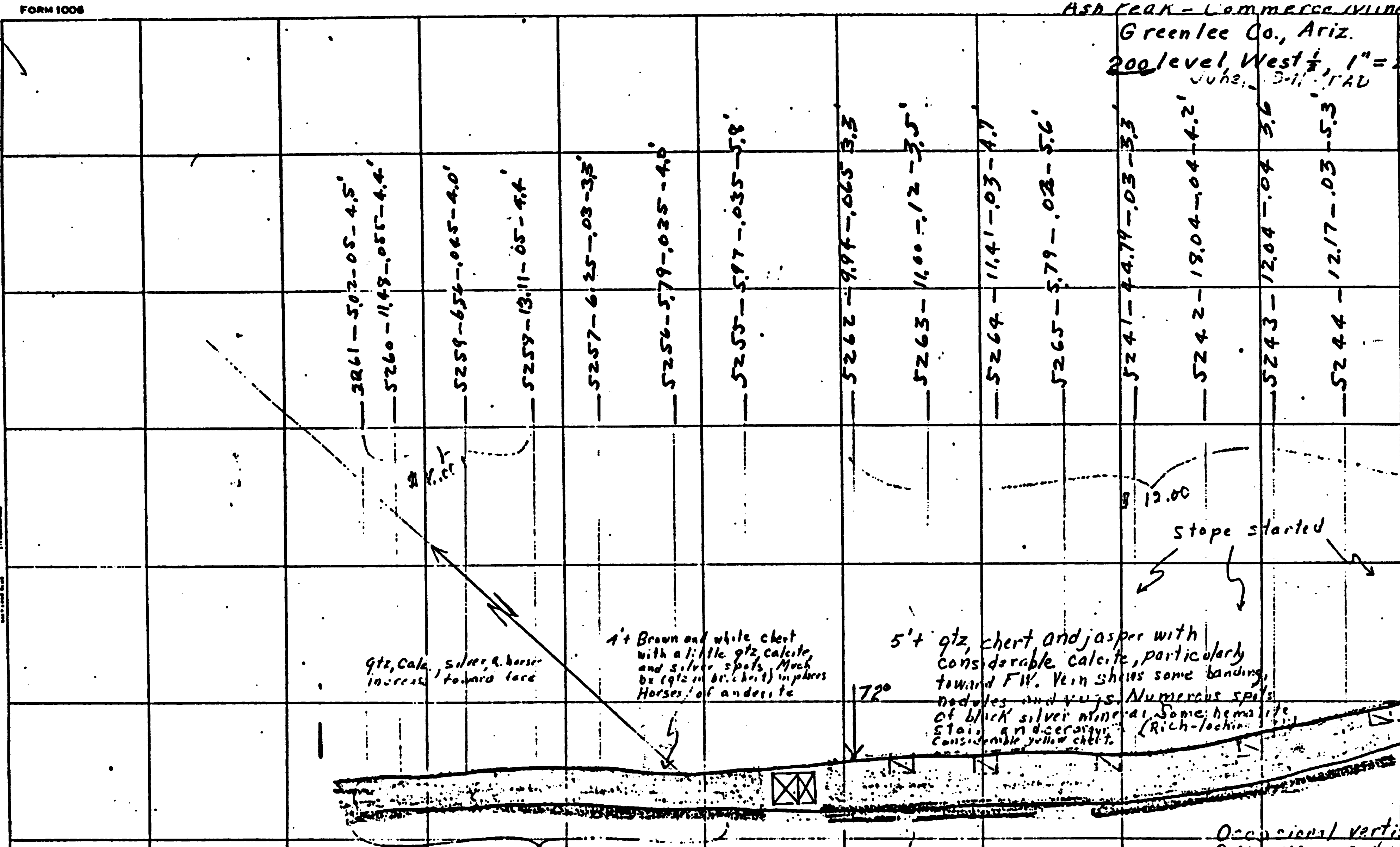
Greenlee Co., Ariz.
200 level, East ½, 1" = 20
June 1911, TAD



(In place ... vein ... In other places stope has broken ... but HW stands pretty well. In still other places ... hold HW?)

HW 14	207'	5.0'	9.12	.06
FW 15	207'	4.0'	7.35	.01
16	221	3.0'	8.43	.01

Ash Peak - Commerce Mine
Greenlee Co., Ariz.
200 level West 1/2, 1" = 20
June - 3-11 - TAD



This rock is massive and fine grained and my be altered andesite or ... "diabase."

"Diabase" dike; medium-fine greenish with occasional large feldspar phenocrysts ... Stain ... Sheeting with many narrow hematite slips is present only 12"-18" from vein. Dike at vein contact is fairly ...

Slight slip and ½" gouge along dike-vein contact

Occasional vertical cross veins and ... courses which ... cut dike.

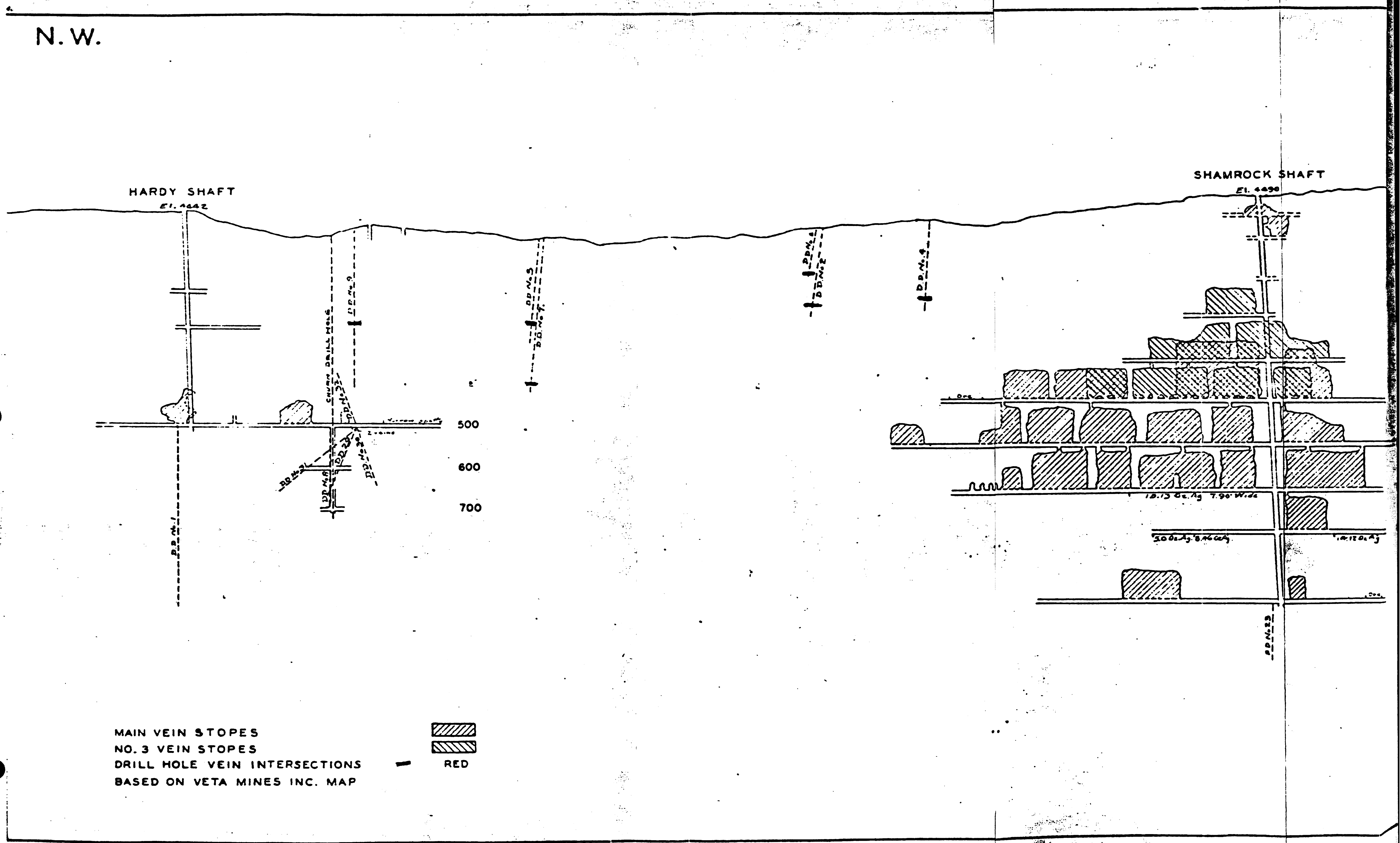
1[5] 1[6] 1[7&8]

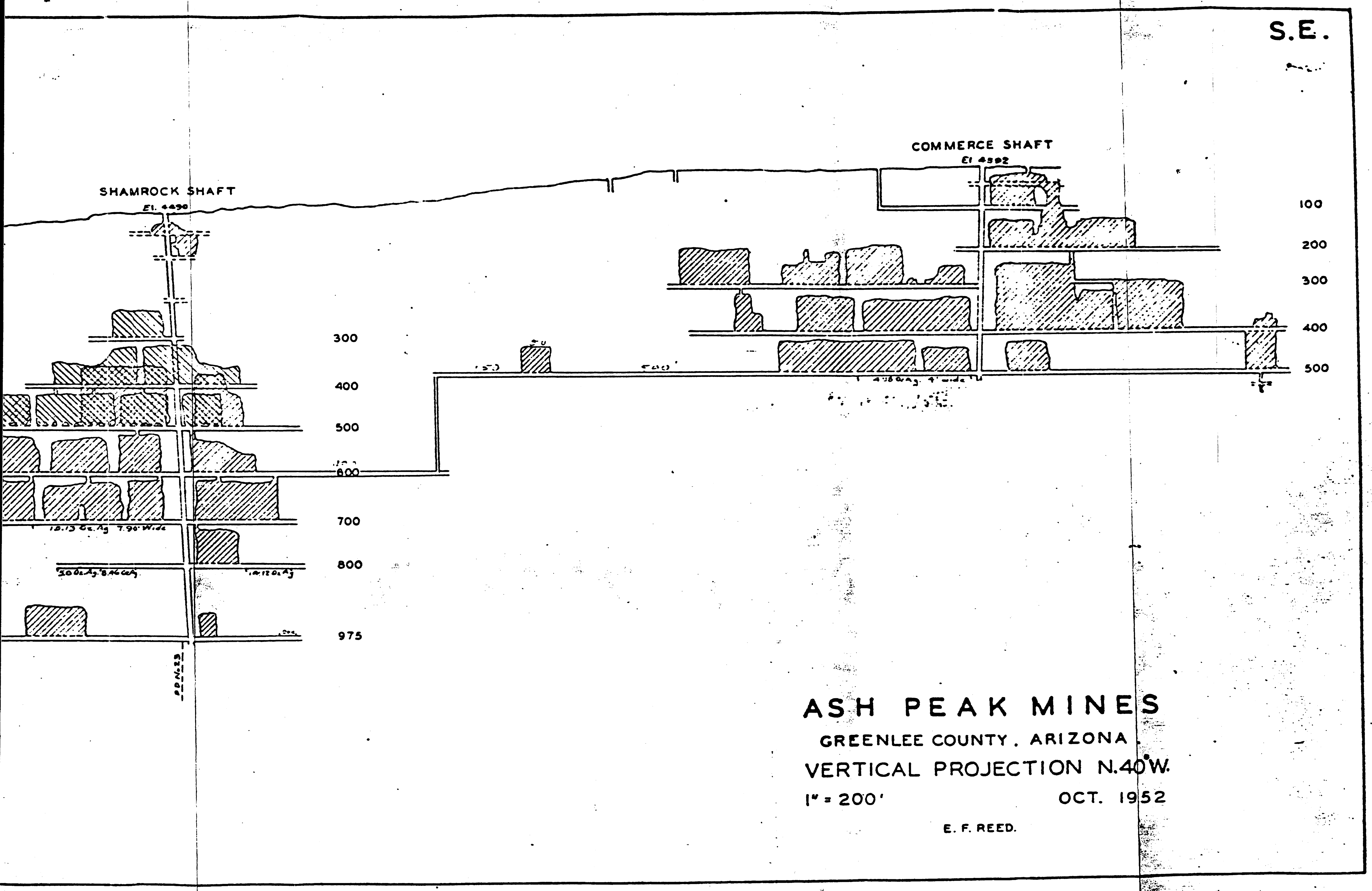
No	Shaft Dist	Above Level	Width
5	37'	25'±	5.5'
6	55'	25'±	5.5'
HW 7	76'	25'±	4.0'
FW 8	76'	25'±	2.7'
HW 9	94'	25'±	4.0'
FW 10	94'	25'±	3.0'
11	102'	25'	3.0'

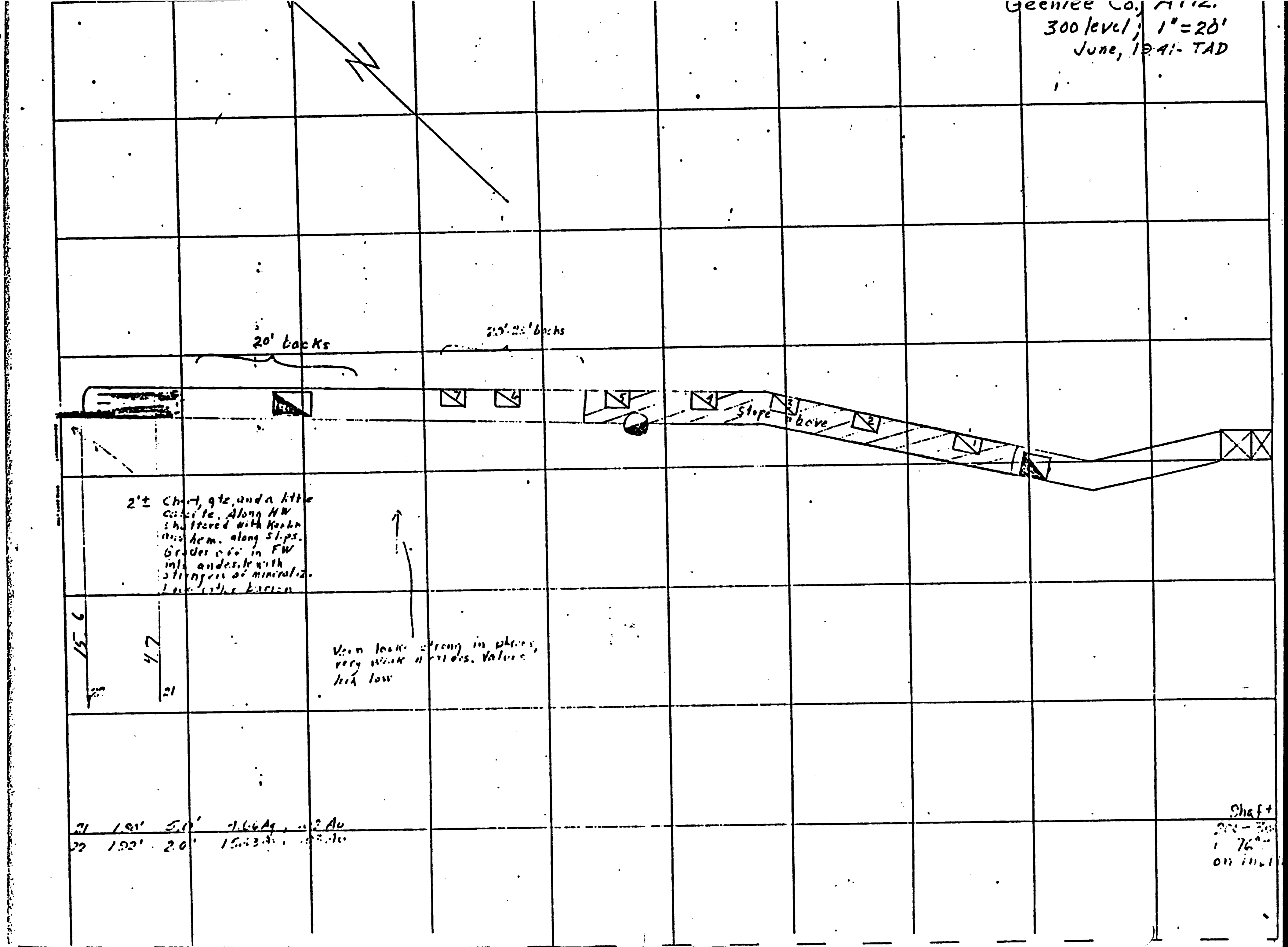
17	37'	4.2'	11.44	.04
18	47'	3.3'	14.57	.05
19	57'	3.3'	7.76	.05
Face 20	62'	4.5	8.59	.03

1[20] 1[19] 1[18] 1[17]

... 200 level ...

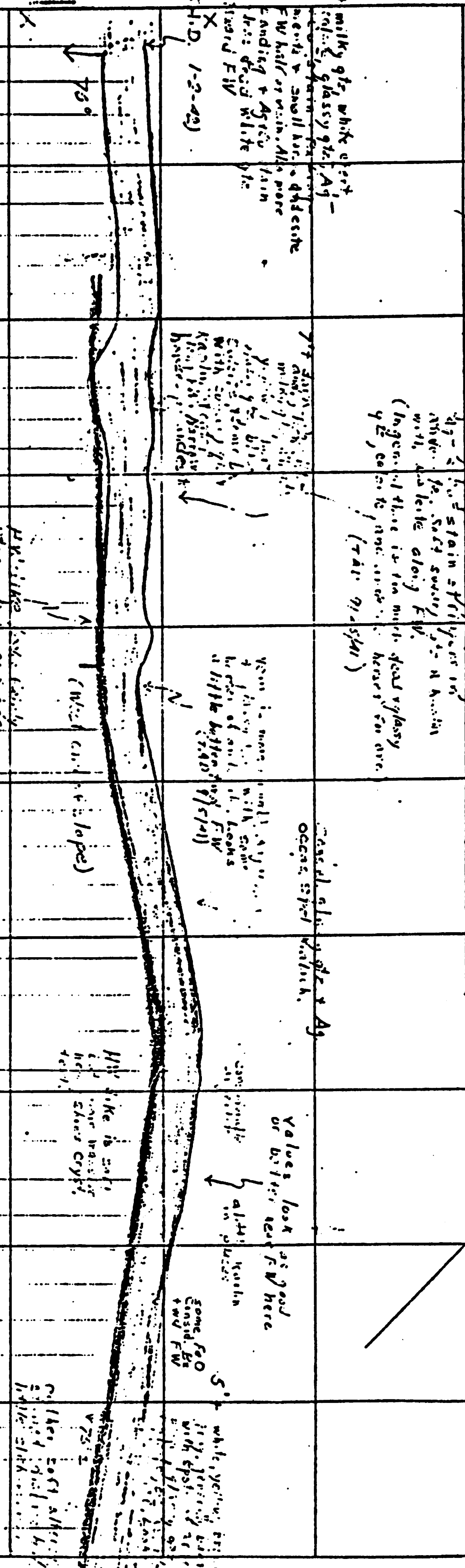

N. W.
HARDY SHAFT
El. 4442
SHAMROCK SHAFT
El. 4490
CHURN DRILL HOLE
D.D. No. 1
D.D. No. 9
D.D. No. 5
D.D. No. 7
D.D. No. 6
D.D. No. 2
D.D. No. 4
D.D. No. 23
500
600
700
10.13 Oz. Ag 7.90' Wide
MAIN VEIN STOPES
NO. 3 VEIN STOPES
DRILL HOLE VEIN INTERSECTIONS
RED
BASED ON VETA MINES INC. MAP


S.E.
COMMERCE SHAFT
El 4392
SHAMROCK SHAFT
El. 4490
100
200
300
400
500
600
700
800
975
ASH PEAK MINES
GREENLEE COUNTY, ARIZONA
VERTICAL PROJECTION N.40W.
1" = 200'
OCT. 1952
E. F. REED.



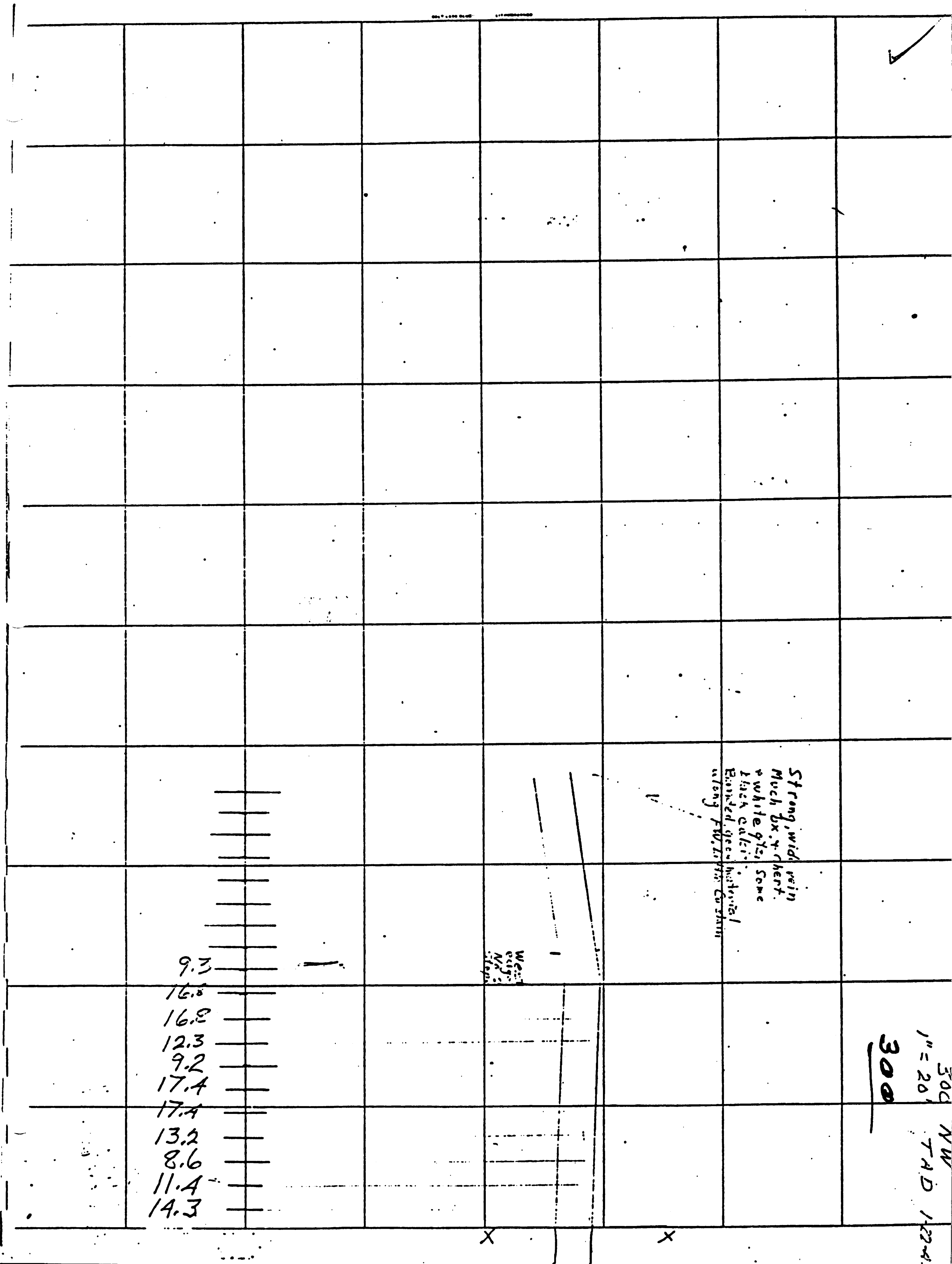
300 level; 1"=20'
June, 1941- TAD
20' backs
Stope above
1
2
3
4
5
6
7
2'±
15.6
4.7
21
Shaft

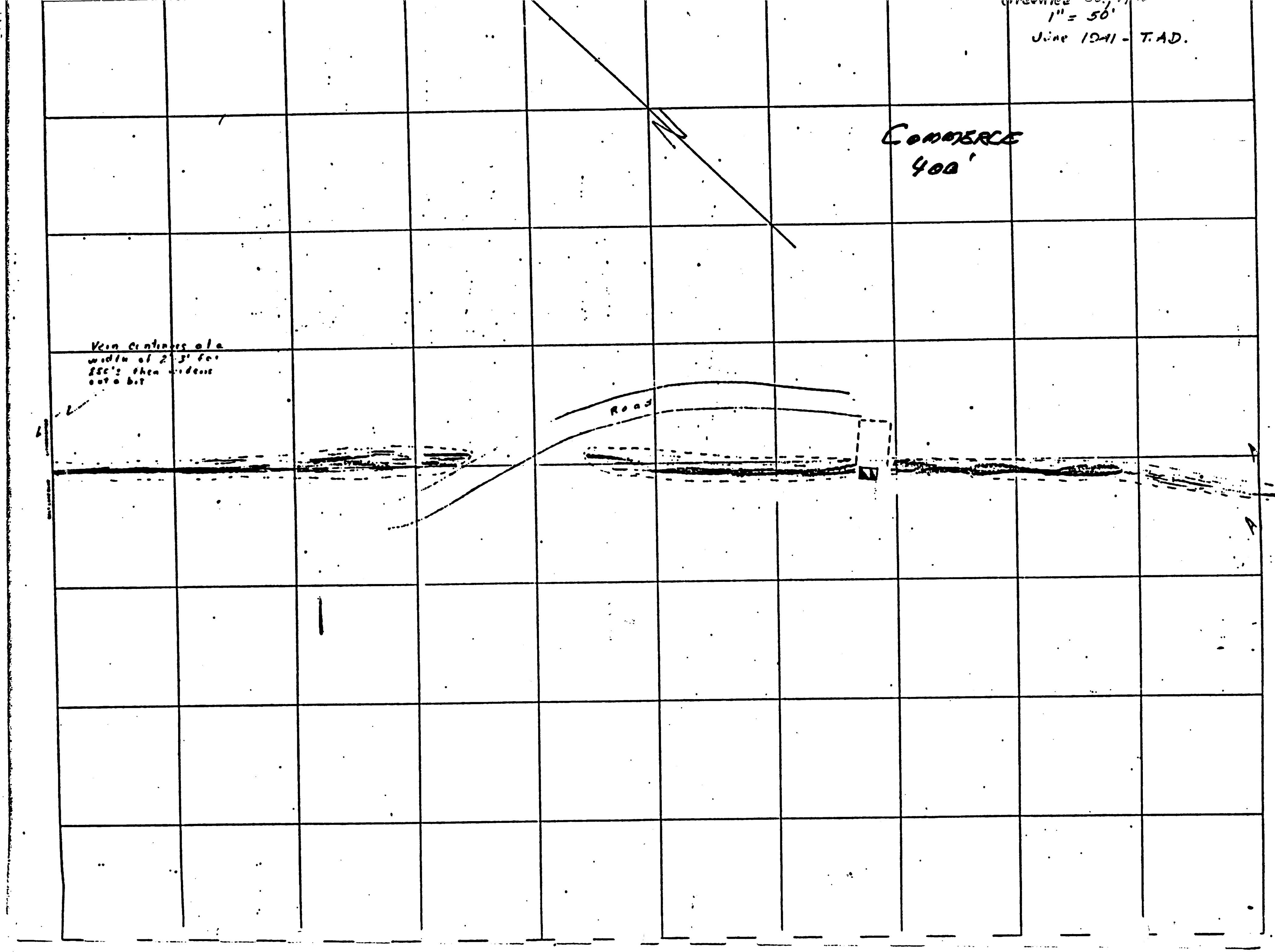
	11.4	
	14.3	
	15.8	
Muck	12.8	
"	11.1	
"	11.5	.05
"	13.1	.04
"	7.4	.03
"	12.3	.08
"	2.0	.03
	9.2	
	6.8	
	20.A	
	14.1	
	15.6	
	7.A	
	11.1	
	5.8	
	6.6	
	4.0	
	5.1	
	2.3	
	7.1	
	6.1	
	6.2	
	5.4	
Muck	8.9 A	
"	14.6	
"	23.6	
"	17.1	
"	18.6	
"	12.5	
"	14.0	
"	12.6	
"	3.2	
"	5.4	
"	6.2	
"	4.3	
"	9.3	
"	2.4	
"	10.5	
"	11.1	
"	8.7	
"	17.0	
"	12.6	
"	12.7	
"	2.8	
"	7.1	
"	6.5	

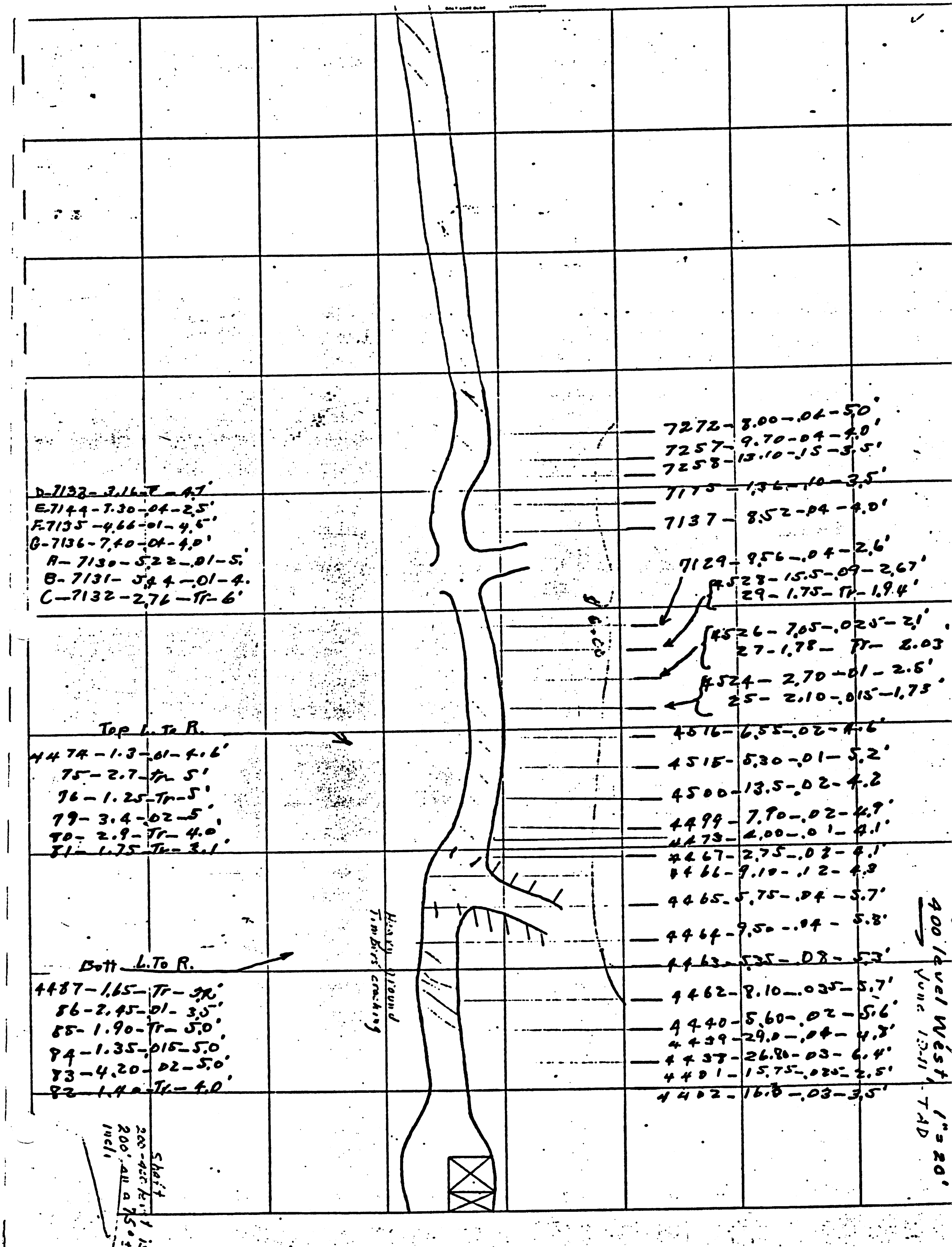


300

Green Tree
300 level
1" = 20', T.A.D.

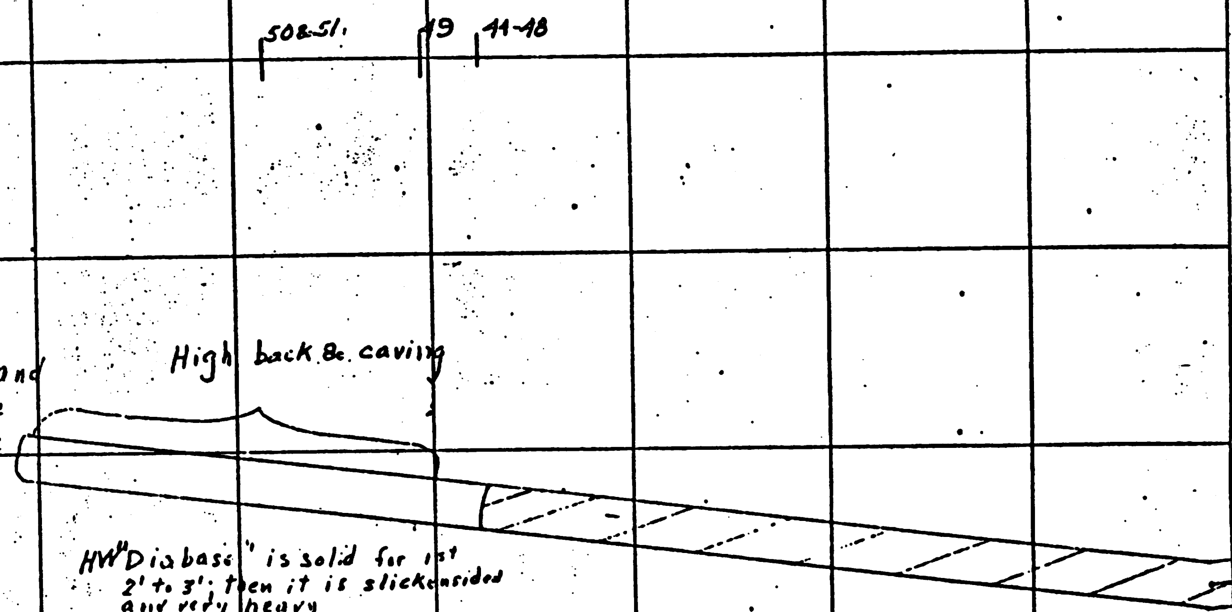

9.3
16.8
16.8
12.3
9.2
17.4
17.4
13.2
8.6
11.4
14.3
Strong, wide vein
Much bx. + chert.
+ white qtz. Some
black calcite.
Banded green material
along FW. Little Cu stain
X
X
300 NW
1" = 20'
TAD 1-22-
300


1" = 50'
June 1941 - T.A.D.
Commerce
400'
Vein continues at a
width of 2-3' for
550': then widens
out a bit
Road
A
A


7272- 8.00-.04-5.0'
7257- 9.70-.04-4.0'
7258- 13.10-.15-3.5'
7175- 1.36-.10-3.5'
7137- 8.52-.04-4.0'
7129- 9.56-.04-2.6'
4528-15.5-.09-2.67'
29- 1.75- Tr- 1.94'
4526- 7.05-.025- 2.1'
27-1.78- Tr- 2.03
4524- 2.70-.01- 2.5'
25- 2.10-.015-1.73
4516- 6.55-.02-4.6'
4515- 5.30-.01-5.2'
4500-13.5-.02-4.2
4499- 7.90-.02-4.9'
4473- 2.00-.01-4.1'
4467- 2.75-.02-4.1'
4466- 9.10-.12-4.3
4465- 5.75-.04-5.7'
4464- 9.50-.04-5.8'
4463- 5.35-.08-5.7'
4462- 8.10-.035-5.7'
4440- 5.60-.02-5.6'
4439- 29.0-.04-4.8'
4437- 26.80-.03-6.4'
4401- 15.75-.025-2.5'
4402- 16.0-.03-3.5'
D-7133-3.16-T-4.7'
E-7144-7.30-.04-2.5'
F-7135-4.66-.01-4.5'
G-7136-7.40-.04-4.0'
A-7130-5.22-.01-5.
B-7131-5.44-.01-4.
C-7132-2.76-Tr-6'
Top L. To R.
4474-1.3-.01-4.6'
75-2.7-Tr 5'
76-1.25-Tr-5'
79-3.4-.02-5'
80-2.9-Tr-4.0'
81-1.75-Tr-3.1'
Bott. L.To R.
4487-1.65-Tr-3.2'
86-2.45-.01-3.5'
85-1.90-Tr-5.0'
84-1.35-.015-5.0'
83-4.20-.02-5.0'
82-1.40-Tr-4.0'
Heavy ground Timbers cracking
400 level West, 1"=20'
Shaft

400 level west. 1"=20'
June 1941, TAD

400

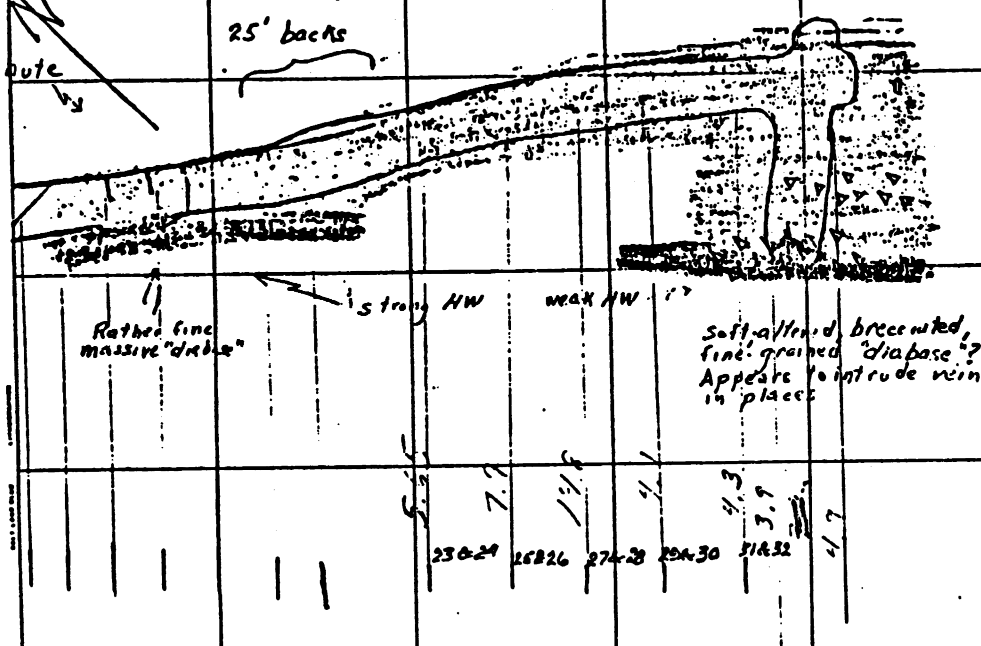


44	270'	5.0'	73' up [illegible] (meas. Vert.)
45	270'	6.0'	58' " "
46	270'	[illegible]'	35' " "
47	270'	5.0'	10' " "
48	270'	5.0'	0' " "
49	276'	5.5'	
HW 50	[illegible]'	[illegible]'	
FW 51	[illegible]'	[illegible]'	
52	[illegible]'	6.[illegible]'	
53	317'	5.5'	Face

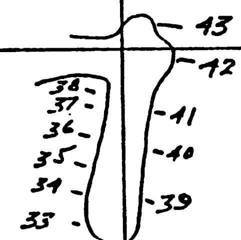
FORM 1006

Greenlee Co., Ariz.
400 level East, 1" = 20'
June, 1941 - TAD

21' usual-type vein showing some gypsum in fractures. Increasingly cherty and calcareous toward FW. Horses of andesite near FW. A little kaolin towards HW. Usual steep cross fractures



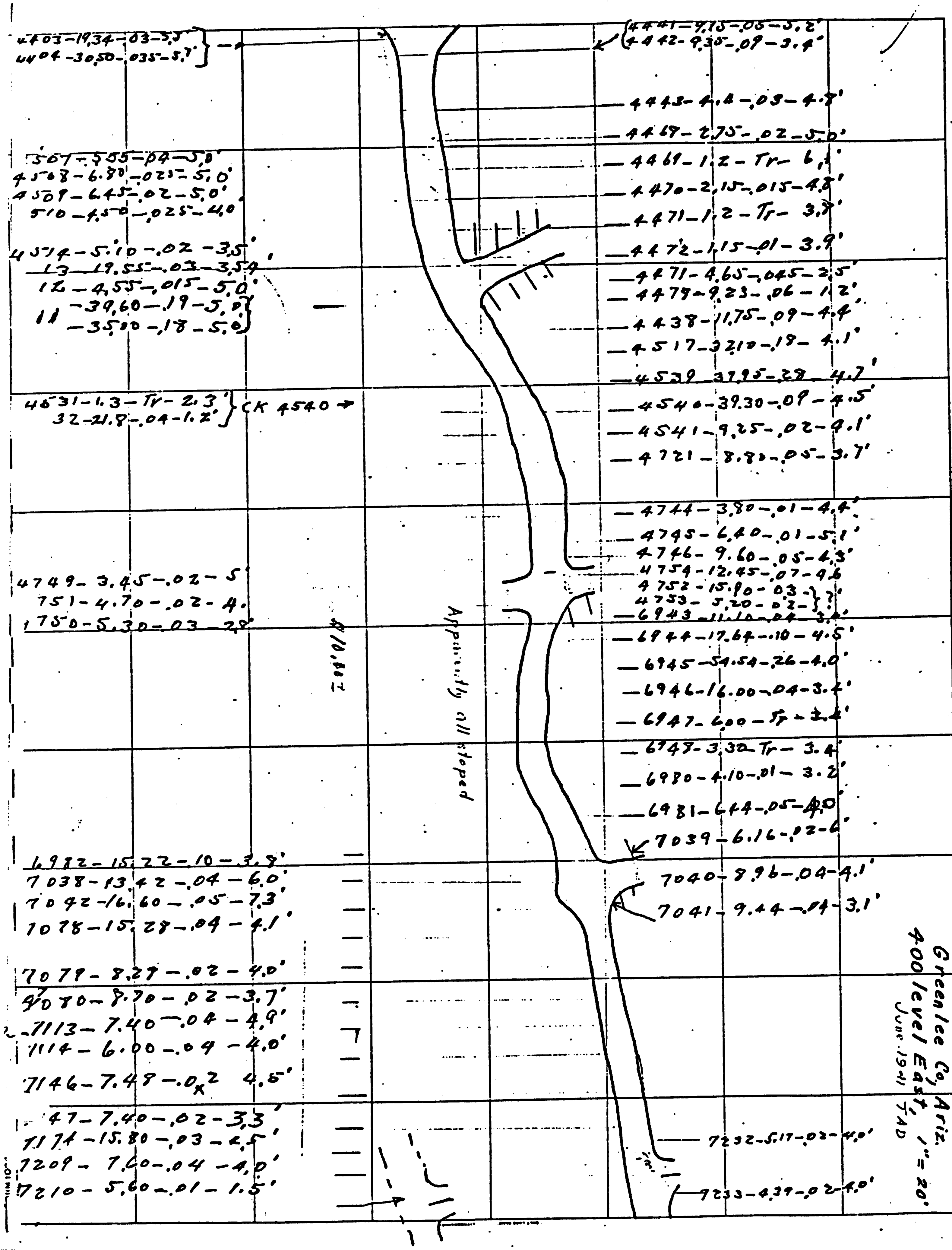
Vein shows usual early well-cemented bx and also later bx like HW rock



7211 - 20.70 - .06 - 5'
7227 - 10.10 - .04 - 4.5'
7246 - 12.0 - .02 - 3.5'
7247 - 4.88 - .01 - 4.0'
7248 - 5.00 - .02 - 4.0'
7249 - 4.04 - .02 - 4.0'
7273 - 7.10 - .01 - 5.8'

	Samp. No.	Dist. from Shaft	Width	Ag	Au
HW	23	252'	3.5'	2.83 Ag	.03 Au
FW	[illegible]	252'	3.5'	8.47	.05
HW	25	260'	3.5'	8.57	.07
FW	26	260'	2.0'	7.72	.07
HW	27	26[illegible]	3.5'	25.21	.0[illegible]
FW	28	[illegible]	[illegible]	1.34	[illegible]
HW	2[illegible]	276'	3.5'	1.21	.02
FW	30	276'	2.2'	4.[illegible]	.05
HW	31	[illegible]	3.5'	2.11	.01
FW	32	284'	2.7'	6.5A	.02
	33	[illegible]	[illegible]	3.20	.02
	3[illegible]	[illegible]	[illegible]	5.28	.05
	35	[illegible]	[illegible]	5.50	.02
	3[illegible]	[illegible]	[illegible]	3.[illegible]	.015

39	293'	5.0'	10.66 Ag	.01 Au
40	293'	5.0'	1.1[illegible]	.02
41	293'	[illegible]	2.6[illegible]	.0[illegible]
42	297'	6.0'	4.24	.02
43	293'	4.0'	2.88	.02


4403-19.34-.03-3.5'
4404-30.50-.035-3.7'
4441-9.15-.05-3.2'
4442-9.35-.09-3.4'
4443-4.2-.03-4.8'
4469-2.75-.02-5.0'
4507-5.55-.04-5.0'
4508-6.80-.025-5.0'
4509-6.45-.02-5.0'
4510-4.50-.025-4.0'
4461-1.2-Tr-6.1'
4470-2.15-.015-4.8'
4471-1.2-Tr-3.8'
4472-1.15-.01-3.9'
4514-5.10-.02-3.5'
13-19.55-.03-3.54'
12-4.55-.015-5.0'
11 -39.60-.19-5.0'
-35.00-.18-5.0'
4471-4.65-.045-2.5'
4479-9.23-.06-1.2'
4438-11.75-.09-4.4'
4517-32.10-.18-4.1'
4539-37.95-.28-4.7'
4531-1.3-Tr-2.3'
32-21.8-.04-1.2'
CK 4540
4540-39.30-.09-4.5'
4541-9.25-.02-4.1'
4721-8.80-.05-3.7'
4744-3.80-.01-4.4'
4745-6.40-.01-5.1'
4746-9.60-.05-4.3'
4754-12.45-.07-4.6
4752-15.90-.03
4753-5.20-.02
4749-3.45-.02-5'
751-4.70-.02-4.
1750-5.30-.03-2.8'
6943-11.10-.04-3.0'
6944-17.64-.10-4.5'
6945-54.54-.26-4.0'
6946-16.00-.04-3.4'
6947-6.00-Tr-3.4'
Apparently all stoped
6948-3.32-Tr-3.4'
6980-4.10-.01-3.2'
6981-6.44-.05-4.0'
7039-6.16-.02-6'
6982-15.22-.10-3.8'
7038-13.42-.04-6.0'
7042-16.60-.05-7.3'
7078-15.28-.04-4.1'
7040-8.96-.04-4.1'
7041-9.44-.04-3.1'
7079-8.29-.02-4.0'
7080-8.70-.02-3.7'
7113-7.40-.04-4.9'
7114-6.00-.04-4.0'
7146-7.48-.02 4.5'
47-7.40-.02-3.3'
7174-15.80-.03-4.5'
7209-7.60-.04-4.0'
7210-5.60-.01-1.5'
7232-5.17-.02-4.0'
7233-4.39-.02-4.0'
Greenlee Co, Ariz.
400 level East, 1" = 20'
June 1941 TAD

GK 7208-3.80-.02 - 7188CA

89.0 +

~~7164-15.10-.10-2.3'~~

1178-4.10-Tr-4.0'

~~7189~~ 7188-3.00-.04-4.0'

~~7188~~ 7178-3.94-.01-4.0'

~~7206-20.60-.14-4.0'~~

7207-2.70-.01-4.0'

7215-4.34-.02-4.5'

7226-25.30-.06-3.0'

7231-4.45-.01-4.0'

7261-3.80-.02-3.5'

7262-3.00-.01-4.0'

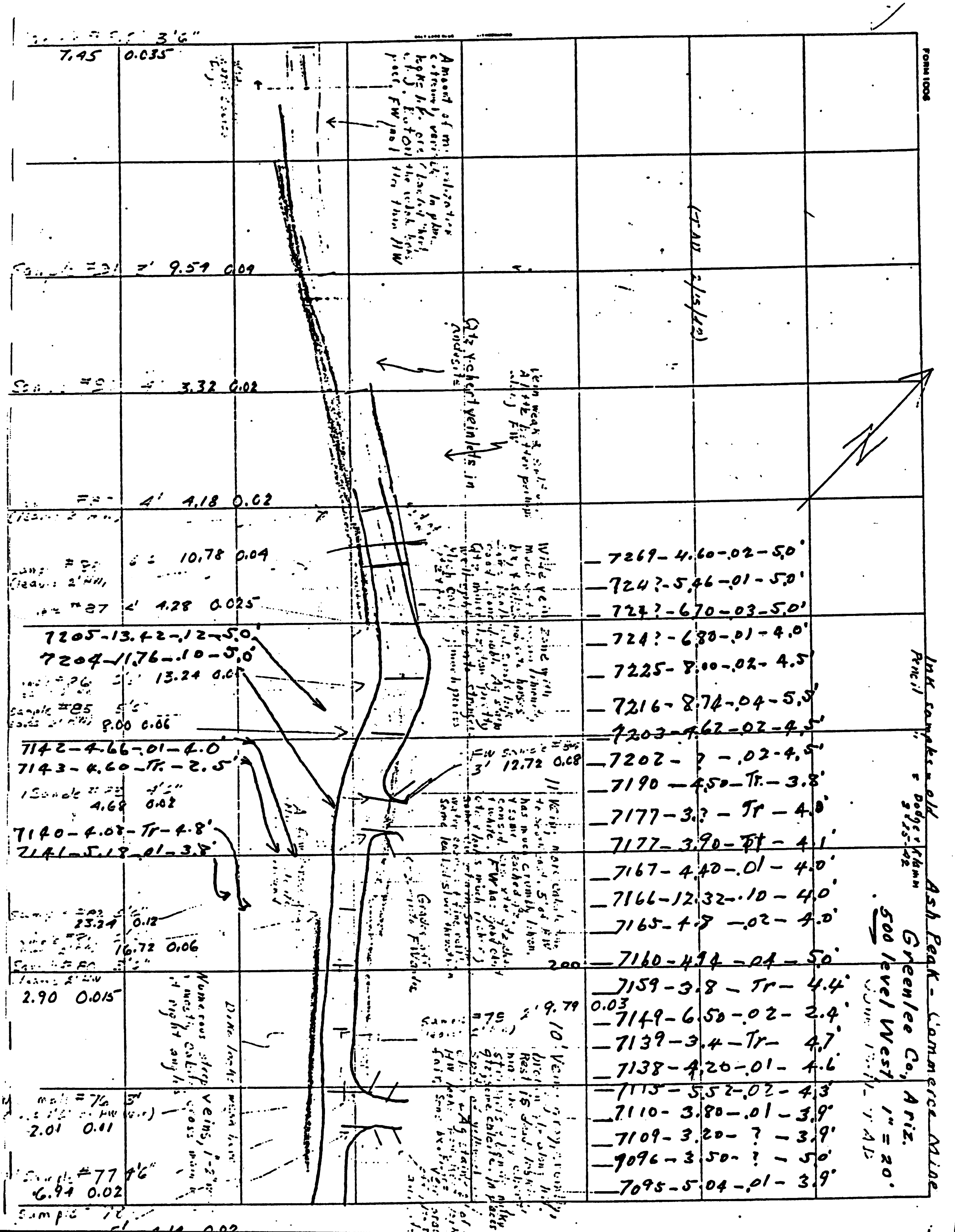
7263-2.70-.01-3.5'

7264-3.30-.01-4.5'

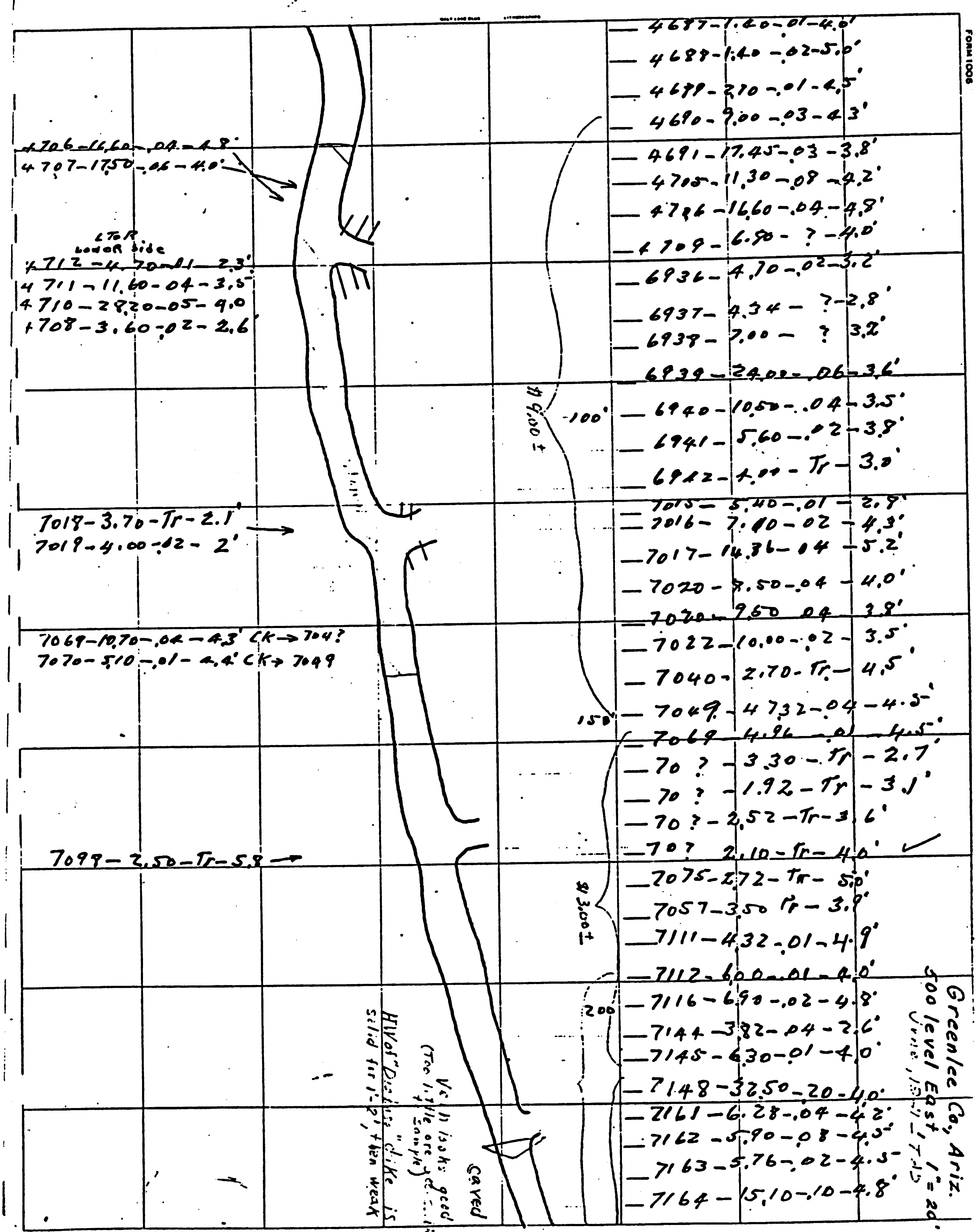
590

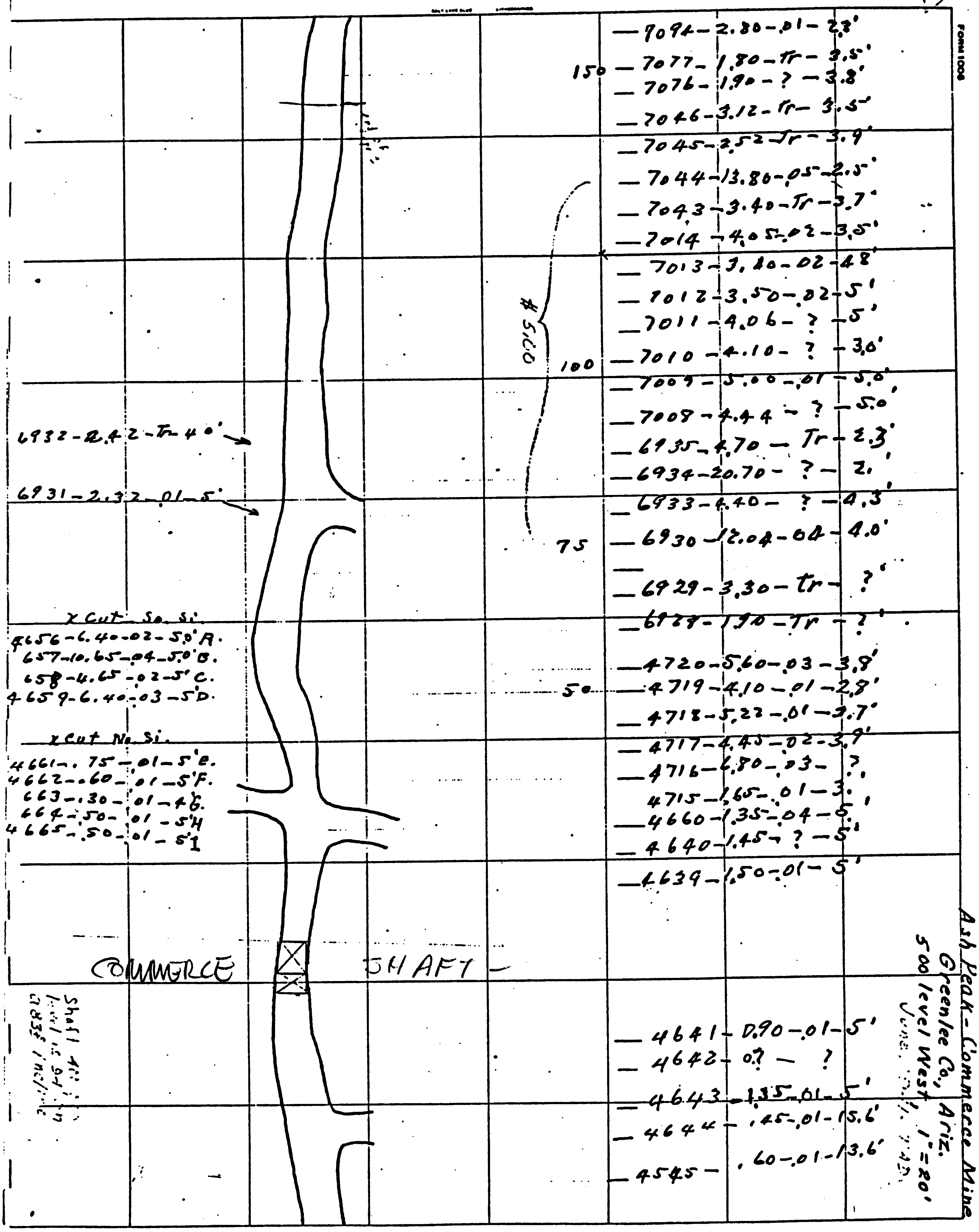
Greenlee Co., Ariz.

500 level East, 1" = 2

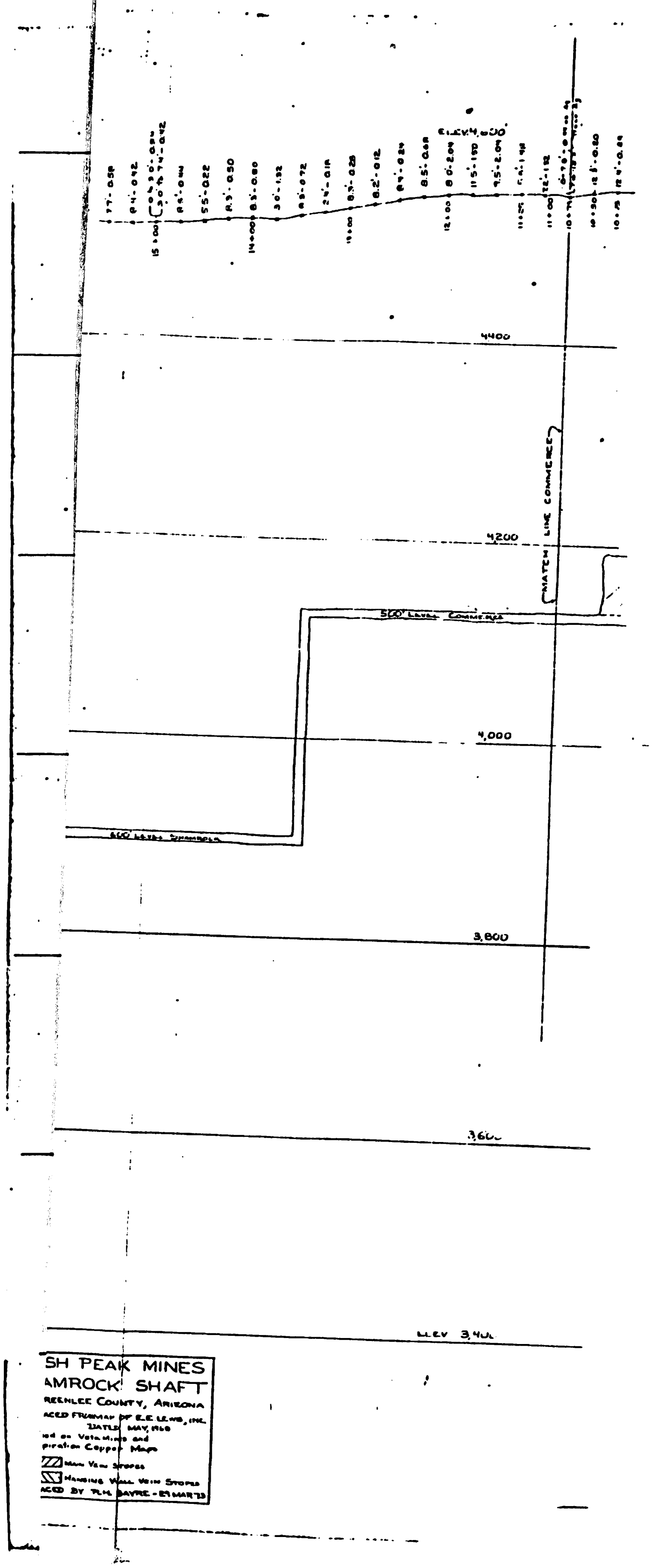


Ash Peak - Commerce Mine
Greenlee Co, Ariz.
500 level West 1" = 20'
Ink samples = old
Pencil
FORM 1008
3'6"
7.45 0.035
9.59 0.04
3.32 0.02
4' 4.18 0.02
10.78 0.04
4' 4.28 0.025
7205-13.42-.12-5.0'
7204-11.76-.10-5.0'
13.24 0.0
Sample #85 5'
8.00 0.06
7142-4.66-.01-4.0
7143-4.60-Tr.-2.5'
4.68 0.02
7140-4.08-Tr-4.8'
7141-5.18-.01-3.8'
23.24 0.12
16.72 0.06
2.90 0.015
2.01 0.11
Sample #77 4'6"
6.94 0.02
3' 12.72 0.08
9.79 0.03
7269-4.60-.02-5.0'
724?-5.46-.01-5.0'
72??-6.70-.03-5.0'
724?-6.80-.01-4.0'
7225-8.00-.02-4.5'
7216-8.74-.04-5.5'
7203-4.62-.02-4.5'
7202- ? -.02-4.5'
7190-4.50-Tr.-3.8'
7177-3.? -Tr-4.8'
7177-3.90-Tr-4.1'
7167-4.40-.01-4.0'
7166-12.32-.10-4.0'
7165-4.8 -.02-4.0'
7160-4.94-.04-5.0'
7159-3.8-Tr-4.4'
7149-6.50-.02-2.4'
7139-3.4-Tr-4.7'
7138-4.20-.01-4.6
7113-5.52-.02-4.3
7110-3.80-.01-3.9'
7109-3.20-?-3.9'
7096-3.50-?-5.0'
7095-5.04-.01-3.9'
200
Qtz. chert veinlets in andesite
Numerous steep veins, 1-2" wide
Dike
10' Vein
N


FORM 1006
4687-1.40-.01-4.0'
4688-1.40-.02-5.0'
4689-2.10-.01-4.5'
4690-9.00-.03-4.3'
4691-17.45-.03-3.8'
4705-11.30-.08-4.2'
4706-16.60-.04-4.8'
4709-6.90-?-4.0'
6936-4.70-.02-3.2'
6937-4.34-?-2.8'
6938-7.00-?-3.2'
6939-24.00-.06-3.6'
6940-10.50-.04-3.5'
6941-5.60-.02-3.8'
6942-4.00-Tr-3.0'
7015-5.40-.01-2.9'
7016-7.10-.02-4.3'
7017-14.86-.04-5.2'
7020-8.50-.04-4.0'
7020-9.50-.04-3.8'
7022-10.00-.02-3.5'
7040-2.70-Tr-4.5'
7049-47.32-.04-4.5'
7069-4.96-.01-4.5'
70 ?-3.30-Tr-2.7'
70 ?-1.92-Tr-3.1'
70 ?-2.52-Tr-3.6'
70 ?-2.10-Tr-4.0'
7075-2.72-Tr-5.0'
7057-3.50-Tr-3.9'
7111-4.32-.01-4.9'
7112-6.00-.01-4.0'
7116-6.90-.02-4.8'
7144-3.82-.04-2.6'
7145-6.30-.01-4.0
7148-32.50-.20-4.0'
7161-6.28-.04-4.2'
7162-5.90-.08-4.5'
7163-5.76-.02-4.5'
7164-15.10-.10-4.8'
4706-16.60-.04-4.8'
4707-17.50-.06-4.0'
L to R
Lower side
4712-4.70-.01-2.3'
4711-11.60-.04-3.5'
4710-28.20-.05-4.0
4708-3.60-.02-2.6'
7018-3.70-Tr-2.1'
7019-4.00-.02-2'
7069-10.70-.04-4.3' CK → 704?
7070-5.10-.01-4.4' CK → 7049
7099-2.50-Tr-5.8
$9.00±
100'
150'
$3.00±
200
Vein looks good
(Too little ore yet ... sample)
HW of "Dike" "dike is solid for 1-2', then weak
caved
Greenlee Co, Ariz.
500 level East, 1" = 20'
June, 1945



FORM 1006
7094-2.80-.01-2.8'
150
7077-1.80-Tr-3.5'
7076-1.90-?-3.8'
7046-3.12-Tr-3.5'
7045-2.52-Tr-3.9'
7044-13.80-.05-2.5'
7043-3.40-Tr-3.7'
7014-4.05-.02-3.5'
7013-3.20-.02-4.8'
7012-3.50-.02-5'
7011-4.06-?-5'
5.60
100
7010-4.10-?-3.0'
7009-3.00-.01-5.0'
7008-4.44-?-5.0'
6935-4.70-Tr-2.3'
6934-20.70-?-2.'
6933-4.40-?-4.3'
75
6930-12.02-.02-4.0'
6929-3.30-tr-?'
6928-1.90-Tr-?'
4720-5.60-.03-3.8'
50
4719-4.10-.01-2.8'
4718-5.22-.01-3.7'
4717-4.45-.02-3.9'
4716-4.80-.03-?
4715-1.65-.01-3.
4660-1.35-.04-5.
4640-1.45-?-5'
4639-1.50-.01-5'
6932-2.42-Tr-4.0'
6931-2.32-.01-5'
x cut So. Si.
4656-6.40-.02-5.0' A.
657-10.65-.04-5.0' B.
658-4.65-.02-5' C.
4659-6.40-.03-5' D.
x cut No. Si.
4661-.75-.01-5' E.
4662-.60-.01-5' F.
663-.30-.01-4' G.
664-.50-.01-5' H
4665-.50-.01-5' I
COMMERCE SHAFT
4641-0.90-.01-5'
4642-0.?-?
4643-1.35-.01-5'
4644-.45-.01-15.6'
4545-.60-.01-13.6'
Ash Peak-Commerce Mine
Greenlee Co., Ariz.
500 level West 1"=20'

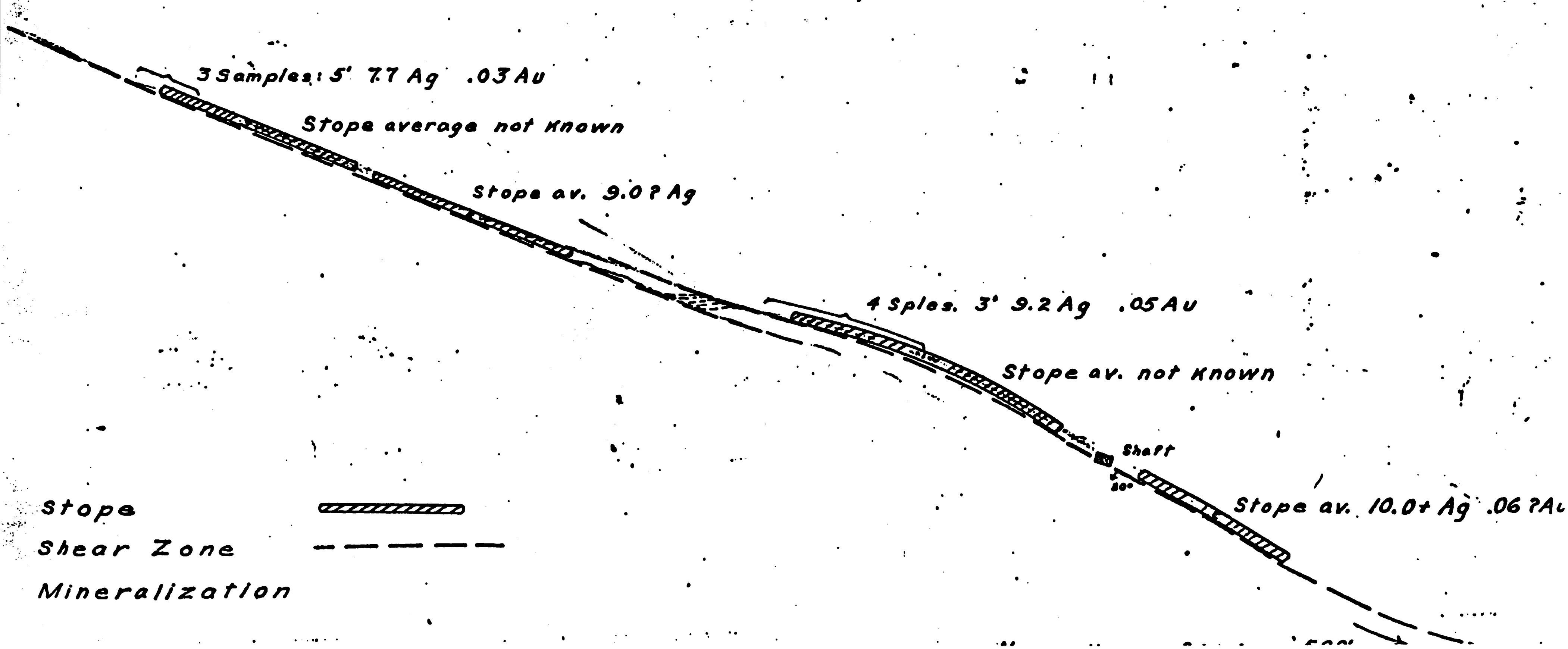


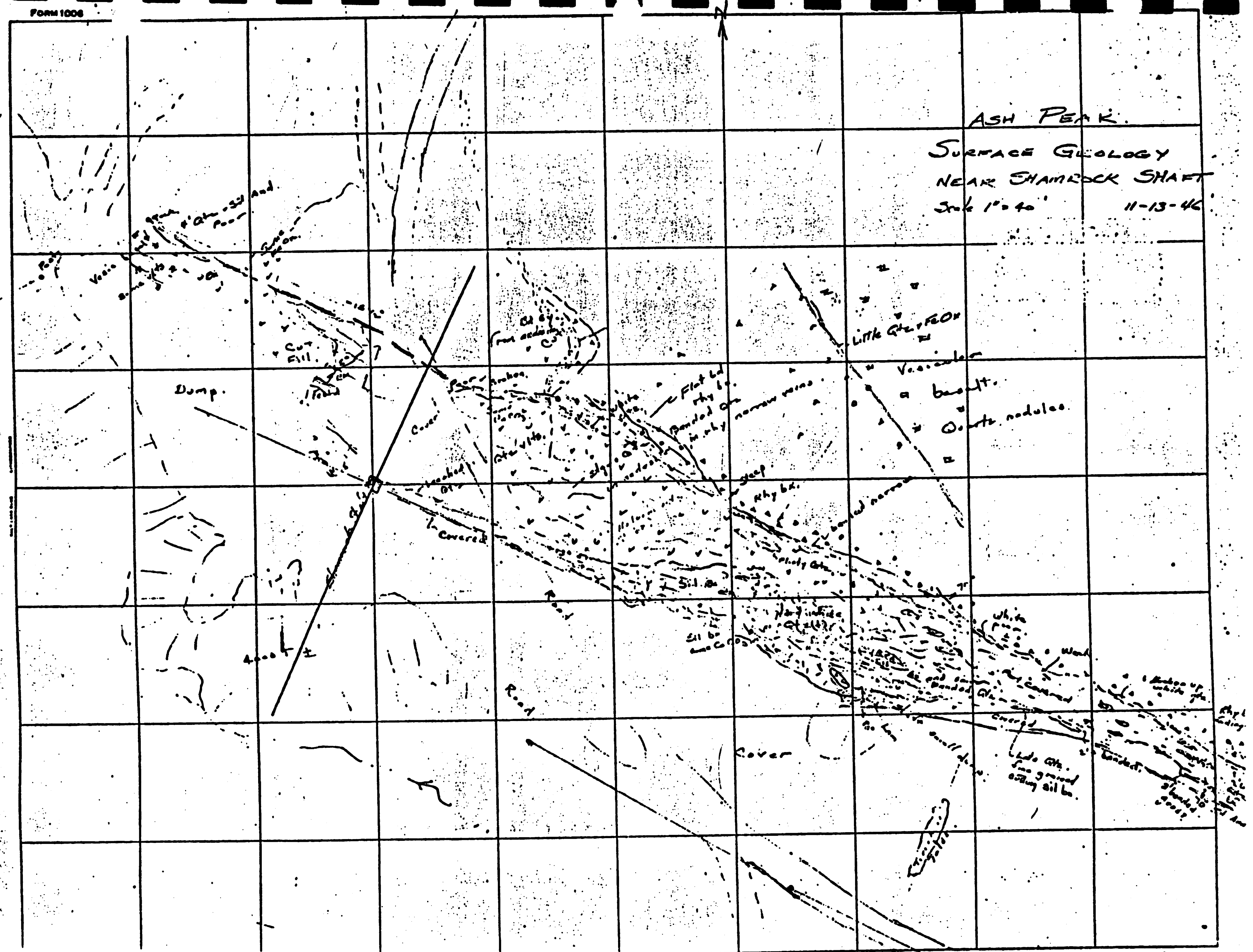
ELEV 4,600
4400
4200
MATCH LINE COMMENCE
500' LEVEL COMMENCE
4,000
600' LEVEL SHAMROCK
3,800
3,600
ELEV 3,400
SH PEAK MINES
AMROCK SHAFT
REENLEE COUNTY, ARIZONA
MAIN VEIN STOPES
HANGING WALL VEIN STOPES

ASH. PEAK - SHAMROCK
DUNCAN, ARIZ.

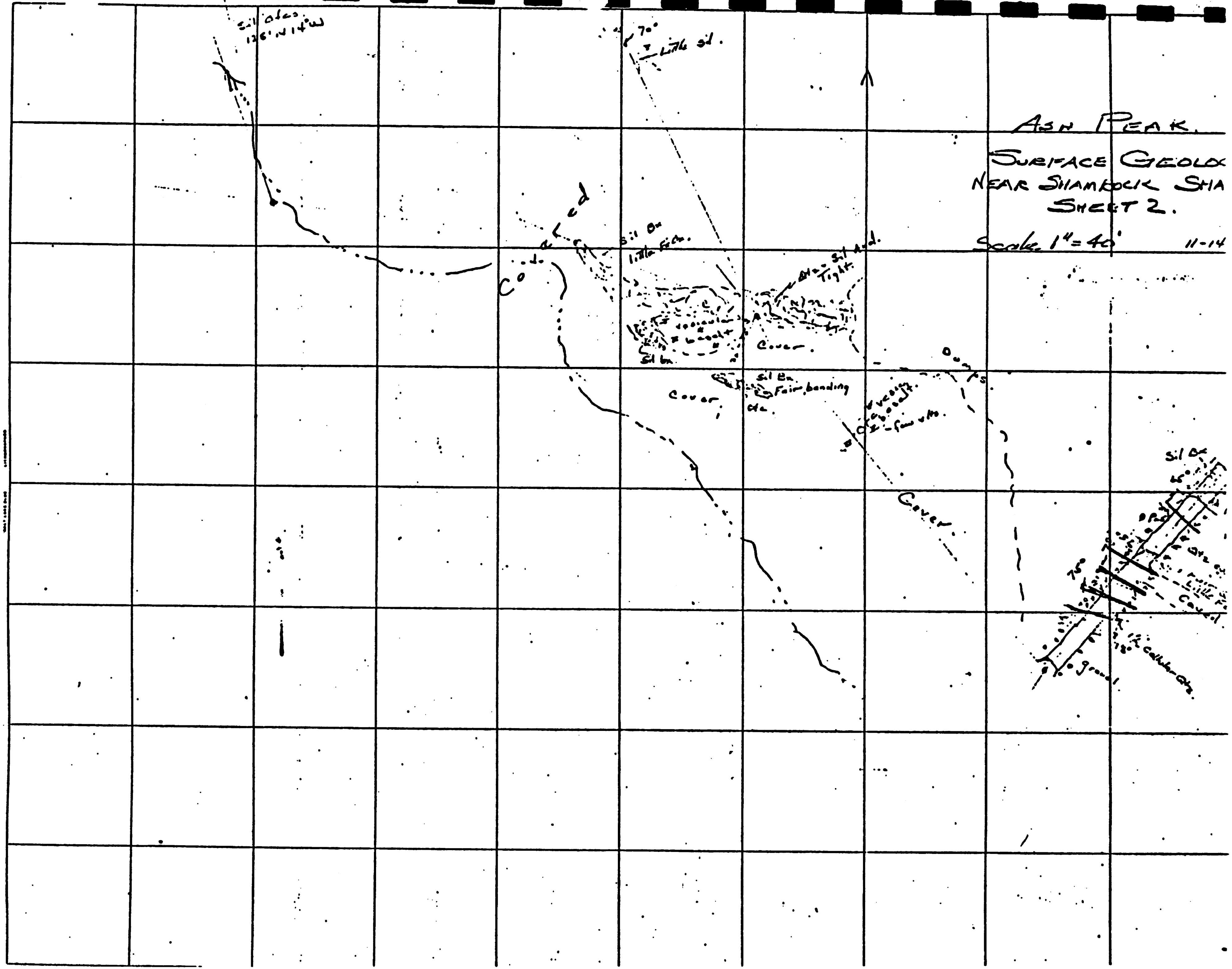
APPROXIMATE STOPE PLAN AT 480' LEVEL
SHOWING DIAGRAMMATICALLY
THE APPARENT VEIN RELATIONSHIPS

1" = 100'



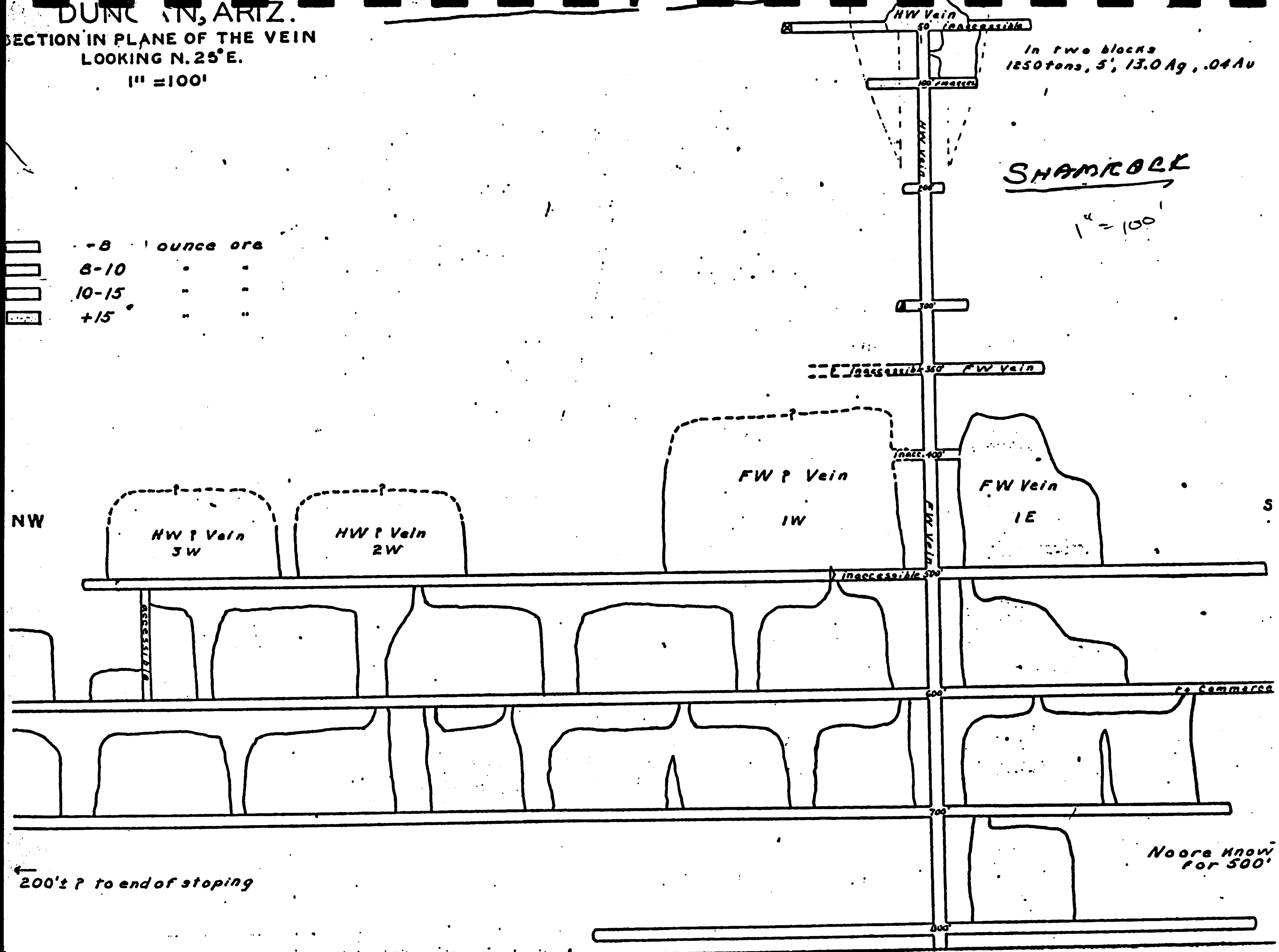


ASH PEAK.
SURFACE GEOLOGY
NEAR SHAMROCK SHAFT
Scale 1" = 40'
11-13-46
Little Qtz. FeOx
Vesicular
basalt.
Quartz nodules.
Dump.
Cut
Fill
Cover
Covered
Road
Road
Cover
Banded Qtz.
Rhy. bx.
FORM 1006

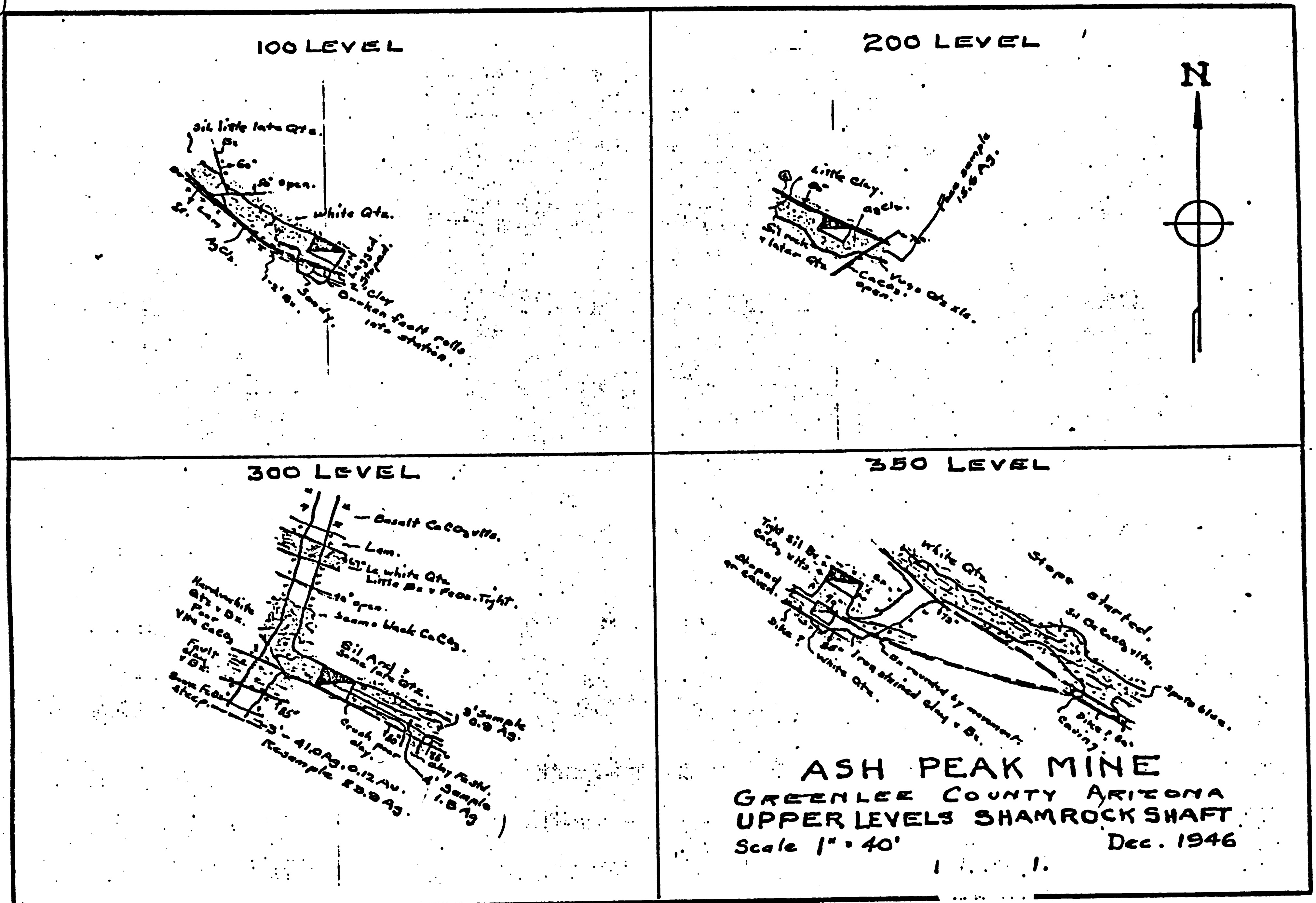

ASH PEAK.
SURFACE GEOLOGY
NEAR SHAMROCK SHA
SHEET 2.
Scale 1" = 40'
11-14
Little sil.
70°
Cover.
Cover
Cover.
Dumps
Fair banding
Gravel

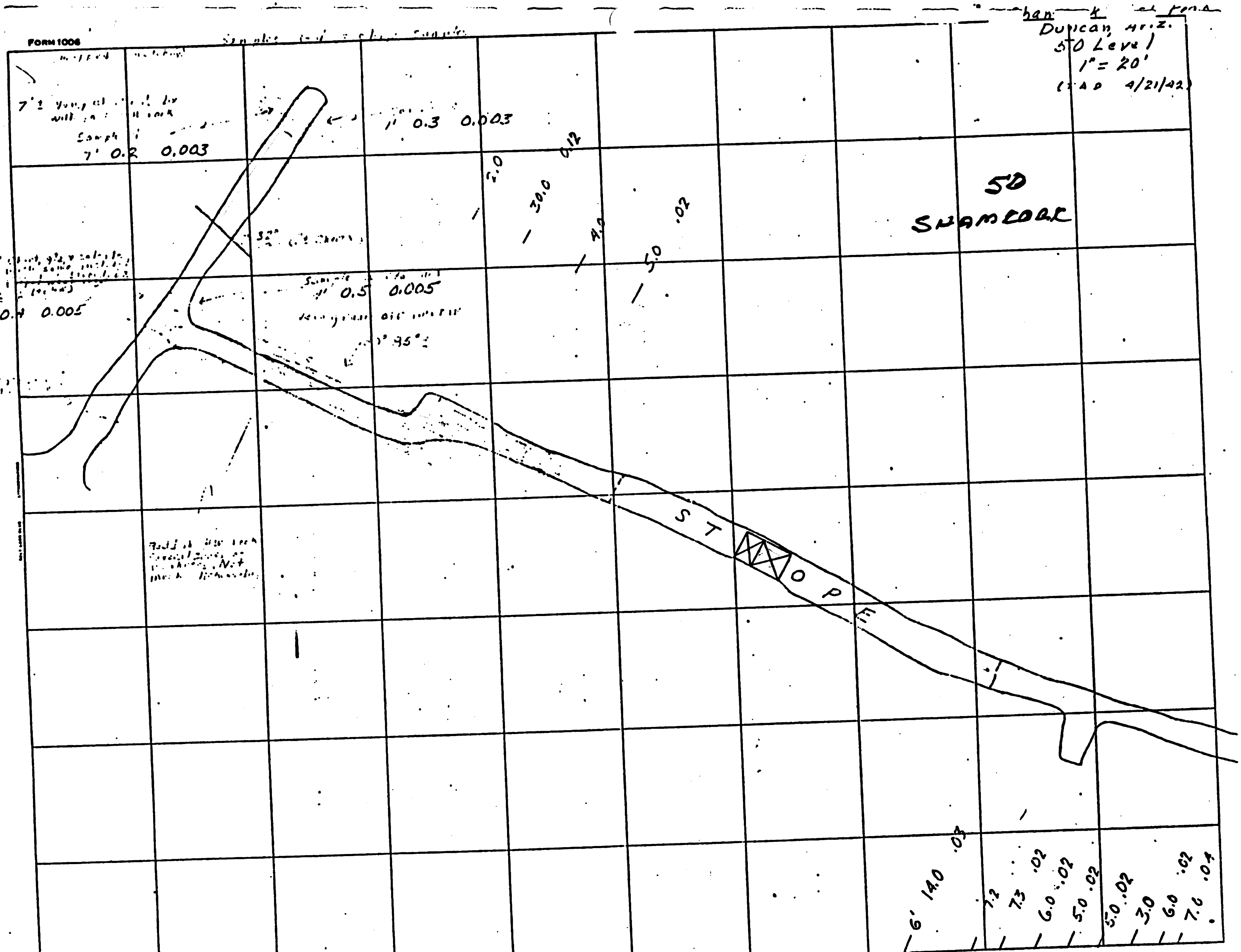
DUNC[illegible] [illegible]N, ARIZ.

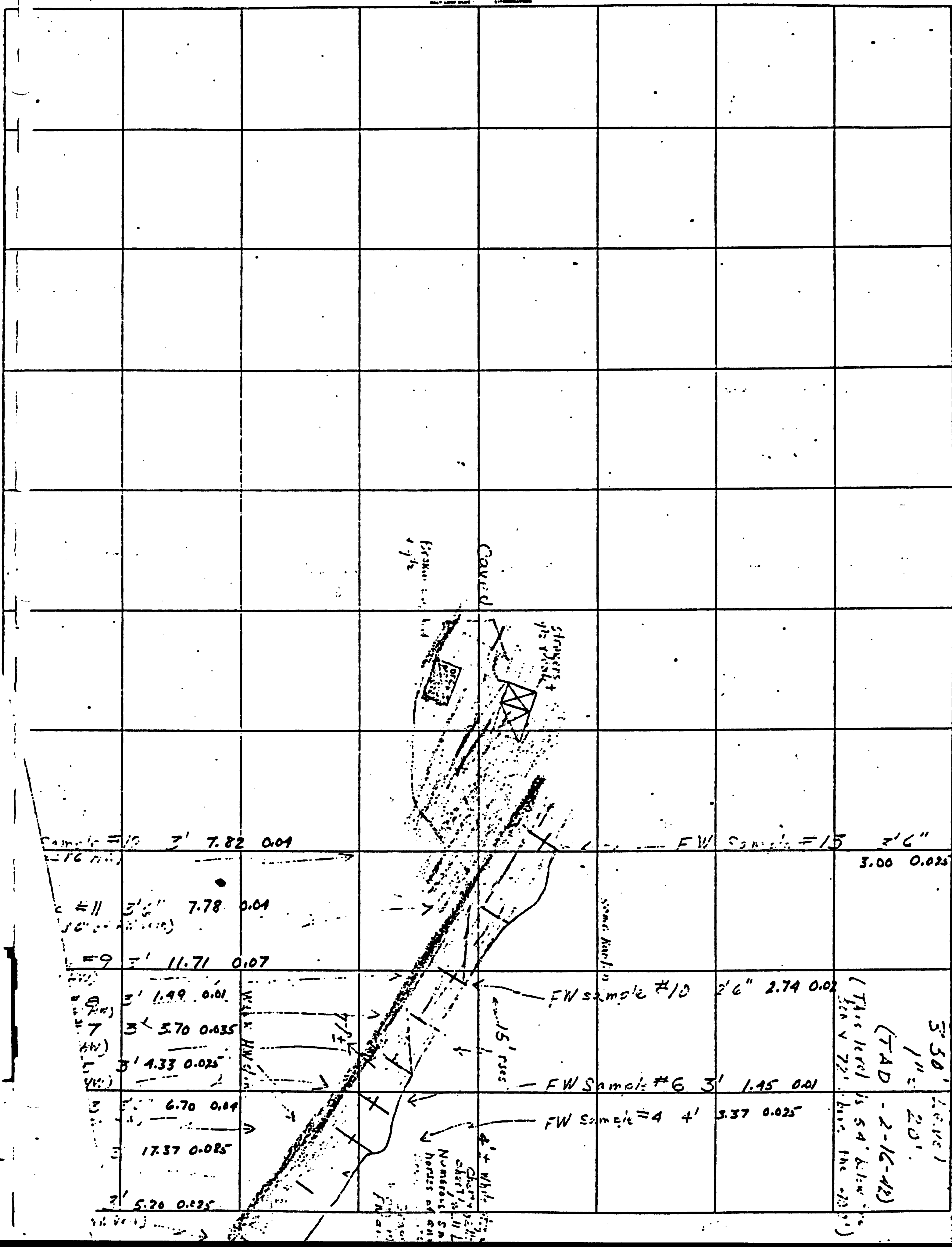
SECTION IN PLANE OF THE VEIN
LOOKING N. 25° E.
1" = 100'



(4)


100 LEVEL
200 LEVEL
N
300 LEVEL
350 LEVEL
ASH PEAK MINE
GREENLEE COUNTY ARIZONA
UPPER LEVELS SHAMROCK SHAFT
Scale 1" = 40'
Dec. 1946

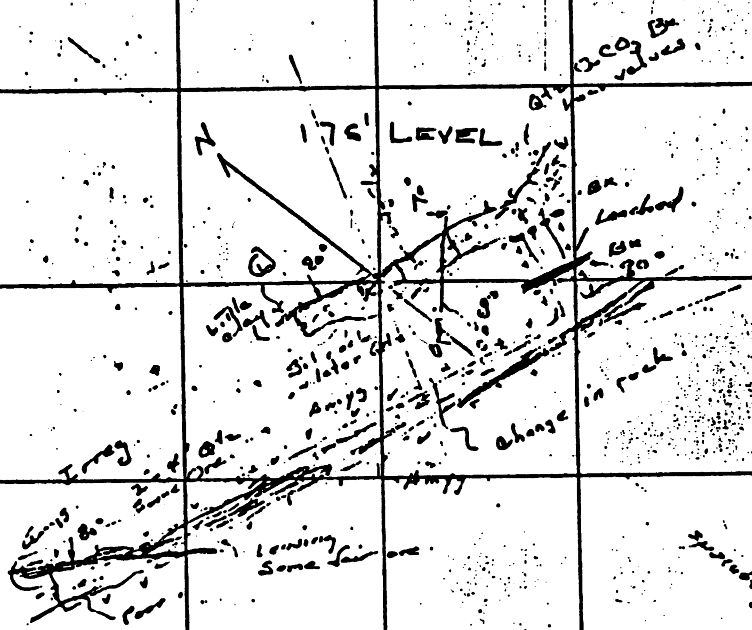

FORM 1006
Duncan Hriz.
50 Level
1" = 20'
4/21/42
50
STOPE
1' 0.3 0.003
7' 0.2 0.003
1' 0.5 0.005
0.4 0.005
30.0
4.0
5.0
.02
0.12
6' 14.0 .03
7.2
7.3 .02
6.0 .02
5.0 .02
5.0 .02
3.0
6.0 .02
7.6 .04


FORM 1006
Caved
7.82 0.04
FW Sample #15 3'6"
3.00 0.025
#11 3'6" 7.78 0.04
#9 3' 11.71 0.07
3' 1.49 0.01
#7 3' 3.70 0.035
3' 4.33 0.025
6.70 0.04
17.37 0.085
3' 5.20 0.025
FW sample #10 2'6" 2.74 0.02
15' raise
FW Sample #6 3' 1.45 0.01
FW Sample #4 4' 3.37 0.025
350' Level
1" = 20'.
(TAD - 2-16-42)

ASH' PEAK MINE.

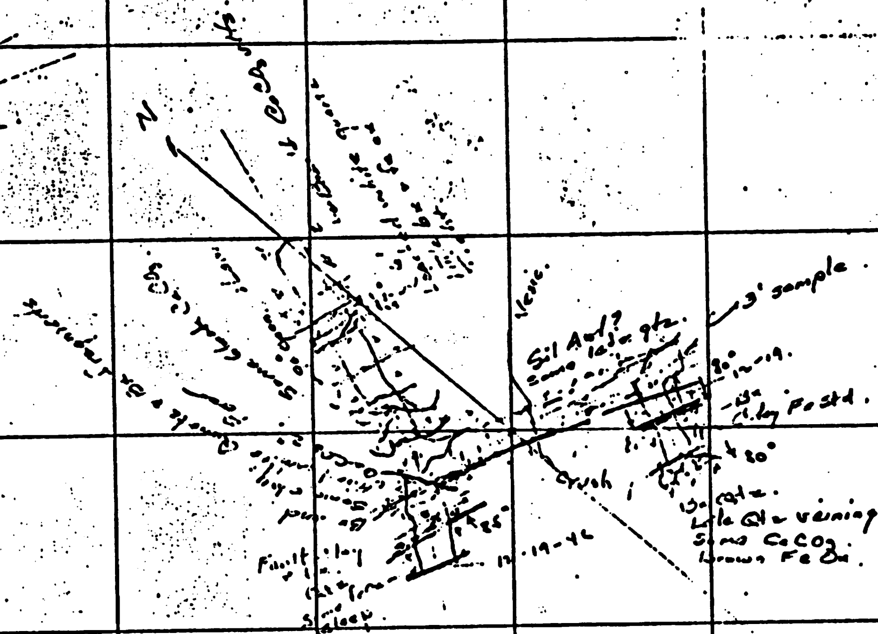
260 LEVEL.

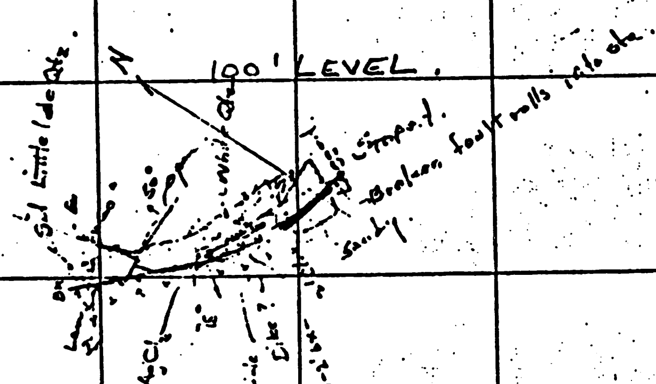
1" = 40'   11-14-46



Just below change in dip in shaft

structure from HW crosses towards FW.
Back lagged off. HW not exposed.
Ground open & vuggy some clay.





At 35' level fault is at HW of shaft

Stope from below stops but cave 10 ft wide extends
15' above. Stope is at 40' to E of shaft. Vein bro
Some clay & iron oxide.

Form 1006

ASH PEAK.

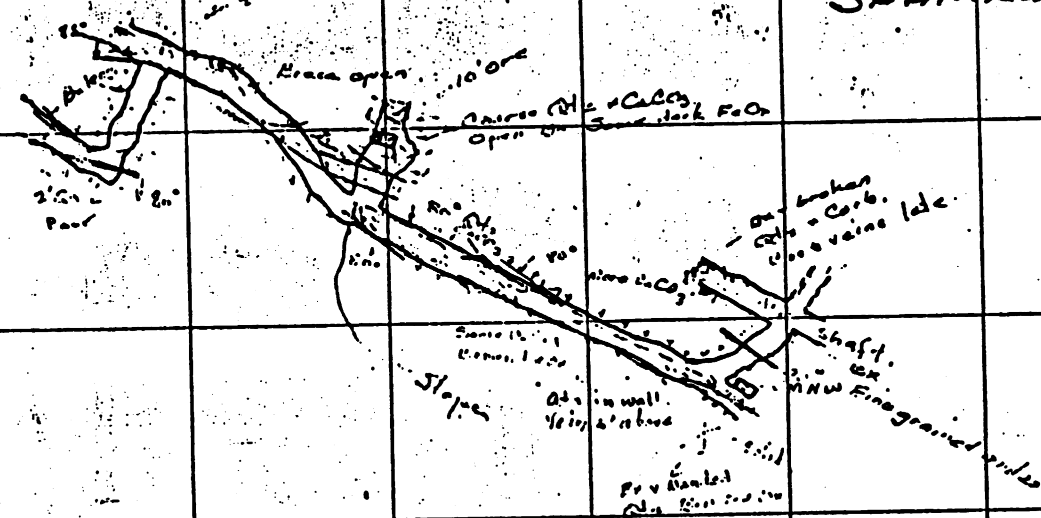
SHAMROCK SECTION.

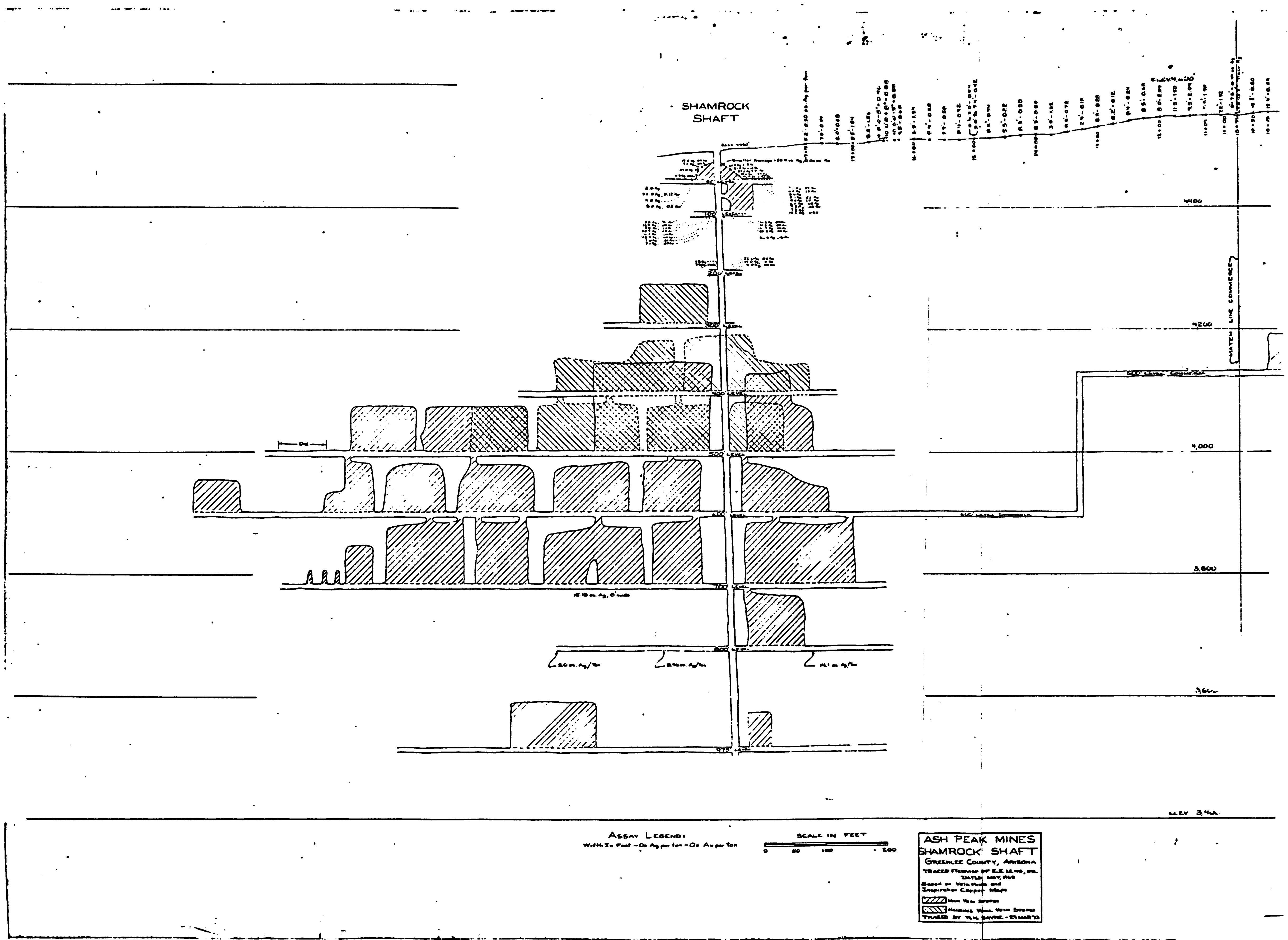
WEST END 275 (2nd) LEVEL.

1" = 50'

2-10-48.

SHAMROCK 275



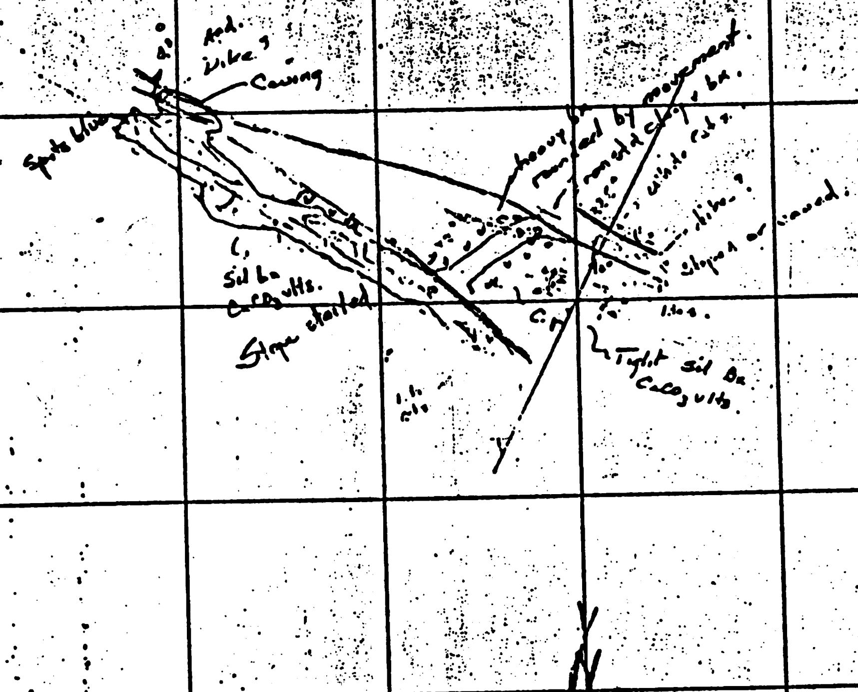

SHAMROCK SHAFT
4400
4200
4,000
3,800
MATCH LINE COMMERCE
ELEV 4,000
ASSAY LEGEND:
Width In Feet - Oz Ag per ton - Oz Au per ton
SCALE IN FEET
0
50
100
200
ASH PEAK MINES
SHAMROCK SHAFT
GREENLEE COUNTY, ARIZONA

[illegible] Mine.

Shamrock Shaft
355' Level.

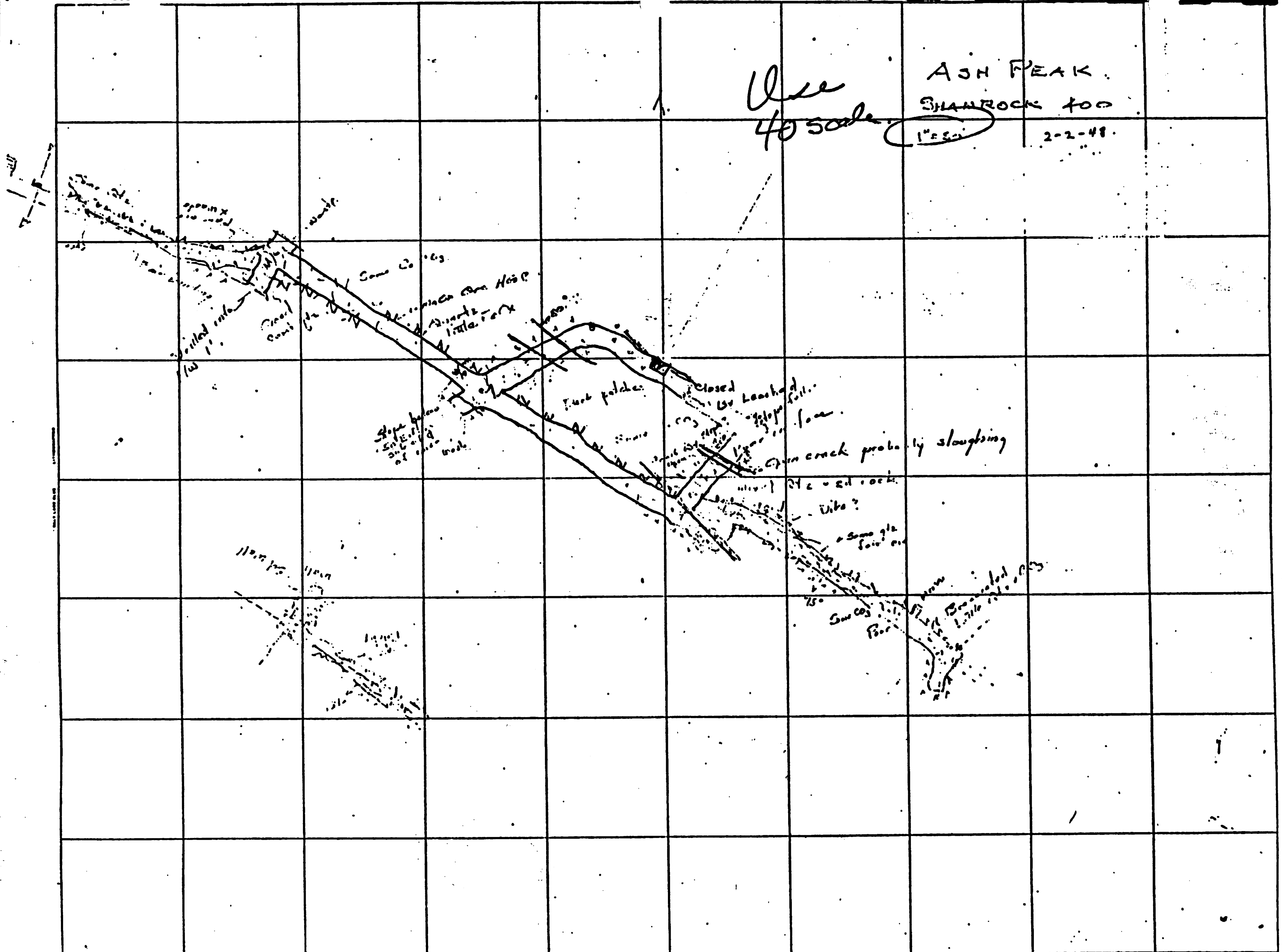
1" = 40' 12-19-46.

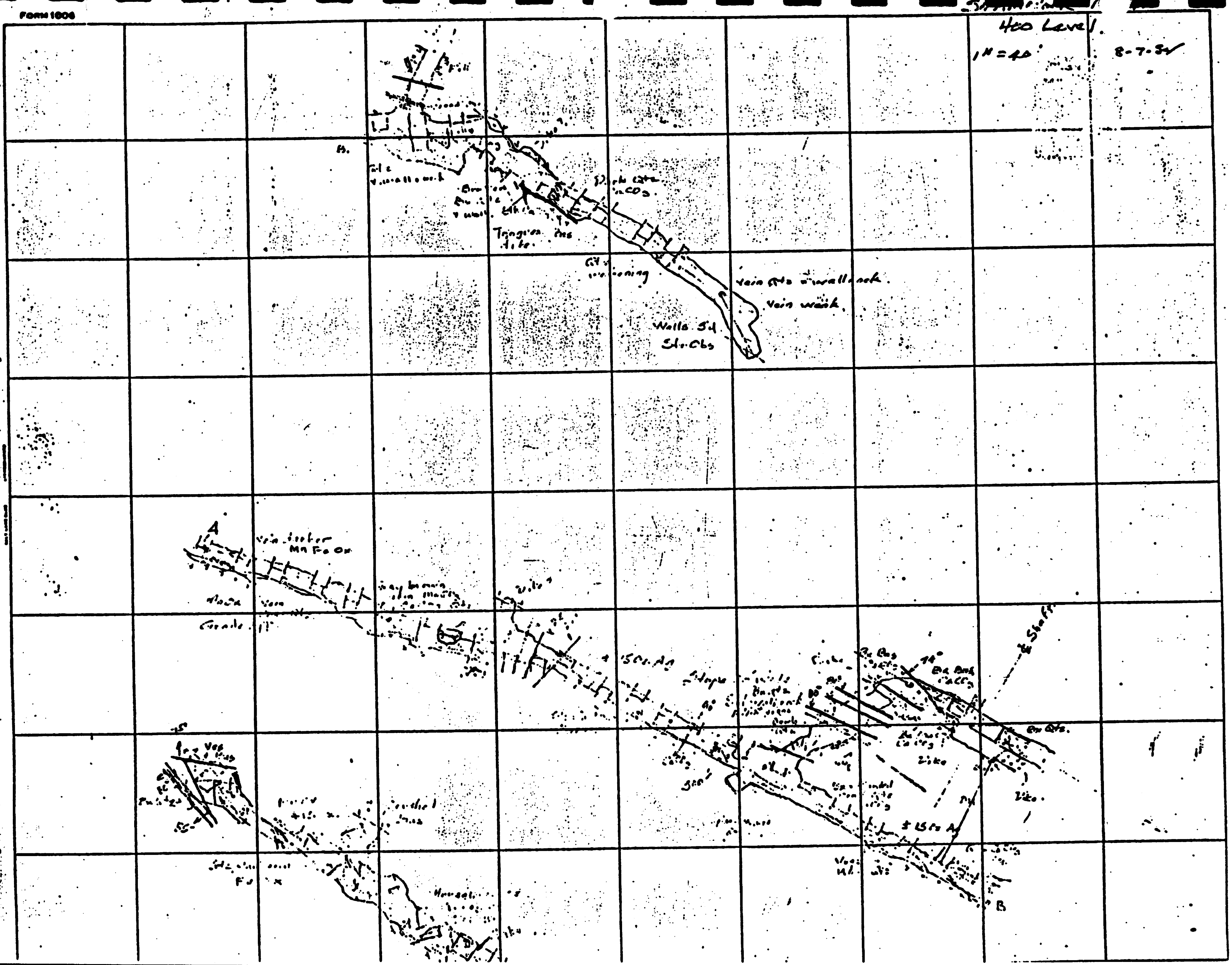
350



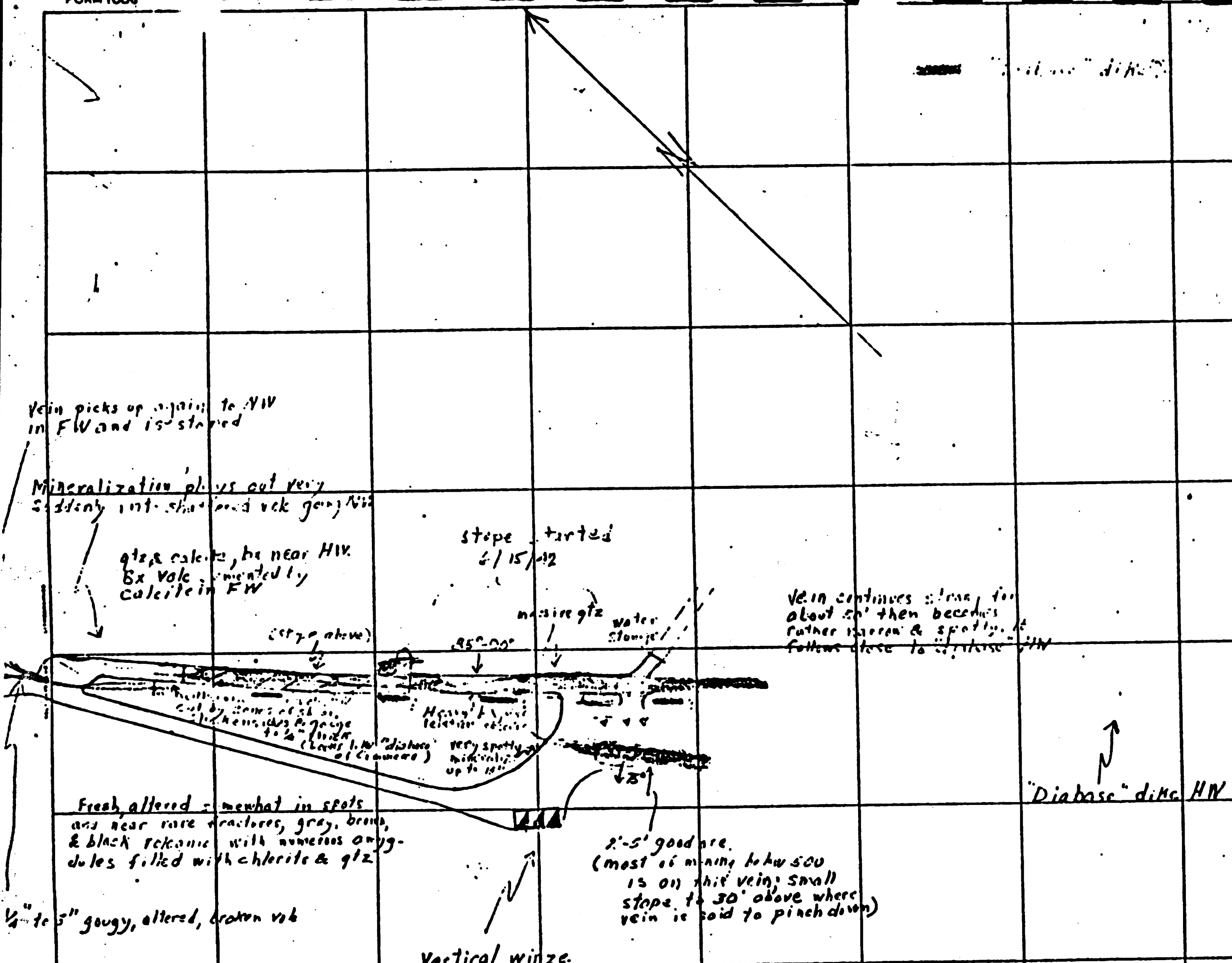
FORM 1006

FORM 1006


ASH PEAK
SHAMROCK 400
2-2-48
Use 40 scale
1"=50'
Some Co
Closed
Open crack probably sloughing
Dike?


Form 1006
400 Level.
1" = 40'
8-7-54
Vein Qtz ? wallrock.
Vein weak.
Walls Sil
Sil. Obs
Tungsten dike.
A
Vein better
Mn Fe Ox
B
Shaft
Dike.

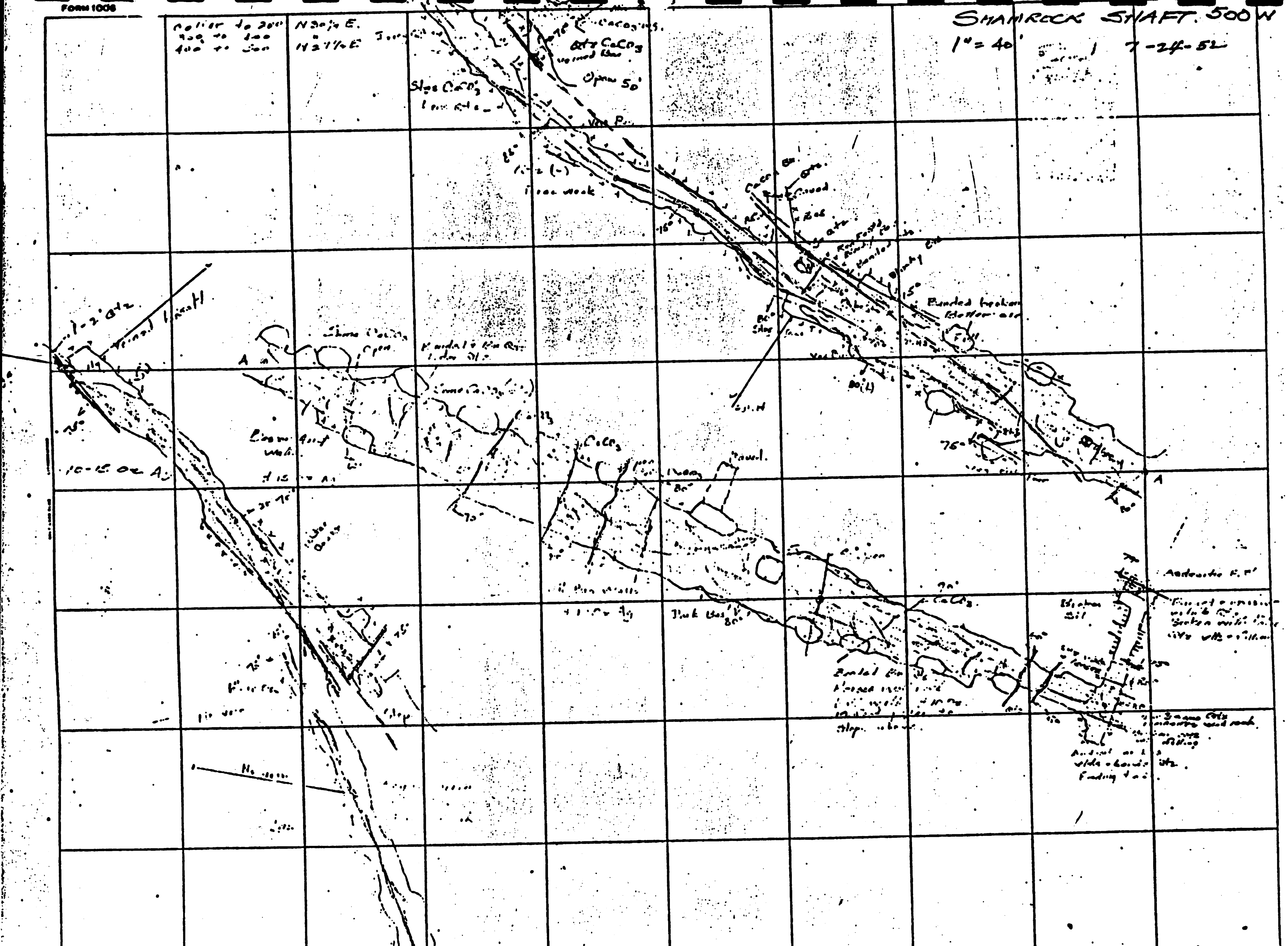
Greenlee Co, Ariz.
500 level; 1"=50'
June, 1942 AD



SHAMROCK SHAFT. 500 W

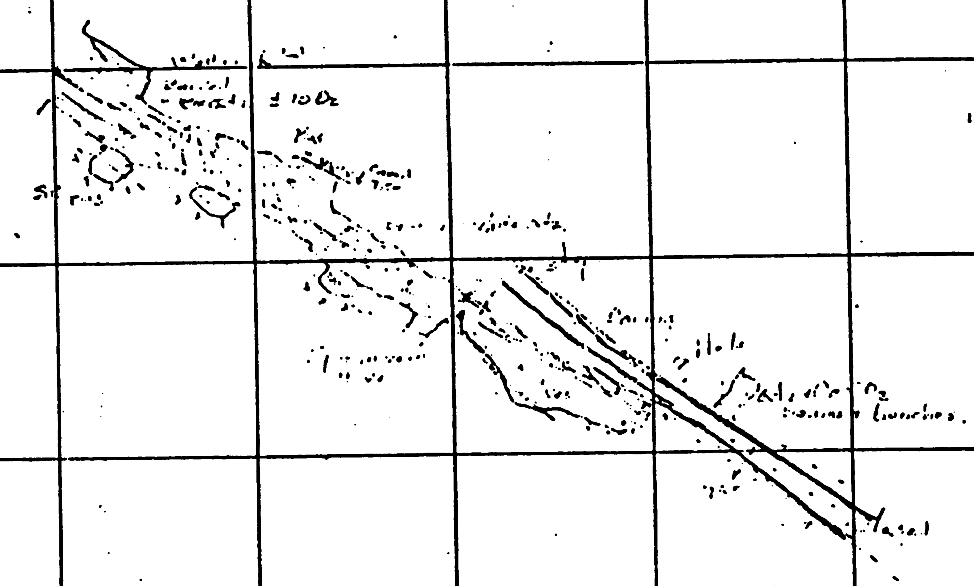
1" = 40'

7-24-52

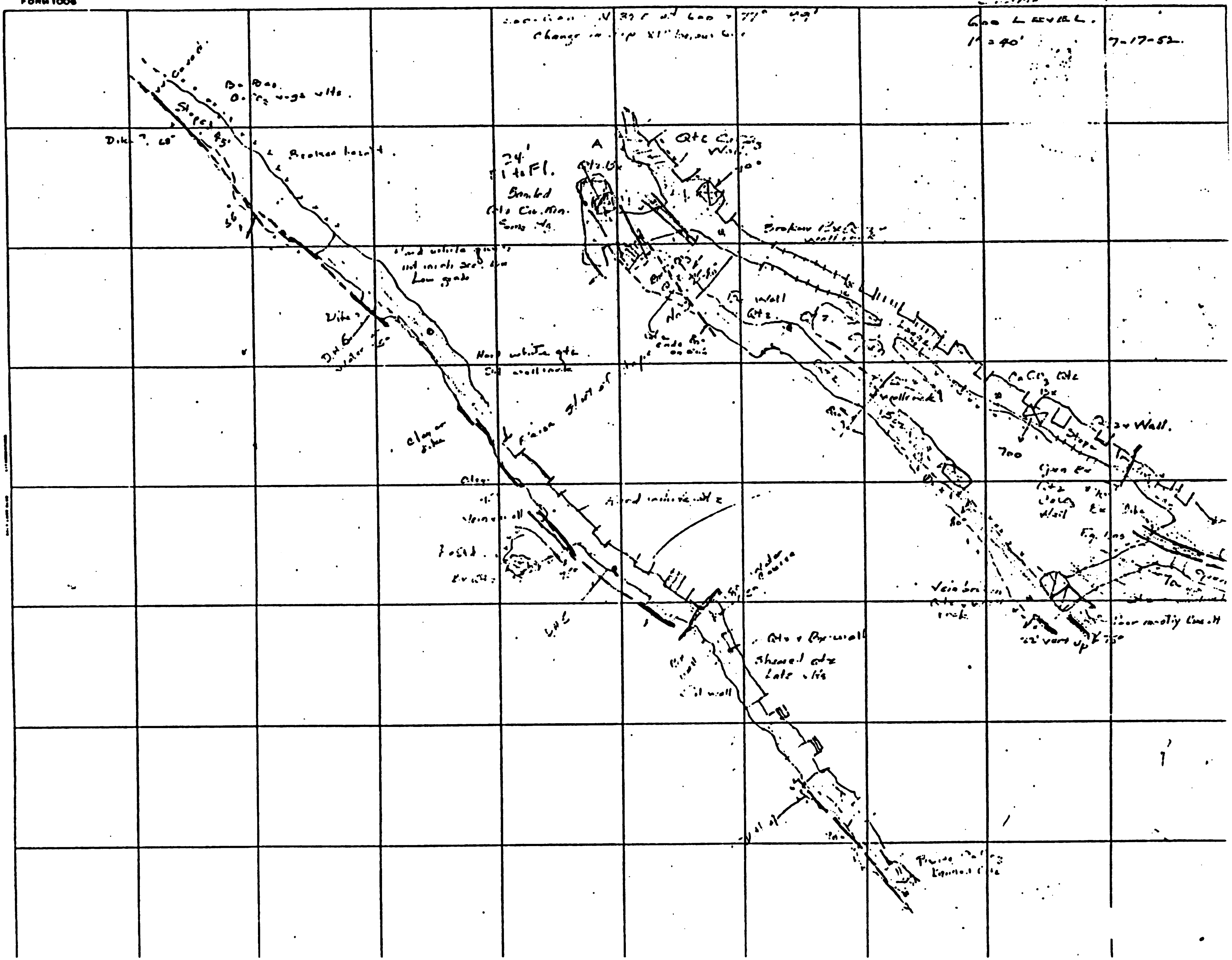


FORM 1006

Diamond Shaft Scale
1" = 10'
8-14-57

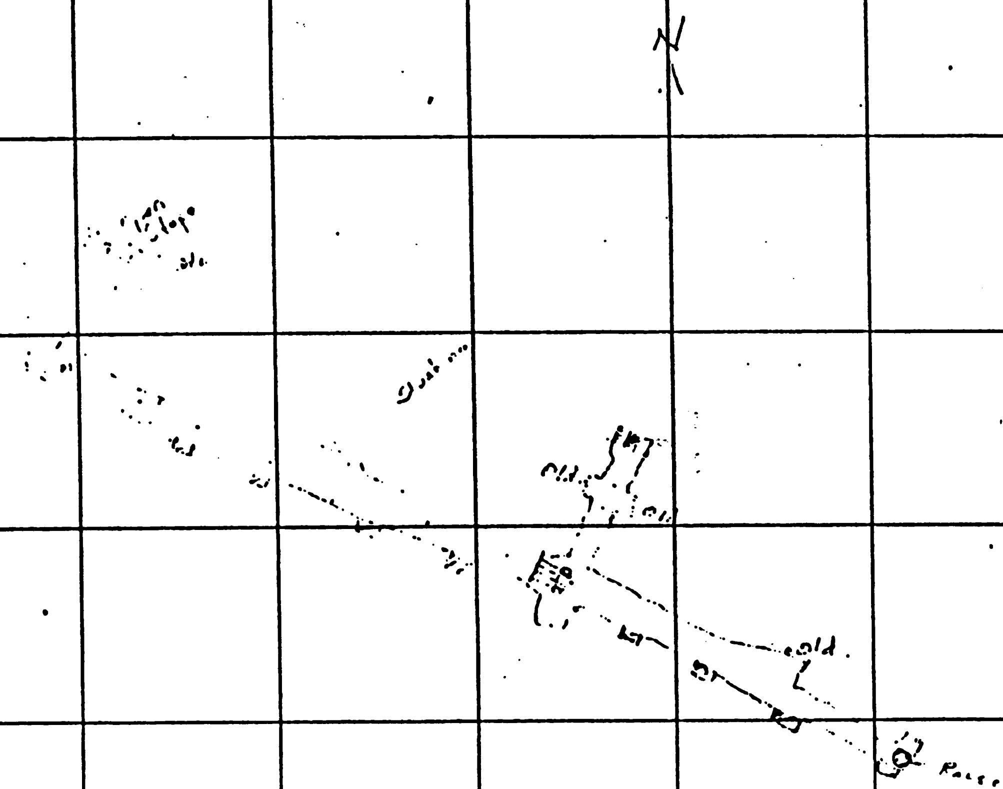


FORM 1006

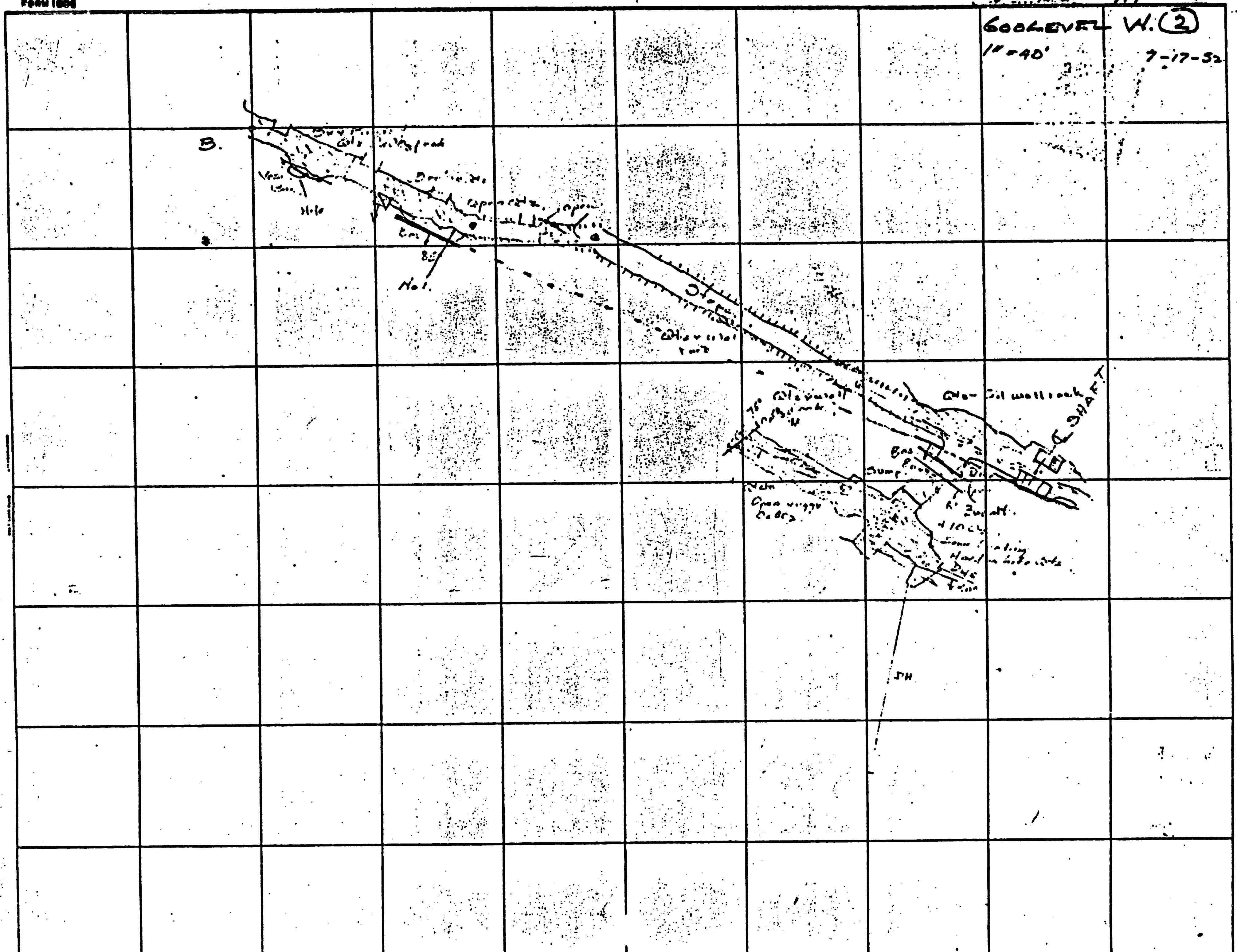

600 LEVEL.
1" = 40'
7-17-52.
Stope
Qtz Ca CO3 Wall
A
24'
Banded
Hard white qtz
Low grade
Hard white qtz
Wall
Qtz
Ca CO3 Qtz
Wall.
Stope
700
Clay
Qtz + Py wall
Sheared qtz
Wall

FORM 1006

Ash Peak
Shamrock 500 Level.
1" = 50'
1-5-50



FORM 1806



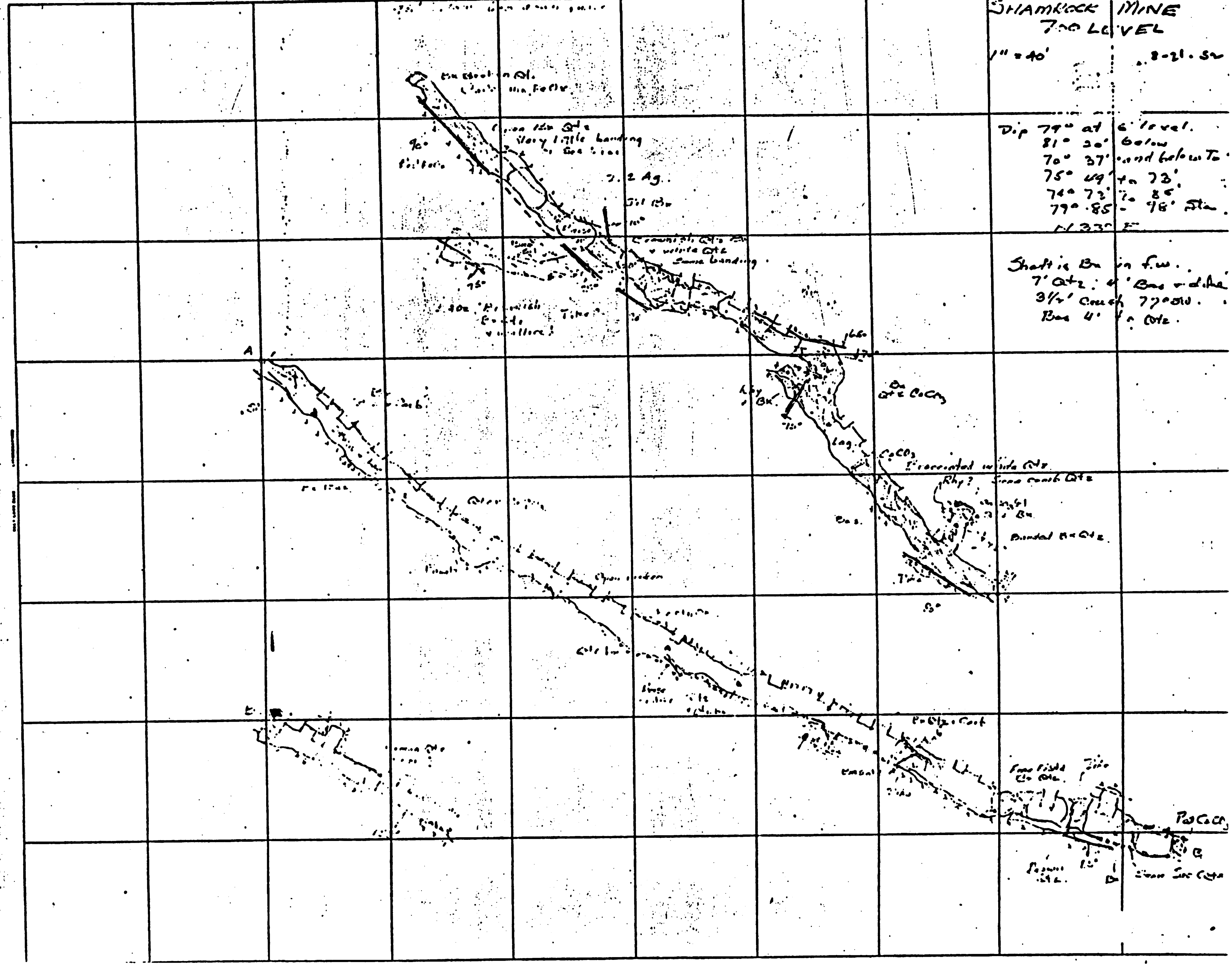
SHAMROCK MINE
700 LEVEL

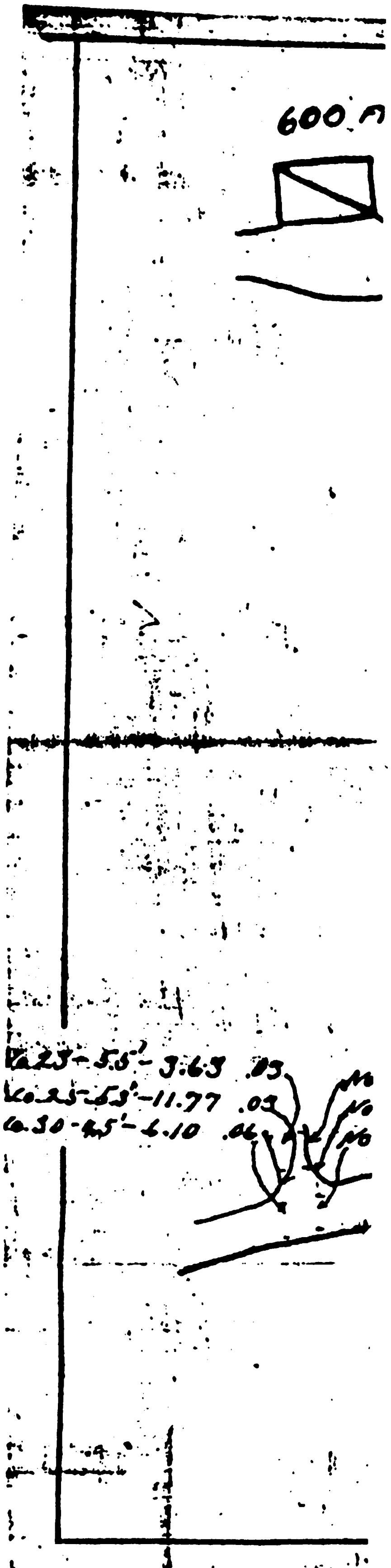
1" = 40'

8-21-52

Dip 79° at 6' level.
81° 30' below
70° 37' and below to
75° 49' to 73'
74° 73' to 85'
79° 85' - 98' Sta.
N 33° E

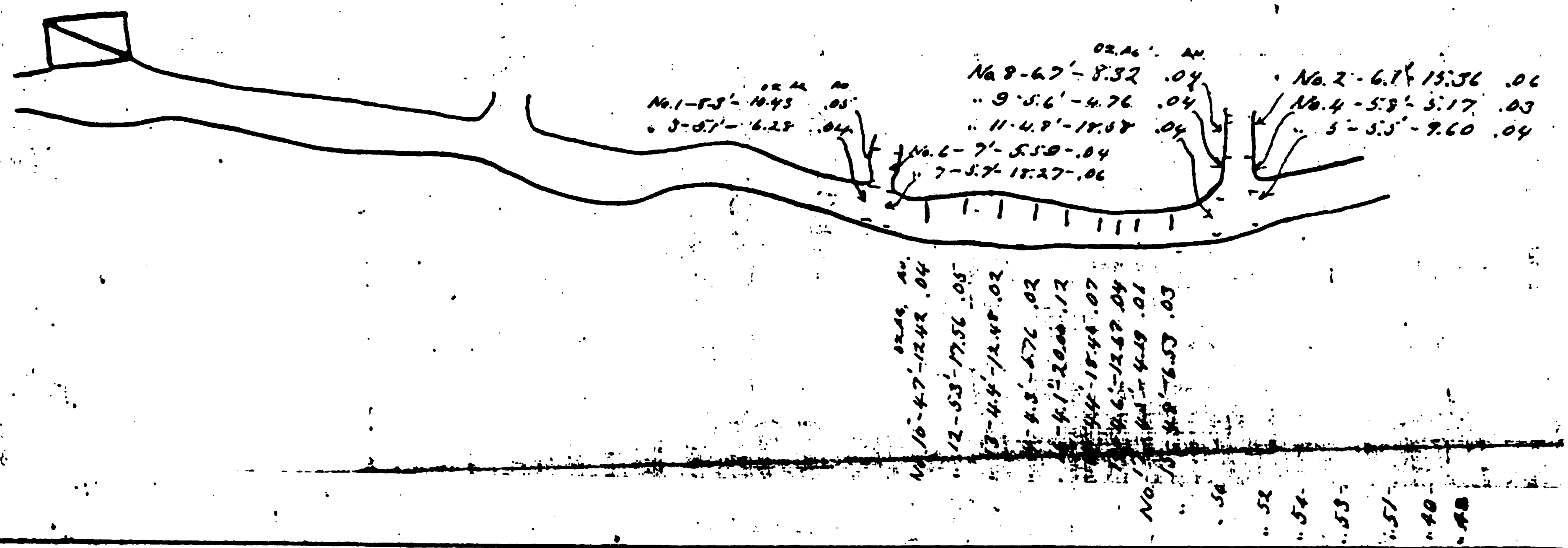
Shaft is Bx in f.w.
7' Qtz.; 4' Bx and dike
3½' Crush 77° SW.
Bx 4' to Qtz.




600 ft
a23 - 55' - 3.63 .03
6-25 - 53' - 11.77 .03
6-30 - 45' - 6.10 .06

SHAMROCK

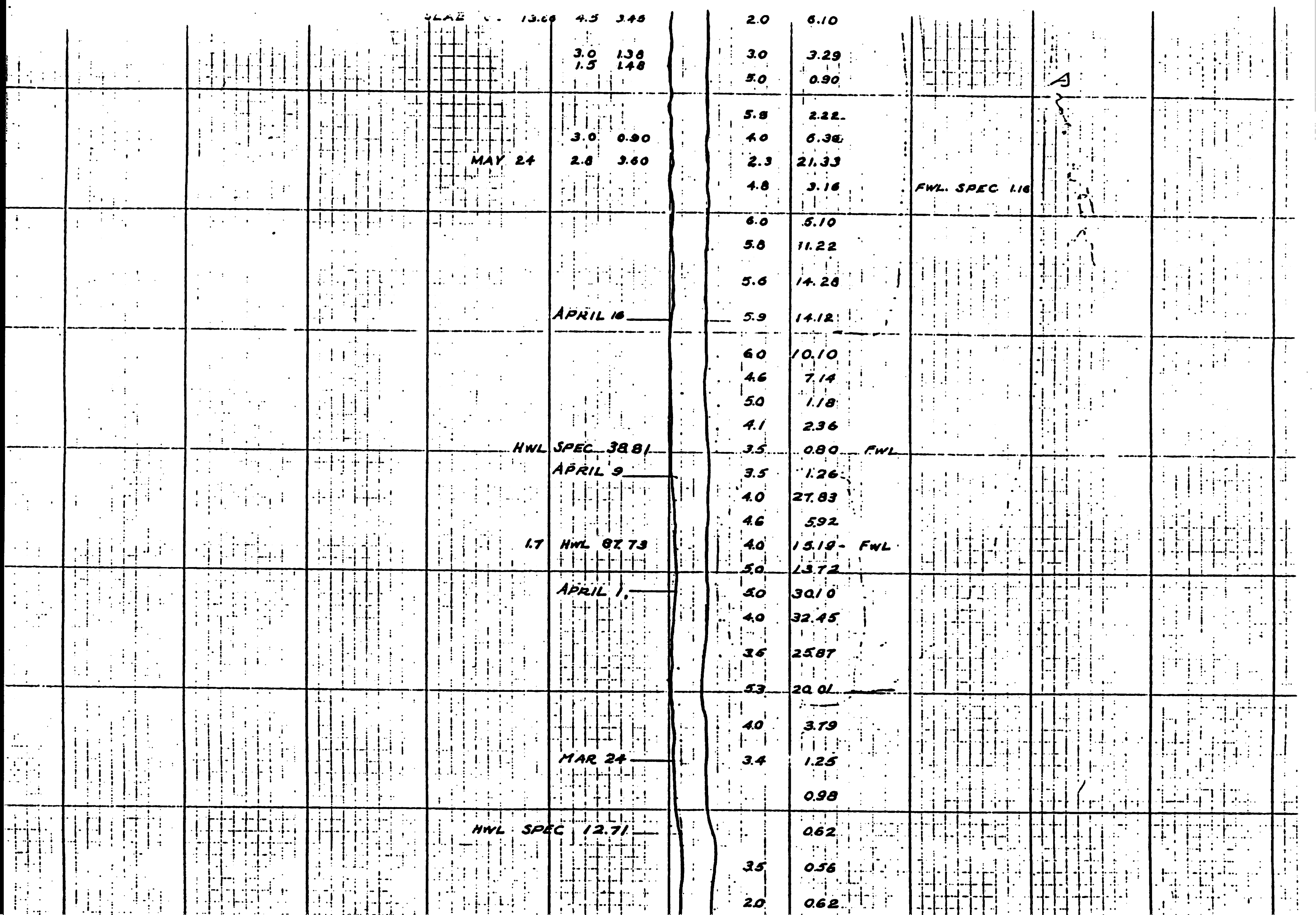
600 FT. LEVEL. SHAMROCK SHAFT.



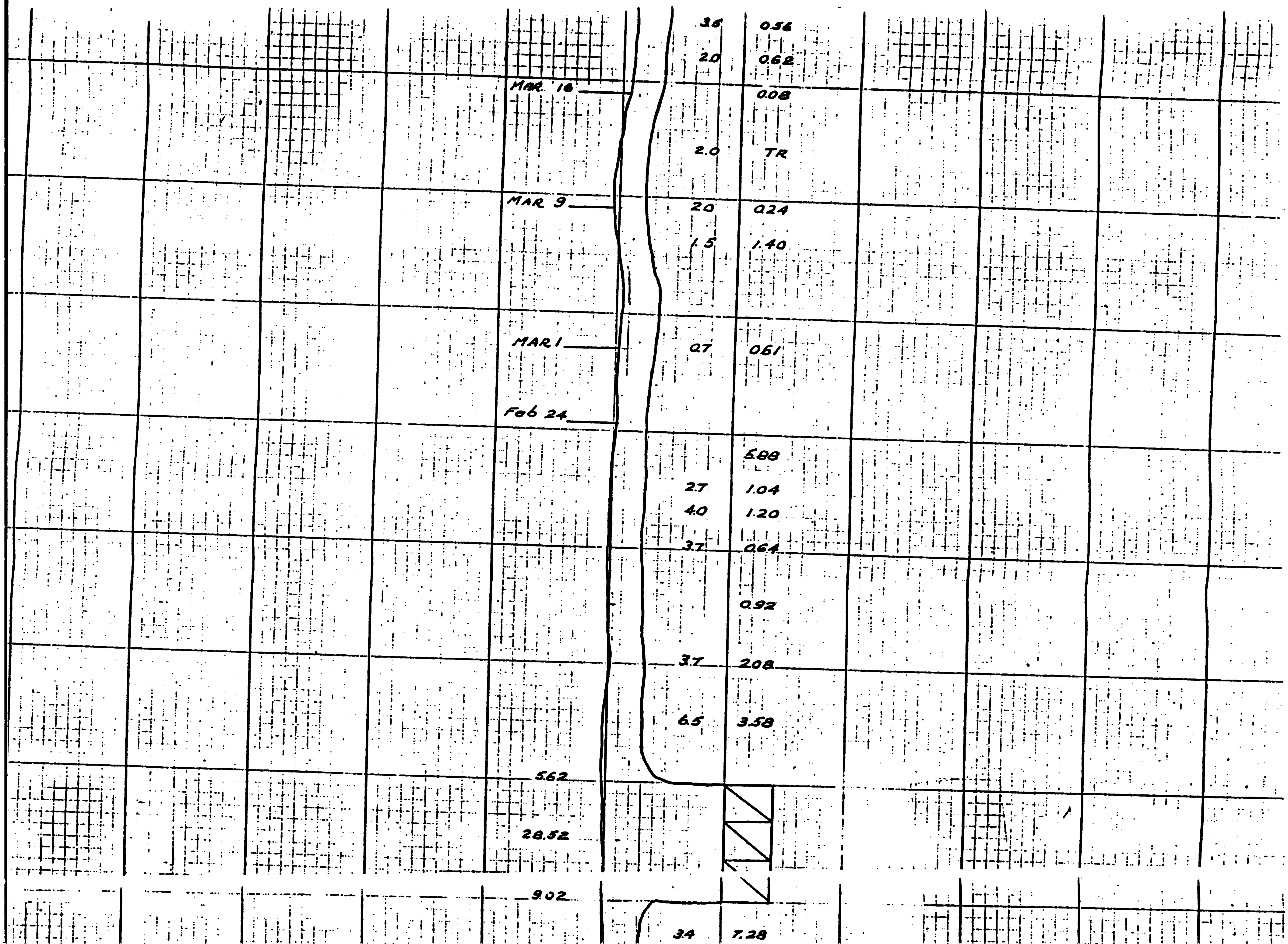
3.0 1.02	5.0 18.64	5.0 17.99
	4.0 1.32	5.0 3.87
8.0 1.16	5.0 0.66	5.0 0.80
HWL SPEC. 5.0 17.32	6.0 1.48	
	5.0 2.92	
	6.0 2.32	
	5.0 3.46	FWL SLAB 5.0 096
	5.0 5.16	
	5.0 27.37	
	4.5 24.87	
	6.0 17.32	FWL SLAB 3.0 0.90
	5.0 7.92	
	4.0 4.73	
SLAB 5.0 15.87	4.0 2.08	
	5.0 5.63	
4.5 19.63	2.7 2.14	
4.4 1.12	5.0 11.59	
3.5 1.04	4.0 9.62	
4.5 0.86	3.0 7.87	
4.0 0.80	2.0 7.17	
	5.0 7.57	
2.0 0.36	5.0 8.07	
	5.0 0.40	
2.0 0.94	5.0 9.06	
4.0 0.36	5.0 13.88	
6.0 2.71	2.0 6.22	
SLAB 3.0 1.18	6.0 15.80	
	5.0 24.69	
	5.0 8.17	
	4.5 2.64	
JUNE 1		
SLAB 6.0 13.6? 4.5 3.48	2.0 6.10	

6.0 1.25

6.0 1.26

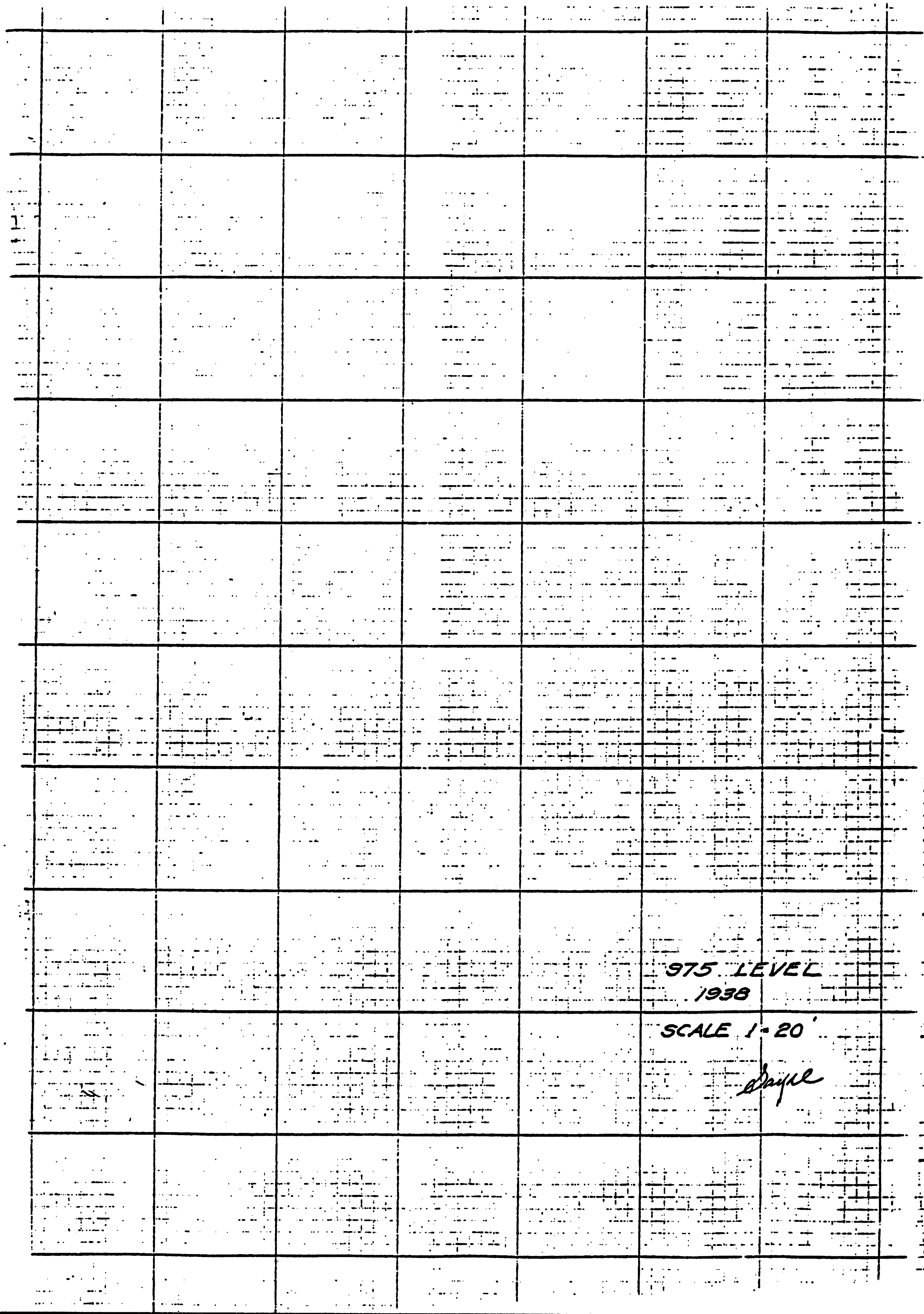


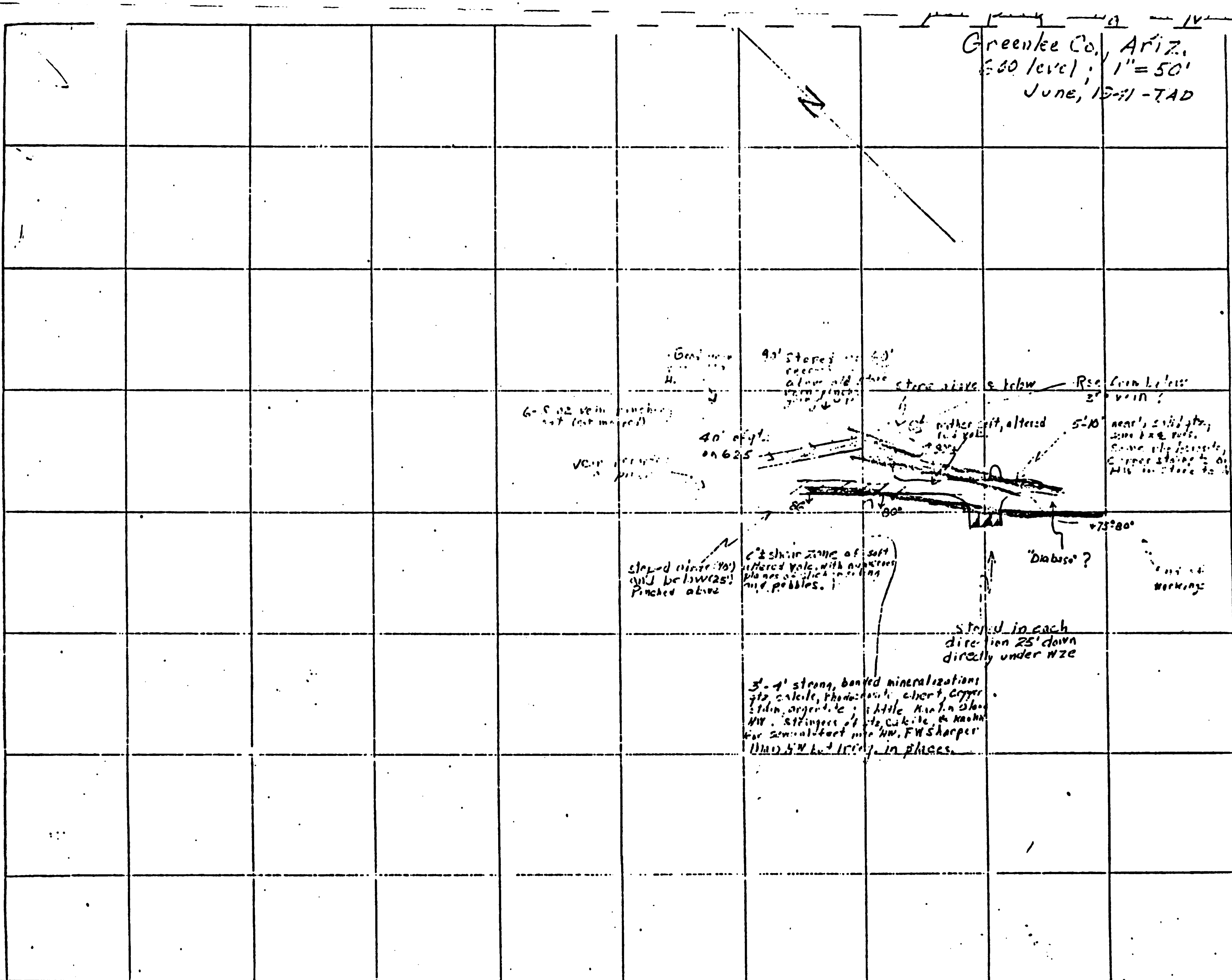
SLAB 13.66 4.5 3.45
2.0 6.10
3.0 1.38
1.5 1.48
3.0 3.29
5.0 0.90
5.8 2.22
3.0 0.90
4.0 6.36
MAY 24 2.8 3.60
2.3 21.33
4.8 3.16
FWL. SPEC 1.16
6.0 5.10
5.8 11.22
5.6 14.28
APRIL 16
5.9 14.12
6.0 10.10
4.6 7.14
5.0 1.18
4.1 2.36
HWL SPEC 38.81
3.5 0.80 FWL
APRIL 9
3.5 1.26
4.0 27.83
4.6 5.92
1.7 HWL 87.73
4.0 15.19 FWL
5.0 13.72
APRIL 1
5.0 30.10
4.0 32.45
3.6 25.87
5.3 20.01
4.0 3.79
MAR 24
3.4 1.25
0.98
HWL SPEC 12.71
0.62
3.5 0.56
2.0 0.62



3.5
0.56
2.0
0.62
MAR 16
0.08
2.0
TR
MAR 9
2.0
0.24
1.5
1.40
MAR 1
0.7
0.61
Feb 24
5.88
2.7
1.04
4.0
1.20
3.7
0.64
0.92
3.7
2.08
6.5
3.58
5.62
28.52
9.02
3.4
7.28

			3.4	7.28	
			3.5	27.38	
			5.4	91.71	
			4.5	554	
JAN 1			3.0	19.60	
			3.0	31.05	
			4.4	3.48	
			7.4	1.50	
			3.7	1.94	
			3.5	4.71	
JAN 9			4.0	6.44	
			3.5	4.50	
			4.2	354	
			4.2	520	
JAN 16			4.0	229	
			4.2	1.04	
			2.3	26.2	
			3.7	230	
JAN 24			3.6	4.61	
			2.2	096	
HWL	30	4.84	2.5	264	FWL
HWL	25	1384	3.2	678	FWL
			4.0	50.82	
FEB 1			3.9	12.14	
			4.8	11.24	
			4.9	3.80	
			4.5	4.50	
				258	
				084	
HWL	24	296	22	1.90	FWL
FEB 9			3.8	538	


975 LEVEL
1938
SCALE 1 = 20'


Greenlee Co., Ariz.
1" = 50'
June, 19?1 - TAD
N
stope above & below
Rise from below
40' effyt.
on 625
5'-10"
75°80°
"Diabase"?
80°
86°
stoped in each
direction 25' down
directly under WZE
3'-4' strong, banded mineralizations
Pinched above
in places.

Ash Historical Data

RECEIVED
OCT 29 '66

ROBERT H. SAYRE, JR.
MINING ENGINEER
230 - 27 ROAD--CH 2-5611
GRAND JUNCTION, COLO.

October 28, 1966

Mr. George Setter
Mr. George E. Morehouse

I have just completed a trip to the Ash Peak Mine and wish to summarize our information to date:

Economic Geology and Potential. Avisit to Mr. Rudy Gebhardt in Hillsboro, New Mexico on Oct. 17th proved to be interesting and informative. Mr. Gebhardt describes the lone Ash Peak vein as an "orphan", no other veins nearby and very little alteration. After spending some additional time at the property I tend to concur.

However, Mr. Gebhardt agrees that the mine does present some promise as a source of flux. He suggests the staking of additional claims, and he further suggests that the owners accept geological studies as exploration expense.

I travelled to Tucson to see if any further information on geology might be available. The only geologist who did any considerable work in the Ash Peak area was Eldred Wilson, former head of the Arizona Bureau of Mines, and he died a year ago.

The county geologic map, which seems to be the only source available, seemsto place the nearest exposed sedimentary rocks at Morenci about 25 miles north of Ash Peak. No sediments except Quaternary alluvium are shown along the Gila River. In my opinion the exact position and description of the rocks underlying the Tertiary andesite at Ash Peak would be nice to know of course but not critical to consideration of the value of the property. As a matter of fact a relatively great thickness of the favorable andesite might very well be a very favorable factor.

My conversation in Morenci with Herb Lines, former General Superintendent for Veta Mines, indicates that Veta, from a crosscut in the hanging-wall on the 975 Level, drilled a hole intending to pierce the vein some 600 ft. below the 975 Level but that the drill bit intersected the hard quartz vein at such an acute angle that no satisfactory penetration was achieved. However, it is quite significant that the vein was encountered at that depth. Herb Lines has considerable confidence in the mine as a silver and flux producer and feels that further development is justified.

Market for Ores. A conversation with Mr. Ray Kinneberg, Phelps Dodge smelter superintendent, at Douglas on Oct. 19th, indicates that Phelps Dodge is not very interested in receiving the Ash Peak ore-----at this time. Another source of flux is available, apparently. Shipments of tailings a few months ago from Ash Peak averaged 85% SiO_2 (barely meeting Phelps Dodge requirements) and 2½ ounces silver per ton. Mr. Kinneberg would not make any statement as to what sort of schedule we might be able to obtain, and he would not guarantee us a market. However, he left the door open, and I feel that Phelps Dodge is a good probable market.

Claims. I made a Brunton-pace survey on the ground to determine the approximate position of the tailings pile. The western one-fourth (approx.) of the tailings pile lies on our Homestead patented claim. The shipper was Jack Quay, supposedly an engineer. Quay had staked a placer claim to cover the tailings. A pile of about 100 tons remains at the loading dock near Duncan. Shipments ceased a couple of months ago.

On ~~Oct. 23,~~ 1966 I located three unpatented ~~claims: Last~~ Chance No. 1 (Hardy), ~~Green No. 1~~ (Green vein) and Ash Peak Tailings placer ~~claim~~ to cover the tailings in case there ~~is default in~~ Quay's claim.

Accessibility of Shafts. With one Guillermo "Blue" Ortega of Duncan belaying me on a ½" manila rope I descended both the Shamrock and Commerce shafts but only went down about 50 ft. in each one. To have descended further in either shaft, without much more adequate preparations, would in my opinion have been unnecessarily risky. Some breaks in the ladders and skip guides were observed. However the shafts are in reasonably good shape, and a well-equipped crew could repair and descend the shafts at a relatively low cost. There was a good updraft through the Commerce shaft.

Ortega worked in the mine during the Inspiration operation under Howard Mottier. Supposedly there is a stope prepared for chute construction on the 500 Level of the Commerce.

Exploration Expenditures to Date. I spent 6 full days, not consecutive, on exploration work to date. If we conservatively estimate my professional services at $50 per day, the amount so far expended for services is $300. Mileage at 8¢ per mile plus normal travel expense has amounted to $212.11. Thus we have an expenditure to date on exploration of this property of $512.11.

Conclusions. The Ash Peak property deserves consideration as a silver and silica flux mine. At the present price of silver it would probably be a losing proposition to attempt to further develop and mine this vein. However, a substantial rise in the price of silver seems reasonably assured within a few years. With silver at something on the order of $2.50 per ounce Ash Peak becomes an attractive venture.

Recommendation. I recommend that we approach the owners and describe to them our considerable efforts and expenditures to date. We should ask them to reconsider the terms of the agreement of May 2, 1966 with the objective of reducing both the cash payment and exploration requirements.

Respectfully Submitted

Robert H. Sayre, Jr.

Robert H. Sayre, Jr.

ASH PEAK MINE
ORE RESERVE ESTIMATE

By Robert H. Sayre, Jr.
June 27, 1975

COMMERCE SHAFT

PROBABLE ORE

Block	Tons	Oz. Ag. Per Ton	Total Oz. Ag.
C-1	8,700	5.1	44,000
C-2	16,700	6.0	100,000
C-3	3,400	6.0	20,000
C-4	2,600	6.0	16,000
C-5	2,700	6.0	16,000
C-6	13,600	5.0	68,000
C-7	3,700	6.0	22,000
C-8	7,200	7.0	50,000
	58,600	5.7	336,000

POSSIBLE ORE

Block	Tons	Oz. Ag. Per Ton	Total Oz. Ag.
C-9	185,000	5.0	925,000

SHAMROCK SHAFT

PROBABLE ORE

Block	Tons	Oz. Ag. Per Ton	Total Oz. Ag.
S-1	1,100	13.2	15,000
S-2	1,600	15.7	25,000
S-3	1,100	13.0	14,000
S-4	300	6.7	2,000
S-5	700	11.0	8,000
S-6	1,000	17.9	18,000
	5,800	14.1	82,000

POSSIBLE ORE

Block
S-7
S-8
S-9

POTENTIAL OP'

Bl

POTE

GRAND TOTAL

PRODUCTION RECORD
ASH PEAK MINE

From 12/21/68 to 4/28/70
From Phelps Dodge Settlement Sheets

by E E Lewis
FROM · OPEN CUT / AREA - A P
#3 ADIT

Date of Shipment	Dry lbs.	Dry Tons	Ounces Silver	Ounces Per Ton
12-21-68	368,364	184.182	1,067.78	5.81
1-23-69/ 1-31-69	750,111	375.0555	1,657.54	4.4
2-2-69/ 2-27-69	2,927,026	1,463.5130	8,502.94	5.8
3-1-69/ 3-21-69	2,384,276	1,192.1380	5,905.76	4.9
4-1-69/ 4-30-69	3,402,075	1,701.0375	8,839.93	5.2
5-3-69/ 5-29-69	1,956,153	978.0765	3,410.82	3.48
6-5-69/ 6-28-69	2,351,067	1,175.5335	5,011.84	4.26
7-2-69/ 7-29-69	1,719,439	859.7195	3,620.76	4.2
8-3-69/ 8-14-69	1,312,197	656.0985	2,467.33	3.76
9-8-69/ 9-29-69	2,235,350	1,117.6750	3,284.58	2.93
10-7-69/10-28-69	1,754,096	877.0480	2,994.22	3.41
11-1-69/11-26-69	2,454,086	1,227.0430	3,680.44	2.99
12-1-69/12-26-69	1,990,142	995.0710	3,399.61	3.41
1-2-70/ 1-30-70	2,816.415	1,408.2075	4,203.24	2.98
2-6-70/ 2-27-70	2,114,858	1,057.4290	4,278.35	4.04
3-2-70/ 3-31-70	2,699,097	1,349.5485	5,873.04	4.35
4-2-70/ 4-28-70	1,978,660	989.3300	3,021.65	3.05
		17,606.70	71,219.83	4.045

Compiled by GEM August 28, 1972

ASH PEAK MINE
ORE RESERVE ESTIMATE

By Robert H. Sayre, Jr.
June 27, 1975

COMMERCE SHAFT

A.P. -

PROBABLE ORE

Block	Tons	Oz. Ag. Per Ton	Total Oz. Ag.
C-1	8,700	5.1	44,000
C-2	16,700	6.0	100,000
C-3	3,400	6.0	20,000
C-4	2,600	6.0	16,000
C-5	2,700	6.0	16,000
C-6	13,600	5.0	68,000
C-7	3,700	6.0	22,000
C-8	7,200	7.0	50,000
	58,600	5.7	336,000

POSSIBLE ORE

Block	Tons	Oz. Ag. Per Ton	Total Oz. Ag.
C-9	185,000	5.0	925,000

SHAMROCK SHAFT

PROBABLE ORE

Block	Tons	Oz. Ag. Per Ton	Total Oz. Ag.
S-1	1,100	13.2	15,000
S-2	1,600	15.7	25,000
S-3	1,100	13.0	14,000
S-4	300	6.7	2,000
S-5	700	11.0	8,000
S-6	1,000	17.9	18,000
	5,800	14.1	82,000

POSSIBLE ORE

Oz. Ag Total

Block

S-7
S-8
S-9

POTENTIAL OR

Bl

POTE

GRAND TOTAL

ASH PEAK MINE
ORE RESERVE ESTIMATE

By Robert H. Sayre, Jr.
June 27, 1975

COMMERCE SHAFT

PROBABLE ORE

Block	Tons	Oz. Ag. Per Ton	Total Oz. Ag.
C-1	8,700	5.1	44,000
C-2	16,700	6.0	100,000
C-3	3,400	6.0	20,000
C-4	2,600	6.0	16,000
C-5	2,700	6.0	16,000
C-6	13,600	5.0	68,000
C-7	3,700	6.0	22,000
C-8	7,200	7.0	50,000
	58,600	5.7	336,000

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SHAMROCK SHAFT

PROBABLE ORE

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S-4	300	6.7	2,000
S-5	700	11.0	8,000
S-6	1,000	17.9	18,000
	5,800	14.1	82,000

POSSIBLE ORE

Block
S-7
S-8
S-9

POTENTI 24.

POS.
POTEN
GRAND TOTAL

ASH PEAK MINE, International Smelting Company, Lessees. Dan Mayne and Howard Mottier, Sub-lessees, Box 206, Duncan, Arizona.

In 1942 this property has been mining and shipping approximately 50 tons per day of highly silicious, low alumina, gold and silver ore to the International Smelting Company at Miami, Arizona. This property constitutes the major consistent producer of high grade fluxing material available for that smelter.

Development consists of a 1,000 foot shaft with laterals every 100 feet. Diamond drilling has extended to the 1,400 foot level and located ore below the present developed area. Arthur Murphy, owner, estimates 200,000 tons of potential ore within the present development limits. This is confirmed by various estimates of independent engineers.

from COPPER REPORT NO. 2, DECEMBER 23, 1942, by Earl F. Hastings, for COPPER BRANCH, WAR PRODUCTION BOARD.

EDGAR J. MARSTON
P. O. BOX 1063
COLORADO SPRINGS, COLORADO

November 14, 1945

DEPT. MINERAL RESOURCES
RECEIVED
NOV 16 1945
PHOENIX, ARIZONA

Mr. Chas. H. Dunning, Director,
Department of Mineral Resources,
State of Arizona,
304 Home Builders Bldg.,
Phoenix, Arizona.

Dear Mr. Dunning;

TAILINGS- A.P.R.D

Thank you for your letter of the 10th. I will contact Mr. Horton as you suggest.

Regarding the tailings sample- I will take a careful sample and forward it to you for further analysis. In the meantime the following is a short analysis of our findings-

85% of material will pass 200 mesh.
Gold content of heads .01 oz. or about 35 cents
Silver content of heads 3.10 oz. or about $ 2.17
Average dollar value of our heads $ 2.47 per ton.

The property is owned by Arthur Murphy of Phoenix. He made a lease to I.S. James, J.L. Anderson and R.Z. McKown in May of 1944 which called for a royalty of 10% of Mint returns and gave them a five year lease subject to renewal. The three mentioned above assigned their lease to Edgar J. Marston in July of 1944 on the basis of their each having a 13% interest in the NET PROFITS of the Marston operation. Profits to be figured after Marston had received his investment back out of the operations. Marston then purchased the McKown interest personally leaving 26% outstanding. Since that time we have of course discontinued the operation and under the terms of our agreement with James and Anderson we should reassign the lease to them. They are not in any position to do any work as far as I know and have indicated that they are willing for us to make a new agreement with some other operator if their interests are protected.

I know that Mr. Marston would be perfectly willing to assign his interest in the deal to some responsible operator and take back a small over-riding royalty- say between 5% and 10%. I further believe that Anderson and James might consider some reduction in their interest although I am not certain.

With these facts in mind it may or may not be of interest to your people. However, I am willing to come to Phoenix if you feel that a frank discussion of all parties would be helpful,

Very truly yours,

Charles G Berls

Ash. Peak

November 19, 1945

Mr. Charles G. Berls
Box 5
Duncan, Arizona

Dear Mr. Berls:

Thank you for your letter and phone call regarding the tailings pile.

The impression I gathered over the phone was that the shortage of water might be a serious drawback. The proposition has such narrow margins that one could not afford either expensive installation or operating costs for water. Will you please review that phase of the project again to me?

In the meantime I will await your sample and turn it over to my friends for a preliminary test.

You probably know by this time that Arthur Murphy died last night. I presume this would make little difference in any arrangements that might be made.

The real mining fraternity will miss Arthur.

Yours sincerely,

Chas. H. Dunning
Director

CHD:LP

EDGAR J. MARSTON
P. O. BOX 1063
COLORADO SPRINGS, COLORADO

November 21,1945

DEPT. MINERAL RESOURCES
NOV 23 1945
PHOENIX

Mr. Charles H. Dunning, Director,
Department of Mineral Resources,
State of Arizona,
304 Home Builders Bldg.,
Phoenix, Arizona.

Dear Mr. Dunning:

With reference to your letter of November 19th please let me review for you the situation at Ash Peak as regards the water.

We drilled three wells and the three wells have a combined capacity of from 15 to 20 gallons of water per minute. This is based on our experience with the wells during the past summer which was a very dry one. Just what they could do in the event of a wet season is not known but the condition should be better than we found.

Each well has a separate pumping unit as described in our list of equipment. This list also shows the size of the tubing and rods. Our procedure has been to pump the water from wells number two and three into a sump at well number one; from this point all the water is pumped to a storage tank near the leaching plant by the equipment on well number one. The distance that the water is pumped is approximately 2000 feet against a 70 foot head. The size of water line is 2".

The sample of tailings was sent from Duncan by Railway Express on November 16th and I trust that you have it in your possession by now.

I was sorry to learn of the death of Mr. Murphy and as you say the real mining fraternity will miss him.

I will be at Duncan for the next several days at least and will be glad to hear further from you.

Very truly yours,

Charles G. Berls

(Charles G. Berls)

December 1, 1945

Mr. Charles G. Berls
Box 5
Duncan, Arizona

Dear Mr. Berls:

I have just returned from a week at Salt Lake and find your letter of the 21st.

Before leaving I received your sample of the tailings and turned it over to a laboratory for a preliminary test.

Instructions on this test were rigid and definite because it was desired to find what extraction could be made by following a certain process or procedure that would work out in practice to be inexpensive both in capital outlay and operating costs. No attempt was made to find a better way.

The results of this test were as follows:

Heads:	Au .01	Ag 3.20	)Solution samples
Tails:	Au .003	Ag 1.71	)check fairly well

This gives an extracted value of about $1.25 per ton for a process that should not cost over 50 cents per ton for operating expense and the initial outlay would not be great.

It is therefore interesting. But the nigger in the woodpile would be the water supply. It would require at least 200 tons of water per day and that at practically no expense. Your data indicates something less than half of that.

The thought of drilling more wells or going to the river for water would be out because of the initial expense. The thought of cutting the capacity to the water supply would be out because of the increased operating costs per ton.

COPY

Dec. 3, 1940.

ASH PEAK MINE.

Location: On U. S. Highway 70, 11 miles west of Duncan and 30 miles east of Safford, Arizona.

Altitude: 4500 ft. Water plentiful and good. Camp useable.

Property: Principal claims patented,-title perfect, - majority ownership and control in hands of Arthur Murphy. Free from debt or obligations.

History: Property was first developed in 1900 and considerable ore shipped to smelters. In 1906 large scale development started and has been carried on ever since with few lapses. In 1936 property was leased to Veta Mines Co. and during the next 3 years nearly 200,000 tons of ore was mined and milled. The milling process, flotation, was not entirely adapted to the ore and a comparatively low recovery was made. This operation ceased in 1939. The lease was terminated and property reverted to present owner. For the past 6 months shipping to the International Smelter has been going on with satisfactory results.

Ore: The averages of all ore milled and shipped by Vetz Mines was $9.36 per ton. The ore subsequently shipped is fractionally lower, as it contained some wall dilution. The vein is large, being over 20 ft. wide and is continuous for 1½ miles. It is tapped and opened by a number of shafts of which the Commerce, Shamrock and Hardy are the deepest.

The Commerce shaft is 500 ft. deep, has developed a number of thousands of tons of ore. Recent shipments have been from this shaft.

The Shamrock shaft is 1,000 ft. deep, has levels at 100 ft. intervals; has produced 180,000 tons of ore; has about 200,000 tons of potential ore within the area of development and about 450,000 tons of probable ore above present bottom. The mine has been diamond drilled to 1400 ft. and large and comparatively high grade ore located by drilling.

The Hardy is at present under lease and shipping to International. It is 650 ft. deep and development in progress is highly satisfactory.

Needs: This property needs some $40,000 to put it in shape for many years of continuous production.

1. The Shamrock shaft needs repairing, retimbering in part; a hoist, and to take over the present steel headframe and skip (not the property of owner).

2. To connect the Shamrock 700 ft. level with Hardy mine for transportation and ventilation. This job is about 1100 ft. of drifting and grading and should be in commercial ore not less than 60% of the distance. It could pay for itself in ore shipped.

3. Opening and reopening the large commercial stopes on 500, 600, 700 and 800 levels in Shamrock mine; opening stopes on 500 ft. level of Commerce Mine, and extending 400 east drift on Commerce mine. All of the stopes mentioned are at least 12 ft. in width and several hundred feet in length.

4. For lights and water distribution in camp, etc.

Housing is not necessary here as the men prefer to live in Duncan and drive to work. It is about 25 minute drive.

No mill is needed at the property. Power will be required, but can be cheaply installed and operated.

With the mines shaped for production contracts with the smelters can be made that will take up to 150 tons per day. At this time we have a very satisfactory arrangement with the International smelter at Miami. The margin of operating profit with firm smelting contracts is equal to that to be anticipated from any milling operation, and thus there is no necessity for a mill,-much of the power that would be required for same, and the water for milling. Hauling to the railroad is on the paved highway, and quite inexpensive.

Complete maps, records, data, etc. are available at the mine, and accessible to anyone qualifying as interested and responsible.

ARTHUR MURPHY

December 20,1940.

Mr. Arthur Murphy
Ash Peak Mine
Duncan, Arizona.

Dear Arthur;-

Many thanks for your letter of the 4th with the memo on Ash Peak.

I have forward a copy of this memorandum with some comments to Mr. Scholey at Seattle.

In reply to other matters Mr. Scholey stated that he expected to be in Phoenix shortly after the first of the year and would have an engineer with him to look over the various properties that we have called to his attention as being really worthy of his serious and immediate attention.

With best wishes for the holidays.

Very truly yours,

J. S. Coupal.

July 16, 1953

MEMORANDUM - ASH PEAK MINE

The Shamrock shaft is in the so-called No. 2 vein, and is open to approximately 780'. Old operations took place on the No. 2 vein and the No. 1 vein, No. 1 being 15' on the footwall side of No. 2. No operations have been carried on on the No. 1 vein by the present lessees. Operations of the present lessees took place on the No. 2 vein at the beginning of operations at the Shamrock shaft. A few years ago they discovered the No. 3 vein, never formerly recognized nor worked, and that vein has been the producing vein since 1948. Below the 350' level only the No. 2 and No. 3 veins are recognized, operations of the lessee since 1948 having been carried on exclusively on the No. 3 vein below the 300' level, using parallel open workings on the No. 2 vein for access where feasible.

No. 3 vein cut off at about 150' east of the shaft, on the 400' level, and at the shaft on the 600' level. West of the shaft it was stoped to a fault zone which was 150' west of the shaft at the 300' level and 500 west of the shaft on the 550' level. Cross-drilling from a drift on the No. 2 vein, for a distance of 750' from the shaft on the 600' level has shown only marginal ore occurrence on the west No. 3 vein beyond the fault zone.

No. 3 vein lies 25' to 30' away from No. 2 vein on the hanging-wall side, and is reached by cross-cuts from the shaft or from drifts on the No. 2 vein. The only ore remaining for profitable extraction is 6000 - 10000 tons from drift backs and floors, leaving vertical pillars intact. Such removal destroys access to the end of development on the No. 3 vein, all of which ended on sub-marginal ore. Since parallel openings exist on the No. 2 vein to a much greater distance on each side of the shaft than any of the No. 3 workings, destruction of the levels on No. 3 vein is of small consequence.

Operations of the present lessee started in July, 1941, at the Commerce shaft. Operations at the Commerce were suspended in 1947, due to lack of ore, and activity transferred to the Shamrock shaft. Shipments from the Commerce totalled 75,368 tons, containing 571,024 ounces of silver and 2,499 ounces of gold.

To July 1st, 1953, shipments from the Shamrock totalled 88,662 tons, containing 890,242 ounces of silver and 3,311 ounces of gold. In the aggregate the lessee has produced 164,030 tons of ore at an average grade of 8.91 ounces silver and 0.0354 ounces gold per ton.

Long-hole drill sampling, and exploration, has failed to discover ore of commercial grade for further exploitation, and only the ore from drift floors and backs is now available for recovery.

The tailings may be of interest for smelter flux. They are on ground which was located as loade claims by Joe Hardy. Mr. Murphy later located the tailings as a placer claim, and the tailings became the subject of suit which, I believe was never settled, due to the decease of both litigants. The Hardy lode claims later fell open, and were located by our representative. That representative has filed affidavits in regard to work done on the Ash Peak patented claims, and claimed as assessment work on the Ash Peak un-patented claims (including the placer claims covering the tailings). The validity of the claims of assessment work done for the benefit of the placer claims may be considered doubtful, and I suggest that, with the advice of Mr. Shimmel, it may be desirable for us to make a new placer location on the tailings if we make an agreement to use them.

We believe that there are 100,000 tons of tailings available, at an average value of $3.00 per ton. Trucking 28 miles to Solomon, and rail freight to Miami will cost more than that, so all that can be said for the use of tailings is that they might cost less than some other desirable fluxes. We arrived at the $0.10 per ton proposed payment as a logical development from the royalty on ore. That royalty is 7 1/2% down to $10.00 value and 5% below $10.00. A reasonable royalty on tailings, on which we know there is no profit possible, would seem to be 3%.

H. FOARD
Superintendent

HF:b

ASH PEAK MINES Greenlee County

COPIES OF SMELTER SHIPMENTS FROM ASH PEAK MINES TO SMELTERS OF SHANNON COPPER CO., CLIFTON AND COPPER QUEEN CONSOLIDATED DOUGLAS, ARIZONA.

DATE	CAR NO.	INITIAL	NET WEIGHT POUNDS	SILVER OZ.	GOLD OZ.
1906					
8/25	86962	S. F.	28,700	30.50	.055
"	74758	S. F.	51,300	27.50	.047
"	75732	S. F.	28,000	27.50	.047
"	74857	S. F.	44,950	21.67	.040
SEPT. 1,	72860	S. F.	46,000	19.00	.051
5,	74405	S. F.	39,400	23.60	.050
5,	86737	S. F.	43,700	23.60	.06
" 19,	86153	S. F.	44,400	22.70	.04
" 19,	7067	E.P.S.W.	43,200	22.70	.04
19,	350253	PENN.	57,000	17.40	.04
19,	74405	S. F.	40,200	17.40	.04
" 28,	73005	S. F.	50,600	18.73	.035
28,	74592	S. F.	48,200	18.73	.035
29,	78411	S. F.	52,000	15.35	.035
" 29,	72752	S. F.	58,000	15.35	.035
3,	76701	S. F.	54,900	13.80	.03
" 8,	74007	S. F.	49,200	13.80	.03
" 9,	2339	E.P.S.W.	25,400	11.50	.03
" 15,	72538	S. F.	54,800	11.40	.03
" 15,	86561	S. F.	56,800	11.40	.03
" 22,	71667	S. F.	53,700	21.00	.032
" 22,	78924	S. F.	57,100	21.00	.032
" 29,	63322	B & O.	62,100	18.90	.037
" 29,	77861	S. F.	54,300	18.90	.037
Nov 5,	79057	S. F.	55,300	24.10	.03
" 5,	74235	S. F.	56,100	24.10	.03
" 19,	170511	PENN.	56,400	20.37	.03
" 19,	78142	S. F.	56,000	20.37	.03
" 26,	25106	K. S. C.	55,300	25.01	.03
" 26,	41505	W.L.E.	75,000	25.01	.03
" 27,	75178	S. F.	57,300	22.42	.055
" 27,	74160	S. F.	37,700	22.42	.055
C. 12,	75178	S. F.	51,100	12.75	.027
" 12,	74150	S. F.	50,600	12.75	.027
" 18,	75178	S. F.	55,600	16.49	.02
" 18,	74150	S. F.	56,700	16.49	.02
" 24,	1843	E.P.S.W.	68,100	14.02	.035
" 24,	1814	E.P.S.W.	65,000	14.02	.035
" 31,	12474	I.C.E.	56,200	10.065	.035
" 31,	12136	I. C. E.	69,100	10.955	.035
1907					
JAN 14,	77671	S. F.	51,800	22.00	.04
" 14,	76906	S. F.	52,200	22.00	.04
" 21,	76943	S. F.	50,400	21.40	.52
" 21,	1708	E.P.S.W.	71,600	21.40	.052

COPIES OF SMELTER SHIPMENTS FROM [illegible] TO SMELTERS OF SHANNON COPPER CO., AND COPPER QUEEN CONSOLIDATED, DOUGLAS, ARIZONA.

MADE BY [illegible] U.S.A. FORM 85613

DATE	CAR NO.	INITIAL	NET WEIGHT POUNDS	SILVER OZ.	GOLD OZ.
1907					
Feb. 4,	50172	ERIE	105,800	16.70	.04
" 11,	77275	S.F.	50,000	16.10	.035
" 18,	6959	E.P.S.W.	86,000	9.10	.02
" 25,	1508	E.P.S.W.	74,500	10.60	.033
" 25,	76359	S.F.	47,800	10.80	.03
" 25,	76751	S.F.	50,850	10.80	.03
MAR 11,	33877	LS & MS	75,300	14.40	.032
" 11,	47448	SLE	33,500	14.40	.032
" 11,	74826	S.F.	49,200	9.10	.032
" 26,	4068	MCP	45,500	12.50	.04
" 26,	21779	MCP	66,800	12.50	.04
" 26,	4029	MCP	48,100	12.50	.04
APR 1,	78035	S.F.	59,100	11.50	.035
" 1,	276597	PENN.	72,500	11.50	.035
" 1,	344892	"	54,900	11.60	.035
" 1,	75418	S.F.	51,200	11.60	.035
" 1,	78894	S.F.	55,400	23.00	.0425
" 1,	6741	EPSW	69,800	23.00	.0425
" 1,	77463	S.F.	44,400	16.40	.04
" 1,	42899	B & O.	79,700	16.40	.04
" 14,	75902	S.F.	49,600	13.00	.0175
" 14,	564	SL	59,400	13.50	.02
" 27,	118355	SO	70,400	13.50	.02
" 27,	70862	S.F.	44,400	16.80	.04
May 21,	80444	MKT	60,150	16.80	.04
" 21,	20242	"	46,200	15.01	.02
" 28,	72016	S.F.	52,600	15.01	.02
" 28,	72019	S.F.	55,800	9.50	.03
" 28	78018	S.F.	49,000	15.00	.03
" 28	75902	S.F.	35,800	9.50	.03
JUNE 5,	73624	S.F.	44,850	38.00	.05
" 5,	73488	S.F.	45,000	38.00	.05
MAY 13,	82550	R.I.	85,700	12.70	.05
" 13,	6691	EPSW	65,000	12.70	.05
1908					
Mar. 4,	8112	"	76,500	29.80	.04
" 4,	7914	"	56,720	29.80	.04
" 20,	77836	S.F.	44,150	33.00	.05
" 20,	88594	S.F.	43,000	33.00	.05
" 20,	7195	EPSW	59,140	27.60	.035
" 20,	6712	EPSW	37,200	27.80	.035
" 23,	7744	"	90,150	25.30	.035
" 23,	78576	"	46,260	25.30	.035
1909					
JAN. 9,	181449	SOU	96,400	12.30	.04
FEB. 5,	84112	RI.	80,720	13.40	.04
" 5,	7522	EPSW	73,940	13.40	.04
MAR. 5,	30157	MKMT	105,100	13.60	.06
" 26,	94446	S.F.	88,100	12.20	.06

COPIES OF SMELTER SHIPMENTS FROM ASH PEAK MINES
TO SMELTERS OF SHANNON COPPER CO., AND COPPER QUEEN
CONSOLIDATED. DOUGLAS, ARIZONA.

DATE 1909	CAR NO.	INITIAL	NET WEIGHT POUNDS	SILVER OZ.	GOLD OZ.
Apr. 10	146027	N.O.	82,400	12.80	.05
May 25	76960	S.F.	34,880	13.70	.04
Nov. 19	400B4p	O. W.	115,540	16.30	.05
DEC. 10	1655	EPSW.	81,040	28.30	.045
MAR. 23-08	72545	S. F.	48,840	23.30	.035
" 28-"	93054	S. F.	86,900	25.60	.05
" 28-"	80745	S. F.	60,100	33.60	.05
" 30-"	7314	EPSW.	98,540	17.40	.03
" 30-"	94376	S. F.	74,200	17.40	.05
Apr. 6-"	73931	S. F.	50,030	17.60	.03
" 6-"	8055	EPSW.	70,600	17.80	.03
" 16-"	76542	S. F.	47,800	17.80	.03
" 16-"	95020	S. F.	76,100	17.50	.05
" 20-"	8113	EPSW.	52,660	25.60	.04
" 20-"	9685	C&S.	73,660	25.60	.04
" 21-"	6192	C.O.& S.F	60,220	20.20	.03
" 21-"	86486	S. F.	46,420	20.20	.03
MAY 6,"	75408	S. F.	48,900	17.40	.02
" 6,"	76520	S. F.	56.240	17.40	.02
" 12,"	7454	EPSW.	85,900	14.80	.05
" 12,"	72539	S. F.	49,460	14.80	.05
" 21,"	73317	S. F.	87,540	14.30	.04
" 21,"	6119	EPSW.	65,720	14.30	.04
" 26,"	74580	S. F.	49,200	15.20	.04
" 30,"	82361	S. F.	93,480	22.40	.05
6-6-08	20205	C.&S.	86,660	19.80	.04
6-15 "	20274	C. & S.	87,640	15.90	.04
6-19 "	20220	C. & S.	88,300	21.70	.05
3-4-09	30157	N.L.T.	103100-	13.40	.03
3-24-09	94446	S. F.	88,130	13.60	.06
3-7 "	7444	EPSW.	112,100	28.90	.03

SHIPMENTS FROM SHAMROCK DUMP TO
EL PASO SMELTER (REPRESENTING
THE LOWER WORKINGS)

DATE			CAR NO.	INITIAL	NET WEIGHT	SILVER OZ.	GOLD. OZ.
MARCH	3,	1923	7453	EPSW	110,425	18.00	.05
"	5,	"	7007	"	87,685	12.40	.05
"	7,	"	7319	"	73,841	11.80	.05
"	11,	"	13049	"	40,432	17.70	.04
"	28,	"	8538	"	84,408	13.45	.065
"	30,	"	7375	"	132,241	14.70	.07
"	31,	"	7121	"	106,734	14.76	.056
APRIL	2,	"	7850	"	119,757	15.60	.06
"	6,	"	7338	"	122,885	13.90	.08
"	21,	"	7204	"	127,305	13.80	.05
"	24,	"	7736	"	127,036	12.90	.06
"	25,	"	7051	"	124,939	12.90	.052
"	28,	"	8350	"	81,137	10.08	.05
MAY	4,	"	9805	"	137,951	12.20	.05
"	4,	"	7627	"	127,044	11.10	.047
"	7,	"	6714	"	85,706	14.35	.05
"	12,	"	7215	"	118,930	12.40	.05
"	14,	"	8421	"	117,998	14.20	.05
"	14,	"	7085	"	119,836	16.70	.051
"	18,	"	7074	"	117,857	14.20	.05
"	18,	"	7798	"	133,197	13.80	.043
"	18,	"	7087	"	127,066	9.00	.05
"	23,	"	7763	"	135,966	9.80	.06
"	23,	"	11434	"	108,731	11.10	.043
"	26,	"	7235	"	123,487	9.35	.047

This property consists of five patented claims, two patented millsite claims, eight unpatented lode claims, and nine unpatented millsite claims, located in Sections 2, 3, 10 and 11 in T. 7 S. R 30 E. G. & S. R. B. & M. in Greenlee County, Arizona. Title to this property is, and for many years has been, vested in Ash Peak Mines. The property is located on the paved U. S. Highway No. 180, ten miles west of Duncan, Arizona and seven miles from Fox siding on the Clifton branch of the Southern Pacific Railroad.

The elevation at the mine is 4,600 feet, at Fox siding 3,600 feet above sea level. The Gila River runs parallel to the railroad at Fox. Water has been developed and pumped to the mines from the patented millsite claims one mile north. The river is about five miles from the mine and will furnish unlimited water for all purposes.

Ash Peak Mines are located within a mining area comprising the camps of Morenci, Clifton, Bisbee, Douglas, Globe, Miami, and Superior in Arizona and Silver City, Mogollon, and Santa Rita, New Mexico.

GEOLOGY

Rocks near the mines are tertiary lavas and consist of andesites, rhyolites, and rohyolite tuffs. The Ash Peak vein follows a fault fissure of about 100 feet vertical displacement and with a somewaht greater lateral displacement. Following the hanging wall of the fissure which in turn is the hanging of the vein, is a diabase dyke of a few feet width, probably a feeder to the late andesite flow referred to below.

LATE ANDESITE

A flow rock, basaltic in character overlies a rhyolite tuff, a volcanic ash lying flat and separating the late Andesite from an earlier andesite. The tuff is from 20 to 40 feet thick and is very prominent. It is exposed for a mile along the north side of the Ash Peak fissure. The earlier andesite is of unknown thickness but probably around a thousand feet at the site of the vein and presumably overlies the upper sedimentary lime-stone members. This earlier andesite varys in texture from porphyritic to aphanitic, and as this material forms the original braccia in the fault fissure, the porph-yritic phase has been more readidly converted into ore than the aphanitic phase. This fact is of economic importance.

MINERALIZATION

The vein follows the original fissuring with the better values generally on the hanging wall. The fissure is from 25 to 60 feet wide, the pay streak from 6 to 18 feet wide. Following the original faulting there was first a quartz mineralization which altered and connected the fault breccia; further faulting both laterally and vertically was followed by further mineralization, cemented and altering of the breccia, and quartz and ore deposition from the mineral bearing solutions pulsating through the fissured area, resulting in the present vein and ore bearing ... that this fissuring has extended to the underlying lime-stone, and that ascending solutions in passing through the limestones lost much of their mineral content before reaching the upper tertiary zone. Practically no copper, zinc, or lead are found in the veins; the commercial mineral being principally argentite carrying gold values.

The original fault fissure was nearly vertical, the displacement about 100 feet, Later and lateral faulting along the original zig-zagged fissure has resulted in elongated diamond shaped areas along the plane of the fault and the result is a series of recurrent lenses of enormous size in which are the ore bodies in the vein. This condition is well evidenced by developments to-date. The vein outcrops well above the ground and from end to end of the patented lode claims. The quartz is generally banded, evidencing a pulsating deposition. The best values are found in the banded quartz and in the highly altered breccia of originally porphyritic texture.

O-R-E

The ore is quartz and silicified andesite containing finely desiminated Argentite, Pyrite and associated minerals. Little oxidation has taken place within the vein. The ore is essentially a primary sulphide. When the ore occurs as ribbon quartz it is of higher grade. The pay streak is from 6 to 18 feet wide and up to 600 feet long within the area of each recurrent diamond shaped lense. There are six such ore shoots indicated on the property. Values generally tend to diminish as they approach the foot-wall. This makes an ideal condition for selective mining.

DEVELOPMENT

The principal work has been in the Shamrock and Commerce mines, although a great many surface cuts and shafts have been sunk along the vein outcrop. The Shamrock shaft is 800 feet deep, levels cut and driven at 100 feet intervals, and cross-cuts on all levels at 50 feet intervals. In this development work much of the ore hoisted was shipped to the smelters and constitutes a very exact sampling of the mine. The Commerce mine is 500 feet deep with levels at 100 feet intervals. A great deal of the ore from this development was likewise shipped to the smelter.

In report (September 1924) Mr. Henry M. Crowther states "The following estimated of ore tonnage divided into several segregations of widths and values are based on sample maps and shipments to smelters (for development) equal in tonnage to one ton of ore actually shipped to each twenty tons estimated as blocked, which test is considered ample proof of values since much of the tonnage is extracted in sinking shafts and driving drifts".

"Ore Blocked "A" Method".

Workings	Tons	Total Values	Width	Total
Shamrock Mine	130,000	$10.00	10	$1,300,000
Commerce Mine	39,000	11.00	6	350,000
DUMPS	20,000	9.50		190,000

" Ore Blocked "B" Method".

Workings	Tons	Total Value	Width	Total
Shamrock Mine	90,000	12.00	7	$1,180,000
Commerce Mine	39,000	11.00	6	330,000
Dump	20,000	9.50		190,000

INDICATED ORE--

All development, 300,000 tons $10.00. The 300,000 "indicated" has not been topped "blocked" for the reason that it was not exposed on three sides, but was believed assured at the value stated in view of the existing conditions.

The above tonnage blocked and indicated is computed by the development of the Commerce shaft and levels; the Shamrock shaft on levels and the ore on the dumps. (Silver @ .70 cents per ounce. Gold $20.. per ounce)

(Signed) HENRY M. CROWTHER .

(Copy of Leter dated September 15, 1924 to
Southwest Mining Company. Los Angeles, California)

Dear Sirs:

I have known Mr. Henry M. Crowther for the last twenty-five years; during which time I have been in consultation with him on many occasions. Mr. Crowther has had a very extensive experience in the west, not only in charge of properties but also in working out economic geology of a number of districts. Mr. Crowther is one of the highest standing men in the profession and I have the fullest faith in his ability and integrity.

(Signed) Park Channing.

C O P Y (Letter Dated Septptember 15,1924)

Southwest Mining Co.,
Los Angeles, Calif.

Dear Sirs:

It is with pleasure that I am able to state that I have personally known Mr. Henry M. Crowther for the past twenty years, during which time he has operated extensively in the mining industry. Mr. Crowther has had a very wide experience in many sections as manager and engineer of important operations. I have a high personal and professional regard for Mr. Crowther and would not hesitate to accept his report on mining property as accurate and reliable.

Yours very truly,

(Signed) Louis M. Cates.

Following is from the report of Henry V. Snell of Globe, Arizona, to Southwest Mines Co. Dated August 1924. (On file) .

"In mining on a tonnage basis I think it safe to figure that on an average the ore will be broken on a width of from 7 to 8 feet, and using this width as a basis, the blocked ore figures at about 150,000 tons, at $11.00 per ton or $1,650,000.00. Based on present mine opening and surface indications of ore shoots I have figured it safe to accept 300,000 tons indicated as probable ore with a value of $10.00 per ton.

Note: Mr. Snell is a graduate of Michigan School of Mines, was formerly engineer for Old Dominion Copper Co. of Globe, Arizona. He was in charge of the development of Ash Peak Extension Mine which adjoins the Ash Peak property.

Mining and Milling Costs.

(a) (From Crowther Report.) The mines are dry to present depth and ore can be mined with little timber and with safety and economy at an estimated cost of $2.00 per ton delivered into mill bin.

Milling by cyaniding process by which a saving of 95% of assay values has been made in the test work is estimated at $2.00 cost per ton. By large tonnage these should be reduced.

Taking 90% mill saving (altho 95% is possible) by cynide extraction, and basing costs on 250 tons daily output, on "A" method estimates, we have 480,000 tons $10.00, 90% recovery $9.00 less costs of $4.50 per ton indicated profit $4.50 per ton or $2,160,000.00 (Based on 70 cents silver and $20.00 gold). (Cynide tests indicate 95% extraction with 150 mesh grinding and 2.4 cynide consumption per ton. By Flotation a very high concentrate is possible with equally high recoveries. Fine grinding is likewise necessary.

SUMMARY. (From Crowther Report).

"The property has large and valuable ore reserves in sight and indicated. The enterprise of recovering generous profits therefrom will in reality be a manufacturing operation promises a generation of successful life. The outlook for the incidental development of ore bodies of rich shipping ore is promising with additional depth attained. I recommend the property as having every element for success and profit over many years of tonnage operations. From every viewpoint it is the best and biggest property that I have seen in years. "

CONCLUSIONS. (From report of H. V. Snell)

It is certain that a large tonnage of ore will be developed in the vein in addition to that which is now in sight. As it stands it is a virgin property, practically no ore having been stoped. It is very probable that additional depth will open higher grade direct shipping ore. The property should be equipped for operation on a scale not less than 250 tons per day. This will indicate a capital requirement of not less than $250,000.00.

The present indicated ore reserves insure the operation of such a plant for several years, with a likelyhood that additional development will indicate the advisability of increasing the scale of operations.

(Signed) (H. V. Snell.)

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
~~FIELD ENGINEERS REPORT~~
NEW ITEM

Mine Ash Peak Mine — Date Dec. 11, 1951.

District Ash Peak District, Greenlee County. — Engineer Axel L. Johnson

Subject: News Item--- Source of Information--- Les Billingsly, Duncan, Ariz.

Location Near Ash Peak--- about 9 miles west of Duncan, and about 1/2 miles south of Highway 70.

Owner Howard Mottier

Operator Howard Mottier

Officers Howard Mottier, Superintendent

Metals Mined Silver and Silica Flux.

Men Employed 20 men---- 10 on day shift, 7 on 2nd shift, and 3 on 3rd shift.

Production Rate Shipping about 40 carloads per month--- about 60 tons per day.

Marketing Facilities Shipping ore to International Smelting Co. at Miami, Ariz. The ore is used for flux.

Ore Values The silica ore mined runs from $6 to $10 per ton in silver values.

Workings The ore is mined through a 60 degree inclined shaft. This shaft is now down to the 600 ft. level.

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA

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From Harold
Last shipments to smelter were for
6½ % Pb

October 4, 1952

Dear Harold:

Starting July 17, 1952, I went to Ash Peak with Cliff Smith each Thursday until August 21st to map the various workings which have exposed the No. 3 vein. On the last trip the 700 level was mapped preparatory to exploring the No. 3 vein.

The geological mapping indicates that the best ore in the No. 3 vein was encountered on the 400 level and the 500 level where the vein has a North 60° to 70° West trend and is probably a little flatter than in other parts of the mine. About 500 feet west of the shaft the trend of the veins turns to about North 40° West and the orebodies are broken up and of lower grade.

Development to date indicates that very little of the higher grade material in vein No. 3 reaches the 600 level and the stopes are being prepared to mine only part of the ore below the 500 level. This condition leaves very little hope of stoping ground between the 600 and 700 levels but the No. 3 vein on the 700 level should be explored by long holes since the level is all open and such exploration would not be expensive.

There appears to be a small block of ore on the 500 level about 700 feet west of the shaft. This ore is in the No. 2 or main vein and there is no exploration on it above the 500 level. On the 600 level below this ore there is only about 5 ounces of silver per ton of ore but to the west a stope was started which apparently ran out of ore. If these two bodies of ore represent a flat lying ore shoot the stope from the 600 level would have passed through the ore band. This orebody is small but of good grade and could be prospected on the 400 level with about 300 feet of drifting. If much exploring is done to the west of the Shamrock shaft it would be advisable to drive a raise to the surface for exploration and ventilation.

The accompanying section which was adapted from a map made by the Veta Mines Inc. shows the Hardy, Shamrock and Commerce shafts and the amount of stoping in the various areas. Most of the stoping from the Shamrock workings is lower than that in the Commerce as if there were a downward trend to the ore shoots to the west. If this trend continued to the Hardy area most of the ore there might be below the ground which has been explored.

Surface exposures of the main vein in the Hardy area appear poor and maps of the underground workings by T. A. Dodge indicate that the veins were pinching out upwards. The Hardy property now belongs to the Smelter and if continued operations at Ash Peak are anticipated it should be explored. Since the veins appear to pinch out upwards this property should be explored by workings below the present levels preferably the 975 level of the Shamrock shaft. Approximately 1,700 feet of drifting and 250 feet of raise work would be necessary to connect with the Hardy winze. The Hardy workings should be repaired while the connection was being made so that there would be a total cost of around $50,000.

The above amount appears large and would be excessive unless considerable ore was developed during the driving of the connection. The section submitted with this report shows five diamond drill holes between the Hardy workings and the Shamrock shaft. All of these apparently cut the vein but there are no records available regarding the grade of the material cut. If the ore shoots are lower to the west none of the drill holes would have been deep enough to be in the ore zone. Two or three 1,100 or 1,200 foot diamond drill holes between the Hardy and Shamrock shafts would indicate conditions at depth but would cost between $15,000 and $20,000 and in spotty silver ore might give erroneous results.

On the North Vein No. 3 claim of the Hardy group there is a vein trending Northwest and dipping at about 60° to the Northeast. This vein can be traced for a little more than 1,000 feet and probably averages three feet in width. There is one shaft of unknown depth on this vein which should be repaired and the workings should be sampled. It would be very easy to explore this vein with diamond drill holes. U. S. Highway 70 is about 400 feet northwest of the vein and at about 50 feet lower elevation. Holes drilled downward from along the highway could cut the vein at 300 or 400 feet depth. Most of the drilling would be in basaltic flows.

The accompanying section indicates a large amount of unexplored veins both east and west of the Shamrock shaft. Most of the levels were abandoned in very low grade material and further exploration did not seem justified. In the Commerce area most of the ore appears to have bottomed above the 500 level. Available assays show little or no ore on that level. The small stope that was mined above the 500 level from the connection to the Shamrock shaft has not been explored above or below the level. 300 feet of driving to the east on the Shamrock 600 would explore the area below the known ore.

The only developed ore in the Shamrock area at present is the block below the 500 level in the No. 3 vein. This ore does not reach the 600 level and the tonnage is limited. Some ore could be obtained by mining the level and stope pillars at the 500 level on the No. 3 vein but care should be taken not to damage the Shamrock shaft. The old working drawings show a block of ore above the Shamrock 800 east of the shaft. Assays indicate 14.12 ounces of silver at the 800 level. This block could be very easily developed if the 800 level is in as good condition as the 700 level.

Drifting to the west on the 700, 800 or 900 levels might prove more ore in the main vein and exploration in the No. 3 vein might find more ore bodies. If the large ore bodies in the vicinity of the Shamrock shaft are associated with the change in strike of the vein there is no similar condition indicated throughout the explored part of the veins. Other oreshoots not associated with known structural conditions will have to be found by drifting and raising.

At present it appears that there is a limited amount of ore remaining near the Shamrock shaft and extensive exploration will be necessary if the Ash Peak mine is to remain in operation. Higher grade ore rather than large ore bodies will improve conditions at the mine. The fact that higher grade ore came from the Hardy workings than from the Shamrock and Commerce would indicate that development should be extended in that direction. This development might prove costly and suggests the serious consideration of other mines as a source of siliceous flux material.

Very truly yours,

EFR:EB

c

The Ash Peak property is more than a prospect. With a proven production of over 296,675 tons averaging almost 10 oz. silver, it has produced about 3 million ounces. There is a large tonnage of semi-developed vein which warrants further exploration and development. Former production has been by "Assay Limits", mining those widths of vein which were determined to be ore. Silver values increased toward the hanging wall of the vein and previous mining took the higher values determined by assay usually in widths of 5 to 7 feet. At the present increased price of silver, even allowing for inflated costs of labor, equipment, supplies and money, greater widths should prove to be ore and it may be possible to re-mine some of the formerly mined stopes.**

The Commerce Mine (reference assay map 27 March 1973) has blocks C-1 and C-2 developed and ready for mining. At the present time there is no equipment at the property, however, the Commerce shaft was re-timbered in 1969-70 and appears to be in useable condition with minor repairs. Re-opening the shaft to the 200 level would make blocks C1&2 available for mining 25,400 tons having an average value of .035 oz. Gold and 5.6 oz. silver over a width of 5 feet and a length of 400 feet and 200 feet in height. At present silver prices the vein can probably be mined at a greater width to provide greater tonnage at a lower cost per ton. An exploration and development program can be started to extend the 200 level an additional 600 feet northwest with cross-cuts and long hole drilling into the hanging and footwall to determine additional tonnage and grade. At an average width of 7 feet this should produce a block of 60,000 tons

** Veta Mines left about a foot of ore on the hanging wall along the dike to prevent air slacking and dilution of the ore in the shrinkage stopes.
The caved stope fill may be mill feed

The same surface plant, with some modifications to the hoisting equipment, can be used to re-open the Commerce shaft to the 500 foot level. Block C-8 on the 500 level SE would be readily accessible by cleaning out a short caved section. This block has tons averaging oz. and a width of feet. Again, greater mining width may be feasible.

The 500 level NW toward the Shamrock shaft - 1300 feet in length is essentially "virgin territory", awaiting sampling and long hole drilling into the hanging and footwalls to determine the width and grade.

At the 1300 foot breast of the 500 level, there is a winze down to the 600 ft. level of the Shamrock workings which was driven as a raise from the Shamrock by Veta Mines for ventilation and a second exit route. No records or assays are available on the connection, except that all the material extracted was milled by Veta Mines. The excellent circulation of air from the Shamrock to the Commerce indicates that the winze is still open.

Access to the 600 Shamrock workings can be accomplished by installing an air hoist and, if necessary, re-timbering the winze down to the 600 level. This would make it possible to explore and sample the Shamrock workings and especially the 600 level Hanging Wall vein opened up by Inspiration Copper during World War 2. but not mined to the 500 level. There is a potential block of ore 1200 ft. in length, 100 feet high and at a width of 7 feet which would produce 60,000 tons.

The Shamrock headframe was set on fire by vandals (or environmentalists) in 1976 and it is believed that, due to the air circulation from the Commerce shaft, all the timbers were burned at least down to the 600 level. The Shamrock Shaft has a dip of about 80 ° and, although crooked, was equipped by Veta Mines with a skip. (Inspiration mined all of their ore in both the Commerce and Shamrock using a 1 ton bucket) The Shamrock shaft could be re-timbered, but with advanced technology in raise boring, it would probably be cheaper and more satisfactory to bore a circular shaft to the 975 ft. level by "gobbing" the cuttings in old stopes or workings. The Shamrock shaft would serve as a ventilation shaft and possibly an escape shaft.

The Hardy shaft is small, crooked and presently caved. The area could be more economically opened by extending the Shamrock 500 level NW to the churn drill hole on the Hardy and boring a raise to the surface.

The meteoric rise in the price of Silver begins to approach its true value as a vital commodity in short supply. The Ash Peak property is now a far more attractive venture than was available to either Veta Mines or Inspiration, because it makes possible greater mining widths. This, coupled with improved technology, trackless mining, improved drilling machinery, ammonium nitrate blasting and better material handling, off-sets increased labor, equipment and supply costs.

The Ash Peak vein has an unique advantage of very little waste product. The high silica content makes it possible to market the gold, silver and silica to smelters as flux, or to extract the gold and silver as bullion and market an enriched silica product to the smelters or to industry.

A plan to re-open the Ash Peak mines to get into production at an early date and to carry on an investigation, exploration and development program follows::::::

A. GEORGE SETTER, E.M.
Registered Professional Engineer
1128 GUNNISON AVENUE
GRAND JUNCTION, COLORADO 81501
(303) 241 1803

October 28, 1985

Dear Paul,

The Ash Peak Mine is a most unusual property. After mining over 400,000 tons of ore which produced 3,304,000 ounces of silver and 10,400 ounces of gold (net),there are no dumps and practically all of the Veta Mines tailings have been shipped to smelters for flux. This is proof that Ash Peak is indeed a Precious Metal Bearing Silica Flux (PMBSF) mine.

As a source of silica flux, Ash Peak has hardly been scratched. For instance there is probably in excess of 1,000,000 tons of silica which can be mined by open pit to a depth of only 100 feet.. This might be low grade silver but the gold might average .o2 as there seems to be no correllation between the gold and silver values. There is a substantial quantity of ore developed by Phelps Dodge above the 200 level which is ready to extract. Gold and silver values will depend on the width mined. The largest tonnage of semi-developed silica is the hanging wall vein at the Shamrock shaft below the 500 foot level. This probably extends down to the 800 foot level but has only been explored to the 600 foot level. (by Inspiration) There is a good potential of finding parallel veins, especially the hanging wall vein, along the entire length of the Ash Peak vein. The greatest long term potential may be at depth where the igneous lava flows lie on the conglomerate and limestone sedimentary beds. This is a situation found in several mines a few hundred miles south in Mexico, where strong silica silver veins intersect the sedimentaries to produce large ore bodies of gold, silver, copper, lead, zinc, fluorspar.

There are 50,000 tons or more of PMBSF depending on silver prices developed by PD at the Commerce ready to mine by re-equiping the No 3 decline area at Stope 6. It would not be in the best interest of the property to "gut" this orebody to produce a cash flow. THE ASH PEAK MINE CAN NOT BE LIFTED BY ITS BOOTSTRAPS! It will take a Capital investment for exploration and development and other facilities to make this a successful venture. The sale of the silica is also essential.

There are several operating mines which have methods which might be applicable to the development and operation of the Ash Peak mine. Enclosed are articles on the following:

1. The Belmont Resources open pit mine in Nevada which is producing bullion from heads of .02 gold and 1.4 silver in a heap leaching operation. ?? ($/15)

2. The R0pes gold mine in Michigan has a vein structure similar to Ash Peak and at the same depths. Ore assays 0.10 gold0.10 silver ($30) (no better than AP @4oz AG & .02 AU) Ropes is developing the mine with a 7,000 ft ramp a 12% grade to the 900 ft level (AP needs only a 5000 ft decline to get to the 800 ft level) They will then bore a 13ft Ø shaft to the 1000 ft level for production hoisting. (AP has the Shamrock, Commerce & Hardy)

3/ The Boliden Mines in Sweden. The mining methods used there are cut and fil (CAF) using hydraulic fill, a method of possible use at Ash Peak. This system allows tonnages of 25 or more tons per man shift. Since AP has only silica tails, sand can be substituted as they do at Boliden. Hydraulic fill is used extensively in Mexico at Naica, Santa Eulalia, and by Homestake at the Bulldog mine at Creede, Colo. rado where they are getting 25 ton per man shift in a narrow vein. Hydraulic fill requires considerable water and consideration should be given to deepening the Homestead Well by drilling to the 1500 ft level where sedimentary deposits may be encountered.

On PD drawing no I have outlined a plan for exploring and developing the Ash Peak mine. It entails drilling a series of horizontaldiamond drill holes (AX) into the hanging wall to determine the existence ofthe hanging wall vein and other possible parallel veins, and a similar series into the footwall to determine the width and grade of the Ash Peak vein. These holes would be drilled on the 200 level of the Commerce where there is easy ac--cess and set up room. This would be done in lieu of trenching on the surface. (The hanging wall vein did not outcrop on the surface and there appear to be no veins of any appreciable width showing on the surface. The Shamrock shaft should be equipped with a temporary (but safe) hoist and cage to check out the shaft for possible re-timbering and use for a limited production shaft. This would also permit getting down to the 600 ft level to examine the hanging wall vein. and cpndotopn of the 600 ft level which is probably caved in many places. If the examination of the 600 is favorable the shft should be cleaned out to the 975 level and the shaft re timbered.

Development would be done by extending the PD No 3 decline from the 200 level of the commerce by driving at a 12% decline parallel to the Ash Peak vein 5000 feet to the 800 level of the Shamrock.

AX diamond drill bore holes would be drilled at intervals into th hanging wall and into the footwal to intersect the Ash Peak vein to determine its width. Assays would be made in the bore holes by means of a Mapco Bore Hole Probe and crosscuts would be driven at intervals to the old stopes for ventilation and loading purposes. Crposcuts would also provide means to mine ores on any of the intermediary levels of the Commerce and/or Shamrock The ramp would provide the means touse the hydraulic fill system and the hanging wall vein can be mined from the 800 level to the 500 level without driving intermediate drifts and would give minimum dilution of the silica.It also would make it possible to mine the pillars and ore between these levels left in the Ash Peak vein.

Since the Ash Peak mine has historically produced no waste and has no dumps, all of the ore mined hase been saleable. It therefore is not necessary to process or beneficiate the ore at the mine site. It probably would be more advantageous and profitable to locate the plant where there is more room for stockpiling, water, rail facilities.

We have discussed many times the desireability of an ore buying station to be located at Fox Siding on the SP railroad. Ore from Ash Peak would be crused to -1½" sampled and stockpiled in lots of 500 or 1000 tons. Ores, depending on grade, could be either shipped to smelters or beneficiated to provide bullion and a premium grade silica flux.

A sampling plant and ore buying station would permit getting ores from other mines, primarily from the Steeple Rock District for sale or beneficiation,

The success of the project is dependent on either developing a market for silica, particularly silica slurry, of improvement in the price of gold and silver, or both. The enclosed article on GOLD: the ultimate burglar alarm is from Forbes Sept 20, 1985 issue. I also have information on hoists, compressors, etc.

Looking forward to seeing you and Betty,

G.O. 17.13 6-12-70 5M

PHELPS DODGE CORPORATION
Morenci, Arizona

Hole No.
Drill No. AP - 17
Date Assayed July 15, 1983

PROSPECT DRILLING ASSAY REPORT

Sample Number	Date	Sample Interval	Weight In Grams	SiO_2	Al_2O_3	CaO	Ag	Au	
				%	%	%			
		AP - 17							
1	7-13-83	62.5 - 65	1350	87.3	1.4	1.08	0.88	.007	
2		65 - 67.5	930	91.6	0.8	0.44	0.97	.012	
3		67.5 - 70	918	91.3	0.3	0.26	0.79	.012	
4		70 - 72.5	1381	89.7	0.5	1.35	0.34	.014	
5		72.5 - 80	1046	78.7	1.3	8.12	0.40	<.005	
6		80 - 82.5	1702	74.8	8.8	4.32	0.70	<.005	
7		82.5 - 85	1664	75.2	8.4	3.28	0.28	<.005	
8		85 - 87.5	2090	71.4	4.9	10.07	0.27	<.005	
9		87.5 - 90	1818	75.1	2.1	7.51	0.33	<.005	
10		90 - 92.5	1968	79.1	5.3	3.92	0.33	<.005	
11		92.5 - 95	1514	83.3	4.2	1.67	0.33	<.005	
12		95 - 97.5	1277	80.8	7.9	0.52	0.29	<.005	
13		97.5 - 100	1705	76.5	9.7	1.32	0.28	<.005	
14		100 - 102.5	1492	74.7	10.7	1.12	0.14	<.005	
15		102.5 - 106	2158	70.8	7.9	7.70	0.12	<.005	

Assayer [illegible]

Ash Peak Drill Hole Assays

Hole	Sample Nos.	Footage
AP-1	1	29'3" - 32'4"
	2	45' - 47'
	3 - 38	53' - 89'
	39 - 42	89' - 93'
	43 - 44	93' - 95'
AP-2	1	68' - 74'
	2 - 39	105' - 143'
	40 - 48	143' - 152'
AP-3	1	31' - 31'8"
	2 - 17	72' - 88'
	18 - 20	88' - 91'
AP-4	1	9'6" - 11'
	2	40'8" - 41'6"
	3	84'4" - 85'5"
	4 - 32	105'6" - 134'
AP-5	1	50' - 50'7"
	2 - 17	70'3" - 91'8"
AP-6	1	78'2" - 80'2"
	2 - 20	103'6" - 123'
	21 - 26	131' - 137
	27 - 28	138 - 142
AP-7	1	54'4" - 62'10"
	2 - 17	77' - 93'2"
AP-8	1	67' - 71'
	2 - 15	81' - 101'6"
	16	107'10" - 111'
	17 - 31	137' - 167'
AP-9	1	86'2" - 97'8"

G.O. 17.18 5-15-72 5M

Table 1

PHELPS DODGE CORPORATION

DAILY ASSAY RECORD

Morenci Branch - Reduction Works

SAMPLED May 23, 1980 Morenci, Arizona ASSAYED May 27, 1980

		H_2O %	Cu %	SiO_2 %	Al_2O_3 %	Fe %	CaO %	S %	Ounces Per Ton Ag	Au
	SPECIAL GEOLOGY									
	ASH PEAK									
	DDH - AP - 1									
1	32			72.7	1.4	2.4	11.10		1.47	0.013
2	45 - 47			77.7	1.2	2.1	9.58		1.75	0.008
3	53 - 54			84.0	0.9	2.1	6.96		1.51	0.002
4	54 - 55			79.0	1.3	1.8	8.28		3.54	0.008
5	55 - 56			79.6	0.5	1.4	9.50		0.72	<0.002
6	56 - 57			63.8	1.3	1.6	7.48		0.90	<0.003
7	57 - 58			75.4	1.1	1.4	11.42		2.70	0.010
8	58 - 59			67.9	1.3	1.5	14.80		2.51	0.013
9	59 - 60			70.0	1.0	1.1	14.50		3.33	0.008
10	60 - 61			84.7	1.4	2.3	4.88		2.09	<0.002
11	61 - 62			82.2	1.5	2.1	5.64		1.50	<0.002
12	62 - 63			78.3	1.0	2.7	6.22		1.84	0.002
13	63 - 64			82.7	0.8	2.4	7.08		2.64	0.018
14	64 - 65			55.9	0.5	2.2	21.48		0.98	<0.002
15	65 - 66			79.9	0.9	2.2	8.68		0.85	0.002

[illegible] Chemist

G.O. 17.18 5-15-72 5M

PHELPS DODGE CORPORATION

DAILY ASSAY RECORD

Morenci Branch - Reduction Works

SAMPLED May 23, 1980 Morenci, Arizona ASSAYED May 27, 1980

		H2O %	Cu %	SiO2 %	Al2O3 %	Fe %	CaO %	S %	Ounces Per Ton Ag	Au
PECIAL GEOLOGY										
ASH PEAK										
DDH - AP - 1										
6	66 - 67			76.7	1.7	2.8	10.60		0.81	<0.002
17	67 - 68			84.5	0.8	2.9	5.06		0.69	<0.002
8	68 - 69			82.7	0.5	1.7	7.36		0.60	<0.002
19	69 - 70			73.3	0.6	1.8	13.40		0.39	<0.002
0	70 - 71			80.0	0.6	2.2	8.72		0.51	<0.002
	71 - 72			74.7	1.0	2.0	10.52		0.36	<0.002
22	72 - 73			82.4	1.2	2.6	7.12		0.42	<0.002
3	73 - 74			86.9	2.1	2.4	3.42		0.66	<0.002
24	74 - 75			93.2	0.7	2.0	2.22		0.51	<0.002
5	75 - 76			79.0	0.5	1.8	9.54		0.38	<0.002
6	76 - 77			80.6	2.5	2.9	5.58		0.81	<0.002
27	77 - 78			63.8	0.9	2.3	16.90		0.91	<0.002
8	78 - 79			87.0	0.9	3.1	3.44		0.56	0.002
29	79 - 80			80.5	1.2	2.5	6.62		0.76	<0.002
0	80 - 81			73.6	1.4	2.6	10.20		0.59	<0.002

W.K. Vaughan Chemist

G.O. 17.18 5-15-72 5M

PHELPS DODGE CORPORATION
DAILY ASSAY RECORD
Morenci Branch - Reduction Works

SAMPLED May 23, 1980 Morenci, Arizona ASSAYED May 27, 1980

SPECIAL GEOLOGY

ASH PEAK

DDH - AP - 1

		H_2O %	Cu %	SiO_2 %	Al_2O_3 %	Fe %	CaO %	S %	Ounces Per Ton Ag	Ounces Per Ton Au
31	81 - 82			50.2	0.2	1.0	25.80		0.78	<0.002
2	82 - 83			77.7	0.3	1.2	11.24		0.43	<0.002
33	83 - 84			90.6	0.5	2.3	2.40		2.17	0.013
4	84 - 85			95.8	0.4	1.8	0.20		4.18	0.005
	85 - 86			83.1	0.7	1.7	7.98		2.35	0.005
36	86 - 87			95.2	0.5	2.0	0.70		2.35	0.028
7	87 - 88			95.0	0.8	2.5	1.04		2.62	0.063
38	88 - 89			82.0	0.9	2.4	7.32		3.92	0.075
9	89 - 90			86.4	2.8	2.4	2.74		4.32	0.028
40	90 - 91			84.9	4.6	3.4	1.26		2.02	0.005
41	91 - 92			80.7	6.4	3.6	1.48		1.70	0.013
2	92 - 93			77.9	7.8	4.6	0.68		1.47	0.005
43	93 - 94			71.5	10.7	4.4	1.12		1.21	0.005
4	94 - 95			63.5	14.0	5.7	1.82		1.04	0.002

W.K. Farquhar Chemist

G.O. 17.18 5-15-72 5M

Table 2

PHELPS DODGE CORPORATION

DAILY ASSAY RECORD

Morenci Branch - Reduction Works

SAMPLED June 5, 1980 Morenci, Arizona ASSAYED June 17, 1980

		H_2O %	Cu %	SiO_2 %	Al_2O_3 %	CaO %	Fe %	S %	Ounces Per Ton Ag	Au
SPECIAL GEOLOGY										
ASH PEAK										
DDH - AP - 2										
1	68-74			66.3	1.6	14.76	2.2		2.54	0.015
2	105-106			86.1	1.5	3.74	2.2		14.35	0.026
3	106-107			75.6	2.5	7.41	2.6		25.79	0.032
4	107-108			73.0	2.3	9.53	1.8		9.26	0.035
5	108-109			71.3	1.6	12.07	1.4		8.13	0.055
6	109-110			68.4	0.8	13.89	1.1		8.19	0.043
7	110-111			67.6	0.9	14.66	1.1		7.90	0.044
8	111-112			67.7	1.1	14.15	1.2		5.54	0.046
9	112-113			74.9	1.4	11.20	1.4		6.48	0.055
10	113-114			82.4	1.1	7.93	1.4		4.92	0.035
11	114-115			84.7	0.9	5.91	1.4		5.26	0.050
12	115-116			80.8	0.8	7.36	1.8		4.39	0.032
13	116-117			84.6	1.0	5.92	1.6		4.26	0.041
14	117-118			85.7	0.7	6.10	1.6		3.38	0.030
15	118-119			86.0	0.8	5.11	1.6		3.21	0.022
16	119-120			89.3	0.5	3.78	2.4		3.35	0.023

[illegible signature] Chemist

G.O. 17.18 5-15-72 5M

PHELPS DODGE CORPORATION
DAILY ASSAY RECORD
Morenci Branch - Reduction Works

SAMPLED June 5, 1980 Morenci, Arizona ASSAYED June 17, 1980

		H_2O %	Cu %	SiO_2 %	Al_2O_3 %	Fe %	CaO %	S %	Ounces Per Ton Ag	Ounces Per Ton Au
SPECIAL GEOLOGY										
ASH PEAK										
DDH - AP - 2										
17	120-121			88.0	0.4	1.6	4.47		3.36	0.018
18	121-122			78.8	1.4	3.9	6.55		1.79	0.015
19	122-123			65.3	1.9	3.8	12.91		5.99	0.030
20	123-124			91.8	0.3	2.1	2.65		3.23	0.033
21	124-125			93.8	0.6	1.8	0.98		2.71	0.018
22	125-126			94.6	0.5	2.0	1.55		2.22	0.023
23	126-127			93.3	0.7	1.7	2.13		3.32	0.030
24	127-128			89.0	0.8	1.8	3.55		4.89	0.040
25	128-129			84.9	1.8	2.1	4.26		5.19	0.020
26	129-130			83.9	0.7	2.0	7.72		4.38	0.008
27	130-131			79.3	1.1	1.8	9.67		4.33	0.005
28	131-132			88.3	0.4	1.8	6.92		7.65	0.010
29	132-133			92.5	0.8	1.8	3.78		5.75	0.008
30	133-134			87.1	1.1	2.2	6.02		4.59	0.023
31	134-135			92.6	0.8	2.0	5.25		4.44	0.015
32	135-136			93.8	0.9	2.0	3.05		4.75	0.033

A.K. Farquhar Chemist

G.O. 17.18 5-15-72 5M

PHELPS DODGE CORPORATION
DAILY ASSAY RECORD
Morenci Branch - Reduction Works

SAMPLED June 5, 1980 Morenci, Arizona ASSAYED June 17, 1980

		H_2O %	Cu %	SiO_2 %	Al_2O_3 %	Fe %	CaO %	S %	Ounces Per Ton Ag	Ounces Per Ton Au
SPECIAL GEOLOGY										
ASH PEAK										
DDH - AP - 2										
3	136-137			89.9	0.8	2.3	5.46		3.81	0.025
34	137-138			90.1	1.5	2.2	4.44		5.03	0.023
35	138-139			91.9	0.4	1.8	5.40		2.80	0.013
36	139-140			81.7	4.9	3.3	3.63		2.46	0.013
37	140-141			82.0	4.1	2.6	5.01		2.80	0.013
38	141-142			83.1	0.8	1.3	9.52		1.36	0.008
39	142-143			85.8	2.9	2.5	4.39		2.04	0.033
40	143-144			82.4	4.4	3.4	3.98		1.72	≤.0025
41	144-145			81.4	4.6	3.3	4.00		1.65	≤.0025
42	145-146			79.1	3.9	3.3	5.14		1.90	≤.0025
43	146-147			76.5	6.2	3.4	3.22		1.53	≤.0025
44	147-148			78.8	4.8	3.1	3.20		1.49	≤.0025
45	148-149			72.9	8.9	4.3	2.67		1.58	≤.0025
46	149-150			67.9	5.0	3.1	10.63		1.86	0.008
47	150-151			63.8	11.0	3.9	6.01		1.78	≤.0025
48	151-152			59.3	14.2	4.6	4.42		1.49	≤.0025

W.K. [illegible] Chemist

G.O. 17.18 5-15-72 5M

Table 3

PHELPS DODGE CORPORATION

DAILY ASSAY RECORD

Morenci Branch - Reduction Works

SAMPLED June 5, 1980 Morenci, Arizona ASSAYED June 17, 1980

		H_2O %	Cu %	SiO_2 %	Al_2O_3 %	Fe %	CaO %	S %	Ounces Per Ton Ag	Au
SPECIAL GEOLOGY ASH PEAK										
DDH - AP - 3										
1	31-31$_8$			77.6	5.7	2.9	3.88		0.168	< .0025
2	72-73			86.0	4.0	3.3	2.20		2.61	0.018
3	73-74			88.8	1.3	1.5	4.20		1.83	0.010
4	74-75			90.1	0.8	1.3	3.98		4.22	0.010
5	75-76			87.9	4.2	2.8	1.02		2.03	0.008
6	76-77			90.7	2.9	2.6	0.88		1.86	.0025
7	77-78			79.4	8.7	3.8	0.92		1.73	< .0025
8	78-79			80.5	7.9	3.6	0.80		2.03	.0025
9	79-80			79.6	8.5	3.4	0.88		1.32	.0025
10	80-81			77.6	9.6	3.8	0.96		1.49	0.008

[signature] Chemist

.O. 17.18 5-15-72 5M

PHELPS DODGE CORPORATION
DAILY ASSAY RECORD
Morenci Branch - Reduction Works

AMPLED June 5, 1980 Morenci, Arizona ASSAYED June 17, 1980

		H_2O %	Cu %	SiO_2 %	Al_2O_3 %	Fe %	CaO %	S %	Ounces Per Ton Ag	Au
PECIAL GEOLOGY										
SH PEAK										
DDH - AP - 3										
	81-82			88.0	4.3	2.7	0.72		1.74	0.015
12	82-83			79.6	8.1	4.1	0.78		0.92	0.008
	83-84			72.9	10.8	4.6	1.02		0.400	≤.0025
	84-85			83.3	6.4	3.6	0.80		0.525	≤.0025
	85-86			77.8	7.8	4.2	0.92		0.208	≤.0025
	86-87			79.0	8.2	3.7	0.88		0.143	≤.0025
17	87-88			73.9	10.0	4.3	1.00		0.110	≤.0025
	88-89			68.5	12.9	4.5	1.06		0.153	≤.0025
19	89-90			66.9	14.0	4.2	0.96		0.150	≤.0025
	90-91			70.6	11.8	3.9	1.16		0.155	≤.0025

W. K. [signature] Chemist

.O. 17.18 5-15-72 5M

Table 4

PHELPS DODGE CORPORATION

DAILY ASSAY RECORD

Morenci Branch - Reduction Works

SAMPLED June 10, 1980 Morenci, Arizona ASSAYED June 26, 1980

		SiO_2 %	Al_2O_3 %	CaO %	Fe %	Pb %	Zn %	%	Ounces Per Ton Ag	Au
	SPECIAL GEOLOGY									
	ASH PEAK									
	DDH - AP-4									
	9_6-11	83.8	4.7	2.54	2.5	0.002	0.006		≤ 0.10	≤ 0.005
2	40_8-41_6	80.2	4.3	4.60	2.4	0.003	0.007		< 0.10	< 0.005
3	84_4-85_5	87.2	2.2	3.74	2.2	0.001	0.003		1.10	0.005
	105_6-106	94.3	1.3	0.74	1.9	0.011	0.018		2.17	0.02
5	106-107	86.3	0.9	6.14	1.7	0.016	0.013		2.56	0.01
	107-108	84.6	2.9	6.44	1.7	0.004	0.009		1.91	0.01
7	108-109	89.9	1.8	4.20	1.7	0.013	0.015		1.89	0.03
8	109-110	91.8	1.9	1.46	1.8	0.009	0.010		2.14	0.015
	110-111	93.4	0.9	1.20	1.5	0.010	0.022		1.94	0.035
10	111-112	91.0	2.9	0.82	2.2	0.010	0.020		2.71	0.020
	112-113	94.7	1.8	1.04	1.7	0.006	0.021		2.19	0.025
12	113-114	89.0	2.7	1.08	2.4	0.007	0.025		2.39	0.015
13	114-115	94.9	1.8	0.72	1.9	0.004	0.016		2.22	0.015
	115-116	88.4	2.7	1.84	2.6	0.001	0.012		1.99	0.010
15	116-117	82.0	3.8	1.88	2.8	0.002	0.011		1.83	0.010
	117-118	84.2	4.1	2.30	2.9	0.002	0.009		1.81	0.015

W.K. [illegible] Chemist

.O. 17.18 5-15-72 5M

PHELPS DODGE CORPORATION
DAILY ASSAY RECORD
Morenci Branch - Reduction Works

SAMPLED June 10, 1980 Morenci, Arizona ASSAYED June 26, 1980

		SiO_2 %	Al_2O_3 %	CaO %	Fe. %	Pb %	Zn %	%	Ounces Per Ton Ag	Au
	SPECIAL GEOLOGY									
	ASH PEAK									
	DDH - AP-4									
	118-119	79.1	4.4	9.06	1.9	0.002	.006		0.70	0.015
18	119-120	72.5	6.7	10.94	2.1	0.007	.008		1.02	0.015
	120-121	63.4	11.3	1.90	5.0	0.002	.011		1.21	0.015
	121-122	71.2	10.1	2.22	4.2	0.003	.009		0.60	0.015
21	122-123	71.9	9.9	2.12	4.1	0.002	.007		0.180	0.005
	123-124	71.8	10.6	2.90	4.5	0.002	.007		0.090	0.005
23	124-125	71.2	9.8	2.22	4.5	0.02	.006		<0.10	≤0.005
	125-126	77.8	5.4	4.40	2.9	0.001	.006		<0.10	≤0.005
	126-127	76.3	6.2	4.32	3.6	0.002	.004		0.130	0.005
26	127-128	81.1	4.2	4.12	2.6	0.002	.007		0.120	0.005
	128-129	73.0	8.9	1.70	4.2	0.002	.015		<0.10	≤0.005
28	129-130	70.7	10.4	1.64	4.4	0.002	.007		<0.10	≤0.005
	130-131	79.2	6.5	1.50	3.2	0.003	.006		0.255	0.005
	131-132	70.0	9.6	3.56	3.4	0.002	.007		<0.10	≤0.005
31	132-133	73.8	9.9	1.46	3.2	0.002	.007		<0.10	≤0.005
	133-134	69.1	9.1	4.20	3.5	0.002	.007		0.090	0.005

W.K. Vaughan Chemist

G.O. 17.13 5-15-72 5M

Table 1

PHELPS DODGE CORPORATION

DAILY ASSAY RECORD

Morenci Branch - Reduction Works

SAMPLED June 20, 1980 Morenci, Arizona ASSAYED July 1, 1980

	H_2O %	Cu %	SiO_2 %	Al_2O_3 %	Fe %	CaO %	S %	Ounces Per Ton Ag	Au
PECIAL GEOLOGY									
ASH PEAK									
AP - 5									
#1 50 - 50⁷			64.2	1.3	1.6	16.62		3.65	0.045
70³ - 71⁷			90.2	0.9	1.9	3.40		3.13	0.025
3 71 - 72			86.9	1.1	1.4	4.22		3.43	0.005
4 72 - 73			92.5	0.4	1.6	2.72		4.88	0.005
5 73 - 74			92.9	0.5	2.1	2.48		2.31	0.005
6 74 - 75			93.2	0.3	1.3	2.72		10.39	0.005
7 75 - 76			90.2	0.7	2.8	2.80		2.47	0.045
8 76 - 77			92.6	0.8	1.5	1.29		2.48	0.035
9 77 - 78			93.0	1.0	1.9	1.21		1.94	0.010

[signature] Chemist

G.O. 17.18 5-15-72 5M

PHELPS DODGE CORPORATION
DAILY ASSAY RECORD
Morenci Branch - Reduction Works

SAMPLED July 18, 1980 Morenci, Arizona ASSAYED July 23, 1980

		H_2O %	Cu %	SiO_2 %	Al_2O_3 %	Fe %	CaO %	S %	Ounces Per Ton Ag	Ounces Per Ton Au
	SPECIAL GEOLOGY									
	ASH PEAK									
	AP-5									
10	78 - 79			92.3	2.6	2.5	1.70		1.76	0.01
11	79 - 80			87.0	5.8	3.1	1.28		1.73	0.005
12	80 - 81			88.6	2.3	3.0	3.52		0.96	0.010
13	81 - 82			93.5	1.9	2.8	1.54		0.65	0.010
14	82 - 83			91.5	3.9	3.2	1.22		0.54	<0.005
15	83 - 84			84.5	5.2	3.4	1.40		0.48	<0.005
16	84 - 85			87.4	2.8	2.6	3.30		0.20	<0.005
17	89 - 91[8]			82.8	5.9	5.6	2.32		0.11	<0.005

[signature] Chemist

G.O. 17.18 5-15-72 5M

Table 2

PHELPS DODGE CORPORATION

DAILY ASSAY RECORD

Morenci Branch - Reduction Works

SAMPLED July 7, 1980 Morenci, Arizona ASSAYED July 18, 1980

	H_2O %	Cu %	SiO_2 %	Al_2O_3 %	Fe %	CaO %	S %	Ounces Per Ton Ag	Au
SPECIAL GEOLOGY									
ASH PEAK AP-6									
1 $78_2 - 80_2$			81.3	1.5	2.2	8.23		1.62	0.010
2 $103_6 - 105$			94.4	1.1	1.6	1.06		3.73	0.040
3 105 - 106			91.4	0.9	2.2	1.86		4.68	0.045
4 106 - 107			46.6	0.6	2.8	27.57		9.72	0.005
5 107 - 108			67.3	1.2	3.9	13.82		3.13	0.010
6 108 - 109			88.7	2.3	2.7	0.96		5.36	0.015
7 109 - 110			76.6	7.7	3.6	1.51		6.02	0.030
8 110 - 111			90.3	1.3	1.9	2.67		2.70	0.010
9 111 - 112			92.2	0.9	3.1	1.34		1.53	0.015
10 112 - 113			94.0	0.7	2.2	1.75		2.68	0.015
11 113 - 114			87.4	1.1	1.9	4.62		3.23	0.015
12 114 - 115			71.7	0.3	1.9	14.60		3.46	0.015
13 115 - 116			67.1	0.6	1.5	16.28		2.31	0.005
14 116 - 117			91.7	0.7	2.9	3.55		3.31	0.015

B. W. Bedsind Chemist

G.O. 17.18 5-15-72 5M

PHELPS DODGE CORPORATION

DAILY ASSAY RECORD

Morenci Branch - Reduction Works

SAMPLED July 7, 1980 Morenci, Arizona ASSAYED July 18, 1980

		H_2O %	Cu %	SiO_2 %	Al_2O_3 %	Fe %	CaO %	S %	Ounces Per Ton Ag	Ounces Per Ton Au
SPECIAL GEOLOGY										
[illegible]SH PEAK AP-6										
1	117-118			85.9	0.7	2.6	6.17		2.69	0.015
16	118-119			90.1	0.8	1.9	3.35		2.25	0.015
1.	119-120			74.9	2.0	2.1	10.54		1.11	0.015
[illegible]	120-121			65.1	2.8	2.4	14.00		1.33	0.020
19	121-122			64.8	1.9	1.8	16.29		1.07	0.025
[illegible]	122-123			83.6	4.2	3.2	1.26		0.86	0.020
21	131-132			92.0	0.8	4.7	2.81		0.91	0.020
2	132-133			78.7	8.3	1.9	2.00		0.07	0.015
[illegible]	133-134			84.5	3.7	2.5	1.88		0.38	0.020
24	134-135			85.4	2.3	2.3	2.69		0.11	0.020
[illegible]	135-136			88.0	2.1	2.2	2.83		0.66	0.020
26	136-137			86.2	3.1	2.7	1.80		0.14	0.025
2.	138-139			91.0	0.9	2.9	1.35		0.09	0.020
[illegible]	139-142			85.4	3.4	3.7	2.34		0.06	0.015

B.W. Bodesinsky Chemist

G.O. 17.18 5-15-72 5M

Table 3

PHELPS DODGE CORPORATION

DAILY ASSAY RECORD

Morenci Branch - Reduction Works

SAMPLED July 21, 19 80 Morenci, Arizona ASSAYED July 24, 19 80

		H_2O %	Cu %	SiO_2 %	Al_2O_3 %	Fe %	CaO %	S %	Ounces Per Ton Ag	Ounces Per Ton Au
SPECIAL GEOLOGY										
ASH PEAK										
AP-7										
1	54^{4} - 62^{10}			83.6	2.1	1.7	6.62		1.13	0.005
2	77 - 78			87.2	0.8	1.9	5.10		3.23	0.020
3	78 - 79			81.4	0.9	1.9	5.76		10.81	0.015
4	79 - 80			80.3	0.7	1.8	8.58		5.36	0.045
5	80 - 81			85.2	1.1	1.6	6.16		4.84	0.025
6	81 - 82			86.5	0.8	1.5	5.66		3.51	0.010
7	82 - 83			86.1	0.7	1.5	5.98		5.61	0.015
8	83 - 84			91.4	0.9	2.3	2.72		1.50	0.005
9	84 - 85			92.7	0.6	1.9	2.46		1.79	0.005
10	85 - 86			95.2	0.6	1.9	1.40		1.88	0.010
11	86 - 87			89.7	0.6	1.8	3.72		2.49	0.005
12	87 - 88			77.1	1.1	2.2	9.88		1.17	0.010
13	88 - 89			89.3	2.1	2.1	2.98		1.81	0.025
14	89 - 90			89.8	0.9	1.6	4.14		1.00	0.005
15	90 - 91			78.3	3.9	2.8	6.62		0.76	0.005
16	91 - 92			77.5	6.2	3.0	4.50		0.81	0.005
17	92 - 93^{2}			74.9	2.3	2.2	11.12		0.65	0.005

Chemist

G.O. 17.18 5-15-72 5M

PHELPS DODGE CORPORATION
DAILY ASSAY RECORD
Morenci Branch - Reduction Works

SAMPLED July 24, 1980 Morenci, Arizona ASSAYED July 25, 1980

		H_2O %	Cu %	SiO_2 %	Al_2O_3 %	Fe %	CaO %	S %	Ounces Per Ton Ag	Au
SPECIAL GEOLOGY ASH PEAK #8										
1	67 - 71			74.1	0.8	1.8	14.00		1.19	0.010
2	81 - 82			85.2	3.4	2.6	5.26		4.55	0.015
3	82 - 83			86.2	1.1	1.4	6.72		2.76	0.010
4	83 - 84			85.6	1.0	1.9	6.66		2.27	0.010
5	84 - 85			85.1	0.6	2.8	6.66		2.08	0.005
6	85 - 86			90.3	0.9	2.0	3.96		1.37	0.005
7	86 - 87			90.1	0.6	1.8	4.14		1.34	0.005
8	87 - 88			93.8	0.5	1.8	2.62		1.21	0.005
9	88 - 90			92.6	0.9	1.7	3.10		1.72	0.010
1	90 - 92			95.5	1.0	2.0	1.34		2.26	0.015
1	92 - 94			92.0	1.2	1.7	3.12		2.34	0.005
12	94 - 96			83.6	1.5	1.3	6.54		2.81	0.015
1	96 - 98			94.7	1.4	1.7	1.56		3.24	0.010
14	98 - 100			85.9	2.5	2.4	5.18		3.64	0.020
1	100 - 101^{6}			95.9	2.0	2.0	0.88		2.93	0.010
1	107^{10}-111			89.3	1.7	1.7	4.80		3.54	0.005
17	137 - 139			89.9	1.2	1.5	5.40		1.29	0.005
1	139 - 141			87.8	0.9	1.6	7.38		2.10	0.035
19	141 - 143			93.4	1.0	1.4	4.23		12.33	0.080
	143 - 145			95.5	0.6	1.6	2.94		3.12	0.015

Chemist

.O. 17.18 5-15-72 5M

PHELPS DODGE CORPORATION

DAILY ASSAY RECORD

Morenci Branch - Reduction Works

SAMPLED July 24, 19 80 Morenci, Arizona ASSAYED July 28, 19 80

		H_2O %	Cu %	SiO_2 %	Al_2O_3 %	Fe %	CaO %	S %	Ounces Per Ton Ag	Ounces Per Ton Au
	SPECIAL GEOLOGY									
	ASH PEAK									
	#8									
21	145 - 147			86.0	0.2	1.5	7.56		1.93	0.010
22	147 - 149			73.6	0.5	1.4	13.10		2.85	0.005
23	149 - 151			77.6	0.6	1.8	10.70		2.32	0.010
24	151 - 153			73.7	0.6	2.1	12.50		1.58	0.010
25	153 - 155			81.5	0.7	1.8	8.10		1.92	0.005
26	155 - 157			77.6	0.2	1.4	11.00		1.81	0.005
27	157 - 159			54.1	0.4	2.0	23.80		1.39	0.005
28	159 - 161			19.2	0.2	0.8	41.4		0.34	0.005
29	161 - 163			27.5	0.7	1.2	37.5		0.55	0.005
30	163 - 165			16.7	0.5	0.6	45.6		0.29	0.005
31	165 - 167			40.2	0.2	1.1	32.1		0.33	0.005
	ASH PEAK									
	#9 86^{2}-97^{8}			94.3	0.9	1.7	0.94		1.36	0.020
	SPECIAL ASH PEAK									
	#416			94.0	0.9	1.4	0.26		5.98	0.035
	417			93.2	1.2	1.6	0.92		4.55	0.020
	418			91.4	0.4	1.3	3.52		4.86	0.020

Chemist

:.O. 17.18 5-15-72 5M

PHELPS DODGE CORPORATION

DAILY ASSAY RECORD

Morenci Branch - Reduction Works

SAMPLED July 8, 19 80 Morenci, Arizona ASSAYED July 11, 19 80

		H_2O %	Cu %	SiO_2 %	Al_2O_3 %	Fe %	CaO %	S %	Ounces Per Ton Ag	Ounces Per Ton Au
S ECIAL GEOLOGY										
ASH PEAK										
AP-401A	C + 10			94.2	0.9	1.6	2.66		9.19	0.035
A -402A	C + 16			89.6	2.9	2.5	1.82		5.87	0.068
AP-404	C + 20			90.0	2.0	1.6	2.63		14.87	0.035
AP-405	C-+ 40			94.8	1.9	1.8	1.43		5.15	0.013
A -406	C + 60			94.1	1.8	1.6	1.36		7.18	0.028
AP-406A	C + 80			91.0	2.8	2.0	1.62		5.82	0.023
A -407	C + 80			80.4	3.7	1.8	8.97		(1.51)	0.005
AP-408	C + 100			86.6	3.6	2.0	2.37		5.07	0.020
AP-409	C +120			88.9	2.9	2.2	2.72		3.90	0.0025
A -410	C + 140			92.3	1.3	1.5	2.71		10.70	0.090
AP-411	C + 160			82.9	2.3	1.3	3.07		6.99	0.030

[signature] Chemist

.O. 17.18 5-15-72 5M

PHELPS DODGE CORPORATION
DAILY ASSAY RECORD
Morenci Branch - Reduction Works

SAMPLED July 8, 19 80 Morenci, Arizona ASSAYED July 11, 19 80

		H_2O %	Cu %	SiO_2 %	Al_2O_3 %	Fe %	CaO %	S %	Ounces Per Ton Ag	Ounces Per Ton Au
PECIAL GEOLOGY										
ASH PEAK										
AP-412	C + 180			89.4	1.2	1.8	4.07		4.38	0.013
P-413	C + 177			82.0	4.4	2.4	2.65		3.30	0.0025
P-414	C + 204			82.7	1.9	2.1	6.03		10.26	0.043
AP-415	C + 221			86.6	0.7	1.9	5.44		7.46	0.008
P-613	C + 620			85.9	3.8	2.1	1.61		1.23	0.0025
AP-614	C + 645			94.8	1.4	1.1	1.06		2.12	0.0025
P-615	C + 669			89.3	4.6	2.0	1.17		2.12	0.005
P-616	C + 720			90.6	2.1	1.4	2.91		2.87	0.0025
AP-617	C + 740			90.4	1.6	1.2	4.63		3.20	0.025
P-618	C + 770			78.1	6.8	3.2	3.57		1.88	0.0025
AP-619	C + 795			96.0	1.1	1.1	1.63		2.58	0.0025

WK Langahn Chemist

G.O. 17.18 5-15-72 5M

PHELPS DODGE CORPORATION
DAILY ASSAY RECORD
Morenci Branch - Reduction Works

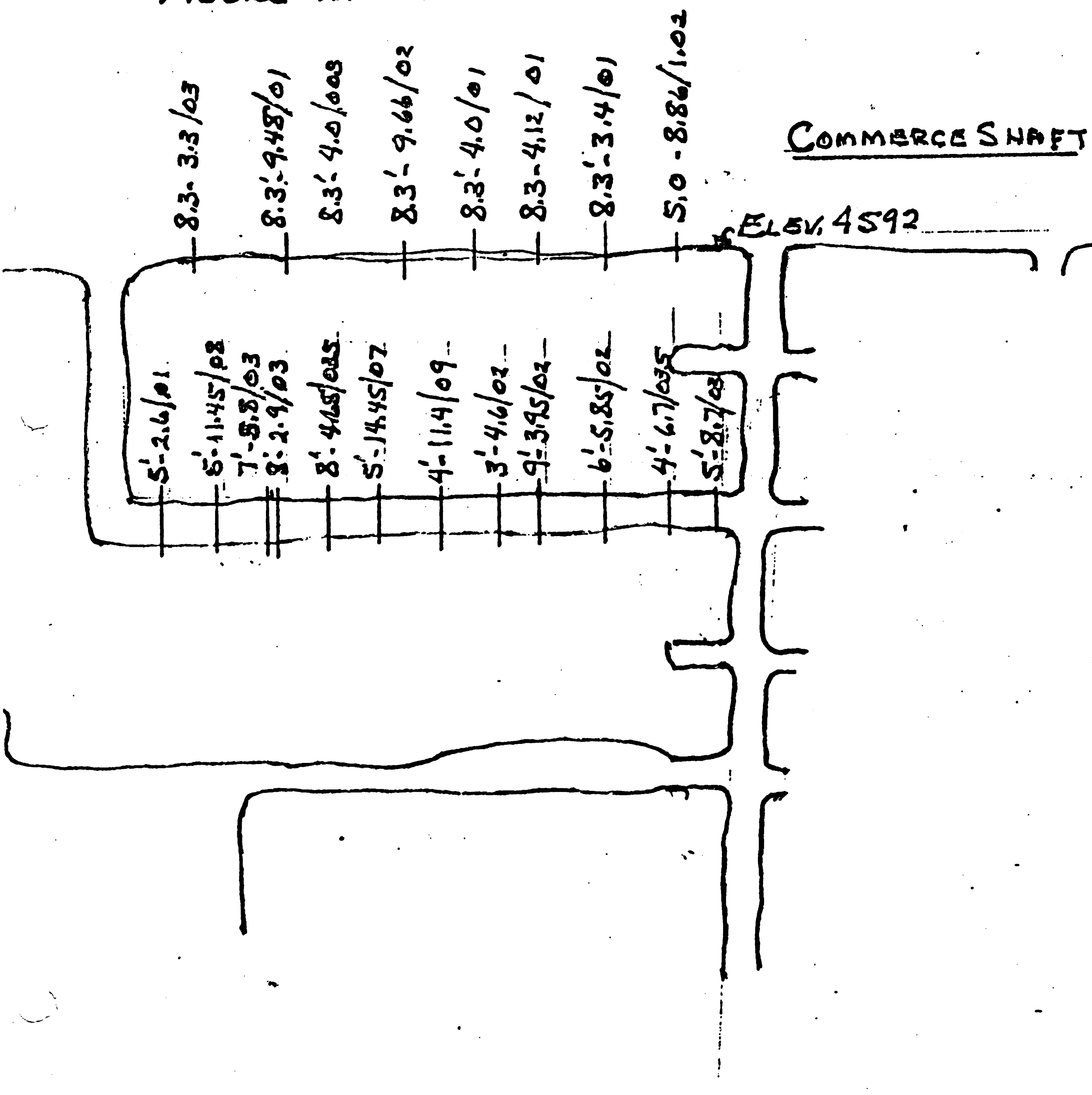
SAMPLED June 17, 19, 1980 Morenci, Arizona ASSAYED June 27, 1980

	H_2O %	Cu %	SiO_2 %	Al_2O_3 %	Fe %	CaO %	S %	Ounces Per Ton Ag	Au
EOLOGY SPECIAL									
ASH PEAK									
6-17-80									
AP-601			48.1	9.0	1.8	13.82		1.27	0.00
AP-602			89.9	1.0	1.6	2.70		5.42	0.00
AP-603			85.4	1.3	1.8	4.84		4.15	0.01
AP-604			86.7	2.1	2.1	2.74		4.39	0.01
AP-605			86.6	1.1	1.8	5.06		1.35	0.01
AP-606			94.0	1.5	2.6	0.58		2.55	0.01
6-19-80									
AP-607			90.4	2.3	1.5	2.30		2.44	0.01
AP-608			86.1	3.9	2.0	2.86		1.54	0.01
AP-609			85.8	1.5	2.8	5.02		1.45	0.00
AP-610			90.6	0.9	1.4	3.40		2.00	<0.00
AP-611			87.4	1.6	4.0	1.72		1.62	0.00
AP-612			94.3	1.4	1.5	0.94		2.28	0.00
6-19-80									
AP-401			82.5	5.4	3.0	1.42		6.42	0.03
AP-402			86.2	3.9	2.7	2.10		10.04	0.08
AP-403			94.1	0.9	2.0	0.86		5.56	0.02

Chemist

KEY
WIDTH - SILVER - GOLD

AV. 47.0 AG.
FIGURE TONNAGE AT 13 CF/TON



ASH PEAK MINES - COMMERCE SHAFT

Sample Locations

Diamond Drill Holes

Hole No.	Distance from Commerce Shaft (ft,NW along vein)	Orthogonal Distance from Vein (ft, SW)	Angle	Total Depth (feet)
AP-1	320	63	-50	140
-2	320	65	-73	184
-3	420	61	-50	110
-4	420	63	-72	144
-5	520	58	-50	95
-6	520	60	-72	144
-7	720	65	-50	97
-8	720	67	-72	170
-9	920	76	-50	100

Underground Channel Samples

Sample No.	Commerce Mine Level	Distance NW fm Commerce Shaft	Remarks
401	50	10	
401A	50	10	Re-sample of 401
402	50	20	
402A	50	20	Re-sample of 402
403	50	24	
404	100	20	
405	100	40	
406	100	60	
406A	100	80	
407	100	80	Crosscut NE of 406A
408	100	100	
409	100	120	
410	100	140	
411	100	160	
412	100	180	
413	100	177	Crosscut NE of 412
414	100	205	
415	100	220	
416	150	10	
417	150	20	
418	150	25	

Ash Peak Mines - Commerce Shaft
Sample Locations (Continued)

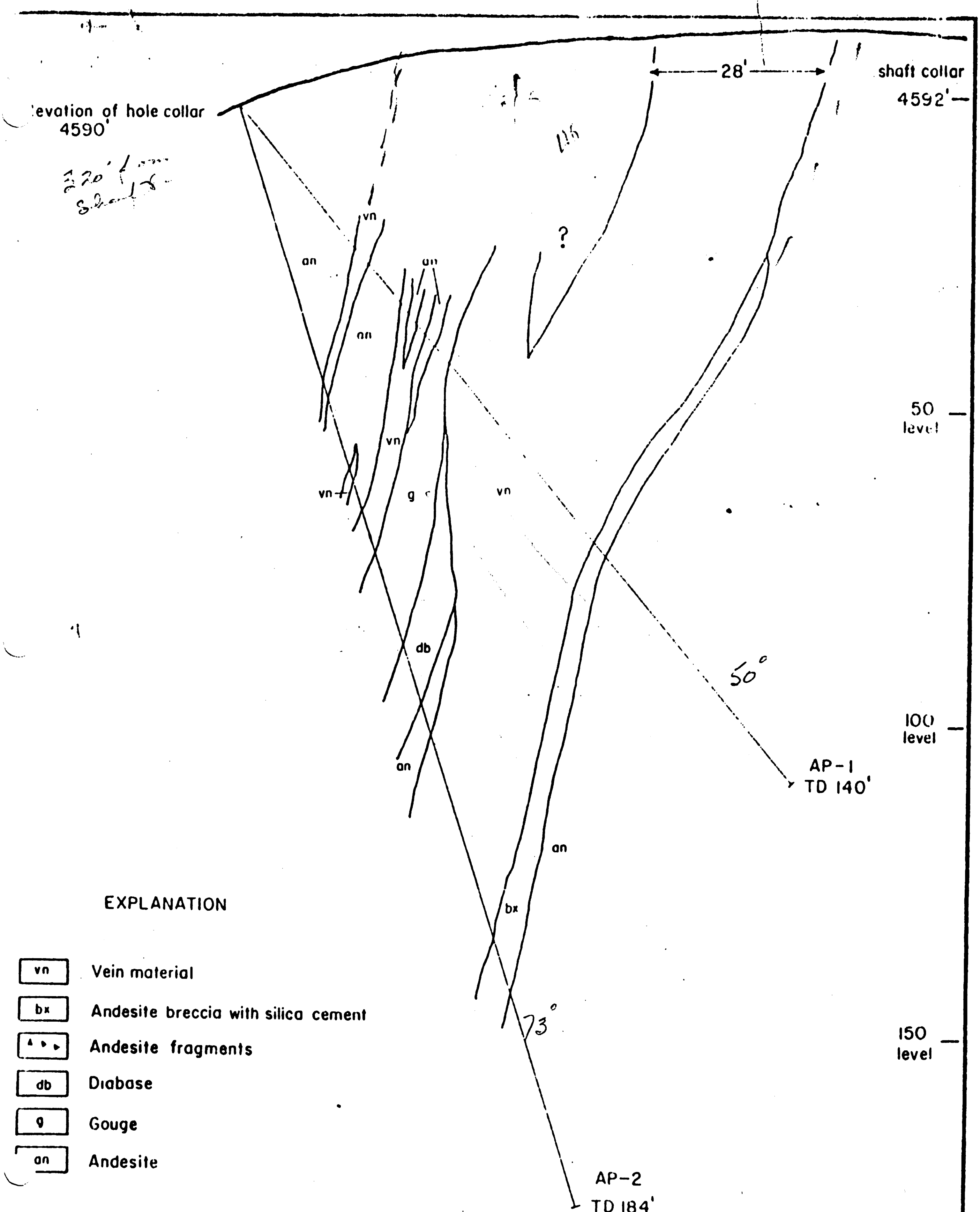
Surface Jackleg Drill Samples

Sample No.	Distance from Commerce Shaft(ft, NW along Vein)
601	249
602	278
603	295
604	394
605	420
606	444
607	470
608	495
609	520
610	545
611	570
612	595
613	620
614	645
615	669
616	720
617	740
618	770
619	795

FJM:tlw
9/4/80

Table 5. Explanation of Ash Peak Drill Hole Assays

Hole	Sample Nos.	Footage	Explanation
AP-1	1	29'3" - 32'4"	hangingwall vein
	2	45' - 47'	Hangingwall vein
	3 - 38	53' - 89'	Ash Peak vein
	39 - 42	89' - 93'	andesite breccia with silica cement
	43 - 44	93' - 95'	andesite
AP-2	1	68' - 74'	Hangingwall vein
	2 - 39	105' - 143'	Ash Peak vein
	40 - 48	143' - 152'	andesite breccia with silica cement
AP-3	1	31' - 31'8"	Hangingwall vein
	2 - 17	72' - 88'	Ash Peak vein
	18 - 20	88' - 91'	andesite breccia with silica cement
AP-4	1	9'6" - 11'	hangingwall vein
	2	40'8" - 41'6"	hangingwall vein
	3	84'4" - 85'5"	Hangingwall vein
	4 - 32	105'6" - 134'	Ash Peak vein with variable amounts of andesite frgaments (10-50%) in lower portions.
AP-5	1	50' - 50'7"	Hangingwall vein
	2 - 17	70'3" - 91'8"	Ash Peak Vein
AP-6	1	78'2" - 80'2"	Hangingwall vein
	2 - 20	103'6" - 123'	Ash Peak vein
	21 - 26	131' - 137	Ash Peak vein - continuation below 8' of andesite
	27 - 28	138 - 142	Ash Peak vein - continuation below 1' of andesite
AP-7	1	54'4" - 62'10"	Hangingwall vein
	2 - 17	77' - 93'2"	Ash Peak vein
AP-8	1	67' - 71'	Hangingwall vein
	2 - 15	81' - 101'6"	Ash Peak vein (#1)
	16	107'10" - 111'	Small vein
	17 - 31	137' - 167'	Ash Peak vein (#2)
AP-9	1	86'2" - 97'8"	Drill hole abruptly terminated - insufficient data to indicate whether this is Hangingwall vein or small interval of Ash Peak vein.



EXPLANATION

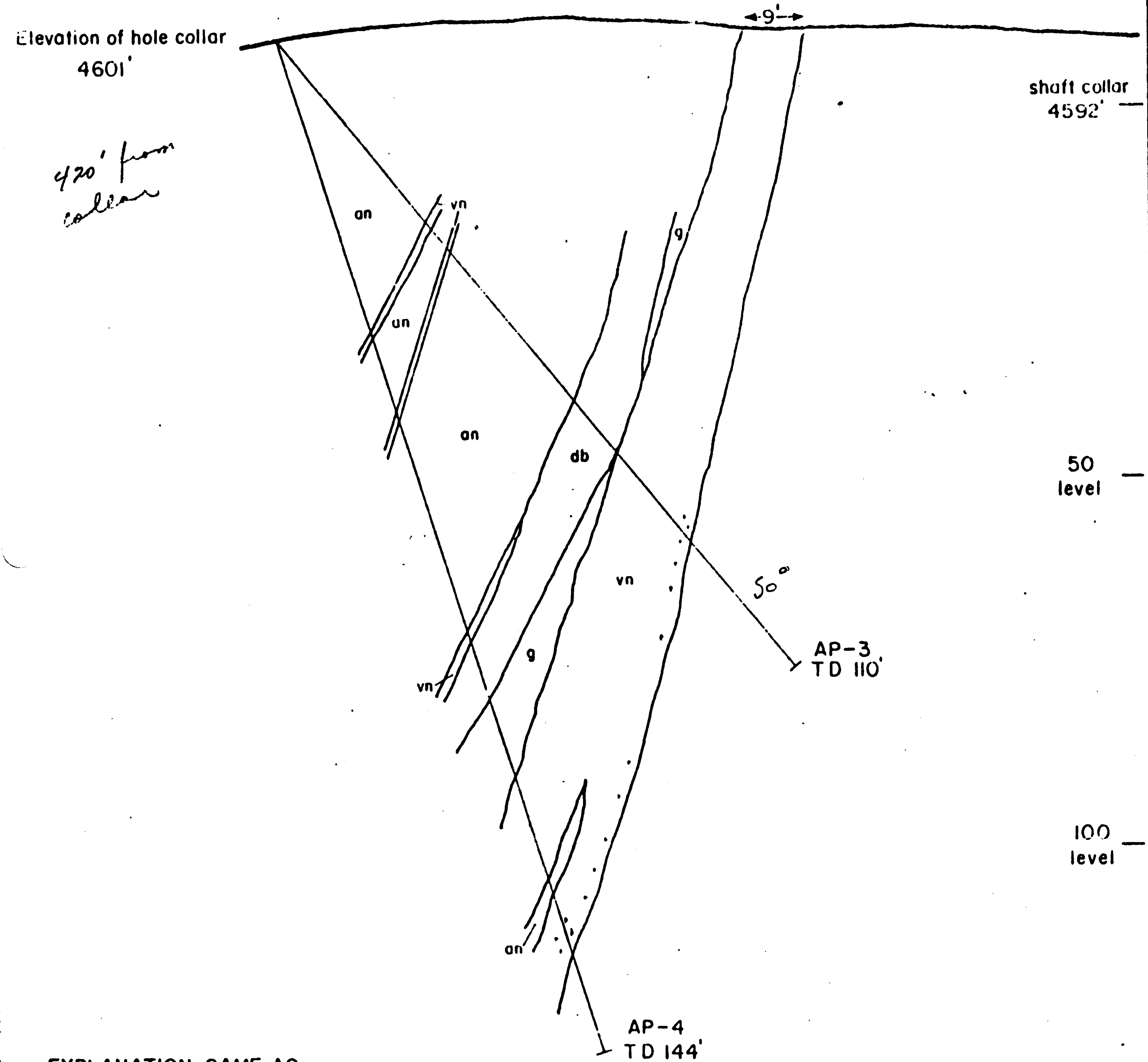
vn	Vein material
bx	Andesite breccia with silica cement
	Andesite fragments
db	Diabase
g	Gouge
an	Andesite

TITLE Geologic section thru AP-1 and AP-2 Drill Holes

PHELPS DODGE CORPORATION
ASH PEAK PROJECT

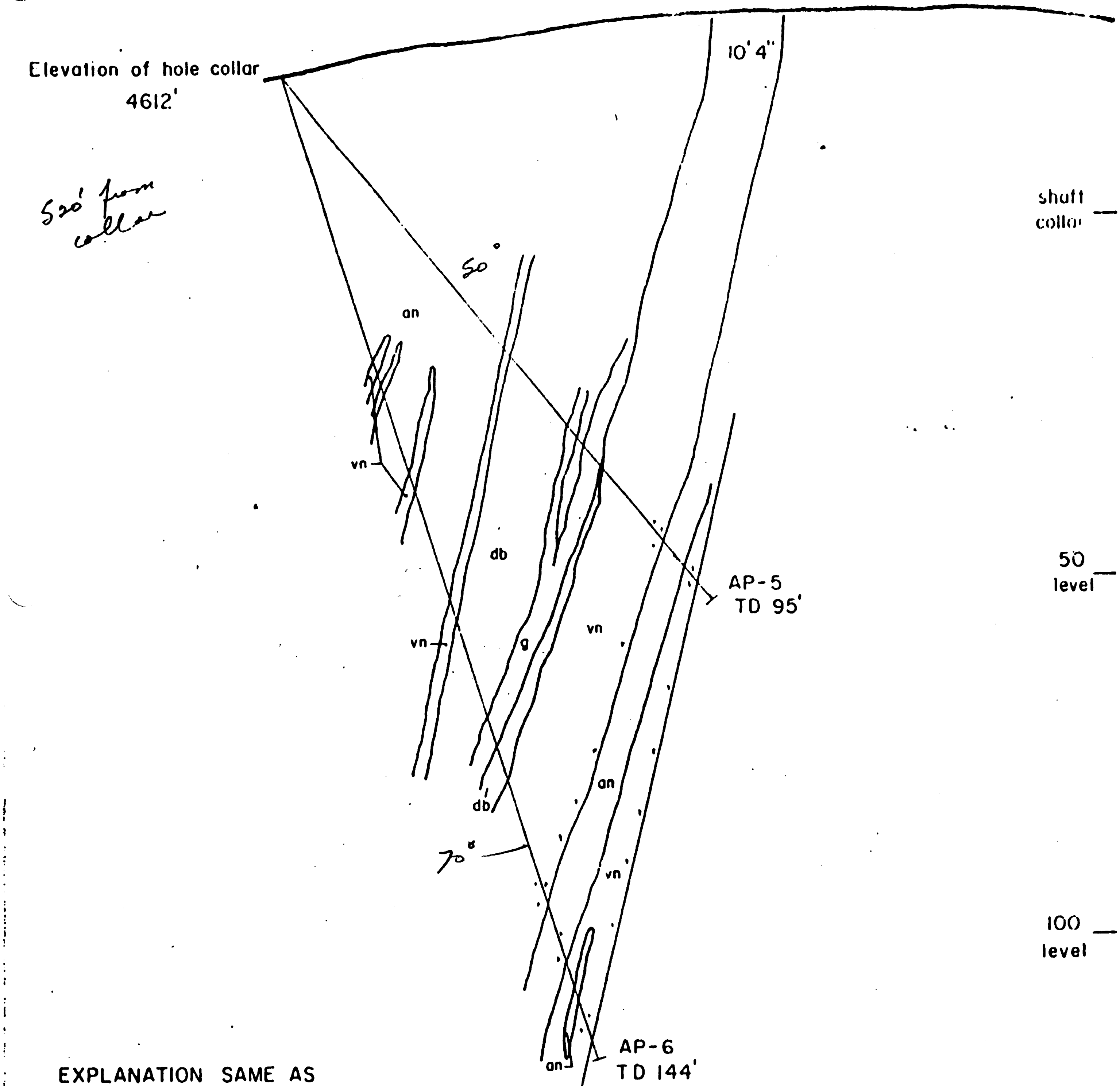
MORENCI BRANCH DATE 7-31-80

DRAWN BY FJM/DAD
SCALE 1" = 20'
NO. Fig 1



EXPLANATION SAME AS
FIGURE 1

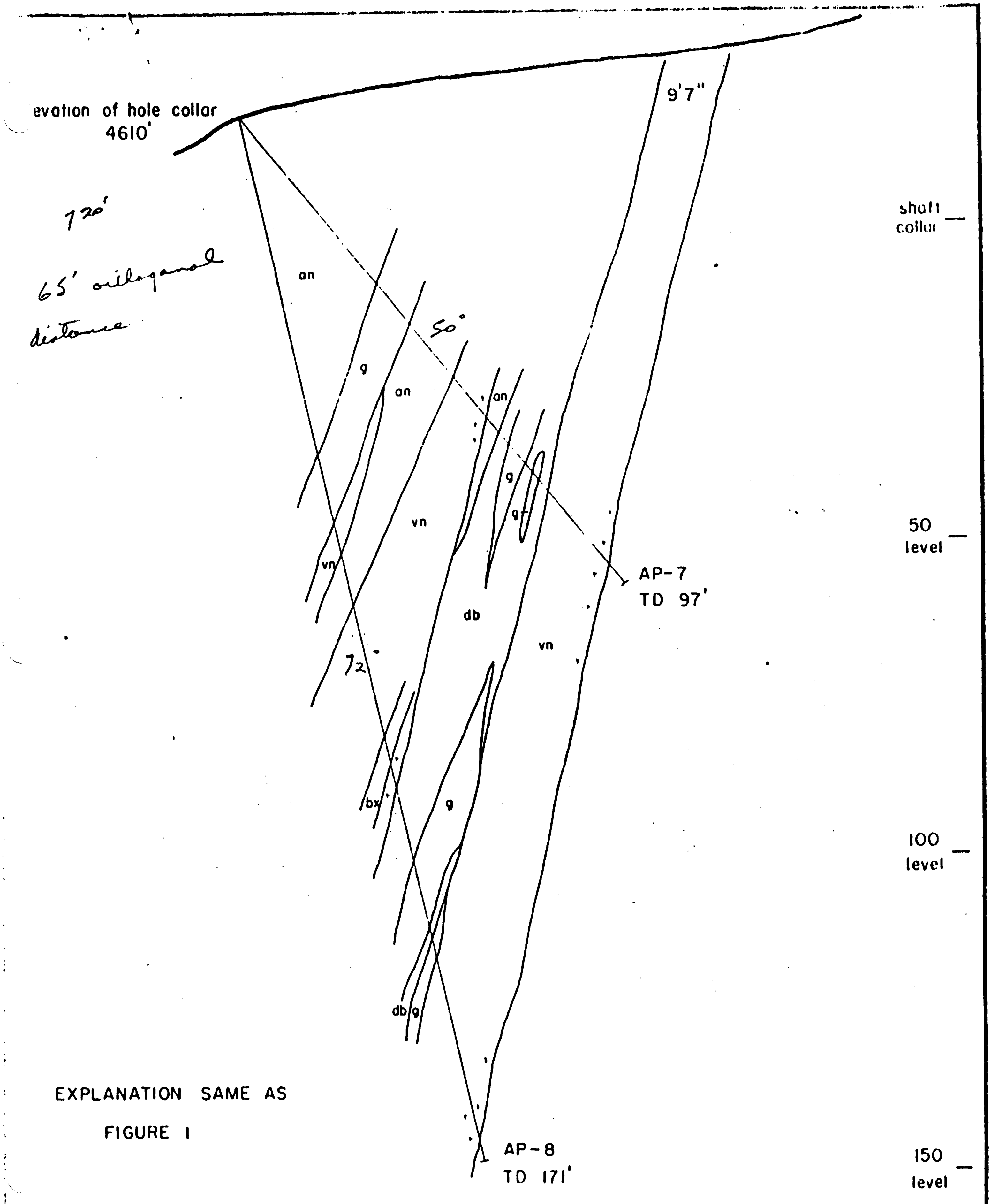
TITLE Geologic section thru AP-3 and AP-4 Drill Holes	PHELPS DODGE CORPORATION ASH PEAK PROJECT	DRAWN BY FJM/DAD
		SCALE 1" = 20'
	MORENCI BRANCH DATE 7-31-80	No Fig. 2



EXPLANATION SAME AS

FIGURE I

TITLE Geologic section thru AP-5 and AP-6 Drill Holes	PHELPS DODGE CORPORATION ASH PEAK PROJECT	DRAWN BY FJM/DAD
		SCALE 1" = 20'
	MORENCI BRANCH DATE 7-31-80	No Fig. 3



TITLE Geologic section thru AP-7 and AP-8 Drill Holes

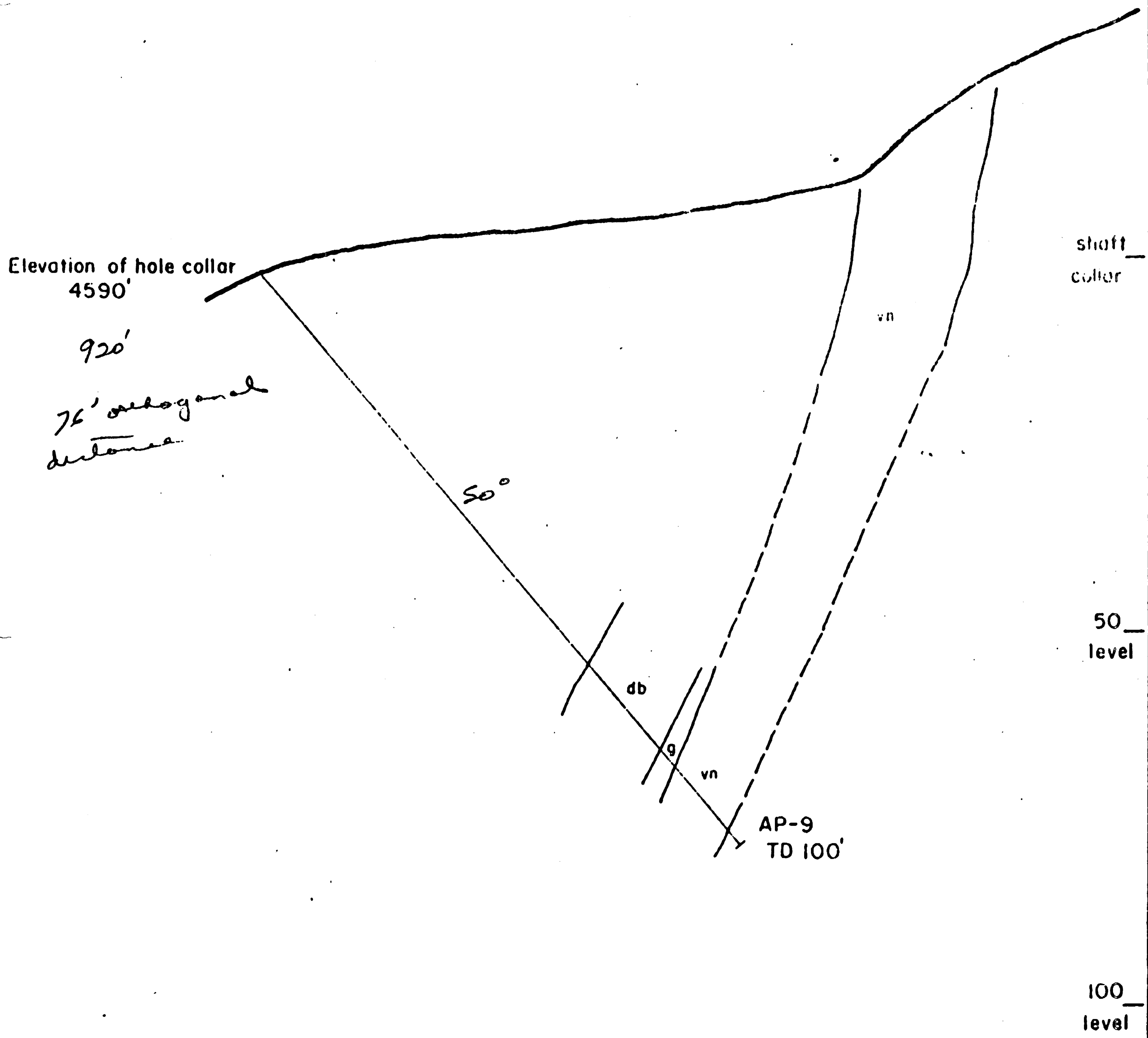
PHELPS DODGE CORPORATION
ASH PEAK PROJECT

MORENCI BRANCH DATE 7-31-80

DRAWN BY FJM/DAD

SCALE 1" = 20'

No Fig. 4



EXPLANATION SAME AS
FIGURE 1

TITLE Geologic section thru AP-9 Drill Hole	PHELPS DODGE CORPORATION ASH PEAK PROJECT	DRAWN BY FJM/DAD
		SCALE 1" = 20'
	MORENCI BRANCH DATE 7-31-80	No Fig. 5

TABLE 1

1983 DRILLING AT ASH PEAK

Hole No.	Coordinates North	Coordinates East	Elevation	Bearing	Inclination	Dates Drilled	Rotary Footage (4-1/2" Rock Bit)	Core Footage (Nx)	Vein Intercepts (Intercept) Footage		Vein Intercepts True Vein Width (Feet)	Vein Intercepts Ag (Oz/Ton)	Vein Intercepts Au (Oz/Ton)
AP-10	9,660.35	10,199.88	4569.65	N 29° 44' E	-57°	5/12-5/17	0- 8	8-205	Hw	143.5-145.0	1.0	1.07	<.005
									Hw	149.5-151.7	1.5	3.53	.023
									Hw	154.5-159.4	3.5	2.05	.014
									AP	178.7-187.0	6.0	5.09	.018
									AP	187.0-195.0	6.0	2.41	.006
AP-11	9,576.33	10,322.19	4565.96	N 28° 14' E	-53°	5/18-5/24	0-14	14-215.5	Hw	147.6-161.7	11.0	1.33	.007
									AP	178.6-187.3	7.0	6.50	.057
AP-12	10,871.02	8,352.62	4451.53	N 16° 43' E	-37°	5/26-6/01	0-16	16-224	Hw	130.0-137.2	7.0	6.26	.019
									Hw	141.8-146.9	4.5	5.16	.030
									AP	167.5-188.0	17.5	4.62	.020
									AP	188.0-202.0	12.0	1.50	.013
AP-13	11,021.11	8,175.68	4444.40	N 32° 47' E	-46°	6/03-6/10	0- 8	8-175.7	Hw	84.0- 90.8	5.5	5.92	.010
									AP	104.4-125.0	17.0	1.85	.011
									AP	145.8-150.0	5.0	0.72	.008
									AP	160.0-168.7	7.0	1.16	.008
AP-14	10,814.75	8,456.39	4468.70	N 20° 0' E	-35°	6/14-6/17	0-36	36-205	Hw	157.0-160.0	3.0	0.30	<.005
									AP	173.5-192.3	17.0	2.18	.007
AP-15	9,535.92	10,469.13	4557.87	N 10° 05' E	-52°	6/21-6/23	0-12	12-182	AP	139.6-144.3	3.5	2.46	.015
AP-16	9,483.34	10,601.83	4557.11	N 23° 53' E	-51°	6/25-6/29	-	0-168	Hw	126.7-130.1	3.0	0.14	<.005
									AP	143.2-148.6	4.5	3.13	.007
AP-17	11,104.11	8,127.84	4442.75	N 33° 57' E	-65°	7/01-7/07	-	0-131	AP	62.5-106.0	27.5	0.42	<.005
AP-18	13,569.58	5,318.82	4403.47	N 26° 30' E	-72°	7/11-7/13	-	0-200	Hole terminated before reaching vein				

Hw = Hanging Wall Veins(s)
AP = Ash Peak Vein

JAW:jc
10-25-83

PHELPS DODGE CORPORATION

Morenci, Arizona

Hole No. AP - 10
Drill No.
Date Assayed May 22, 1983

PROSPECT DRILLING ASSAY REPORT

Sample Number	Date	Sample Interval	Weight In Grams	SiO2 %	Al2O3 %	CaO %	Ag Ounces/Ton	Au Ounces/Ton	
		AP - #10							
1	5-19	143.5-145	1362	84.4	0.6	4.68	1.07	<.005	
2	"	149.5-151.7	1362	78.5	1.3	9.39	3.53	.023	
3	"	154.5-157	1362	82.2	0.7	7.45	2.29	.018	
4	"	157-159.4	1589	86.9	0.6	5.10	1.80	.010	
5	"	178.7-180	908	83.5	0.6	7.32	2.81	.013	
6	"	180-182.5	1135	84.3	1.0	5.54	5.32	.023	
7	"	182.5-185	1816	70.4	0.8	13.62	4.91	.019	
8	"	185 - 187	1135	90.8	0.6	3.11	6.51	.013	
9	"	187 - 190	2270	76.2	7.5	2.30	3.27	.007	
10	"	190-192.5	1816	78.0	7.2	2.22	1.92	<.005	
11	"	192.5-195	2270	80.8	4.8	3.09	1.89	.007	

Assayer B. W. Budinich

C.O. 17.13 6-12-70 5M

PHELPS DODGE CORPORATION

Morenci, Arizona

Hole No. AP - 11
Drill No.
Date Assayed May 25, 1983

PROSPECT DRILLING ASSAY REPORT

Sample Number	Date	Sample Interval	Weight In Grams	Ag	Au	SiO_2	Al_2O_3	CaO	
				Ounces/Ton		%	%	%	
1	5-24-83	147.6-150	454	0.97	.014	90.5	0.8	1.37	
2	"	150-152.5	681	1.20	.005	88.0	0.6	4.27	
3	"	152.5-155	908	1.66	.005	88.3	0.3	3.96	
4	"	155-157.5	1362	1.59	.005	86.8	0.8	3.30	
5	"	157.5-160	908	1.49	.005	90.0	0.4	3.66	
6	"	160-161.7	454	1.00	.005	88.5	0.5	4.37	
7	"	178.6-180	1362	3.93	.009	83.0	2.4	4.51	
8	"	180-182.5	908	3.93	.017	80.3	3.4	14.44	
9	"	182.5-185	454	7.16	.010	68.0	0.8	2.88	
10	"	185-187.3	1362	10.13	.180	84.9	2.2	7.31	

Assayer [illegible]

G.O. 17.13 6-12-70 5M

PHELPS DODGE CORPORATION
Morenci, Arizona

Hole No. AP - 12
Drill No.
Date Assayed June 5, 1983

PROSPECT DRILLING ASSAY REPORT

Sample Number	Date	Sample Interval	Weight In Grams	Ag Ounces/Ton	Au Ounces/Ton	SiO_2 %	Al_2O_3 %	CaO %	
		AP - 12							
1	6-3-83	130 - 132.5	2270	4.05	.015	73.0	4.8	7.40	1st HW
2	"	132.5 - 135	1816	6.27	.020	74.8	0.8	11.86	7.2' 6.26
3	"	135 - 137.2	1362	8.77	.024	84.9	0.8	5.88	.019
4	"	141.8 - 145	1816	4.92	.028	82.7	3.8	3.94	2nd HW 5.1'
5	"	145 - 146.9	1362	5.57	.033	86.6	1.9	4.42	5.16 .030
6	"	167.5 - 170	1362	5.90	.037	63.6	1.1	18.26	4th [illegible]
7	"	170 - 172.5	1816	6.96	.017	74.4	0.6	12.40	Vein
8	"	172.5 - 175	2270	4.63	.012	88.1	0.3	5.00	20.5'
9	"	175 - 177.5	1816	3.47	.006	68.7	0.3	16.10	4.62 .02
10	"	177.5 - 180	1362	5.64	.012	92.9	0.3	2.60	12.5'@5.3
11	"	180 - 182.5	1816	3.98	.016	83.4	0.2	2.54	15'@
12	"	182.5 - 185	2270	3.31	.028	88.8	0.2	6.70	5.[illegible] .10
13	"	185 - 188	2270	3.32	.032	90.9	0.6	2.98	
14	"	188 - 191.4	2724	1.21	.007	48.7	10.6	14.06	
15	"	191.4 - 194.4	1816	1.72	.016	89.4	1.2	3.72	
16	"	194.4 - 197.4	2043	1.80	.025	91.8	2.0	1.68	
17	"	197.4 - 200	2270	1.27	.008	81.0	7.4	1.82	
18	"	200 - 202	1589	1.51	.009	89.1	1.9	2.84	

Assayer [signature]

G.O. 17.13 6-12-70 5M

PHELPS DODGE CORPORATION

Morenci, Arizona

Hole No. AP - 13
Drill No.
Date Assayed June 20, 1983

PROSPECT DRILLING ASSAY REPORT

Sample Number	Date	Sample Interval	Weight In Grams	SiO2	Al2O3	CaO	Ag	Au	
				%	%	%	Ounces/Ton		
		AP - 13							
1	6-18	84-85.5	1135	77.4	9.0	0.81	5.52	.008	Hanging Wall
2	"	85.5-89	908	89.5	3.1	0.61	7.31	.010	vein 5.5'
3	"	89-90.8	1362	90.9	3.4	0.49	3.54	.012	5.92/.010
4	"	104.4-107.5	2270	45.8	0.9	34.52	2.57	.008	
5	"	107.5-110	3178	51.1	1.1	30.82	1.26	.006	
6	"	110-112.5	2497	69.9	0.9	16.01	3.16	.035	A.P.
7	"	112.5-115	2043	85.5	0.9	5.89	1.39	.015	vein
8	"	115-117.5	3178	67.2	0.9	18.00	1.16	.010	17.5' 1.85/.011
9	"	117.5-120	2724	49.1	0.5	30.47	1.05	.008	
10	"	120-122.5	1816	67.5	0.8	18.64	1.38	.007	
11	"	122.5-125	2043	73.2	3.9	10.04	2.62	<.005	
12	"	125-127.2	2270	53.0	2.9	24.37	1.09	.008	Andesite bx
13	"	127.2-128.8	2270	45.3	4.4	28.48	1.10	<.005	lithic tuff
14	"	128.8-130	1135	25.1	7.2	30.64	0.28	<.005	Fault zone
[illegible]		130-132.5	2951	46.4	0.5	12.31	0.85	<.005	Andesite + tuff

Assayer [illegible signature]

G.O. 17.13 6-12-70 5M

PHELPS DODGE CORPORATION
Morenci, Arizona

Hole No. AP - 13
Drill No. -
Date Assayed June 21, 1983

PROSPECT DRILLING ASSAY REPORT

Sample Number	Date	Sample Interval	Weight In Grams	SiO2	Al2O3	CaO	Ag	Au	
				%	%	%	Ounces/Ton		
		AP - 13							
16	6-18	132.5-135.8 3.3	2951	31.3	7.0	33.52	0.23	<.005	Andesite + vein
17	"	135.8-139.3 3.5	3632	68.8	8.0	6.54	1.44	.006	
18	"	139.3-142.5	2270	72.4	7.2	5.89	0.69	<.005	
19	"	142.5-145.8	1816	77.0	4.7	6.35	0.44	.006	
20	"	145.8-147.5	2724	81.7	1.1	7.86	0.46	.006	Vein
21	"	147.5-150	2724	73.7	2.2	12.44	0.96	.007	
22	"	150 -151.7	2951	85.0	4.1	2.73	0.64	.010	
23	"	151.7-155	2497	60.6	11.8	6.38	0.57	<.005	Andesite
24	"	155 -160	2270	57.8	12.5	6.93	0.44	<.005	
25	"	160 -162.5 2.5	2724	80.9	1.8	7.97	1.04	<.005	
26		162.5-165	204[illegible]	[illegible]7.7	[illegible]	0.50	1.14	.008	Vein
27	"	165 -167.5	2745	82.3	1.2	8.38	1.61	.010	
28	"	167.5-168.7	2497	88.1	1.3	4.31	0.55	.015	
29	"	168.7-170	1816	66.8	14.2	4.90	0.13	<.005	Andesite

Assayer [signature]

PHELPS DODGE CORPORATION

Morenci, Arizona

Hole No. AP - 14

Drill No.

Date Assayed June 24. 1983

ROSPECT DRILLING ASSAY REPORT

Sample Number	Date	Sample Interval	Weight In Grams	Si02	A1203	CaO	Ag	Au	
		AP - 14		%	%	%	Ounces/Ton		
1	6-22-83	157-160	2497	73.8	6.2	3.90	0.30	<.005	HW VEIN
2		173.5-175 1.5	1135	88.3	2.2	3.12	0.72	.008	
3		175-177.5	1589	82.0	1.0	6.39	4.73	.018	
4		177.5-180	2270	90.4	0.5	3.34	2.04	<.005	
5		180-182.5	1816	68.1	2.2	14.40	1.75	<.005	ASH PEAK
6		182.5-185	1816	83.1	0.7	6.71	2.15	.006	VEIN
7		185-187.5	1816	81.7	1.9	6.20	1.47	.006	17.5'
8		187.5-190	1816	84.9	2.1	3.93	1.77	.008	2.18/.007
9		190-192.3 2.3	2497	76.0	2.1	10.51	2.23	<.005	

Assayer [illegible]

G.O. 17.13 6-12-70 5M

PHELPS DODGE CORPORATION

Morenci, Arizona

Hole No. AP - #15
Drill No.
Date Assayed June 27, 1983

PROSPECT DRILLING ASSAY REPORT

Sample Number	Date	Sample Interval	Weight In Grams	SiO_2	Al_2O_3	CaO	Ag	Au	
		AP #15		%	%	%	Ounces/Ton		
1	6-25-83	139.6-142 2.4	1816	93.9	1.2	0.31	2.27	.009	
2	"	142-144.3	908	92.0	2.2	0.66	2.66	.022	
3	"	153.9-155	908	76.4	12.4	0.34	<0.10	N.D.	
4	"	155-157.5	681	77.3	11.3	0.30	<0.10	N.D.	
5	"	157.5-160	1135	78.9	10.6	0.35	<0.10	N.D.	
6	"	160-162.5	1816	74.4	12.2	0.45	<0.10	N.D.	
7	"	162.5-164.5	1362	75.4	10.8	0.66	0.24	<.005	

Assayer [signature]

G.O. 17.13 6-12-70 5M

PHELPS DODGE CORPORATION
Morenci, Arizona

Hole No. AP - #16
Drill No.
Date Assayed July 5, 1983

PROSPECT DRILLING ASSAY REPORT

Sample Number	Date	Sample Interval	Weight In Grams	SiO2	Al2O3	CaO	Ag	Au	
				%	%	%	Ounces/Ton		
		AP - #16							
1	7-1-83	126.7-130.1	1528	87.5	3.8	2.83	0.14	<.005	
2		143.2-145	1406	86.7	5.9	0.85	0.84	.007	
3		145 -148.6	2210	90.1	3.7	0.70	4.27	.007	

Assayer

ASH PEAK CLAIMS

The following described unpatented lode mining claims situated in the Ash Peak Mining District, Greenlee County, Arizona, Township 8 South, Range 30 East, G&SRB&M, the names of which are set forth below together with the date of location, the date, docket and page of recording with the Greenlee County Recorder, and the Bureau of Land Management serial number.

LODE CLAIMS

Claim Name	Date Located or Amended	RECORDED Docket	RECORDED Page	BLM Serial Number AMC
Patton No. 1	07/14/79	102	195	57278
Amended	06/05/80	109	626	
Relocated	02/24/82	131	454	165054
Patton No. 2	07/14/79	102	197	57279
Amended	06/05/80	109	628	
Relocated	02/24/82	131	456	165055
Patton No. 3	07/14/79	102	199	57280
Amended	06/05/80	109	630	
Relocated	02/24/82	131	458	165056
Patton No. 4	07/14/79	102	201	57281
Amended	06/05/80	109	632	
Relocated	02/24/82	131	460	165057
Patton No. 5	07/14/79	102	203	57282
Amended	06/05/80	109	634	
Relocated	02/24/82	131	462	165058
Patton No. 6	07/14/79	102	205	57283
Amended	06/05/80	109	636	
Relocated	02/24/82	131	464	165059
Patton No. 7	07/14/79	102	207	57284
Amended	06/05/80	109	638	
Relocated	02/24/82	131	466	165060

TUNNEL SITE CLAIMS

Claim Name	Date Located or Amended	RECORDED Docket	RECORDED Page	BLM Serial Number AMC
Turney Tunnel Site	06/05/80	109	625-625A	105486

c: SCH DMJ
EMS

phelps dodge Corporation

INTEROFFICE CORRESPONDENCE

DATE: March 1, 1982

FROM: D. M. Boggess, Senior Mine Geologist

TO: Mr. F. J. Menzer, Assistant Chief Geologist FJM

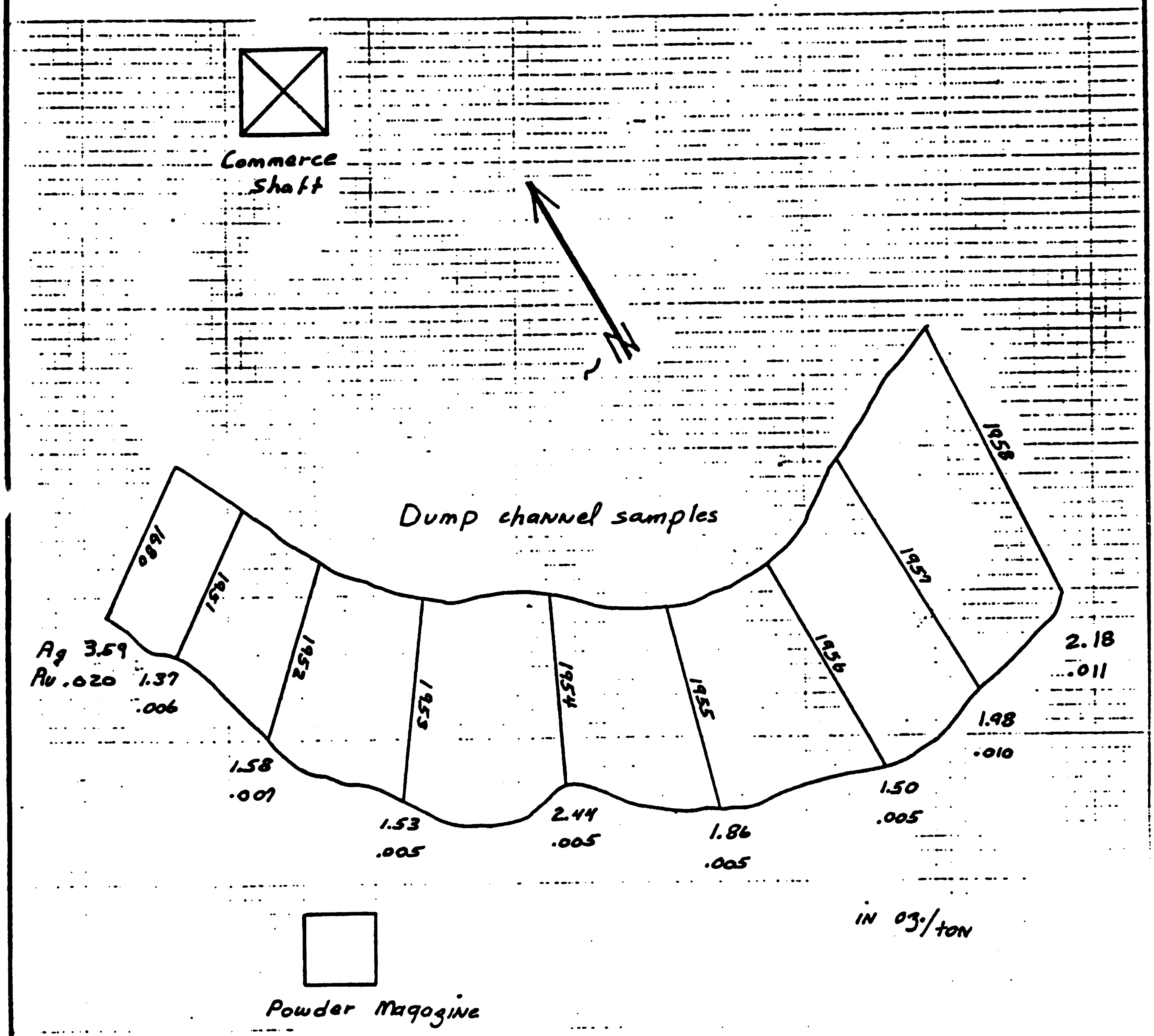
SUBJECT: Commerce Dump Channel Samples
Ash Peak Mine

On February 22, 1982, eight channel dump samples were taken from the Commerce dump. This section of the dump was of interest due to sample 1680 which showed 3.59 oz/T Ag and .020 oz/T Au. Sample 1680 was taken in September 1981, during the stope fill sampling program. The Au and Ag values for the samples are shown on the attached sketch map. SiO_2, CaO, and Fe assays should be available later this week.

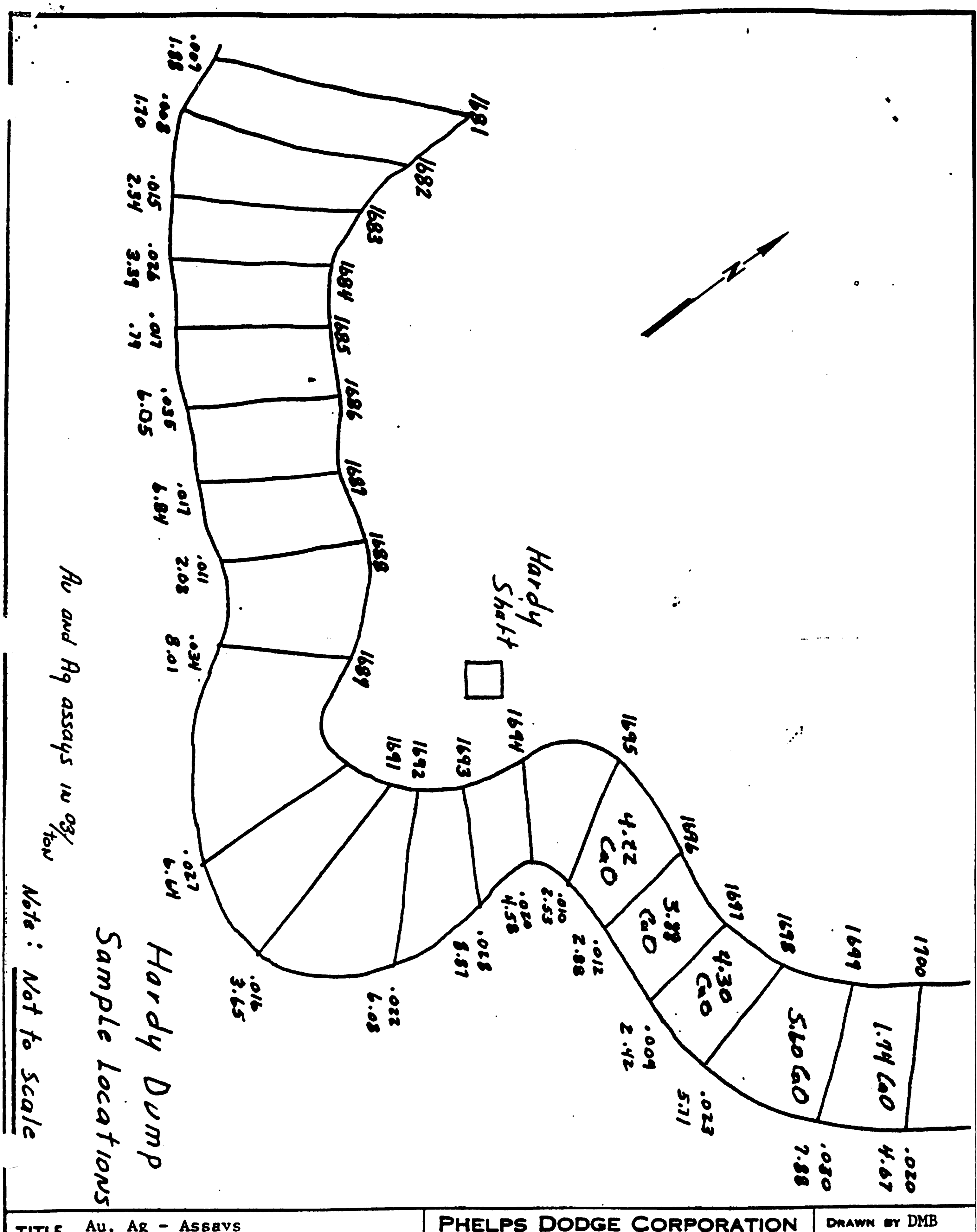
D M Boggess

D. M. Boggess

DMB:gc
Attachment
c: G-059B



TITLE Ash Peak Mine	PHELPS DODGE CORPORATION	DRAWN BY DMB
Commerce Dump Channel Samples	GEOLOGY DEPARTMENT	SCALE None
	MORENCI BRANCH DATE 3/ 1/82	NO.



TITLE Au, Ag - Assays Hardy Dump	PHELPS DODGE CORPORATION Morenci Branch Geology MORENCI BRANCH DATE 11/23/81	DRAWN BY DMB SCALE None NO. SK-195

B

August 16, 1978

SAMPLE--ASH PEAK TAILING

The sample was cyanided with minus 10-mesh charcoal for 20 hours and charcoal removed. Another charge of charcoal was added and cyanided in a revolving bottle for 24 hours. One pound of lime per ton and one pound of Sodium cyanide were added at the start of leaching. Ore to solution ratio was 1 to 1.2. Results are given in the following table:

	Weight Percent	Assay Oz./Ton		Distribution Silver
		Oz./Gold	Oz./Silver	
Head	100.00	0.02	2.2	100.0
Charcoal #1	0.16	0.73	515.5	37.5
Charcoal #2	0.16	0.18	375.5	27.3
Tailing	100.00	Trace	0.6	27.3
Tailing solution	120.0	-o-	0.15*	7.9

*Calculated

The total silver recovery in charcoal #1 and #2 was 64.8 percent.

Geo. Roseveare

GEO. ROSEVEARE,
Metallurgical Consultant

Flotation Test No. 6 B

Notebook Reference
Project No. Ash Peak
Date Nov. 10, 1978

Sample: 6B --- Raw Ore Feed

Purpose of Test:

	Conditions			Reagents - Pounds per Ton of Ore						
	Time Min	% Solids	pH S or F	FA-1	R 801	Fuel Oil	242	404		
CONDITION	5	60	—	1.0	0.5	0.1	0.25	1.0		
FLOAT		30	8-8.5							

Test Notes:

Product	Weight Grams	Weight (%)	Chemical Analysis			Per Cent Distribution		
			SiO_2	CaO	Ag			
TAILS	384	42.7	89.3	1.4	1.40			
CON.	516	57.3	76.5	6.5	2.50			
HEAD.	900	100.0			—			

Observations: • No Desliming

lotation Test No. 2 B

Notebook Reference
Project No. ASA Peak
Date Nov. 10, 1978

ample: 2 B--- Feed for This Test is cyanide
Tails - Na(OH) pH w/cyanide test

urpose of Test:

	Conditions			Reagents - Pounds per Ton of Ore							
	Time Min	% Solids	pH S or F	PAMAK 1	R 801	Fuel 0:1					
CONDITION	5	60	—	1.0	0.5	0.1					
FLOAT	10	30	9.5	—	—	—					

est Notes:

Product	Weight Grams	Weight (%)	Chemical Analysis			Per Cent Distribution		
			SiO_2	CaO	Ag			
TAILS	504	85.7	98.9	1.4	0.70			
CON	84	14.3	36.4	12.3	0.20			
HEAD	588	100.0			0.50			

servations: • Charcoal in Tails (very fine)
• No Desliming

Sample No.	2B	6B
Tails wt. (gr)	504	384
Con wt. (gr)	84	516
total	588	900
Tails wt. (%)	85.7	42.7
Con. wt. (%)	14.3	57.3
Tails (% SiO_2)	98.9	89.3
Tails (% CaO)	1.4	1.4
Con. (% SiO_2)	36.4	76.5
Con. (CaO)	12.3	6.5
Tails Ag (oz/ton)	0.70	1.40
Con. Ag. (oz/ton)	0.20	2.50
Head Ag (oz/ton)	0.50	--

Note: - Test details on data sheets that follow.

FATTY ACID FLOTATION TESTS

Nov. 10, 1978

Objectives:

Investigate the possibility of removing calcium from the ore and in so doing remove adequate silver to permit cyanidation of only this concentrate. Silica tails would then be a final product requiring no cyanidation. The silica tails as such should show silver values in the range of 0.40 to 0.70 oz/ton.

Procedure:

Bench scale tests on both cyanide tails and raw feed utilizing fatty acid and iron and silver mineral collectors. Sample 2B was cyanide tailings conditioned with residual cyanide solution present. Sample 6B was raw ore feed with no cyanidation.

Results & Conclusions:

As can be seen by the following tabulation the silver did not appreciably concentrate with the calcium float, in fact the 2B test on cyanide tailings, the silver tended to go to the silica tailings. These two tests cannot be considered conclusive as an exhaustive amount of research could well prove a certain combination of reagents which could possibly produce a silica tailings equivalent to cyanide tailings of say 0.50 oz/ton silver. To do such testing would first require some mineralogy work to determine where the silver is tied up and what mineral must be floated to concentrate the silver.

1.

Flotation Test No. 6 A

Notebook Reference
Project No. Ash Peak
Date Nov. 10, 1978

Sample: 6 A - Raw ore Feed

Purpose of Test:

	Conditions			Reagents - Pounds per Ton of Ore							
	Time Min	% Solids	pH S or F	Oleic Acid	R 801	Fuel Oil					
CONDITION	5	60	---	1.0	0.5	0.1					
FLOAT	10	30	8-8.5	—	—	—					

Test Notes:

Product	Weight Grams	Weight (%)	Chemical Analysis			Per Cent Distribution		
			SiO_2	CaO	Ag			
TAILS	746	79.3	86.5	1.3	2.05			
CON.	195	20.7	53.4	12.8	4.25			
HEAD	941	100.0			—			

Observations: • No Desliming

Flotation Test No. 4 A

Notebook Reference
Project No. Ash Peak
Date Nov. 10, 1978

Sample: 4A - Cyanide Tails - No pH control in cyanide Test

Purpose of Test:

	Conditions			Reagents - Pounds per Ton of Ore							
	Time Min	% Solids	pH S or F	Oleic Acid	R 801	Fuel Oil					
CONDITION	5	60	—	1.0	0.5	0.1					
FLOAT	8	30	8.5	—	—	—					

Test Notes:

Product	Weight Grams	Weight (%)	Chemical Analysis			Per Cent Distribution		
			SiO_2	CaO	Ag			
TAILS	289	37.9	89.2	1.2	1.05			
CON.	473	62.1	76.4	8.1	0.40			
HEAD	762	100.0			0.60			

Observations:
- Float complete at 8 minutes
- No Desliming

otation Test No. 3 A

Notebook Reference
Project No. Ash Peak
Date Nov. 10, 1978

Sample: 3A - Cyanide tails - NH_3 pH control in cyanide test.

Purpose of Test:

	Conditions			Reagents - Pounds per Ton of Ore						
	Time Min	% Solids	pH S or F	Oleic Acid	R 801	Fuel Oil				
CONDITION	5	60	—	1.0	0.5	0.1				
FLOAT	5	30	9.5	—	—	—				

Test Notes:

Product	Weight Grams	Weight (%)	Chemical Analysis			Per Cent Distribution		
			SiO_2	CaO	Ag			
TAILS	653	88.0	91.3	3.0	0.65			
CON.	89	12.0	46.9	25.1	0.25			
HEAD	742	100.0			0.50			

Observations:
- Float complete at 5 minutes
- No Desliming

Flotation Test No. 2 A

Notebook Reference
Project No. Ash Peak
Date Nov. 10, 1978

Sample: 2A - Cyanide tails - Na(OH) pH control in Cyanide Test

Purpose of Test:

	Conditions			Reagents - Pounds per Ton of Ore							
	Time Min	% Solids	pH S or F	Oleic Acid	R 801	Fuel Oil					
CONDITION	5	60	—	1.0	0.5	0.1					
FLOAT	10	30	9.5	—	—	—					

Test Notes:

Product	Weight Grams	Weight (%)	Chemical Analysis			Per Cent Distribution		
			SiO2	CaO	Ag			
TAILS	708	88.8	84.6	2.2	0.40			
CON	89	11.2	39.1	17.8	0.25			
HEAD	797	100.0			0.80			

Observations: • No Desliming

Flotation Test No. 1A

Notebook Reference
Project No. Ash Peak
Date NOV. 10, 1978

Sample: 1A - Cyanide Tails - CaO pH control in Cyanide test

Purpose of Test:

	Conditions			Reagents - Pounds per Ton of Ore						
	Time Min	% Solids	pH S or F	Oleic Acid	R 801	Fuel Oil				
CONDITION	5	60	—	1.0	0.5	0.1				
FLOAT	10	30	9.5	—	—	—				

Test Notes:

Product	Weight Grams	Weight (%)	Chemical Analysis			Per Cent Distribution		
			SiO_2	CaO	Ag			
Con	67	8.2	37.0	31.2	0.30			
Tails	750	91.8	84.5	3.8	0.35			
Head	817	100.0			0.90			

Observations: • No Desliming

(S.RUDY TEST)

UNIVERSITY OF ARIZONA

ARIZONA BUREAU OF MINES

ORE TESTING SERVICE

Ore No. 2465 Test No. 2

Conditions and Reagents

Point of Addition	Conditions: Time Mins.	% Solids	pH	Reagents Pounds Per Ton: Oleic Acid	R-801	Fuel Oil
[illegible]. Condition	5	60	--	1.0	0.5	0.1
Flotation	10	35	7.9	--	--	--

[illegible]arks:

No desliming. Conditioning done in float cell.

Metallurgical Products

Product	Tons in 100 Tons Feed	Assays: SiO_2	CaO	Ag	% of Total: SiO_2	CaO	Ag
[illegible]	23.66	58.80	17.25	4.45	17.3	75.9	47.9
[illegible]	76.34	87.00	1.70	1.50	82.7	24.1	52.1
[illegible]	100	80.3	5.38	2.20	100	100	100

[illegible]arks:

METALLURGICAL RESULTS OBTAINED ABOVE SHOULD BE CONSIDERED AS ONLY APPLICABLE TO MATERIAL CONFORMING TO THE CHARACTER OF THE SAMPLE UPON WHICH THE TESTS WERE MADE.

Sample No.	2465	1A	2A	2B	3A	4A	6A
Tails Wt. gr.	--	750	708	504	653	289	746
Con. Wt. gr.	--	67	89	84	89.	473	195
total	--	817	797	588	742	762	941
Tails Wt. %	76.3	91.8	88.8	85.7	88.0	37.9	79.3
Con. Wt. %	23.7	8.2	11.2	14.3	12.0	62.1	20.7
Tails % SiO_2	87.0	84.5	84.6	98.2	91.3	89.2	86.5
Tails % CaO	1.7	3.8	2.2	1.4	3.0	1.2	1.3
Con. % SiO_2	58.8	37.0	39.1	36.4	46.9	76.4	53.4
Con. % CaO	17.3	31.2	17.8	12.3	25.1	8.1	12.8
Tails Ag oz/T	1.50	0.35	0.40	0.70	0.65	1.05	2.05
Con. Ag oz/T	4.45	0.30	0.25	0.20	0.25	0.40	4.25
Head Ag oz/T	2.20	0.90*	0.80*	0.50	0.50	0.60	--

Note: Test details on data sheets that follow.

* Head Ag values inconsistant with tails and con. values

CYANIDE TAILINGS FLOTATION TESTS

Nov. 10, 1978

Objectives:

Test the effect of cyanidation chemicals, especially lime, upon calcite flotation performance. Silver recovery is not an objective of this test.

Procedure:

Run bench scale flotation tests on cyanide tails using a standard flotation procedure. This standard procedure selected to be a test by Mr. S. Rudy labeled Ore No. 2465 Test No. 2.. One each of the nominal 1000 gram cyanide test tails samples was selected as flotation feed plus a parallel uncyanided feed. These 5 tests were all processed in the same manner using the same reagents. Data sheets for all tests are attached indicating conditioning times etc. It should be noted that feed samples were not rinsed of cyanide solution but conditioned "as is" and then fresh water was added in the flotation step.

Results & Conclusions:

The following summary tabulation illustrates that cyanidation does not appear to have any significant effect on flotation. As can be seen the silica recovery on sample 4A was upset this is most likely due to pH conditions. In fact further investigation may reveal pH to have a critical effect upon this particular flotation performance. In conclusion it is evident that the cyanidation tails can be floated for high calcium minerals with little problem.

Although not a part of this test, Sample 2B, showed the best results utilizing a different suite of reagents. This test is part of the next section of this report but is tabulated with this series for comparison of results.

Conclusions:

Although the objective of this test was to produce a feed for flotation tests, which was accomplished, it is interesting to note that pH control agents and other cyanidation control aspects do not appear to be super critical. In fact, the natural test with no agent added showed the better recovery.

CHARCOAL IN PULP -- CYANIDATION TESTS

Nov. 10, 1978

Objective:

Prepare 2000 grams of flotation feed each from four different charcoal in pulp cyanidation runs. Each run to have varying pH control; calcium oxide, sodium hydroxide, ammonia, and natural alkaline influnce from the ore. These flotation feeds were to be prepared under such varying conditions to test the effects of cyanidation upon subsequent flotation of the cyanide tails.

Procedure:

Eight samples, 1000 grams each, were tumbled in 1 gallon jugs for 40 hours. Charcoal was removed after 20 hours and replaced with a new charge of charcoal. Samples were run the full 40 hours without adjustment of pH or cyanide level. The control and degree of perfection for these tests was not critical as recovery of the silver was not critical. As mentioned before, the objective was only to create a cyanide tailing for subsequent flotation tests. Pertinent data relative to the test conditions and assay results are tabulated as follows:

Sample No.	1A	1B	2A	2B	3A	3B	4A	4B
pH Control	CaO	CaO	Na(OH)	Na(OH)	NH_3	NH_3	None	None
Charcoal #1(gr)	3.87	3.93	3.65	3.45	3.90	3.55	3.15	3.70
Charcoal #2(gr)	1.85	0.12**	1.71	1.74	1.82	1.81	2.03	1.75
pH Control(#/T)	1.0	1.0	0.4	0.6	3.8*	3.8*	-0-	-0-
NaCN (#/T)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Pulp % Solids	50	50	50	50	50	50	50	50
Beginning pH	10.4	10.4	10.9	10.4	10.4	10.4	9.1	9.1
20 Hr. pH	10.1	10.2	10.0	10.3	10.3	10.2	8.9	8.9
Silver (oz/T)								
Charcoal #1	122	164	192	233	180	212	226	189
Charcoal #2	266	340	319	290	283	406	248	291
Tailings	0.90	0.70	0.80	0.50	0.50	0.90	0.60	0.50
Approx. Recovery (%) ***	57	67	62	76	76	57	71	76

* 6.5 ml of 29% solution

** Unexplained except fine charcoal was evident in tails

*** Estimated recovery based upon a head grade of 2.1 oz/T

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ASH PEAK
FLOTATION TESTS

November 26, 1978

Contents:

- o Charcoal in Pulp -- Cyanidation Tests*
- o Cyanide Tailings Flotation Tests
- o Fatty Acid Flotation Tests

* Cyanide treatment of feed for flotation tests

prepared by: J.J. Cape

DRW 2969 (Rev.)

ABM w/ Olive Ave

~~Tails~~

Phelps Dodge Corporation

DOUGLAS REDUCTION WORKS

ASSAY AND ANALYSIS CERTIFICATE

Hand Samples

DOUGLAS, ARIZONA [illegible] 19

NAME P. Tierney, Ash Peak

Seller Lot	Sampler's Lot	Gold Ozs.	Silver Ozs.	Copper %	Lead %	SiO_2 %	Al_2O_3 %	Fe %	Mn %	CaO %	MgO %	S %	Zn %			
[illegible]2		0.015	2.75			[illegible].2	2.1	[illegible]		4.2	[illegible]					
35		0.010	2.[illegible]			[illegible].2	1.2	[illegible]		0.[illegible]	[illegible]					TAILS
[illegible]3		0.010	2.[illegible]			[illegible]	2.[illegible]	1.[illegible]		1.7	[illegible]					
[illegible]		0.015	2.72			[illegible]	1.[illegible]	[illegible]		[illegible]	[illegible]					Concentrate

Nanci Gregory

[illegible]

312-786-0400

DRW 2969 (Rev.)

Phelps Dodge Corporation

DOUGLAS REDUCTION WORKS

ASSAY AND ANALYSIS CERTIFICATE

DOUGLAS, ARIZONA [illegible] 19

Hand Samples

NAME J. H. Williams, P.O. Box [illegible], [illegible]
Ash Peak [illegible]

Seller Lot	Sampler's Lot	Gold Ozs.	Silver Ozs.	Copper %	Lead %	SiO_2 %	Al_2O_3 %	Fe %	Mn %	CaO %	MgO %	S %	Zn %		
3160	1	0.020	2.73	0.03		[illegible]	2.[illegible]	1.[illegible]		[illegible]					
		0.020	2.[illegible]	0.03		84.4	2.8	4.9		5.5					
161	2	0.015	2.[illegible]	0.0[illegible]		[illegible]	3.5	2.[illegible]		[illegible]					
3161	2	0.015	2.54	0.05		79.6	2.5	2.1		5.7					

TUCSON, ARIZONA 85713

Registered Assayers

Tucson, Arizona, Dec 30, 1976

Sample Submitted by Mr. Arizona Bureau of Mines Ok'lipi Sam Rudy.

Sample Marked	GOLD Ozs. per ton ore	GOLD Value per ton ore*	SILVER Ozs. per ton ore	~~COPPER Per cent Wet Assay~~	Fe. Per cent Wet Assay	SiO_2 Per Cent Wet Assay	CaO Per Cent Wet Assay	AL_2O_3 Per Cent Wet Assay
2371-3/8+10m	0.15	—	0.20		—	—	—	—
2371-10m	0.58	—	0.40		—	—	—	—
2372-1	0.015	—	6.15		—	—	—	—
2372-2	Trace		0.50		—	—	—	—
2372-3	—	—	2.55		0.35	71.50	5.45	8.15
2372-3 Final Tails	—	—	1.70		1.80	86.10	2.60	4.25
2373-3 Slime	—	—	2.00		2.20	78.45	5.75	4.70
2373-3 Alunite Con.	—	—	1.75		2.45	75.00	2.75	5.00
2372-3 Calcite Con.	—	—	3.55		2.25	67.10	12.55	4.75

*Gold Figured $100.00 per oz. Troy

Charges $ 118.00

Very respectfully,

Bill P. Jacobs

TUCSON, ARIZONA 85713

Registered Assayers

Tucson, Arizona. Jan 20 1977

Sample Submitted by Mr Ariz Bureau of Mines c/o Mr. Sam Rudy 1-20-77

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~~	SiO_2 Per Cent Wet Assay	Al_2O_3 Per Cent Wet Assay	CaO Per Cent Wet Assay
2372-4 Slimes	—	—	2.35	—	—	71.80	8.00	6.20
2372-4 Flot Tails	—	—	2.15	—	—	74.70	6.15	8.35
2372-4 Flot Conc.	—	—	14.55	—	—	94.10	3.20	2.60
			2.275	[illegible]				
2372-5	[illegible]							
+400		2.33	7.55 77.			71.[illegible]	1.25	4.05
−400		3.[illegible]	[illegible]			[illegible].5	4.[illegible]	6.30

1435 SOUTH 10TH AVENUE
TUCSON, ARIZONA 85713

Jacobs Assay Office

Registered Assayers

PHONE 622-0813

Tucson, Arizona. Dec 15 1976

Sample Submitted by Mr. Arizona Bureau of Mines c/o Mr. Sam Rudy

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~~	SiO_2 Per Cent Wet Assay	Al_2O_3 Per Cent Wet Assay	CaO Per Cent Wet Assay
#2368 - Feldspar Tails	—	—	5.60	—	—	87.50	3.70	2.45

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*Gold Figured $100.00 per oz. Troy

Charges $ 4.50 Paid By Mr. [illegible]

Very respectfully,
Ben P. Jacobs

1435 SOUTH 10TH AVENUE
TUCSON, ARIZONA 85713

Jacobs Assay Office
Registered Assayers

PHONE 622-0813

Tucson, Arizona, Dec. 26 1976

Sample Submitted by Mr. Arizona Bureau of Mines % Mr. David Rabb

Sample Marked	GOLD Ozs. per ton ore	GOLD Value per ton ore*	SILVER Ozs. per ton ore	~~COPPER Per Cent Wet Assay~~	Fe Per cent Wet Assay	Al_2O_3 Per Cent Wet Assay	SiO_2 Per Cent Wet Assay	CaO Per Cent Wet Assay
#2368 -								
Conc	0.01	—	2.30		0.20	16.20	48.80	21.70
Slims	—	—	1.20		2.40	4.00	81.50	6.10
Tails	—	—	0.60		1.90	4.90	87.10	2.50

76

*Gold Figured $100.00 per oz. Troy

59.50

Very respectfully,
Ben P. Jacobs

UNIVERSITY OF ARIZONA

ARIZONA BUREAU OF MINES

ORE TESTING SERVICE

Ore No. 2368 Test No. Ash Peak

Conditions and Reagents Calcite Flotation

Point of Addition	Conditions			Reagents Pounds Per Ton		
	Time Mins.	% Solids	pH	Oleic Acid	R-801	Fuel Oil
ndition	2	50	—	0.5	0.5	0.1
Ro. Flotation	10	35	8.1	—	—	—

Remarks: Desliming done by decanting suspended material after 1 hour settling. Poor job. Most calcite removed (tested with acid for effervescence) by flotation. CaO in tails probably due to andesite.

Metallurgical Products

Product	Tons in 100 Tons Feed	Assays					% of Total			
		SiO_2	CaO	Al_2O_3	Fe	Ag	SiO_2	CaO	Al_2O_3	Ag
limes	8.7	81.5	6.1	4.0	2.4	1.2	8.8	9.3	5.3	4.2
onc.	15.0	48.8	21.7	16.2	2.0	2.3	9.0	57.2	37.3	13.8
Tails	76.3	87.1	2.5	4.9	2.5	2.7	82.2	33.5	57.4	82.0
lead	100.0	80.9	5.7	6.5	2.4	2.5				

Remarks: This method of desliming not adequate for good selectivity.

UNIVERSITY OF ARIZONA

ARIZONA BUREAU OF MINES

ORE TESTING SERVICE

Ore No. 2372 Test No. Ash Peak

Conditions and Reagents

Quartz Flotation on +325 Mesh

Point of Addition	Conditions			Reagents Pounds Per Ton									
	Time Mins.	% Solids	pH	Armac T									
creen at 325	--	--	--	--									
ondition +325	2	70	--	2.0									
Quartz Flotation	15	15	8.0	--									

Remarks: Relatively small percentage of sample was +325.
High density conditioning essential.
Armac-T used at pH 8.0 to float quartz.

Metallurgical Products

Product	Tons in 100 Tons Feed	Assays						% of Total					
		SiO_2	CaO	Al_2O_3	Ag			SiO_2	CaO	Al_2O_3	Ag		
+325 Con.	10	94.1	2.6	3.2	2.27			12.0	4.4	8.4	9.7		
25 Tail	2	74.7	6.2	8.4	2.15			1.9	2.1	4.4	1.8		
-325	88	76.4	6.2	3.8	2.35			86.1	93.4	87.2	88.5		
ead	100	78.1	5.8	3.8	2.34			100	100	100	100		

Remarks:

Again, a relatively high quality material was obtained at a low recovery. The material appears to be suitable for the desired purposes.

In still another test, a sample of tailings was treated by flotation at a slightly basic pH to remove the calcite. A summary of the test results is given below and a more detailed explanation is given in Appendix B.

Table 4 - Flotation of Calcite from 2368

		Assays				Distribution, %			
Fraction	Wt.%	SiO_2	CaO	Al_2O_3	Ag	SiO_2	CaO	Al_2O_3	Ag
Slimes	8.7	81.5	6.1	4.0	1.2	8.8	9.3	5.3	4.2
Conc	15.0	48.8	21.7	16.2	2.3	9.0	57.2	37.3	13.8
Tails	76.3	87.1	2.5	4.9	2.7	82.2	33.5	57.4	82.0
Head	100	80.9	5.7	6.5	2.5	100	100	100	100

This procedure gave a relatively high recovery of marginal quality product. This material may be suitable for use as a flux in copper smelting.

The two vein samples of rock that were obtained from the Ash Peak outcrop and old mine workings were assayed for gold and silver. The sample designated "East End Tahoe" ran 0.015 ounces per ton Au and 6.15 ounces per ton Ag. The sample designated "Vein Crest 150 Foot East" assayed a trace of gold and 0.50 ounces of silver.

This briefly describes some of the amenability work conducted on the Ash Peak tailings. At your request, I have enclosed copies of all assay reports. Samples of various products are available for you to pick up at your convenience.

The total charges for this work including assays was $325. We have your payment for that amount. I enjoyed working with you on this project. I hope the information generated is useful to you. If you have any questions or need further information or testing, please let me know.

Very truly yours,

Sam Rudy

Samuel Rudy
Assistant Metallurgist

/bo

cc: W. H. Dresher

Enclosures

The amenability of recovering a relatively high grade quartz material with significant associated silver values for subsequent use in copper smelting applications (hot patching or fluxing) was determined. It appeared, on the basis of two physical beneficiation techniques--classification and/or flotation, that a relatively high quality quartz-silver product could be recovered at low to moderate yields. The material produced may be suitable for use in copper smelting subject to negotiation with individual buyers.

The following table gives metallurgical results for wet screening a sample of tailings at 400 mesh. The table shows that about 18 percent of the sample was coarser than 400 mesh. This fraction assays over 91 percent SiO_2 and approximately 2.5 ounces of silver per ton. A relatively simple and inexpensive classification step could be used to upgrade these tailings. The coarse fraction appears to be of suitable quality for hot patching; however, the yield is low. I have generated about 6 pounds of this material and will save it for your disposal.

Table 2 - Wet Screened 2372 at 400 Mesh

		Assay				Distribution, %			
Fraction	Wt.%	SiO_2	CaO	Al_2O_3	Ag	SiO_2	CaO	Al_2O_3	Ag
+400	18	91.8	4.0	1.3	2.33	21.2	12.2	6.1	14.2
-400	82	75.1	6.3	4.4	3.09	78.8	87.8	93.9	85.8
Head	100	78.1	5.9	3.8	2.95	100	100	100	100

In another test a sample of tailings was screened at 325 mesh and the coarse material was subjected to quartz flotation at a slightly alkaline pH. The results for this test are summarized in Table 3 and shown in more detail in Appendix A.

Table 3 - Quartz Flotation Test on +325 Mesh Fraction of 2372

		Assay				Distribution, %			
Fraction	Wt.%	SiO_2	CaO	Al_2O_3	Ag	SiO_2	CaO	Al_2O_3	Ag
+325 Conc	10	94.1	2.6	3.2	2.27	12.0	4.4	8.4	9.7
+325 Tail	2	74.7	6.2	8.4	2.15	1.9	2.1	4.4	1.8
-325	88	76.4	6.2	3.8	2.35	86.1	93.4	87.2	88.5
Head	100	78.1	5.8	3.8	2.34	100	100	100	100

THE UNIVERSITY OF ARIZONA

ARIZONA BUREAU OF MINES

MINERAL TECHNOLOGY BRANCH

TUCSON, ARIZONA 85721

TEL. (602) 884-1943

January 28, 1977

Mr. Paul Turney
3715 North Hash Knife Circle
Tucson, Arizona 85718

Dear Paul:

This letter will report most of the results obtained on the Shamrock-Ash Peak tailing samples examined in this laboratory during the last part of December and the first part of January. This information is presented in two parts, the first is primarily background information taken from the literature or analytical data supplied by you. The second part describes some of the more pertinent laboratory testwork and results.

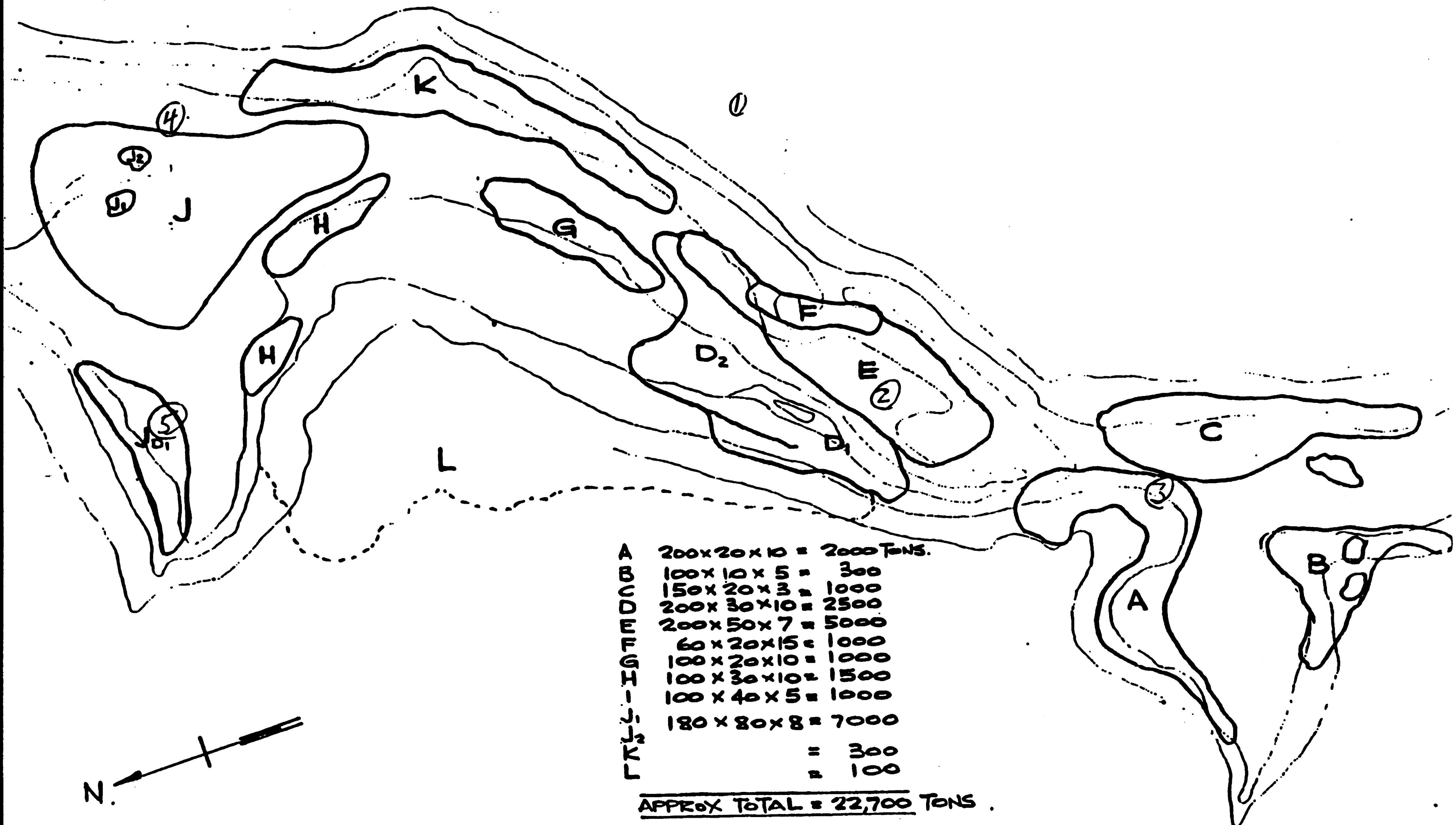
Typical Ash Peak ore was reported to be predominately a dense banded chalcedonic quartz and silicified andesite with varying amounts of calcite, rhodochrosite, pyrite, and small amounts of fine argentite occurring as clouds or streaks associated with the quartz. The mill heads typically ran about 11 ounces of silver per ton of ore with about 65 percent being recovered by flotation. According to the literature, the tailings from the old operation should assay well over 3.5 ounces per ton of silver.

The two samples of tailings tested in the laboratory were a light pink-brown colored, powdery, silicious material, relatively low in alumina with an appreciable silver content. The following table gives the composition of the two samples tested.

Table 1 - Composition of Ash Peak
Tailing Samples

Sample No.	% SiO_2	% Al_2O_3	% CaO	% Fe	OPT Ag
2368	80.7	3.4	5.5	2.1	2.50
2372	78.1	4.7	5.3	2.2	2.20

These analyses are believed to be typical of the 20,000 tons of readily accessible tailings remaining at the old Ash Peak mill site.



A	200 × 20 × 10 =	2000 TONS.
B	100 × 10 × 5 =	300
C	150 × 20 × 3 =	1000
D	200 × 30 × 10 =	2500
E	200 × 50 × 7 =	5000
F	60 × 20 × 15 =	1000
G	100 × 20 × 10 =	1000
H	100 × 30 × 10 =	1500
I	100 × 40 × 5 =	1000
J_1 J_2	180 × 80 × 8 =	7000
K	=	300
L	=	100

APPROX TOTAL = 22,700 TONS.

SHAMROCK TAILINGS DUNCAN ARIZ

H.C. DAVIS R.I.D. SCALE:- 1" = 50'-0

CC

Form **1065**

Department of the Treasury
Internal Revenue Service

U.S. Partnership Return of Income

For calendar year 1980, or fiscal year beginning .... and ending ....

E **1980**

A Principal business activity MINING	Name SHAMROCK ASH PEAK MINING COMPANY C/O PAUL TURNEY	D Employer identification no. 95-3234738
B Principal product or service ALL FRMS OF ORE ORE	Number and street 3715 HASHKNIFE CIRCLE	E Date business started JAN 1, 1977
C Business code number 1000	City or town, State, and ZIP code TUCSON ARIZONA 85715	F Enter total assets from Schedule L, line 13, column (D). $ 84,928.

G Check method of accounting: (1) [X] Cash (2) [ ] Accrual (3) [ ] Other

H Is this a final return? [ ] Yes [X] No

	Yes	No
I Is the partnership a limited partnership (see page 2 of Instructions)?		X
J Is this partnership a partner in another partnership?		X
K (1) Did you elect to claim amortization (under section 191) or depreciation (under section 167(o)) for a rehabilitated certified historic structure?		X
(2) Amortizable basis $		

Income

Line	Description		Amount
1a	Gross receipts or sales $ 167,864 1b Returns & allowances $ .... Bal.	1c	167,864.
2	Cost of goods sold and/or operations (Schedule A, line 34)	2	81,314.
3	Gross profit (subtract line 2 from line 1c)	3	86,550.
4	Ordinary income (loss) from other partnerships and fiduciaries	4	
5	Nonqualifying dividends	5	
6	Interest	6	102.
7	Net income (loss) from rents (Schedule H, line 2)	7	
8	Net income (loss) from royalties (attach schedule)	8	
9	Net farm profit (loss) (attach Schedule F (Form 1040))	9	
10	Net gain (loss) (Form 4797, line 11)	10	
11	Other income (attach schedule)	11	
12	TOTAL income (loss) (combine lines 3 through 11)	12	86,652.

Deductions

Line	Description		Amount
13a	Salaries and wages (other than to partners) $ .... 13b Less Jobs Credit $ .... Bal.	13c	
14	Guaranteed payments to partners (see page 4 of Instructions)	14	18,000.
15	Rent	15	
16	Interest (Caution - see page 4 of Instructions) SEE STATEMENT 2	16	482.
17	Taxes	17	
18	Bad debts (see page 4 of Instructions)	18	
19	Repairs	19	
20	Depreciation (Schedule J, line 5)	20	7,613.
21	Amortization (attach schedule)	21	
22	Depletion (other than oil and gas, attach schedule - see page 5 of Instructions)	22	
23a	Retirement plans, etc. (see page 5 of Instructions)	23a	
23b	Employee benefit programs (see page 5 of Instructions)	23b	
24	Other deductions (attach schedule). SEE STATEMENT 6	24	36,144.
25	TOTAL deductions (add lines 13c through 24)	25	62,239.
26	Ordinary income (loss) (subtract line 25 from line 12).	26	24,413.

Schedule A - COST OF GOODS SOLD AND/OR OPERATIONS

Line	Description		Amount
27	Inventory at beginning of year (if different from last year's closing inventory, attach explanation)	27	
28a	Purchases $ .... 28b Less cost of items withdrawn for personal use $ .... Bal.	28c	
29	Cost of labor.	29	
30	Materials and supplies.	30	1,883.
31	Other costs (attach schedule). SEE STATEMENT 1	31	79,431.
32	Total (add lines 27 through 31)	32	81,314.
33	Inventory at end of year	33	
34	Cost of goods sold. (Subtract line 33 from line 32). Enter here and on line 2, above.	34	81,314.

Under penalties of perjury, I declare that I have examined this return, including accompanying schedules and statements, and to the best of my knowledge and belief, it is true, correct, and complete. Declaration of preparer (other than taxpayer) is based on all information of which preparer has any knowledge.

Please Sign Here ▶ ________________ Signature of general partner ▶ Date

Paid Preparer's Use Only

Preparer's signature ▶	[signature]	Check if self-employed ▶ [ ]	Preparer's social security no. 557-50-0455
Firm's name (or yours, if self-employed), and address ▶	LIONEL B. SANDERS, AN ACCTY. CORP. 1900 AVE OF THE STARS SUITE 510 LOS ANGELES, CALIFORNIA		E.I. No. ▶ 95-3536799 ZIP Code ▶ 90067

95-2396893

A FORMAT FOR A SMALL MINING OPERATION

E

Preface

1. The mining, milling, and marketing of ores from small to medium sized mines has been essentially non-existent for the past fifty years. We know of very few successful operations of less than 500 TPD. This condition is diametrically opposed to mining conditions prior to 1920 where a large proportion of our non-ferrous metals were obtained from small independent operations.

The reasons for the disappearance of the small mine are:

a) Equipment investment and standardizing of equipment to minimize costs and obtain continuous low cost production required large ore bodies to justify the expenditures necessary.

b) Large ore bodies were required to carry the technical overhead to maintain high efficiency production.

c) A tendency in many instances of the small mine to be the province of the technically unqualified who were without sufficient financial resources, or who spent their monies unwisely, thus foredooming their project to failure. These failures, in large part, led to condemnation of the smaller operations as economically unsuitable (a judgement, in many instances, not justified).

The current increase in price of our minerals, interest in protecting the environment, and the need for our mineral materials in the world economy, makes a favorable condition for investigating and installing plants at some of our smaller mines.

The reliability and versatility of equipment has increased to the point that economics in production can be achieved by unit equipment rather than duplications of equipment as required previously. (Plants can be smaller and still be profitable.) Reliable recovery methods have increased many fold, and treating the material mined as a possible source of several products and uses is an advantage that must not be over looked from both economics and environmental acceptability.

With reliability of equipment and a choice of recovery methods, a successful operation can be installed on a small property.

Technical aid is available at our mining colleges, Bureau of Mines, State agencies, and private laboratories -- it remains to effectively use these resources and to make decisions based upon the data supplied

Financial capability will not be difficult to acquire <u>if</u> acquisition, testing, plant design, and economic forecasts are adequate. This requires money and time, but, cannot be omitted with any expectation of success.

Success of a small mining operation will be assured if ore reserves and mining and milling methods are adequately determined before making an investment, and if adequate funds are provided.

It is perhaps unique to the mining industry that there is no such thing as a partially completed mine. A shaft one thousand feet deep is of no use if it stops ten feet short of the ore body.

A profitable small mine depends largely on ingenious design, minute attention to detail, and versatility in management. A small operation cannot carry a formal organization - one or at most two technical people must handle all operations with the judicious use of fee or contract personnel for bookkeeping, transportation etc..

PROPOSED OPERATION

Funds for a small operation must be carefully expended for maximum results. Generally, operations will be confined to four areas:

1. Waste materials ----- Tailings, slags, and other rejected materials offer advantages as the tonnage and grade can be accurately determined, development cost is less, utilities are usually available, and application of recent metallurgical advances may make re-treatment economic. Examples of such operations are the tailings plant at Pachuca, Mexico, my shipment of tailings from Ash Peak to the Morenci Smelter for use

as a diluent in roasting, and several tailings re-treatment projects in Arizona now under consideration.

2. Small properties ----- Areas where there has been activity in the past may contain a property, or properties, which contain sufficient tonnage to justify a concentrator, particularly if production can be marketed under favorable terms. Acquisition of properties in areas of known activity sometimes increase in value as improvements in price and metallurgy make lower grade ores attractive.

3. Special materials ----- Large mining, milling, smelting operations require many materials; flux, clay, coke, mold wash, hot patch, etc.. A well operated small plant can produce these materials profitably at a cost distinctly lower than a large company. The advent of new smelters and processes of a different type will require many different materials and fluxes. Material that can be produced and marketed profitably.

4. Unproven areas ----- A small company is disadvantaged in competing for large ore bodies against large operators. There may be, however, specific instances and areas where a small company can acquire and operate a property profitably in a new area while gaining a presence in that area.

In general, the proposed field of operations is the supplying of materials and ores required as accessory items in large operations; the re-treatment and re-claiming of waste material; and the recovery of mineral from properties too small to be mined on a large scale.

Our method of operation will be to investigate properties of potential interest as follows:

1. Preliminary investigation
2. Determination of title
3. Acquisition of title on option basis
4. Evaluate reserves and determine treatment
5. Obtain committments as to markets
6. Prepare flowsheet, cost, and proforma for operation
7. Prepare economic feasability
8. Decision as to -----

E

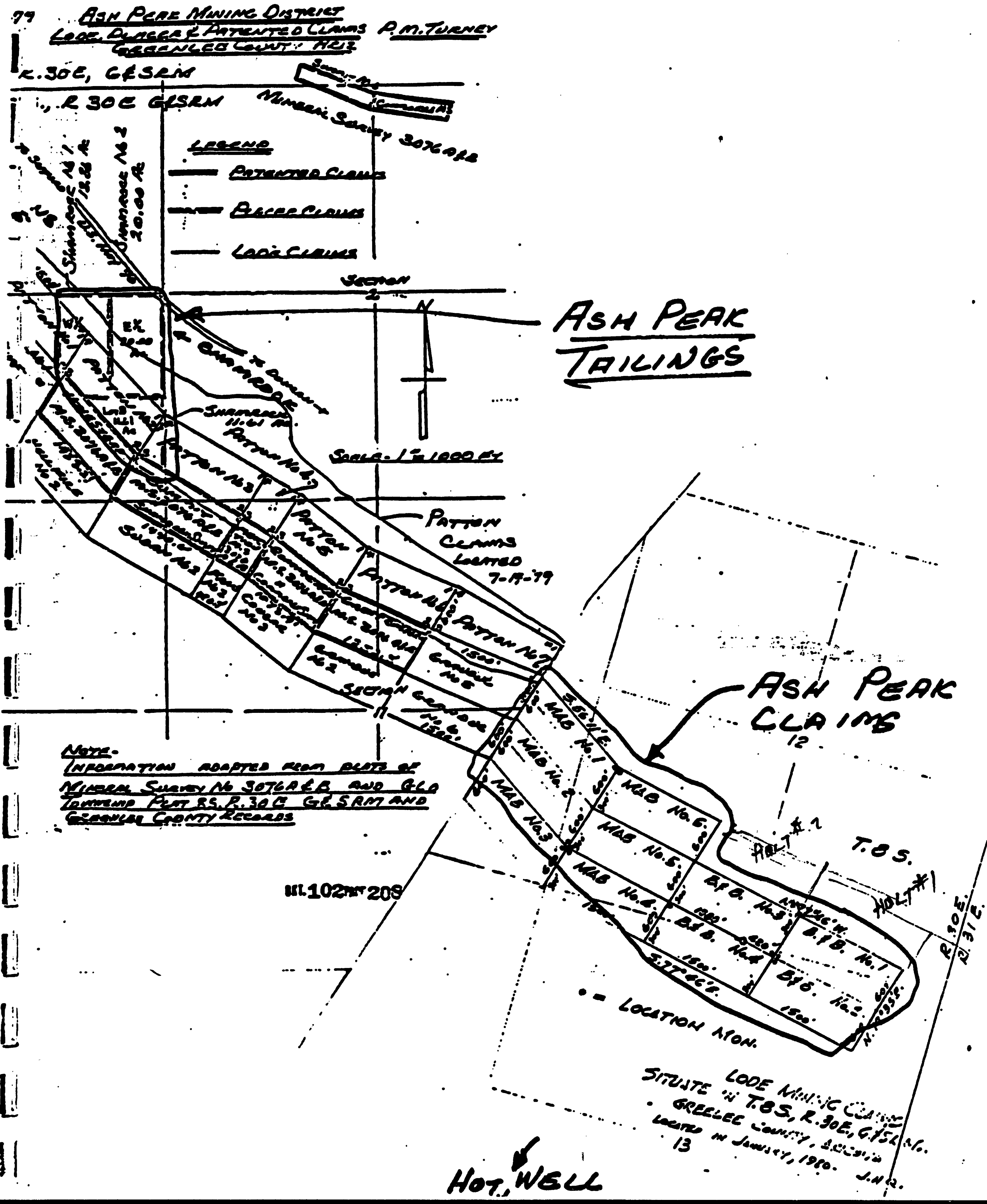
a. Making necessary investment to operate

b. Seek further capital

c. Sell property to others.

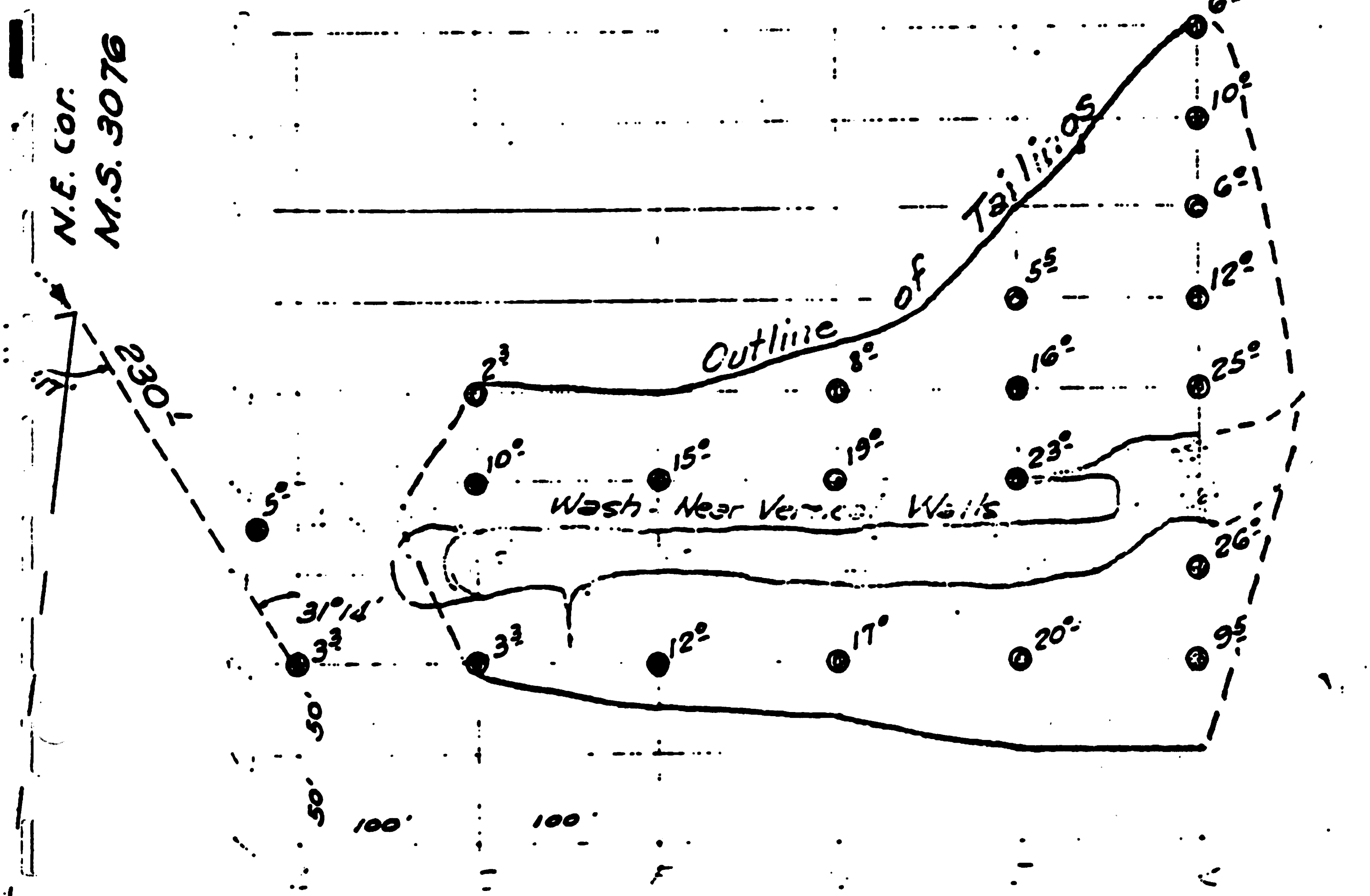
Prepared by
Paul M. Turney
April 24, 1974

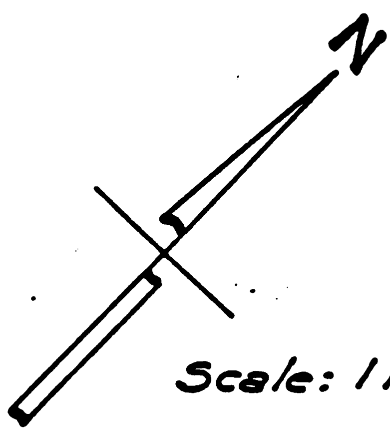
PMT:bj



Ash Peak Mining District
Lode, Placer & Patented Claims P. M. Turney
R.30E, G&SRM
R 30E G&SRM
Legend
Patented Claims
Placer Claims
Lode Claims
Section
Ash Peak Tailings
Scale 1" = 1000 Ft
Patton No. 2
Patton No. 3
Patton No. 6
Patton No. 7
Patton Claims Located 7-17-79
Ash Peak Claims
12
T.8S.
MAB No. 1
MAB No. 2
MAB No. 3
MAB No. 4
MAB No. 5
MAB No. 6
Holy #1
Holy #2
R.30E.
R.31E.
Note-
Information adapted from plats of Mineral Survey No 3076A&B and GLO Township Plat 8S, R.30E G&SRM and Greenlee County Records
BK 102 PG 208
• = Location Mon.
Lode Mining Claims
Situate in T.8S, R.30E, G&SRM
Greelee County
Located in January, 1980.
J.N.R.
13
Hot Well

BY JQ DATE 7-15-63 SUBJECT $3\frac{1}{2}$" DIA BORE HOLES SHEET NO. 1 OF 1
CHKD. BY .... DATE .... ASH PEAK TAILINGS JOB NO. C





depth
$3\frac{1}{2}$" dia. bore hole

Total Footage = 253^{9} ft.

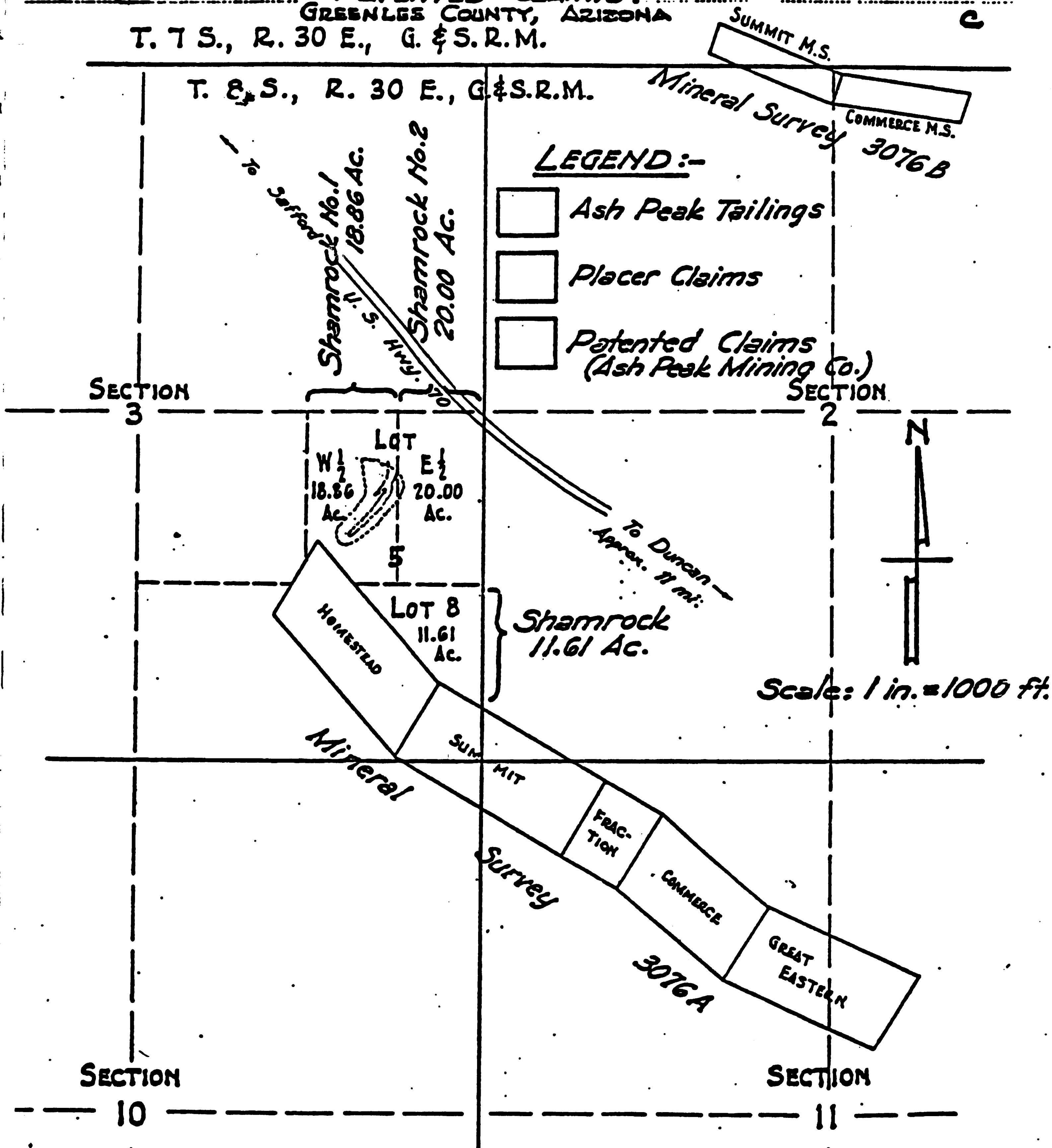
Scale: 1 in. = 100 ft.

BY J.Q. DATE 11-3-63 — ASH PEAK TAILINGS, PLACER LOCATIONS, & PATENTED CLAIMS. — SHEET NO. 1 OF 1

CHKD. BY .... DATE .... — JOB NO. P.M. TURNEY

GREENLEE COUNTY, ARIZONA

C



Note:-
Information adapted from plats of Mineral Survey No. 3076A & B, and G.L.O. Township Plat 8 S., R. 30 E., G & S.R.M., and Greenlee County Records

ASH PEAK MINING COMPANY

Tucson, Arizona

The Ash Peak Mining District is in Greenlee County, Arizona, approximately 12 miles west of Duncan, Arizona, 20 miles southwest of the Steeple Rock District of New Mexico and 50 miles by road south of Morenci, Arizona where Phelps Dodge Corporation maintains a large copper mining-milling-smelting complex.

Ash Peak Mining Company and its predecessors have maintained a presence in the Ash Peak area since 1961. The company maintains a policy of ---

1. Producing metals, fluxes and smelting materials (silica slurry) that cannot be produced as efficiently by larger mining companies ---

2. Searching for new products and techniquss that can be efficiently marketed ---

3. Designing and installing facilities for the treatment and production of mineral products on a small scale (of a semi-portable nature), therefore reducing the amount of reserves necessary to justify an operation. (refer to Exhibit E)

Ash Peak Mining Company has been successful in this policy and has produced and shipped:

1963	1000 tons tails - Douglas Smelter G.P. 0.50
1967-69	69000+tons tails - Morenci Smelter G.P. 1.80
1980-81	9000+tons tails - Morenci Smelter G.P. 13.00

Ash Peak Mining Company has a 50 ton per day carbon-in-pulp (CIP) plant ([redacted]) for the recovery of bullion from the remaining Ash Peak tailings.

Test Lots have determined that an expected 66-2/3% recovery of silver, and gold at plus 90% recovery will be attained.

Test work has also substantiated that a plus 90% silica slurry can be produced from the CIP that is suitable for use by smelters who have "sprung arch" reverberatory furnaces.

Testing has been successfully completed which indicates that a flotation-cyanidation operation will result in a minimum recovery of 65% of the metal values by flotation and 65% of the remaining values will be recovered by cyanidation and a suitable silica slurry, or flux, may be produced from the CIP tailings.

Ash Peak Mining Company desires to complete a flotation mill to complement the CIP Plant to allow the treatment [redacted] of precious metal bearing silica flux to produce a bullion and a silica tailings suitable for sale to smelters, particularly those smelters installing new equipment which require the use of finely divided feed and fluxes and for which the Ash Peak tailings would be very suited.

There are 20,000 to 35,000 tons of Ash Peak tailings available for treatment thru the CIP Plant which should have a grade of approximately 2.5ounces of silver and .01-ounces of recoverable gold. (Exhibit A)

Ash Peak Mining Company believes that these tailings can be processed, [redacted] and recover from the average grade of clean tailings of 2.5-ounces of silver and .01-ounces of recoverable gold, should be 1.6-ounces of silver net and .01-ounces of gold net. (At [redacted]

Ash Peak holds by Location and/or Lease Option the B&B Claims #1-4 incl. and MAB Claims #1-6 incl., which are potential sources of fluxing ore, although the properties are unproven. Ash Peak also holds by Location, a thermal well approximately a mile from Ash Peak, which may provide sufficient water for milling operations. [redacted]

Ash Peak Mining Company's CIP Plant is located approximately one mile east of the [redacted] Wilkins Mine and there is a possible source of milling ore from this property. Ash Peak has received a number of expressions of interest for it to mill ores from other mineral properties in the Ash Peak Steeple Rock and other areas.

[redacted]

[redacted]

[redacted]

Ash Peak Mining Company believes that a complete milling facility of a semi-portable nature, properly installed and operated, will provide an opportunity for profitable milling of precious metal bearing siliceous fluxing ores to produce bullion and marketable fluxing material.

P. M. Turney
June 15, 1981

PAUL M. TURNEY
REGISTERED PROFESSIONAL ENGINEER

September 22, 1982

[redacted]
[redacted], [redacted]

Dear Sir:

Subject - Silica Beneficiation

In the past ten years, copper smelters have been increasingly restricted in their operations by the imposition of environmental controls and the increased cost of fuel. These restrictions have resulted in the smelters revising their procedures and investigating other approaches to smeltings in an endeavor to produce copper economicaly under environmentally acceptable conditions.

Flash smelting, oxygen enriched smelting techniques, electric furnacing or a modification of these are being used or favorably considered by copper smelters and all of these smelting methods charge their furnaces with finely divided feed. Therefore the siliceous flux used must also be ground or finely devided.

Ash Peak Mines has the expertise and equipment available to supply ground flux to [redacted] smelters at [redacted] or [redacted] with the following advantages to [redacted]:

1. Milling of flux on A.P. site by Ash Peak should be cheaper than milling at smelter with re-handling, storage, and difficulty of performing efficiently a small tonnage operation by a large company.

2. At [redacted] option milling may include beneficiation of flux to increase silica content and reduce lime content with:

    a. Savings in freight,
    b. better melting efficiency,
    c. increased furnace capacity,
    d. ability to treat marginal ores to produce premium flux with decrease in mining costs.

3. [redacted] may prefer to remove portions of the contained precious metals as bullion to allow the sale of bullion at [redacted] option rather than as a consequence of refinery operations. This should allow the stockpiling of beneficiated flux at the mine site with bullion sales reducing flux production costs.

Ash Peak Mines proposes the installation of a mill for the benefication of fluxes which will be operated at direct audited operational cost plus a fixed fee per ton treated.

The attached information may be subject to different intrepretations. Ash Peak submits that the beneficiating of an amenable PMBSF is economically justifiable as an integrated part of a mine-mill-smelter-complex.

Very truly yours,

Paul M. Turney

PMT:sz

TURNEY

PRO FORMA
BENEFICIATION
PMBSF

Assumptions

1. Smelter requires 100 ton of flux containing 80% SiO_2 Min., 3% Al_2O_3 Max, 5% CaO Max. Silver paid at 90% and Gold at 95% of assay.

2. Assumed Fluxing Ore is -

   SiO_2 - 70%

   Al_2O_3 - 3% +

   CaO - 5% +

   Ag - 2.25

   Au - 0.01 (recoverable)

3. Silica flotation - 85% recovery
   Silver flotation - 65% recovery
   Silver cyanidation - 65% recovery
   Silica grade - 95%

To produce the equivalent of 80 ton SiO_2 at a grade of 95% requires crushing and grinding to 100 mog, optional sulphide flotation, optional cyanidation, and non-metallic flotation to remove lime and alumina.

Equivalents - 84.2 ton SiO_2 at 95% = 100 ton SiO_2 at 80 %

134.45 ton SiO_2 at 70% x 85% recovery = 100 ton at 80 %

TURNEY

FLOWSHEET
PMBSF

R.O.M. 134.45 ton @ 70% SiO_2, 2.25 ox Ag, 0.01 or Au

Mill to 100 Mog

Sulphide flotation (optional)

134 ton
105.9 oz Ag

65% of Ag
@500 oz/T } 196.6 oz

Cyanidation (optional)

Tails
134 Ton
37.08 oz Ag

65% of Ag
68.8 oz Ag
1.34 oz Au

Silica Flotation

50 ton tails
13.86 oz Ag
1

85%
84.2 ton - 95% SiO_2
23.22 ounces Ag

Ship
or
<u>Pelletize</u>

Income Assumptions

A. All ore must be mined and since the pro forma is based on treating an ore which would be not as selectively mined as direct shipping ore the mining cost should be equal or less than the direct shipping equivalent.

B. All ore will be milled therefore 134 tons of 70% SiO_2 equivalent to 100 ton of 80% SiO_2 results in 34 tons milled additionally, at 15.00 = (510.00)

C. Bullion Production = 265.4 oz Ag @ $8.00 and 1.34 oz Au @ 400 = 2123 + 536 = $2659.00.

D. Beneficiated silica will produce a small amount of metal at the smelter which is, neglected.

E. Approximately 16 ton of freight is saved in shipping 95% SiO_2 versus 100 ton of 80% SiO_2 @ 10.00 = $160.00

F. Approximately 16 ton less material is melted @ 15.00 = $240.00.

G. The furnace will have 16 ton greater capacity.

Total income from an ore that would be difficult to classify as acceptable

Bullion	$2659.00
Freight	160.00
Heat	240.00
	$3059.00

$3059/134.45 = $22.75 per ton which should be of interest since flux must be finely divided for modified smelter techniques in any case.

REHABILITATION PLAN FOR THE

ASH PEAK MINE

BY

JOY J. MERZ
WES BECKER, SR.

October 24, 1987

Arizona Flux Mine's operation at the Ash Peak Mine is in a dichotomous situation. In order to improve profitability the current production rate must be expanded. Current production rate will not allow for the generation of sufficient funds to pay for the necessary expansion. Therefore, an alternative plan must be designed as this report proposes.

Existing obligations require the daily production of approximately 100 tons of siliceous ore averaging at least four ounces of silver in order to meet all expenses. Now accessible workings can produce that grade and tonnage only with difficulty because of limited access and the upper levels of the mine having lower grade material. At the moment, the mine has access to only two working faces. Cash flow from current production rate will not allow for any increase in production personnel.

Higher grade and much more ore is available at lower depths. However, access to these areas requires additional capital expenditures. The existing staff cannot simultaneously maintain the production requirements <u>and</u> gain access to the higher grade material available at depth.

In order to get access to the higher grade ore below (from 6 to 15 oz. per ton silver), shaft rehabilitation and stope development must be done. Funding must be obtained to be able to do the development work.

Our proposal is to obtain $500,000 additional capital to accomplish this and replenish our working capital.

This rehabilitation would increase our production substantially. Ore reserve estimates indicate the probability of sufficient reserves to provide for a daily production rate of 300 or 400 tons per day for more than ten years.

During the period of expansion, the existing staff would continue producing the required tonnage to continue with present operating cash flow. Additional personnel would be hired to perform the expansion work. After the expansion and development work to prepare the stopes for production is completed, the expansion crew will be put on production status. The $500,000 required would generate a substantial increase in cash flow within four months of starting the expansion.

Phelps Dodge's smelters at Hidalgo and Chino are consistantly expecting more production and increased deliveries from us and are well pleased with the product we ship them. Our position with our customer is strong and other smeleters are also trying to get silica from us.

The demand for our product is solid.

INTRODUCTION

The Ash Peak Mine is located within one-qarter mile of paved State Highway No. 70 between Safford and Duncan, in Greenlee County, southeast Arizona. It is approximately 200 miles east of Phoenix, Arizona, and 200 miles west of El Paso, Texas. The climate is mild and operations can be continued throughout the year.

Experienced underground miners are available from other mining districts in Arizona or nearby in Mew Mexico. Electric power and water are available on the property.

Within a radius of 100 miles from the mine are four operating smelters. The location of the mine is ideal for supplying flux ore.

The mine has been operated in the past as a silver mine. When operated as a silver mine the ore was crushed and concentrated by floatation. Some leaching has been done on the property also. The additional costs of concentrating the ore, with the accompanying recovery losses, are eliminated when the ore is directly shipped to a smelter as a flux ore.

At present the property involves patented claims and non-patented claims. These are being purchased under an agreement (copy enclosed) that calls for a minimum monthly payment against royalties to an end price.

HISTORY

An unidentified report dated June 2, 1941, (copy enclosed) states that sometime before 1916 Murphy and others sank three shafts in the area a few hundred feet and shipped some ore. In about 1916, Goldfields Consolidated from Nevada, took an option and did most of the development work done to date in the mines. In 1918 they stopped work at Ash

Peak. During three years in the late thirties Veta Mines produced about 200,000 tons.

A concise, three page summary of the history of Ash Peak Mines prepared by Mr. A. G. Setter is included.

GEOLOGY

The geology at Ash Peak is straightforward. Gently dipping volcanic flows and tuffs are cut by numerous dikes and plugs. Nearly vertical fissure faults are mineralized with strong quartz and calcedonic material with dark clouds of argentite and some few sulfides. The principal vein, the Ash Peak Vein, until the late 1940's was assumed to be the only vein on the property. There is at least one hanging wall vein, and one foot-wall vein. The Ash Peak Vein is the only vein that outcrops. The other veins were found in crosscuts underground. There may well be other veins in the vicinity that are not yet identified.

When the property is in better financial condition, funds should be set aside to do the necessary exploration to find other veins.

Good detailed geologic descriptions are available in the enclosed reports.

MINING METHOD

Ore is mined exclusively by shrinkage stoping. See Page 6 Information Circular for a description of this mining method.

ORE RESERVES

Ore reserves at Ash Peak have been calculated by several previous authors. Until recently, all of the reserves were based upon operating the mine as a silver mine with values occurring in a highly siliceous quartz vein structure. In order to defray the cost of milling and floatation, around nine or ten ounces of silver were needed to make a reasonable profit.

As a silica flux mine with silver values, the economics are different. Depending upon the type of supply contract available, there can be compensation for the silica content, as well as a payment for precious metals content. Flux contracts allow for a lowering of the grade and still being profitable. Currently, a minimum of around 4 oz. is necessary to be profitable. This changes with the fluctuation in price of silver and quantity mined.

As stated previously, work by others in the past is accepted at face value as work done by professionals. Fortunately, we have the benefit of a number of reports made by several reputable engineers in past years.

Robert H,. Sayre, Jr. in 1975 estimated that there were around 58,000 tons in Commerce and 5,800 tons in Shamrock shaft areas of what he called "probable" ore, his most certain category.

The June 2, 1941 report very conservatively lists an estimate of combined "positive" and "probable" reserves of 16,900 tons. He lists an addiitonal 18,000 tons likely to be available with 800 feet of development work.

There are two veins in the immediate vicinity of the Ash Peak Vein, a hanging wall vein, and a foot wall vein. Neither of these structures has been completely defined from underground workings. It appears that the hanging wall vein may be of major significance between the 500 and 600 levels, in the vicinity of the Shamrock shaft, but this will only be confirmed after access is gained to these levels.

The unidentified author of the "Preliminary Report on the Ash Peak Mines" of October 4, 1935 mentions the Green Vein, in the vicinity of the Hardy Shaft. This vein dips in the opposite direction from the Ash Peak Vein. Perhaps this is the foot wall vein.

The hanging wall vein was checked by one of the previous workers in the area of the Shamrock shaft. No figures on value or width are available, only the fact that the vein exists consistently along a length of 1,100 feet. The Sayre report suggests that one can expect some 60,000 tons of ore to be developed in this area.

No workings in the vicinity of the Hardy Shaft have been investigated. Reports indicate that higher grade and stronger structures may be available in this area.

Following is a summary of the reserves likely at Ash Peak catalogued by proximity to each of the shafts.

COMMERCE SHAFT AREA:

Blocks 103 - 111 each within 800 feet of the shaft and above the 500 foot level. Average width 6 ft.	27,000 t.

SHAMROCK SHAFT AREA:

Within 600 feet of the shaft, above the 975 level on the Ash Peak Vein and the hanging wall vein, at an average width of 5 feet, at least (this vein has been located by drilling from the 975 level to 1600 ft. not included in these figures)	600,000 t.

HARDY SHAFT AREA:

Potentially the greatest tonnage at Ash Peak becase the area has not been examined. Possibly	1,000,000 t.

Note: the possible ore reserves at Ash Peak Mine are unlimited.

PLANNING

The future of Ash Peak Mine will be determined by careful planning and the availability of alternate plans to take care of unforseen developments. This report is based upon a four phase plan for the total development of the Ash Peak Mine.

Because of the nature of the mining business, all plans must be used in a flexible manner. That is, as conditions vary and change, the plan must be accommodated to accept the changes. A plan is valid only as long as the parameters do not vary. As additional information and understanding of the mineralization and geology in the area becomes available, the plans must be reassessed for validity.

A SHORT TERM plan involving production for the immediate future has been outlined in a report dated August 30, 1987. Since that time, because we are getting too close to the surface, the No. 1 stope has been found to have values that do not justify continuation of this shrink stope, the stope is being pulled. The calculated volume of stoped ore ready to be pulled from both No. 1 West and No. 1 East is 3,100 tons.

Starting immediately, the No. 7 stope on the hanging wall vein will be stoped and prepared for mining. The No. 7 stope should provide production for one or two weeks.

At the same time, Stope 2 East and West will be able to provide some additional ore. Blocks C-4, C-5, and C-6 from Stope 2 East and West may be able to provide up to 5,500 tons, if the grade does not fall off as it did in Stope No. 1. If Stope No. 2 does provide that kind of tonnage, an additional ten weeks of production will be made available.

From these stopes, ore to meet the minimum production may be provided for during the next three or four months. However, alternate plans should be made in the event that production falls off drastically. For this reason, implementation of the expansion program should be as soon as possible.

The proposed rehabilitation plan does not anticipate being able to produce ore until 90-120 days after implementation of the program.

A MEDIUM TERM plan is suggested for a longer period on mine production. This plan should take into account blocks of reserves not currently accessible. The acess to these blocks will be provided for by rehabilitation the Shamrock shaft (See Rehabilitation Shamrock Shaft for details).

As indicated in the above Ore Reserves listing, these blocks could provide for on the order of more than 500,000 tons of ore.

The stope assays and drill hole intercepts indicate, in general, higher grade values (Ave. plus 6 oz. Ag)

The LONG TERM plan is meant to provide for outlining and proving blocks of ore to be developed in the next four to six years. This plan will involve consideration of access to the Commerce and Hardy shaft areas.

This plan will be carefully developed once the Short and Medium Term plans are fairly well developed.

The MINE LIFE TERM plan will include search for orebodies and extensions to the known orebodies beyond the existing current scope of interest and knowledge at Ash Peak. For example, looking for the contact with sediments at depth (400 ft.) below the 975 level where one would expect the veins to blossom out perhaps generating a "manto" type of orebody with high grae values in base metals. The financing of this plan will have to be from profits generated from mining during the next several years or additional investment.

The Ash Peak Mine has endless possibilities. In fact, it could easily become a world class silver mine.

USE AND TIMING OF FUNDS

REHABILITATION OF SHAMROCK SHAFT

Proposed Sequence of Events:

1. Initiation of work to begin only when all equipment and supplies for the expansion are available on the property. This is to minimize future delays and scheduling changes. The cew for expansion will be separate from the production crew.

2. Construction of steel frame, hoist base, ore bin and supports and installation of hoist above the Shamrock shaft.

3. While finalizing skip and safety aspects of hoist system, expansion crew to work two shifts per day on rehabilitating the shaft down to the 300 level. Then Mining crews will immediately initiate development of stopes on the 200 and 300 levels.

4. Shaft rehabilitation crew reduced to one crew working on third shift (graveyard), while the remainder of the underground personnel work two shifts on production.

5. Shaft rehabilitation to stop at 600 level.

6. Equipment Needed: Hoisting equipment and skip. Haulage cars, motor trammers, rail, ties.

Cost Estimate: $400,000.00

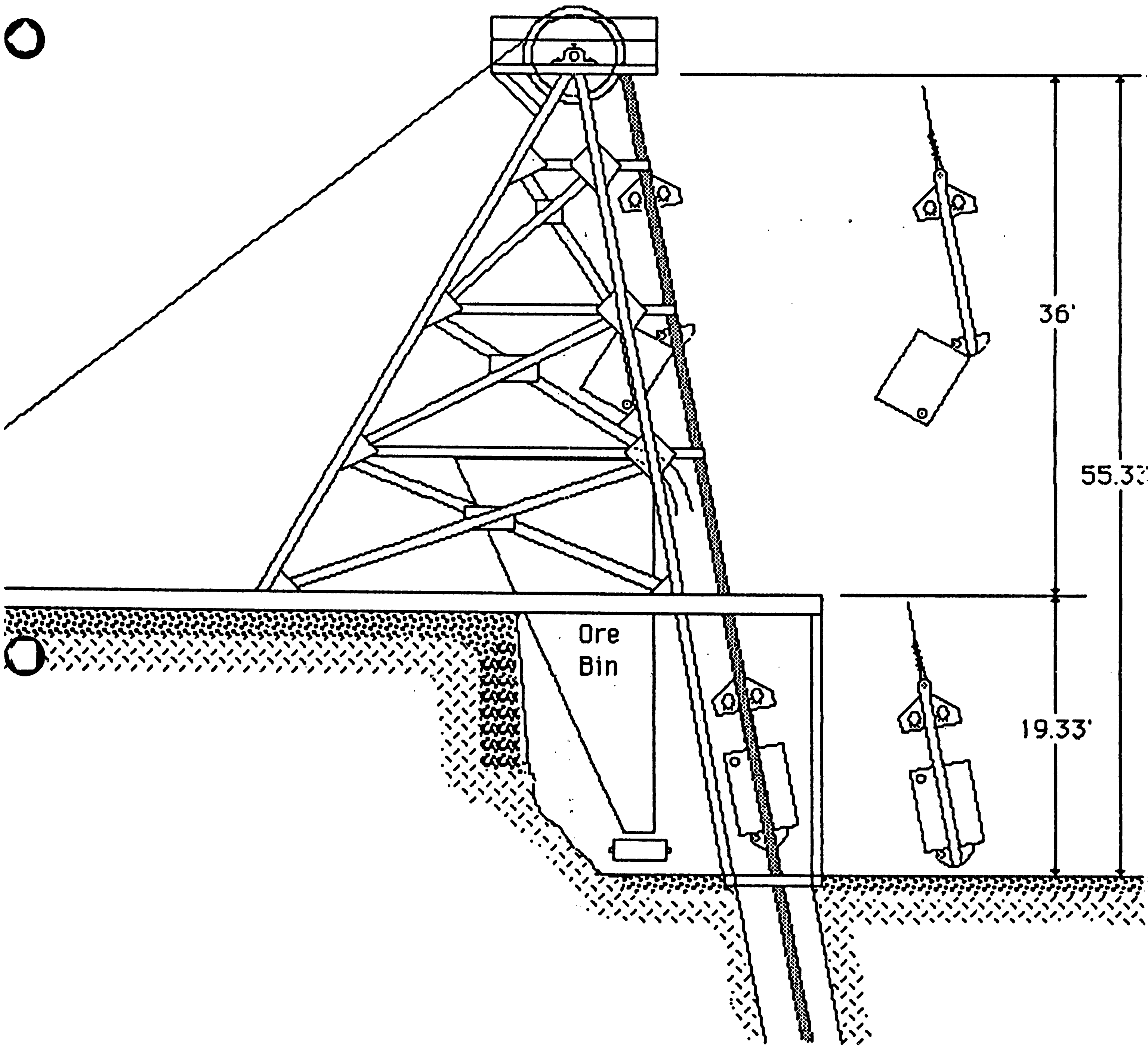
TIMING ESTIMATE

The above items will reqire a minimum of 60 days to a maximum of 90 days for completion.

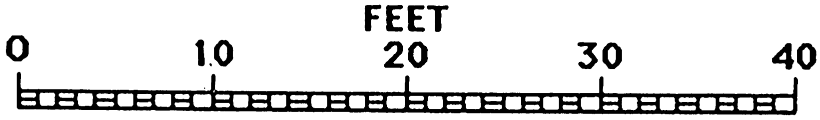
TIMING OF FUNDS

The above funds would be required as follows:

$200,000 to start, then
$100,000 per month for three months



SCALE: 1 inch = 10 feet



(7 pixils = 1 foot & 72 pixils = 10 feet)

SHAMROCK SHAFT HEADFRAME
SIDE ELEVATION (facing Easterly)
Drawn By: Richard Billingsley
October 26, 1987

PROFORMA

WEEKLY OPERATING EXPENSES

23 Employees Incl. Employer Taxes	$10,500	
Powder and Caps	5,000	
Utilities and Fuel	2,500	
Steel and Bits	1,000	
Parts (U.G. and Surface)	1,000	
Miscellaneous and Office	1,500	
Assay and Professional	1,000	$22,500
Capital Payments on Equipment (old & new) and Mine Purchase Royalty Pmts.		4,500
		$27,000

These expenses and capital payments are based on production of 1500 to 2000 tons per week and represent a cost per ton of $18 to $13.50. Our costs during the first 16 months of operation ran $31, and costs were $45 for the first four months of this year. There were unusual situations during this four month period, mainly the loss of 5,000 tons of ore from our #6 stope which we expected to process and the inefficiencies of our previous mining contractor. We feel that the above are realistic cost figures we will be able to achieve with the expansion and increased efficiencies in operation which the new investment will allow us.

ANTICIPATED CASH FLOW AFTER REHABILITATION

WEEKLY AND ANNUAL

	Lowest Gross/Ton	Highest Gross/Ton
Assumptions:		
Oz. Silver	4.00	9.00
% of Value Paid By Smelter	75	75
Price of Silver	$6.00	$7.50
Smelter Weight Pmt/Ton	$18.00	$18.00
Tons per Day	300	400
Work Days/Week	5	5
Weekly Gross	$54,000	$137,240
Weekly Expense	27,000	27,000
Cash Flow Before Freight	$27,000	$110,240
Freight @ $11.10/ton	$16,650	$22,200
Weekly Net Cash Flow	$10,350	$88,040
Annual Net Cash Flow	$538,200	$4,578,080

FINANCIAL STATEMENTS

ARIZONA FLUX MINES, INC.
BALANCE SHEET
JUNE 30, 1987

ASSETS:			
Cash		8518.50	
Accounts Receivable		1233.50	
Mining Equipment	96215.69		
Less Depr. Mining Eq.	7000.00	89215.69	
Wells	8450.93		
Less Depr. Wells	1268.00	7182.93	
Improvements	5971.55		
Less Depr. Improvemets	197.00	5774.55	
Ash Peak Mine	1656000.00		
Less Depr. Mine	35443.00	1620557.00	
Organization Costs	111.85		
Less Amort. Org Costs	22.00	89.85	
Deposits		200.00	
Operating Account		1050.00	
TOTAL ASSETS			1733822.02
LIABILITIES:			
Note Pble-1st Int, TV		35000.00	
Note Pble-1st Int, DT		20000.00	
Notes Pble Affiliates		68171.39	
Note Pble-Baker		4500.00	
Note Pble-Wilkins		3000.00	
Note Pble-Western States		20000.00	
Purchase Option Pble		1631000.00	
TOTAL LIABILITIES			1781671.39
CAPITAL:			
Common Stock Issued and Outstanding		140000.00	
Retained Earings Prior Years		-151038.60	
Profit or Loss		-36810.77	
CAPITAL			-47849.37
TOTAL LIABILITIES AND CAPITAL			1733822.02

ARIZONA FLUX MINES, INC.
PROFIT AND LOSS STATEMENT
FOR FOUR MONTHS ENDING JUNE 30, 1987

INCOME:		
Flux Sales		176796.98
LESS MINING COSTS:		
Direct Mining Expenses	123951.87	
Shipping	53136.85	
Payroll	15623.87	
		192712.59
OPERATING PROFIT/LOSS		-15915.61
OTHER EXPENSES:		
Royalties	.00	
Payroll Tax	940.92	
Assays	1519.00	
Travel & Auto	1343.31	
Promotion & Advertising	198.33	
Telephone	841.39	
Electric	611.38	
Office Expense	126.20	
Insurance	.00	
Property Tax	301.71	
Fees	84.00	
Other Professional Services	9632.01	
Repairs and Maintenance	175.50	
Subscriptions	.00	
Interest	5121.41	
Bank Charges & Misc.	.00	
TOTAL OTHER EXPENSES		20895.16
PROFIT OR LOSS		-36810.77
NON-CASH ITEMS:		
Interest on Purchase Option		
Amortization Expense		
Depreciation Expense		
Depletion Expense		
TOTAL NON-CASH ITEMS		
NET PROFIT OR LOSS		-36810.77

ARIZONA FLUX MINES, INC.
NOTES TO FINANCIAL STATEMENTS
JUNE 30, 1987

1. Statements are prepared on a cash basis. As of June 30, 1987 the amounts due from sales prior to year end approximates the amounts due on accounts which are not reflected on this statement. In addition, no value has been shown for ore under development. Expenses have been paid as of June 30, 1987 for ore mined or being developed which has not been crushed or shipped to smelters.

2. Since the end of fiscal year ending February 28, 1987, shareholder's notes were converted to common stock amounting to $112,000.

3. Approximately 5,000 tons of ore in our #6 Stope which would have been shipped during the four months ending June 30, 1987, and valued at $125,000 net after shipping and crushing costs was lost due to contamination as a result of improper mining technique.

4. Royalties of $20,000 during the period were paid. They are accounted for as a reduction of Purchase Option Payable and accordingly do not show on the Profit and Loss Statement as expense.

5. Accruals of depreciation, depletion , and interest are not made on interim reports, but are accounted for on the fiscal year end statements.

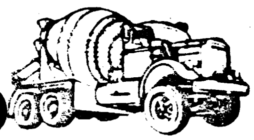
ARIZONA FLUX MINES, INC.
BALANCE SHEET
FEBRUARY 28, 1987

ASSETS:			
Cash		-3076.43	
Accounts Receivable		1233.50	
Mining Equipment	70000.00		
Less Depr. Mining Eq.	7000.00	63000.00	
Wells	8450.93		
Less Depr. Wells	1268.00	7182.93	
Improvements	5971.55		
Less Depr. Improvemets	197.00	5774.55	
Ash Peak Mine	1656000.00		
Less Depletion Mine	35443.00	1620557.00	
Organization Costs	111.85		
Less Amort. Org Costs	22.00	89.85	
Deposits		200.00	
TOTAL ASSETS			1694961.40
LIABILITIES:			
Note Pble-1st Interstate		50000.00	
Purchase Option Pble		1656000.00	
Convertible Notes Payable Stockholders		112000.00	
TOTAL LIABILITIES			1818000.00
CAPITAL:			
Common Stock Issued and Outstanding		28000.00	
Retained Earnings		-151038.60	
CAPITAL			-123038.60
TOTAL LIABILITIES AND CAPITAL			1694961.40

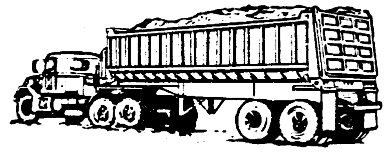
ARIZONA FLUX MINES, INC.
PROFIT AND LOSS STATEMENT
FOR YEAR ENDING FEBRUARY 28, 1987

INCOME:		
Flux Sales		249021.10
LESS MINING COSTS:		
Contracting	136345.68	
Shipping	126099.09	
		262444.77
OPERATING PROFIT/LOSS		-13423.67
OTHER EXPENSES:		
Royalties	1214.61	
Assays	2901.95	
Travel & Auto	2421.66	
Promotion & Advertising	617.55	
Telephone	936.23	
Electric	1229.21	
Office Expense	949.58	
Security	1350.00	
Insurance	399.00	
Fees	159.50	
Other Professional Services	15306.86	
Repairs and Maintenance	363.76	
Subscriptions	29.00	
Interest	732.85	
Bank Charges & Misc.	73.17	
TOTAL OTHER EXPENSES		28684.93
PROFIT OR LOSS		-42108.60
NON-CASH ITEMS:		
Interest on Purchase Option	65000.00	
Amortization Expense	22.00	
Depreciation Expense	8465.00	
Depletion Expense	35443.00	
TOTAL NON-CASH ITEMS		108930.00
NET PROFIT OR LOSS		-151038.60

INFO. ON CURRENT OPERATIONS



Maddux & Sons



L. R. MADDUX
EMPIRE
364-7564
364-7565

1927 Pan American Ave.
Box 1077
Douglas, Az. 85607

Trucking & Excavating
Redi Mix Concrete

October 1, 1987

AZ Flux Mines
P. O. Box 26706
Tucson, AZ 85726

Dear Mr. Becker,

In regards to our conversation on the telephone yesterday about your expansion of production at the mine at Ash Peak. We will be looking forward to serving your trucking needs.

At this time your your production schedule is approximately twenty to thirty loads per week. If you were to double or even triple this production we are prepared to meet your needs. We feel the equipment we now have would handle this production expansion with ease and are prepared to purchase more equipment and enlarge the fleet to meet any of your demands in the future if need be.

Good luck to you and your partners in this endeavor!

Sincerely,

Lenard R. Maddux

Lenard R. Maddux

LRM/tmv

ARIZONA DEPARTMENT OF REVENUE

ARIZONA DEPARTMENT OF REVENUE
LICENSE & REGISTRATION SECTION
CAPITOL BUILDING – WEST WING
1700 WEST WASHINGTON
PHOENIX, ARIZONA 85007

MUST BE
DISPLAYED IN A
CONSPICUOUS PLACE

TRANSACTION PRIVILEGE TAX LICENSE

-NOT TRANSFERABLE-

THIS LICENSE CAN NOT BE TRANSFERRED FROM ONE PERSON TO ANOTHER NOR CAN IT BE TRANSFERRED FROM ONE PLACE TO ANOTHER. STATUTES REQUIRE LICENSEES TO NOTIFY THE DEPARTMENT OF REVENUE IF BUSINESS IS DISCONTINUED, CHANGE IN NAME OF BUSINESS, CHANGE IN TRADE NAME, CHANGE IN LOCATION, CHANGE IN MAILING ADDRESS OR IF THERE IS A CHANGE IN OWNERSHIP.

THE BELOW NAMED LICENSEE IS HEREBY LICENSED TO CONDUCT BUSINESS, IN THE NAME OF THE LICENSEE NAMED AND THE ADDRESS SHOWN. UPON THE CONDITION THAT HE SHALL PAY THE TAX ACCRUING TO THE ARIZONA DEPARTMENT OF REVENUE UNDER PROVISION OF ARS TITLE 42, CHAPTER 8, ARTICLE 1.

ISSUED TO

AZ FLUX MINES INC
C/O WR BECKER SR
PO BX 26706
TUCSON AZ 85726

06-002271-H

ALL communications and Reports MUST REFER to this LICENSE NO.

02 BUSINESS CODE

05/01/87 EFFECTIVE DATE

(DBA) AZ FLUX MINES INC
9 M W OF DUNCAN ON S SIDE HWY 70
DUNCAN AZ 85534

06/12/87 PRINT DATE

DOR 87026 (9/86)

DEPARTMENT OF THE TREASURY — BUREAU OF ALCOHOL, TOBACCO AND FIREARMS

LICENSE/PERMIT (18 U.S.C. CHAPTER 40, EXPLOSIVES)

In accordance with the provisions of Title XI, Organized Crime Control Act of 1970, and the regulations issued thereunder (27 CFR Part 55), you may engage in the activity specified in this license/permit within the limitations of Chapter 40, Title 18, United States Code and the regulations issued thereunder, until the expiration date shown. See "WARNING" and "NOTICE" on back.

DIRECT ATF CORRESPONDENCE TO	REGIONAL DIRECTOR (COMPLIANCE) BATF, P.O. BOX 2994 ATLANTA, GEORGIA 30370	LICENSE/ PERMIT NUMBER	9-AZ-010-33-8K-92080
		EXPIRATION DATE	OCTOBER 1, 1988
NAME	ARIZONA FLUX MINES, INC.	LICENSED PREMISES:	HWY 70 TUCSON, AZ 85726
TYPE OF LICENSE OR PERMIT	33 - USER OF HIGH EXPLOSIVES		
REGIONAL DIRECTOR (COMPLIANCE)	BY: Joseph D Bailey		

PURCHASING CERTIFICATION

I certify that this is a true copy of a license/permit issued to me to engage in the activity specified.

(SIGNATURE OF LICENSEE/PERMITTEE)

LICENSEE OR PERMITTEE MAILING ADDRESS

ARIZONA FLUX MINES, INC.
P.O. BOX 260706
TUCSON, AZ
85726

The licensee/permittee named herein shall use a reproduction of this license/permit to assist a transferor of explosives to verify the identity and status of the licensee/permittee as provided in 27 CFR Part 55. The signature on each reproduction must be an ORIGINAL signature.

ATF F 5400.14/5400.15, Part 1 (9-84) REPLACES ATF Forms 4706 and 4708, PART I, WHICH ARE OBSOLETE

SMELTER CONTRACTS

PHELPS DODGE CORPORATION
2600 NORTH CENTRAL AVENUE
PHOENIX, AZ 85004

PHELPS DODGE CORPORATION
RAW MATERIALS DIRECTOR, D. K. FARQUHAR
WESTERN OPERATIONS, c/o MORENCI BRANCH
MORENCI, ARIZONA 85540

PURCHASE CONTRACT

DATE October 12, 1986

SHIPPER Arizona Flux Mines, Inc.

ADDRESS P. O. Box 26706 Tucson, Arizona 85726

MATERIAL Siliceous Fluxing Ore

DELIVERY F.O.B. Tyrone-Hidalgo smelter, Phelps Dodge Corporation in drop bottom cars S.P. Series 464 thru 467 or equivalent. Truck haulage is acceptable within smelter determined quantities.

SECTION I - ECONOMIC

PAYMENT Payment to be made within 30 days after the date of the exchange of assays. In the case of the shipper not submitting an assay receipt, the Phelps Dodge assay results will be used for the settlement. If a sample is sent to an Umpire, settlement will be delayed until after receipt of the Umpire results.

Silver: Deduct 25% of the silver content, and pay for 100% of the balance at the weekly average Handy & Harmon quotation in Metals Week for the week ending Friday in which the shipment is received.

CHARGES Silica: Ore less than 75% SiO_2 will be charged at $1.00 per unit (1 percentage point = 1 unit = 20 lbs.) fractions in proportion.

Alumina: Above 6 %, charge excess at $1.00 per unit, fractions in proportion.

Above purchase terms are subject to the following non-economic section of this contract.

SECTION II - NON-ECONOMIC

TERMS Agreement will be in force from 'Effective Date' until terminated by Phelps Dodge Corporation. Termination will require thirty (30) days written notice to the Shipper by Phelps Dodge. All terms of this Contract are subject to review and re-negotiation.

Basic weight units will be troy ounces, avoirdupois pounds and short dry tons. The word "unit" will mean "1 percentage point (1.0%)", or 20 pounds.

QUANTITY The Shipper will be advised by Phelps Dodge on a monthly basis as to the quanitity and lot size. Delivery to be within the contracted calendar month. This contract is for (see addendum) tons/month.

WEIGHING, SAMPLING & ASSAYING

Weighing, sampling, moisture determination and assaying will be conducted in accordance with standard practices at the Smelter after receipt of material. The Shipper shall have the right to be present, or have his representative present, at the weighing and sampling procedures.

If the Shipper so desires, and notifies the Tyrone-Hidalgo branch, Phelps Dodge Corporation, prior to the receipt of the siliceous material, then he shall have the right to assay or cause to be assayed by a reputable and qualified assayer his quarter of the sample of his shipment. The Shipper, on receipt of his assay certificate, shall present same to the Chief Accountant of the Branch or his representative, who shall then present at that time the Smelter's assay certificate for comparison. If the variation between the two certificates do not exceed the following splitting limits:

Copper	=	0.15%
Silver	=	0.15 oz/ton
Gold	=	0.010 oz/ton
Lead	=	0.05%
Zinc	=	0.2%
Arsenic	=	0.4%
Antimony	=	0.4%
Bismuth	=	0.1%
Fluorine	=	0.005%
Chlorine	=	0.01%

then the settlement will be established on the average between the respective assays. In the case of the variation exceeding the splitting limits, a mutually acceptable Umpire shall be chosen from the following assayers:

Mountain States Research & Development, Tucson
Metallurgical Labs, San Francisco
American Analytical, Tucson
Skyline Labs, Tucson
North American Assay, Tempe

The Umpire's assay result shall be final, providing it is not higher than the highest result or lower than the lowest result of the Shipper and Smelter assay certificates. Settlement shall be based on the assay nearest to the Umpire's. Cost of the Umpire analysis shall be borne by the party whose assay result is the furthest from the Umpire's.

WITHHOLDING

If any third party should make claim to any of the siliceous material or the purchase price for the same, payment may be withheld for aforesaid material until such time as the dispute has been resolved by:

a) Arbitration pursuant to the provisions of SS 12-1501 et seq., Arizona Revised Statues,

or,

b) Mutual agreement among the parties by which the claims of all contesting parties are resolved and the Tyrone-Hidalgo Branch, Phelps Dodge Corporation is released from any and all liability in connection with the purchase of and payment for said siliceous material.

WARRANTIES

The Shipper warrants that it has the right to mine and ship siliceous material to the Tyrone-Hidalgo Branch, Phelps Dodge Corporation, hereunder, and that it will have good title to all siliceous material delivered to the Tyrone-Hidalgo Branch, Phelps Dodge Corporation, and the Shipper agrees to indemnify and hold the Tyrone-Hidalgo Branch, Phelps Dodge Corporation, from any and all claims, demands, obligations and liabilities of any kind whatsoever that may be asserted against the Tyrone-Hidalgo Branch, Phelps Dodge Corporation, for or on account of siliceous material delivered hereunder, or the purchase thereof.

FORCE MAJEURE

Either party herto shall be excused from performance during any period such performance is prevented by govermental action, war, fire, flood or other force majeure cause beyond the control of such party, or by strike, lockout, or failure of transportation facilities, and the Tyrone-Hidalgo Branch, Phelps Dodge Corporation, shall not be required to order, accept or receive any siliceous material hereunder during any period when the operations of the Tyrone- Hidalgo Branch, Phelps Dodge Corporation are suspended or curtailed on account of any such cause.

Payment for siliceous material sampled during a period when force majeure has been declared shall be extended by a period of time equivalent to the number of days which force majeure was in effect.

PHELPS DODGE CORPORATION

by D K Farquhar
Donald K. Farquhar
Title Raw Materials Director, Western Operations

Date September 30, 1986

Accepted:

ARIZONA FLUX MINES, INC.
(Shipper)

by [signature]
(Authorized Rep. For Shipper)

Title President and General Manager

Date 10/8/86

Letter of Addendum
for
Arizona Flux Mines, Inc.
Siliceous Fluxing Contract
Dated: October 12, 1986

Section I. Economic provisions

a. Payment: In addition to the contract terms, the sized (1/4 - 3/4 inch converter flux and minus 10 mesh flux) will be paid for at the rate of $18.00 per dry standard ton two weeks following receipt of material.

b. Charges: (minus 10 mesh flux only) For each percent above 10% which does not pass a Tyler 10 mesh screen, a charge of $1.00 per unit, fractions in proportion, will be made.

Any time Phelps Dodge net cost per ton for flux exceeds $8.80 before penalty deductions, based on 90% recovery of precious metals and example calculation, based on a minimum lot of 200 tons, then this excess amount shall be deducted from the next future shipments.

Example Calculations

Assumptions:
Silver = 3.0 oz/ton
Silver = $5.50 per oz
Gold = 0.015 oz/ton
Gold = $400 per oz
Silica = 74% SiO_2
Al_2O_3 = 4%
-10 mesh = 95%

I. Calculation of payments per ton due Ash Peak Mines:

	Payments	Penalties	Net	Notes
Ore	$18.00	-	$18.00	-
Silver	$12.375	-	$12.375	3 oz/ton x 0.75 x $5.50
SiO_2	-	<1.00>	<$1.00>	(75%-74%) x $1.00/ton
Al_2O_3	-	0	-	within specification
-10 mesh	-	0	-	within specification
Total	$30.375	<$1.00>	$29.375	

II. Calculation of Net flux profit <cost> - excluding penalties:

	Costs	Smelter Credits	Notes
Ore:	<$18.00>	-	
Silver:	<$12.375>	$14.850	credit = 3.0 x 0.9 x $5.50
Gold:	-	$ 5.40	credit = 0.015 x 0.9 x $400
Totals	<$30.375>	$20.25	

Costs/ton = <30.375>
Credits/ton = 20.25
Net cost/ton = <$10.125>
Allowed net costs/ton = <$8.80>
Amount reduction on future shipment = ($10.125 - 8.80) x tons
= $1.325 x tons

Section II. Non-Economic Provisions

1. Quantity
   a. Converter flux (sized 3/4" - 1/4") to be delivered at the rate of 1500 tons per month.

   b. Minus 10 mesh flux to be delivered at the rate of 1500 tons per month.

Accepted:
Phelps Dodge Corporation

by

Title Raw Materials Director

Date September 30, 1986

Accepted:
Shipper: Arizona Flux Mines, Inc.

by

Title

Date 10/8/86

PHELPS DODGE CORPORATION
2600 NORTH CENTRAL AVENUE
PHOENIX, AZ 85004

PHELPS DODGE CORPORATION
RAW MATERIALS DIRECTOR, D. K. FARQUHAR
WESTERN OPERATIONS, c/o MORENCI BRANCH
MORENCI, ARIZONA 85540

PURCHASE CONTRACT

DATE ________________

SHIPPER Arizona Flux Mines, Inc.

ADDRESS P. O. Box 26706 Tucson, Arizona 85726

MATERIAL Siliceous Fluxing Ore

DELIVERY F.O.B. Chino Mines Company smelter. Truck haulage is acceptable within smelter determined quantities.

SECTION I - ECONOMIC

PAYMENT Payment for payable silver content to be made within 30 days after the date of the exchange of assays. In the case of the shipper not submitting an assay receipt, the Chino Mines Company assay results will be used for the settlement. If a sample is sent to an Umpire, settlement will be delayed until after receipt of the Umpire results.

Ore: Pay \$16.00 per dry standard ton for sized (minus 1/4") flux two weeks following receipt of material.

Silver: Deduct 25% of the silver content, and pay for 100% of the balance at the weekly average Handy & Harmon quotation in Metals Week for the week ending Friday in which the shipment is received.

CHARGES Silica: Ore less than 75% SiO_2 will be charged at \$1.00 per unit (1 percentage point = 1 unit = 20 lbs.) fractions in proportion.

Alumina: Above 6 %, charge excess at \$1.00 per unit, fractions in proportion.

Economic - At any time Chino Mines Company net cost per ton flux exceeds \$6.80 before penalty deductions, based on 90% recovery of precious metals and example calculation described in appendix A, based on a minimum lot of 200 tons, then this excess amount shall be deducted from the next future shipments.

Above purchase terms are subject to the following non-economic section of this contract.

SECTION II - NON-ECONOMIC

TERMS Agreement will be in force from 'Effective Date' until terminated by Chino Mines Company. Termination will require thirty (30) days written notice to the Shipper by Chino Mines Company. All terms of this Contract are subject to review and re-negotiation.

Basic weight units will be troy ounces, avoirdupois pounds and short dry tons. The word "unit" will mean "1 percentage point (1.0%)", or 20 pounds.

QUANTITY The Shipper will be advised by Chino Mines Company on a monthly basis as to the quantity and lot size. Delivery to be within the contracted calendar month. This contract is for 750 tons, but may be increased by mutual agreement between Chino Mines Company and Arizona Flux Mines, Inc.

WEIGHING, SAMPLING & ASSAYING

Weighing, sampling, moisture determination and assaying will be conducted in accordance with standard practices at the Smelter after receipt of material. The Shipper shall have the right to be present, or have his representative present, at the weighing and sampling procedures.

If the Shipper so desires, and notifies the Chino Mines Company, prior to the receipt of the siliceous material, then he shall have the right to assay or cause to be assayed by a reputable and qualified assayer his quarter of the sample of his shipment. The Shipper, on receipt of his assay certificate, shall present same to the Chief Accountant of the Branch or his representative, who shall then present at that time the Smelter's assay certificate for comparison. If the variation between the two certificates do not exceed the following splitting limits:

Copper	=	0.15%
Silver	=	0.15 oz/ton
Gold	=	0.010 oz/ton
Lead	=	0.05%
Zinc	=	0.2%
Arsenic	=	0.4%
Antimony	=	0.4%
Bismuth	=	0.1%
Fluorine	=	0.005%
Chlorine	=	0.01%

then the settlement will be established on the average between the respective assays. In the case of the variation exceeding the splitting limits, a mutually acceptable Umpire shall be chosen from the following assayers:

Mountain States Research & Development, Tucson
Metallurgical Labs, San Francisco
American Analytical, Tucson
Skyline Labs, Tucson

The Umpire's assay result shall be final, providing it is not higher than the highest result or lower than the lowest result of the Shipper and Smelter assay certificates. Settlement shall be based on the assay nearest to the Umpire's. Cost of the Umpire analysis shall be borne by the party whose assay result is the furthest from the Umpire's.

WITHHOLDING

If any third party should make claim to any of the siliceous material or the purchase price for the same, payment may be withheld for aforesaid material until such time as the dispute has been resolved by:

a) Arbitration pursuant to the provisions of SS 12-1501 et seq., Arizona Revised Statues,

or,

b) Mutual agreement among the parties by which the claims of all contesting parties are resolved and the Chino Mines Company, is released from any and all liability in connection with the purchase of and payment for said siliceous material.

WARRANTIES

The Shipper warrants that it has the right to mine and ship siliceous material to the Chino Mines Company, hereunder, and that it will have good title to all siliceous material delivered to the Chino Mines Company, and the Shipper agrees to indemnify and hold the Chino Mines Company, from any and all claims, demands, obligations and liabilities of any kind whatsoever that may be asserted against the Chino Mines Company, for or on account of siliceous material delivered hereunder, or the purchase thereof.

FORCE MAJEURE

Either party herto shall be excused from performance during any period such performance is prevented by governmental action, war, fire, flood or other force majeure cause beyond the control of such party, or by strike, lockout, or failure of transportation facilities, and the Chino Mines Company, shall not be required to order, accept or receive any siliceous material hereunder during any period when the operations of the Chino Mines Company, are suspended or curtailed on account of any such cause.

Payment for siliceous material sampled during a period when force majeure has been declared shall be extended by a period of time equivalent to the number of days which force majeure was in effect.

CHINO MINES COMPANY

by C K Vance

C. K. Vance

Title Manager, Chino Mines Company

Date 7-1-87

Accepted:

ARIZONA FLUX MINES, INC.

(Shipper)

by

(Authorized Rep. For Shipper)

Title President and General Manager

Date 7/6/87

APPENDIX A

Example Calculations

Assumptions:

Silver	=	3.0 oz/ton
Silver	=	$5.50 per oz
Gold	=	0.015 oz/ton
Gold	=	$400 per oz
Silica	=	74% SiO_2
Al_2O_3	=	4%

I. Calculation of payments per ton due Ash Peak Mines:

	Payments	Penalties	Net	Notes
Ore	$16.00	-	$16.00	-
Silver	$12.375	-	$12.375	3 oz/ton x 0.75 x $5.50
SiO_2	-	<1.00>	<$1.00>	(75%-74%) x $1.00/ton
Al_2O_3	-	0	-	within specification
Total	$28.375	<$1.00>	$27.375	

II. Calculation of Net flux profit <cost> - excluding penalties:

	Costs	Smelter Credits	Notes
Ore:	<$16.00>	-	
Silver:	<$12.375>	$14.850	credit = 3.0 x 0.9 x $5.50
Gold:	-	$ 5.40	credit = 0.015 x 0.9 x $400
Totals	<$28.375>	$20.25	

Costs/ton = <28.375>
Credits/ton = 20.25
Net cost/ton = <$8.125>
Allowed net costs/ton = <$6.80>
Amount reduction on future shipment = ($8.125 - 6.80) x tons
= $1.325 x tons

AGREEMENT NO. C86400

ARIZONA FLUX MINES, INC., P. O. Box 26706, Tucson, Arizona 85726, hereinafter called "AFM", agrees to sell and deliver.............

AND

ASARCO, Incorporated, 180 Maiden Lane, New York, New York 10038, hereinafter called "ASARCO", agrees to purchase and receive.......

1. PRODUCT

Siliceous flux produced by AFM from properties owned or controlled by AFM, approximately 10 miles west of the townsite of Duncan, Greenly County, Arizona on Highway 70.

2. QUANTITY

500 tons of product, any excess at ASARCO's option.

3. QUALITY AND ANALYSIS

Product shall be crushed and sized to minus 3/4 inch plus ¼ inch, unless otherwise specified by ASARCO and shall be of substantially the following analysis:

Cu	0.03%
SiO_2	greater than 85%
Fe	2.5%
CaO	0.5%
Al_2O_3	less than 3%

4. DURATION

The period of this agreement shall commence with product delivered on and after April 21, 1986, and shall continue thereafter until the specified tonnage of product is

4. DURATION CONT'D

delivered; provided, however, that the duration of this agreement shall not extend beyond May 31, 1986.

5. DELIVERY

F.O.B. ASARCO's Hayden, Arizona Plant (hereinafter "HAYDEN") in open top self-dumping trucks to a point within the Hayden Plant as designated by ASARCO.

6. PRICE

The purchase price of the product is $28.50 per net dry ton based upon an analysis of the silica content of 85% or greater and of the alumina content of 3% or less.

For each unit of silica less than 85%, ASARCO shall debit AFM 50 cents per unit, fractions in proportion.

For each unit of alumina in excess of 4%, ASARCO shall debit AFM 50 cents per unit, fractions in proportion.

The agreed purchase price is based upon AFM's current estimates of wages, utilities and supplies.

7. WEIGHING, SAMPLING AND ASSAYING

ASARCO will weigh product at the Hayden Plant. Sampling and moisture determinations as done by ASARCO promptly after receipt of product will be accepted as final. After sampling, the product may be placed in process, commingled or otherwise disposed of by ASARCO. ASARCO's assays will govern.

8. SETTLEMENTS

ASARCO shall make each settlement on all shipments during each calendar month promptly on the earliest practiceable date following the obtaining of all necessary information.

9. TAXES

All taxes or other governmental charges, national, state, local or municipal, now or hereafter imposed in respect

9. TAXES CONT'D

to or measured by the product purchased hereunder, or the production, extraction, transportation thereof, or of the metals derived therefrom, other than income taxes levied upon ASARCO shall be for the account of AFM.

10. DEFINITIONS

A ton means a dry short ton or 2,000 dry avoirdupois pounds.

A unit means 1% or 20 pounds per ton.

A calendar month means a named month in the calendar.

11. SUCCESSION

This agreement shall bind and inure to the benefit of the parties hereto, their legal representatives, successors, and assigns. This agreement shall not be assignable by either party hereto without the written consent of the other. Such consent shall not be unreasonably withheld.

12: NOTICES

All notices, requests and other communications hereunder shall be in writing and shall be deemed to have been duly given or made when sent by first-class mail, postage prepaid, addressed:

if to ASARCO:

ASARCO Incorporated
P. O. Box 98
Hayden, Arizona 85235
Attention: Manager

and if to AFM:

ARIZONA FLUX MINES, INC.
P. O. Box 26706
Tucson, Arizona 85726
Attention: Mr. Wes Becker

or, in each case, at such other address as may be hereafter or has been designated most recently in writing by the

12. NOTICES CONT'D

addressee to the addressor.

Any notice given hereunder may be given by telegraph or telex and confirmed by mail in due course in which case such notice shall be deemed or served when sent in telegraphic form.

13. WAIVER

Waiver of any breach of any provision hereof shall not be deemed to be a waiver of any other provision hereof or of any subsequent breach of such provision.

14. ASSIGNMENT

Buyer shall not assign its rights or delegate its performance hereunder without prior written consent of ASARCO, and any attempted assignment or delegation without such consent shall be void.

15. AMENDMENTS, ENTIRE AGREEMENT

The provisions of this agreement shall not be changed or supplemented except by means of a written amendment signed by both parties. This agreement contains the entire understanding of the parties and no representation, promise or condition not incorporated herein shall be binding on either party.

The terms hereof shall take effect as a contract made in accordance with and be governed by the laws of the State of New York and shall come into full force and effect as of April 21, 1986, when signed by both parties.

Dated 4/11/86

ARIZONA FLUX MINES, INC.	ASARCO, Incorporated
BY: [signature] pres.	BY: [signature]
	TITLE Material Handling Superintendent
	Hayden Plant

87407

AGREEMENT NO. C86406

Arizona Flux Mines, Inc., P. O. Box 26706, Tucson, Arizona, hereinafter called 'seller', agrees to sell and deliver..

AND

ASARCO, Incorporated, 180 Maiden Lane, New York, New York 10038, hereinafter called "ASARCO", agrees to purchase and receive..............................

1. PRODUCT AND TONNAGE

A single parcel not to exceed 1,000 dry tons of siliceous flux produced from the Duncan Mine, located near Duncan, Arizona. Product shall be sized to 100% minus 10 standard mesh.

2. ANALYSIS

Seller agrees that the product will be substantially of the following analysis:

Oz Per Ton		PERCENT		
Au	Ag	SiO2	Fe	Al2O3
.015	4.0 - 5.0	80.0	2.0	1.0

3. DELIVERY

The seller shall deliver product in self-dumping trucks, freight prepaid, to a point designated by ASARCO at it's Hayden, Arizona Plant.

4. PRICE

$38.50 per dry net ton, f.o.b. truck, at ASARCO's Hayden, Arizona plant-site based upon an analysis of the silica content of 80% or greater and of the alumina content of 5% or less. For each unit of silica less than 80%, ASARCO shall debit the seller 50 cents per unit per ton, fractions in proportion. For each unit of alumina in excess of 5%, ASARCO shall debit seller 50 cents per unit per ton, fractions in proportion.

5. WEIGHING AND SAMPLING

Weighing and sampling will be done at plant of ASARCO in accordance with standard practice, and after sampling, product may be placed in process, commingled, or otherwise disposed of by ASARCO. If assays of ASARCO and seller are within limits specified, settlement assays will be determined by averaging the two results. If assay comparisons are greater than the limits, the control sample will be submitted to umpire. Umpire shall be selected in rotation from list mutually agreed upon whose assays shall be final if within the limits of the assays of the two parties; and, if not, the assays of the party nearer to the umpire shall prevail. Losing party shall pay cost of umpire. In case of seller's failure to make or submit assays, ASARCO's assays will govern.

SPLITTING LIMITS

Silica	2.0%
Alumina	0.5%

6. SETTLEMENT

ASARCO will make cash settlement following the completion of each calendar month's receipts.

7. ROYALTIES AND TAXES

All royalties and also taxes or other governmental charges shall be for the account of SELLER.

8. FORCE MAJEURE

Performance of this agreement is subject to any delays caused by strike or other disabling causes beyond the control of either party.

9. DEFINITIONS

A ton means a dry short ton or 2,000 dry avoirdupois pounds.

A unit mean 1% or 20 pounds per ton.

A calendar month means a named month on the calendar.

If the agreement above is written in accordance with your understanding and otherwise satisfactory, please acknowledge your acceptance by signature below and return two fully executed copies to this office.

Yours very truly,

ASARCO Incorporated

BY Doug Modrow

DOUG MODROW, ASARCO Hayden Plant
Ore Purchaser

Dated: Jan 20, 1987

Accepted:

BY

ARIZONA FLUX MINES, INC.

RESUMES

R E S U M E

NAME:	Leslie Hilton Billingsley
ADDRESS:	Rt. 1 Box 9, Old Virden Road, Duncan, AZ 85534
TELEPHONE:	(602) 359-2783
SOCIAL SECURITY:	527-66-0873
BIRTHPLACE:	Safford, Arizona
BIRTHDATE:	October 27, 1942
MARITAL STATUS:	Married to Ellen Estes . Three children.
HEALTH:	Excellent
EDUCATION:	Graduation from high school in Duncan, Az, 1962
ACTIVITIES:	Very active in church and community (Little League, and 4-H Club).

EMPLOYMENT HISTORY:

3/87 - Present: Superintendent for Arizona Flux Mines, at the Ash Peak Mine. Responsible for the daily underground production, the surface crushing plant, safety, hiring of personnel, and maintenance of a 100 ton per day silica flux mine.

11/86-3/87: SUPERINTENDENT - Oak Creek Contractors. Overseeing concrete retainers and concrete pours. Left for Arizona Flux Mines.

2/85-11/86: MINE SUPERINTENDENT - La Paz Mining. Responsible for daily production plant feed, maintenance of grade, execution of mining plan, maintenance, and daily reports. Project was ended because of environmental problems.

12/84-2/85: PARTNER - Bear Creek Partners. Initiated exploration, and production of gold placer just north of Silver City, NM. Project was bought out by La Paz Mining.

3/81-12/84: MINE MANAGER - Queenstake Resources, U.S.A., Inc. Responsible for the shaft sinking, headframe emplacement, underground development work and mine preparation for the Canadian company. Left when Queenstake started to cutback on work.

4/77-3/81: OFFICER, PARTNER - Oak Creek Contracting, Duncan Arizona. In 1978 constructed and put into operation a gravel and concrete plant. In 1979 did a $300,000 job for the U.S. Corps of Engineers. In 1980 started mining in the Imperial Mine. Also started building the headframe, put in the hoist, and cleaned out the shaft. Drove 500 feet of drift. This project was taken over by Queenstake Resources.

1/77-4/77: LEADMAN, WALKER - for R. H. Gunn Mine Developmennt, under the Gulf Oil Mining Mariana Lake Project, Gallup NM. Job entailed shaft sinking, timbering and cutting level stations.

1/75-1/77: PARTNER - OFFICER. Formed Oak Creek Contracting, Inc. Involved in all aspects of the construction business.

6/69-1/75: FOREMAN, MINE SUPERINTENDENT - for the Mount Royal Mining Company. Overseeing the development, and daily production of the mine.

11/68-6/69: SHIFT BOSS - Boyles Bros. Mine Construction. In charge of shaft sinking at Phelps Dodge's Lone Star mine near Safford,Arizona.

5/68-11/68: OPERATOR, RELIEF SHIFTBOSS - Boyles Brothers Mine Construction. While working sinking a 20 ' concrete lined shaft at Stigler, Oklahoma, we set the United States record for sinking 130 feet of completed shaft in one week. This record was repeated for several weeks in a row.

2/68-5/68: MINER, SHIFT BOSS -United Nuclear, Gallup New Mexico. Sinking 14 foot diameter shaft.

6/67-2/68: AIR TRAC OPERATOR, POWDERMAN - for the El Paso Natural Gas Mining Division, in Kingman Arizona.

7/64-6/67: MINER, OPERATOR, SHIFT BOSS - for Boyles Bros. Mine Construction in Silver City, NM. Sinking shafts and building one of the first underground crusher domes in the United States. First shift boss job.

5/64-7/64: EXTRA - with the Arizona State Highway Department. worked as driller, blaster, and operator.

2/64-5/64: OPERATOR - for C. R. Davies Construction Co. Worked as Blue Topper, and heavy equipment operator.

6/63-2/64: DRILLER, BLASTER - for Gilmore Construction. Building a Radar Tracking Station.

6/62-6/63: EQUIPMENT OPERATOR - for the Aice and Haney Construction Co. Laying CMP pipe and compacting.

Pre-1962: From age 11 worked with my father on construction jobs and underground mining. As part of my father's construction work, I helped in the moving of many houses, and other odd jobs that a small contractor does.

JOY JONATHAN MERZ

Since August, 1987 employed by Arizona Flux Mines, Inc. as Project Manager and Geologist.

JOY JONATHAN MERZ
5502 East 7th Street
Tucson, Arizona 85711

PRESENTATION OF QUALIFICATIONS
August, 1987
Telephone: (602) 790-4913

SUMMARY OF CAPABILITIES

Scope of Experience

Background encompasses multifaceted Start-up/Operational/Administrative management experience, plus a university degree at the Master's level.

Qualifications

Twenty years of "hands-on" management experience which includes: development organizing, evaluating, planning, budgeting, accounting and fiscal management/administration, school and mercantile administration, materials handling, public relations, and outstanding human relations.

Characteristics

** Bi-Cultural and Multilingual, capable of establishing a positive and productive rapport with many types of people.
** A decision maker, with excellent organizational skills.
** Career oriented, with a sense of professional dedication.

PROFESSIONAL EXPERIENCE:

November, 1986 to present: CONSULTANT on multi-precious metals deposits for American, Australian, and Mexican interests and deposits. Preparing feasibility studies and project management on two small, high grade gold deposits in the Southwest U.S.

1986-(Nine months) La Paz Mining, Inc.--------------New Mexico & Arizona
GENERAL MANAGER OPERATIONS Initially Project Manager, then General Manager of 1000 cubic yard per day alluvial gold property. **Responsibilities** include planning, cost reduction, production, personnel, equipment control, maintenance, and improvement of equipment and production design system. **Accomplishments** were reduction of overtime, improvement of plant efficiency, increase in production, and a strong preventive maintenance program with introduction of daily emphasis on safety with no lost time accidents. Project closed and job terminated for environmental reasons.

1983-1985 Southern Peru Copper Corporation (SPCC) ------------------Peru
ADMINISTRATIVE GENERAL MANAGER
Successful administrative management of two large mine units and one smelter unit, involving interaction with the surrounding communities and associated suppport facilities, including the following **responsibilities:** contract negotiations, townsites, personnel, accounting, warehouses, agencies, hospitals, mercantiles, schools, general services, public relations, and the sea port through which all materiel was imported and exported. **Accomplishments:** By minister's request drafted education law, which, when enacted in 1984, contained significant economic benefits for companies with schools. Reduced personnel requirements in all departments under my responsibility, specifically, in two departments by 15% and 16%, by increasing efficiency with no loss in service. Installed materials controls decreasing inventories by approximately $12 million. Put bonded warehouse in operation incurring additional savings.

1983 ASARCO, Inc.-ESTALSA (Joint Venture) ------------------------Bolivia
PROJECT MANAGER
Responsibilities: Manage, equip, staff, plan, supply, evaluate, and report on a four-month, $250,000 tin exploration project in the Bolivian Andes. **Accomplishments:** Finished project 1/3 under budget and 1/3 under time limits by working three shifts, seven days per week, instead of the originally planned work schedule.

1977-1982 ASARCO, Inc. ------------------------------------ Philippines
GENERAL MANAGER
Responsibilities: Budget, planning, operations, administration, contract negotiations, supplies and equipment, personnel, safety, property evaluation, financial and technical reporting, economic recommendations, government relations, public relations. **Accomplishments:** Successfully negotiated complex and difficult property agreement with claim holders. Recognized, sampled, negotiated property rights, drilled and evaluated one gold property, and two copper prospects which were passed on to the Philippine joint venture partner when ASARCO left the Philippines.

1969-1977 ASARCO, Inc. ------------------------------ Spain and Portugal
GENERAL MANAGER
Responsibilities: Budgeting, operations, planning, administration, contract negotiation, supplies and equipment, personnel, safety, property drilling and evaluation, financial and technical reporting, economic recommendations, government relations, public relations. **Accomplishments:** By ministerial request, drafted the new Spanish Mining Law for presentation the parliament. Developed concept and defined a new type of ore body not previously recognized, and confirmed its economic potential in the field. Recognized, evaluated and recommended one major alluvial tin deposit, one massive sulfide deposit, and several alluvial gold properties.

1968-1969 Diamond Shamrock Corporation ---------------- Terlingua, Texas
GENERAL MANAGER
Responsibilities: Economic recommendations, operations, plant modernization, production, design, planning, budgeting, administration, health and safety, accounting and fiscal. **Accomplishments:** turned a two-year mine production history of $90,000 per month loss, to profitility in less than ten months through attention to detail and practical solutions to production problems. In order to eliminate overtime charges and to accommodate complex shift schedule alternatives, designed work schedules to supply full work force, three shifts per day, seven days per week.

1968 Diamond Shamrock Corporation ------------------------ Aniak, Alaska
PROJECT MANAGER
Responsibilities: Planning, budgeting, drilling, sampling, evaluation, camp management, ore reserve calculation, economic assessment and recommendation, and report preparation of a mercury prospect.

1967 Diamond Shamrock Corporation ----------------------Terlingua, Texas
PROJECT MANAGER: **Responsibilities:** Preparation of ore reserve calculations, interpretation of exploration results, layout of mine production design, and long term planning.

1961-1965 ASARCO, Inc. --------------- Northern Peru and Northern Chile
MINE GEOLOGIST, and EXPLORATION GEOLOGIST
Responsibilities: Surface and underground detailed mapping, sampling, drilling, evaluation, program and project planning, economic assessment, property negotiation, ore reserve calculations, grass roots exploration. Outside property evaluation.

EDUCATION: M.S. Geology, 1966, University of Arizona.
B.S. Geology, 1961, University of Arizona.

MEMBER: Club Espanol de Mineria (Founder), American Institute of Mining Engineers, Society of Economic Geologists, Philippine Geological Society, Mining Club of the Southwest.

WES BECKER, SR.
BACKGROUND AND EXPERIENCE

Father had a small gold mine in Ash Canyon of Huachuca Mountains when I was 17-19 years old--1935.

Worked for Phelps Dodge Corporation in Bisbee for several years in the early 1940's.

Involved in mining venture near Culiacan, Mexico in 1952.

In between I was an entrepeneur--started a Drive-In Movie chain and then acquired bowling centers. I am presently retired from the operations, but they still provide my livlihood.

I went back to mining in 1979 starting the Hel-Roc Mining Company with some friends and we operated a mine and mill 15 miles south of Tucson.

During this period I knew about the Ash Peak Mine and its potential because the current owner and I were friends.

In 1981 he leased it to Phelps Dodge and they mined the flux for their Morenci smelter until it was shut down.

It took me two years to talk the owner into selling, but he did and we are now operating it as a precious metal bearing silica flux mine.

I do not consider myself a mining expert, but I am acquainted with the business and I feel I have expertise in managing and finance from a business standpoint.

I do not draw any remuneration at this time except car expense. However, I do have interest in Hel-Roc Mining Co. which owns 50% of Arizona Flux Mines, Inc.

Presently President and CEO of Arizona Flux Mines, Inc.

PURCHASE CONTRACT

LEASE, SUB-LEASE AND PURCHASE OPTION AGREEMENT

This Lease, Sub-Lease and Purchase Option Agreement entered into this 25th day of June, 1986 by and between SHAMROCK ENTERPRISES, a partnership; ASH PEAK MINING CO., INC., an Arizona corporation; and ASH PEAK RESEARCH AND DEVELOPMENT CO., a Limited Partnership, hereinafter collectively referred to as "AP", and ARIZONA FLUX MINES, INC., an Arizona corporation, hereinafter referred to as "AFM".

WITNESSETH:

Whereas, AP is the owner of seven (7) unpatented lode mining claims; three (3) unpatented placer mining claims; one (1) Arizona State prospecting permit, together with certain other improvement and property connected with said mines, located in Greenlee County, Arizona (Exhibit A).

Whereas, AP holds a Lease and Purchase Option (Setter Consent and Ratification attached) of five (5) patented lode mining claims; two (2) patented millsites; twelve (12) unpatented lode mining claims, located in Greenlee County, Arizona (Exhibit B)

Whereas, AFM is desirous of purchasing aforesaid AP mining claims and the Lease and Purchase Option (Setter Agreement) aforementioned.

NOW, THEREFORE, IT IS AGREED BETWEEN THE PARTIES AS FOLLOWS:

1. That the intent of this Agreement is to set out the terms and conditions by which AP agrees to sell and AFM agrees to buy all right and title and interest AP has in and to that certain property herein described:

Five (5) patented mining claims;
Two (2) patented mill sites;
Twenty-Two (22) unpatented mining claims;
One (1) State prospecting permit

all as set forth in Exhibits A and B attached hereto and, by this reference, made a part of this Agreement. The property shall include improvements and fixtures located at said property, including but not limited to surface and subsurface installations, power lines, structures, water well and ore stock piles, all drill cores, records and topographic, geologicl, engineering, production and environmental data. Hereafter all said real and personal property shall be referred to as Property. Specifically excluded from this property are ten (10) claims referred to as B&B and MAB set out in Exhibit C attached to this Agreement and by this reference made a part of this Agreement. AFM by this Agreement has the first right of refusal to acquire by purchase these claims though such purchase shall be made by a separate agreement on a comparable production payment basis as described herein.

2. The total purchase price for the property and the method of payment therefor is set out as follows:

a. The minimum total purchase price is $3,300,000.00. This price may increase based on changes to the Producers Price Index (PPI) as set out below in Appendix I.

b. Minimum monthly payments will be paid by AFM in accordance with the schedule set out below in Appendix II. Normally a monthly production payment will be paid by AFM to AP in accordance with the schedule set out below in Appendix III and the minimum monthly payment will be deducted from this monthly production payment. Any excess of the monthly production payment over the minimum monthly payment will be credited against the total purchase price but will not be credited against future monthly minimum payments.

c. Should AFM be required to temporarily halt operations after the second year of the period of this Agreement because production is uneconomic (due to low silver prices or smelter shutdowns, etc.) or for regulatory reasons, then the minimum monthly payment will not be in accordance with the schedule in Appendix II below, but will be reduced to $6,000.00 per month until AFM is able to resume operations. However, this period will not be longer than twelve (12) months. Upon expiration of this twelve month period, the payment schedule will revert to that outlined in Paragraph 2.b above.

d. Any minimum monthly payments not recouped by AFM from its operation of the property shall be applied against the total purchase price of the property.

e. Minimum monthly payments will be paid on the first day of each month to Shamrock Enterprises.

f. Monthly production payment will be paid to Shamrock Enterprises on or before the 15th day of each month for ore paid for by a smelter, or other, the previous month after deducting the minimum payment for the month which coincides with production payment month.

3. During the term of the Purchase Agreement, AFM would perform:

a. All necessary assessment work on the unpatented mining claims, pay the property taxes and the state lease payments on the property as well as comply with all governmental rules and regulations applicable to the exploration, development or production of mineral products from the Property. In connection therewith, AFM would make all necessary filings required by governmental agencies and would furnish copies to the owners.

b. The owners would remain liable for all third party claims and environmental liabilities accruing prior to the effective date of the Purchase Agreement and AFM would assume liability for all third party claims and environmental liabilities resulting from AFM's activities on the property occurring after the effective date of the purchase agreement.

c. Neither AFM nor AP will by any action or inaction cause any lien, charge or other encumbrance to be placed upon or against the Property, other than liens for taxes not yet due and delinquent or being contested, except that if AFM, in good faith, shall dispute the validity or amount of any claims or liability assessed against it for work performed on the Property it shall not be required to pay the same until the amount and validity thereof have been finally determined. AFM will indemnify and save AP harmless as to any laibility for or on account of injury to or death of any person or damage to any property of persons not a party hereto which are sustained during the period this Agreement remains in effect.

d. AFM's obligation under the Purchase Agreement, except for Paragraph 3.a, 3.b, and 3.c above, would be suspended during any period of force majeure.

4. AFM has the right to terminate the Lease Purchase Option Agreement at any time upon six months prior written notice, with no further obligation to accrue after the six month period. Likewise, AP has the right to terminate the Agreement upon six months prior written notice for any failure of AFM to execute the provisions of this Agreement or failure to carry out the work according to safe and prudent mining methods with minimum monthly payments due during this six month period. AFM will have sixty days to correct any failures to comply after receiving written notice of such default.

5. Upon the early termination of this Agreement, AFM shall surrender to AP the possession of the Claims and Permit lands in a condition which substantially complies with applicable state and federal laws relating to safety and to fencing or securing shafts and tunnels. AFM shall further execute and deliver to AP a quit claim deed evidencing the relinquishment of all claims contained in this Agreement.

Upon early termination of the Agreement AFM shall have a vested interest in certain portions of the property, to wit: That property owned or leased by Shamrock Enterprises and Ash Peak Mining Co., Inc. if, at the time of termination, the total of payments made by AFM to AP exceeds $1,000,000.00. AFM's proportionate interest in property owned or leased by Shamrock Enterprises and Ash Peak Mining Co., Inc. shall be based upon current price of AP property as adjusted by PPI and laid out in Paragraph 2.a and Appendix I of this Agreement at the time of early termination of this Agreement.

AFM's interest in that property described in Exhibit B shall be specifically limited to a proportionate interest only in Lease and Purchase options held by AP and will not represent any ownership whatsoever in that property unless AP has, prior to early termination of this Agreement, exercised its option to purchase and holds clear title to that property.

6. Notwithstanding the provisions of Paragraph 5 above, AFM shall have the right, within ninety (90) days following the expiration or termination of this Agreement, to remove, if it so elects, and the right of ingress and egress for such purpose, any and all PMBSF mined by AFM and stockpiled on the Property (subject to payment for such PMBSF in accordance with the provisions for production payments as laid out in Paragraph 2.b and Appendix III, such payment not applicable to the purchase price in view of expiraiton or termination of this Agreement) and any and all pipes and pipelines, improvements, structures, facilities, machinery, equipment, tools and supplies contructed, installed or placed by AFM upon the Property, except timbering, structural supports, and other improvements of a permanent nature.

7. So long as this Agreement remains in effect AFM shall perform all work relating to the Property, or cause the same to be performed, in a good and workmanlike manner and in compliance with all applicable laws and regulations, and safeguard and maintain the Property in compliance with all applicable laws and regulations, including environmental and reclamation. AFM will maintain all shafts and audits in the same condition as exists on the effective date of the Purchase Agreement.

8. AP warrants and represents to AFM that the location of each claim (patented or unpatented) has been perfected and maintained in all respects with the mining laws of the United States and of the State of Arizona and that they have good and sufficient possession, and title thereto, free of all claims, liens, encumbrances and rights of others; subject only to the paramount title of the United States and/or the State if Arizona with respect to the lease.

AP further represents and warrants to AFM that they have the full power and authority to enter into this Agreement and to deal with the Property described herein and assign said Property in accordance with the terms hereof without the leave or necessity or approval of any person except the State Land Department as to the permit.

AP further warrants and represents to AFM that there in not presently pending any suit, action, claim, dispute or other proceeding either at law or in equity affecting the property and to the best of their knowledge, information and belief, there is none now contemplated by any person or corporation and that they have taken no action which would prejudice their right, title or interest in and to said property.

9. Owners represent to AFM that they have marketable title as herein represented and do hereby convey legal rights to the Property and all incidents thereto to AFM as well as any ingress and egress and excess related thereto. In connection therewith, AP agrees that it will furnish two (2) copies of the United States Patents to the above claims within a reasonable time after the execution thereof together with the documents regarding location of the unpatented mining claims and the state lease.

Upon payment of the purchase price AP will deliver to AFM warranty deeds to all of the patented mining claims hereinabove designated and deeds to the unpatented mining claims together with proper assignments of the state prospecting permit. Said deeds and assignments shall be in recordable form and free from any and all liens, encumbrances, rights of others, all of which set forth herein.

10. During the term of this Agreement AP will, to the extent reasonably requested by AFM and at their expense, take prompt action to defend title to the Property as warranted herein and to cure any defect in the title and/or location of the mining claims in accordance with applicable mining laws. Should AP fail to take prompt action to defend such title or to cure such effects in such title, AFM may, at AP's expense take all action necessary for this purpose and such amounts expended by AFM shall be due and payable by AP upon demand. In addition to any other rights it might have, AFM shall have the

right to deduct all such amounts from any payment subsequently becoming due AP.

If there exists now or during the life of this Agreement any underlying obligations payable by AP, then AP shall cause AFM to be included in any default notices that may occur.

11. AP, at any time upon request of AFM, shall execute and acknowledge in form required by law for recording in the State of Arizona and deliver to AFM such assignments, deeds, memorandum of agreement or other instruments incorporating, referring to or carrying out the provisions of this Agreement as AFM may reasonably deem necessary in order to preserve and protect its interest under this Agreement or to effectuate the provisions herein set forth.

12. Any notice required to be given hereunder shall be sufficient as sent by United State Certified Mail as follows:

PAUL M. TURNEY
3715 Hash Knife
Tucson, AZ 85749

ARIZONA FLUX MINES, INC.
Post Office Box 26706
Tucson, AZ 85726

13. If AFM discovers any disseminated, massive, porphyritic or similar type deposit within the Property and mines the same, AFM shall pay AP a production royalty equal to five percent (5%) of the net smelter returns derived by AFM from the sale of the first five million (5,000,000) tons of ore produced from such deposit within the Property, and two percent (2%) of the net smelter returns derived by AFM thereafter from the sale of ores, concentrates, or derivatives retrieved through leaching or solution mining, mined or retrieved from such deposit within the Property. The term "net smelter returns" as used in this Agreement shall mean the gross receipts, including all bonuses and subsidies, from the sale of ores, concentrates, or derivatives retreived through leaching or solution mining, mined or retrieved from any diseminated, massive, porphyritic or similar type deposit within

the Property, less all costs, expenses, charges, and deductions incurred with respect to such ores, concentrates or derivatives subsequent to concentrating (whether or not deducted by the purchaser or paid or incurred by AFM in the first instance).

AP has rights to on-site inspection and information on all mine data not including judgemental information.

14. AP agrees that it will produce a collection agreement acceptable to AFM which will guarantee the payment of any underlying obligation of them in property being sold under this Agreement.

15. This Agreement shall be binding upon and inure to the benefit of the parties hereto, their heirs, personal representatives, successors and assigns.

16. This Agreement supercedes any and all previous agreements in connection with the property described herein.

SIGNED this 25th day of June, 1986.

ARIZONA FLUX MINES, INC.
an Arizona corporation

By: ______________________
W. R. Becker, Sr.
President

SHAMROCK ENTERPRISES
a partnership

By: ______________________
Paul M. Turney

____
Lowell T. Patton

ASH PEAK MINING CO., INC.
an Arizona corporation

By: ______________________
Paul M. Turney

ASH PEAK RESEARCH & DEVELOPMENT CO.
a limited partnership

By: ______________________ ______________________
Paul M. Turney Lowell T. Patton

EXHIBIT A

ASH PEAK CLAIMS

The following described unpatented lode mining claims situated in the Ash Peak Mining Diestict, Greenleee County, Arizona, Township 8 South, Range 30 East, G&SRB&M, the names of which are set forth below together with the date of location, the date, docket and page of recording with the Greenlee County Recorder, and the Bureau of Land Management serial number.

LODE CLAIMS

Claim Name	Date Located or Amended	RECORDED Docket	RECORDED Page	BLM Serial Number AMC
Patton No. 1	07/14/79	102	195	57278
Amended	06/05/80	109	626	
Relocated	02/24/82	131	454	165054
Patton No. 2	07/14/79	102	197	57279
Amended	06/05/80	109	628	
Relocated	02/24/82	131	456	165055
Patton No. 3	07/14/79	102	199	57280
Amended	06/05/80	109	630	
Relocated	02/24/82	131	458	165056
Patton No. 4	07/14/79	102	201	57281
Amended	06/05/80	109	632	
Relocated	02/24/82	131	460	165057
Patton No. 5	07/14/79	102	203	57282
Amended	06/05/80	109	634	
Relocated	02/24/82	131	462	165058
Patton No. 6	07/14/79	102	205	57283
Amended	06/05/80	109	636	
Relocated	02/24/82	131	464	165059
Patton No. 7	07/14/79	102	207	57284
Amended	06/05/80	109	638	
Relocated	02/24/82	131	466	165060

EXHIBIT A

SHAMROCK PLACER CLAIMS

The following described unpatented placer mining claims situated in the Ash Peak Mining District, Greenlee Copunty, Arizona, Township 8 South, Range 30 East, G&SRB&M, the names of which are set forth together with the date of location, the date, docket and page of recording with the Greenlee County Recorder, and the Bureau of Land Management serial number.

Claim Name	Date Located or Amended	RECORDED Docket	RECORDED Page	BLM Serial Number AMC
Shamrock	05/19/63	12	669	41275
Relocated	07/10/79	101	188	
Amended	05/27/80	109	640	
Shamrock No. 1	05/19/63	12	670	41276
Relocated	07/10/79	101	191	
Amended	05/27/80	109	642	
Shamrock No. 2	05/19/63	12	671	41277
Relocated	07/10/79	101	194	
Amended	05/27/80	109	644	

EXHIBIT B

1. The following described property in Greenlee County, Arizona, to-wit:

   Great Eastern (lode claim)
   Commerce (lode claim)
   Fraction (lode claim)
   Summit (lode claim)
   Homestead (lode claim)
   Commerce (mill site)
   Summit (mill site)

   United States Patent No. 783751, which is recorded in the office of the County Recorder of Greenlee County, Arizona, in Book 1 of Patents at Pages 277 to 281.

2. The following described upatented lode mining claims located in Ash Peak Mining District, Greenlee County, Arizona:

Name of Claims	Location Certificate Recorded Docket	Page
Hardy No. 1	43	339
Hardy No. 2	43	340
Lone Camp No. 3	43	361
Lone Camp No. 6	43	362
Hellfire No. 2	43	363
Sudan No. 2	43	364
Fran No. 2	43	365
Cougar No. 2	43	366
Granduc No. 2	43	367
Granduc No. 5	43	368
Granduc No. 6	43	369
Granduc No. 7	131	452

EXHIBIT C

Claim Name	Book	Page	AMC No.
B & B No. 1	105	578-9	100836
B & B No. 2	105	576-7	100837
B & B No. 3	105	580-1	100838
B & B No. 4	105	582-3	100839
MAB No. 1	105	594-5	100840
MAB No. 2	105	592-3	100841
MAB No. 3	105	590-1	100842
MAB No. 4	105	588-9	100843
MAB No. 5	105	586-7	100844
MAB No. 6	105	584-5	100845

APPENDIX I

A. The monthly minimum payment shall be increased for each three-year term of this Agreement as of July 1 of the first year of each three year term in the same proportion that the Producer Price Index (as hereinafter defined) for the preceding month of June is greater than the Producer Price Index for the month of December, 1985.

B. For purposes of this Agreement the Producer Price Index shall mean the average prices of all commodities, at all stages of processing, prodced or imported for sale in primary markets in the U.S., promulgated by the Bureau of Labor Statistics of the United States Department of Labor. In the event that such Producer Price Index or a successor or substitute index is not available, a reliable governmental or other publication shall be used in lieu of such Producer Price Index.

APPENDIX II

Minimum monthly payments will be in accordance with the following schedule subject to adjustment (upwards only) in accordance with the PPI as laid out and defined in Appendix I.

A. For the first three (3) months of the year 1986 the sum of $24,000.00 payable on or before November 20, 1985, receipt of which sum is hereby acknowledged by AP.

B. For the last nine (9) months of 1986 the sum of $4,000.00 per month totaling $36,000.00.

C. For the year 1987 the sum of $5,000.00 per month totaling $60,000.00 for the year 1987.

D. For the years 1988 through 1990 the sum of $6,250.00 per month totaling $75,000.00 for each year.

E. For the years 1991 through 1995 the sum of $20,000.00 per month totaling $240,000.00 for each year.

F. For the years 1996 through the year 2000 the sum of $33,000.00 per month until the total purchase price as herein set forth is paid in full.

APPENDIX III

Monthly production payments are determined as follows per short dry ton of such material:

1. A. For ore shipped directly to smelters, the values and tonnage are determined by reports furnished by the smelters.

   B. For ore concentrated by AFM before shipment to smelters a method for determination of values and tonnage shall be mutually agreed upon by both parties in a manner in which results are consistent with the methods used in Paragraph A above.

2. On ore having a net metal value (NMV) of twenty dollars ($20.00) or less per ton, two dollars ($2.00) per ton.

3. On ore having a NMV of fifty-two dollars ($52.00) per ton or less but more than twenty dollars ($20.00) per ton, two dollars ($2.00) per ton plus 6.25% of the difference between the NMV per ton and twenty dollars ($20.00).

4. On ore having a NMV of sixty-two dollars ($62.00) per ton or less but more than fifty-two dollars ($52.00) per ton, four dollars ($4.00) per ton plus 22.5% of the difference between the NMV per ton and fifty-two dollars ($52.00).

5. On ore having a NMV greater than sixty-two dollars ($62.00) per ton, six dollars and twenty five cents ($6.25) per ton plus 37.5% of the difference between the NMV per ton and sixty-two dollars ($62.00).

6. The NMV limits and the base per ton payment specified in Paragraphs 2, 3, 4, and 5 above shall be increased or decreased for each three-year term of this agreement as of

July 1 of the first year of each three year term in the same proportion that the Producer Price Index (as defined in Appendix I) for the preceding month of June is greater or lesser than the Producer Price Index for the month of December, 1985.

To illustrate, the NMV limits and base royalty (R) for 1985 are as follows:

NMV < $20	R = $2.00
$20 < NMV < $52	R = $2.00 + .0625 (NMV - $20)
$52 < NMV < $62	R = $4.00 + .225 (NMV - $52)
NMV > $62	R = $6.25 + .375 (NMV - $62)

Assume the Producer Price Index for the month of June, 1988 is twenty percent (20%) greater than the same index for the month of December, 1985. The NMV limits and base payment for the three-year term of July 1, 1988 through June 30, 1991 would be as follows:

NMV < $24	R = $2.40
$24 < NMV < $62.40	R = $2.40 + .0625 (NMV - $24)
$62.40 < NMV < $74.40	R = $4.80 + .225 (NMV - $62.40)
NMV > $74.40	R = $7.50 + .375 (NMV - $74.40)

7. The net metal value per short dry ton of PMBSF (Precious Metal Bearing Silica Flux) shall be determined in accordance with the folowing formula:

NMV = (Au x R)Pau + (Ag x R)Pag

Wherein:

Au = Troy ounces of contained gold per short dry ton of PMBSF

Ag = Troy onces of contained silver per short dry ton of PMBSF

R = Applicable deemed rate of recovery of the precious metal

Pau = Price of gold

Pag = Price of silver

HISTORICAL DATA

HISTORY OF THE ASH PEAK MINES

The Ash Peak Mining Claims known as the Great Eastern, Commerce, Fraction, Summit, and Homestead Lodes are located in Sections 2,3, 10, and 11 Township 8 South, Range 30 East G&S.R. M. and were surv surveyed June thry August 1913 MINERAL SURVEY NO. 3076 A&B.

The Ash Peak mines were developed by Gold Fields Consolidated before World War I by sinking the Shamrock shaft, a single compartment shaft with manway to the 800 ft level and driving drifts along the vein in both directions in the ore body at 100 ft intervals. The Commerce shaft located approximately 2000 feet South=East of the Shamrock shaft along the outcrop of the vein was sunk to the 500 foot level with drifts at 100 ft intervals along the vein in both directions. Extensive sampling was done by Goldfields but no ore was extracted.

On January 1, 1936 Veta Mines Inc with Robert H. Sayre as General Manager leased the patented Ash Peak claims from Arthur D.Murphy, and the unpatented claims from Joe Hardy, and simultaneously started to re-open and retimber the Shamrock, Commerce, and 500 ft Hardy shafts. A contract was awarded to Stearns-Roger to build a 200 ton flotation mill and a 1200 KW Diesel power plant. Inasmuch as several thousand tons of ore was blocked out no development work was done by Veta Mines other than to sink the Shamrock shaft to the 975 foot level in a desperate search for mill water and to start a connection from the 600 foot level of the Shamrock with a raise 200 feet to the 500 foot level of the Commerce. This raise was completed late in 1937 and no assay or sampling records are available. It is known however that all development muck was milled as the mill commenced operation in late 1937.

Veta Mines was unable to develop sufficient water to operate the mill (85 gpm) from the Shamrock 975 and the Murphy wells so they installed a 4" pipe line 7 miles in length from the Gila River and pumped water against a 1200 foot head with a Diesel driven triplex pump.

On January 1, 1938 President Franklin Roosevelt cut the Treasury price of silver from 77¢ per ounce to 64½¢ which eliminated the profit margin and forced Veta Mines to shut down the operation after milling all of the broken ore from the shrinkage stopes.

The mine and mill equipment were sold to Morse Brothers and the leases with Arthur D. Murphy were terminated. Veta Mines mined and mdlled 173,282 tons of ore averageing .035 ounces Gold, and 9.5 ounces of silver and left approximately 173,000 tons of tailings which averaged 2.5 ounces of silver which in later years was sold to Phelps Dodge.

At the start of World War II Inspiration Copper Co leased the patented claims from Arthur D. Murphy and opened up the Commerce shaft to produce silica flux for the Inspiration Smelter, at the rate of 80 tons per day.. After mining all of the useable ore in the Commerce they re-opened the Shamrock shaft to the 600 foot level, and mined all of the developed ore left by Veta Mines. The only development work done by Inspiration was to drive a 26 foot croscutt into the hanging wall on the 400 foot level which opened up a parallel vein to the Ash Peak vein. Inspiration developed the hanging wall vein on the 400 and 500 foot levels and mined in at a grade comparable to the Ash peak vein. Inspiration drove crosscuts to the hanging wall on the 600 foot level and drill holes at intervals for a length of 1200 feet bu: no data is available on the assay values. No mining was done below the 500 foot level on the hanging wall vein.. Inspiration found a copper- silica mine nearer to their smelter and' closed down the Ash Peak property, after shipping123,393 tons, Au.035 Ag 9.2

On May 2, 1963, Robert H. Sayre Jr., and A. George Setter negotiated a lease with option to purchase the patented claims with Arizon Title & Trust Co, Agents for the Arthur D. Murphy Estate. They also located the former Joe Hardy claims and 10 other unpatented claims. During 1964 George Morehouse and John Chapman became partners with Sayre and Setter and the claims were held by them until leased to E.E. Lewis, Inc in 1968. E.E. Lewis, a subsidiary of Beaver Mesa Exploration, did considerable sampling along the outcrop of the vein between the Commerce and the Shamrock shafts which resulted in a small open pit operation which produced tons of ore over a width of feet which averaged ounces per ton. This ore was shipped to the Phelps-Dodge Morenci smelter.

E. E. Lewis, Inc installed a hoist and headfaame and re-timbered the Commerce shaft to the 500 foot level. At the 200 foot level NW a block of ore was developed and prepared for stoping and the level was extended to develop additional ore for mining. No ore was extracte

E.E.Lewis, Inc made an application to the D.M.E.A for a government loan on a 25%-75% government participation. The loan was approved to sink the Commerce shaft 200 feet to the 700 foot level with drifts in each direction for 375 feet and for diamond drilling into the hanging and foot walls. A change in management of Beaver Mesa exploration to strictly oil exploration combined with a drop in the price of silver resulted in the termination of the E. E. Lewis lease, and the DMEA project was cancelled.

During 1978 Robert H. Sayre deeded his 10% interest in the partner--ship to A. George Setter. George Morehouse and John Chapman also deeded their interest (45%) to A. George Setter for a small carried interest.

On May 1, 1978 A. George Setter purchased the property from the Arizona Title and Trust Co, who retained a mineral interest until the option price is paid from royalties.

On April 16, 1979 a lease with option to purchase was made between A. George Setter and Paul M. Turney for the patented mining claims.

HISTORICAL REPORT ON OPERATIONS
of the
ASH PEAK MINES

January, 1968

Report on Ash Peak Mines, Greenlee County, Arizona
TS 8S, R 30E, Sections 2, 3, 10, 11
Mineral Survey No. 3076 A & B

The Ash Peak Mines were discovered in 1899 and five claims were patented October 14, 1913. The history of the early development work done by Goldfield Consolidated is documented in the Preliminary Report on the Ash Peak Mines of October 4, 1935, and Supplementary Report of December 27, 1935, by Robert H. Sayre, Sr.

Following is a summary of the history of this property after that time:

On January 1, 1936, Veta Mines, Inc. took over the operation of the Ash Peak Mine and the Hardy Group of claims. The Commerce, Shamrock, and Hardy shafts were rehabilitated. The Commerce and Hardy shafts were equipped with gasoline powered hoists, the Shamrock shaft was equipped with an electric hoist. The shaft was reconditioned and a skip with approved safety guides was installed to the 800 ft. level. Stearns-Roger Manufacturing Company were awarded a contract to build a 200 ton flotation mill and a 1000 KW power plant. Development work was started to drive the 600 ft. level of the Shamrock toward the Commerce and the 500 ft. level of the Commerce toward the Shamrock. These two levels were eventually connected by means of a raise, and ventilation established. Stoping was started on the 600 ft. level, and the mill went into production about September, 1936, and operated continuously on a 200 ton per day basis until January, 1938. The property was shut down due to a drop in price of silver from $0.775 to $0.645. The mining and milling equipment was sold and the entire property was dismantled. Veta removed 173,282 tons of ore during this period as shown on U. S. Bureau of Mines records.

On June 24, 1941, the property was re-opened as a silica flux mine by Inspiration Consolidated Copper Company smelter under the direction of Clifton H. Smith, and a lease was given to Howard Mottier of Duncan, Arizona., to operate the property. Ore was mined, trucked to Safford, Arizona, and then shipped by rail to the Inspiration smelter at Miami, Arizona. It is estimated that during this period of time, 50,000 tons of ore were mined from the Commerce workings above the fifth level and 74,000 tons from the Shamrock shaft above the 5th level. The U. S. Bureau of Mines records show a total of 123,917 tons were mined from 1946 thru 1953.

The following data on the 1951 operation was furnished to me by Harold Foard, Superintendent and ore buyer of the Inspiration Consolidated Copper Company on March 1, 1966:

Tons Mined		19,842
Values: Gold	.032 oz. @	
Silver	9.7 oz.	
Mining Costs		$139,031.00
Trucking to Solomon		22,029.00
Royalty to Arthur Murphy		12,444.00

Royalty was based on $0.50 per ton minimum or 5% on values over $10.00.

Harold Foard stated that this was a typical year toward the latter part of the operations which was finally closed down in June of 1954 and has remained idle ever since.

I obtained the following information from Cliff Smith, former Superintendent for Inspiration Copper Company, now living in Phoenix, Arizona, when I visited him on March 1, 1966.

On about the 50 ft. level of the Shamrock shaft there is a crosscut which goes from the shaft to the bottom of the creek bed. In this crosscut a quartz vein approximately two feet wide was evident and Smith decided to drive a crosscut on the 400 ft. level a distance of 24 ft. plus one round to see if this vein persisted in depth. At 26 feet he encountered this vein and it turned out to have better width and equal values to the Ash Peak vein developed by Goldfield Consolidated. Therefore, stoping was accomplished on both veins by Inspiration Copper and subsequently a crosscut was driven on the 500 ft. level, and this ore developed and mined and later a crosscut was driven on the 600 ft. level to the vein which at this point is 50 ft. in width and averages 5.6 oz. silver, according to Smith. The 600 ft. level on the Ash Peak vein is driven out 1100 feet to the west toward the Hardy shaft and a long hole drill hole was put every 100 feet from the Ash Peak vein to the Hanging Wall vein and it was found to persist for the entire 1100 feet.

No information was given on the width of the vein other than it was very wide, nor on the values of these long hole drill holes. According to Smith the Veta Mines operation used the Shamrock shaft below the 600 ft. level to "gob" their waste rock and the shaft is, therefore, filled up below this point and Inspiration never cleaned it out.

In May of 1962 additional information was obtained from the offices of Inspiration Copper Company from the retiring chief geologist, Mr. E. F. Reed, and at this time various maps were inspected and a copy of their vertical projection was obtained. From this it was determined that most of the ore developed by Goldfield Consolidated above the 700 ft. level has been mined out as well as one stope on the 800 ft. level and two stopes on the 975 ft. level. The lower workings were undoubtedly mined out by Veta Mines, Inc. Inspiration did not mine any of the ore below the 500 ft. level in the Hanging Wall vein; so it can be assumed that the Hanging Wall vein is definitely proved for a length of 1000 feet and a height of 100 feet from the 600 ft. to the 500 ft. levels. Width and value are unknown. There has been no mining of the Hanging Wall vein below the 500 ft. level and, therefore, exploration might prove a considerable tonnage.

In June of 1966 records were obtained from the United States Bureau of Mines at Denver on the Ash Peak property showing production records from 1934 to 1954. Summary of this is as follows:

Tons mined by Veta Mines, Inc., 173,282. Production 3,613 oz. gold, 933,643 oz. silver.

Inspiration Consolidated Copper mined 123,393 tons of ore with production of 4,388 oz. of gold and 1,139,201 oz. silver.

Production

Company	Tons	Gold Total Oz.	Gold Oz/Ton	Silver Total Oz.	Silver Oz/Ton
Veta Mines Inc.					
Mill	173,382	4,404	.025	1,212,693	7.0
Mill Tails	173,200	1,732	.01	433,000	2.5
Calculated Mill Heads	173,382	6,136		1,645,693	9.5
Commerce Dump					
Direct Shipping Ore	6,551	193	.029	50,074	7.6
Inspiration Consolidated Copper					
Direct Shipping Ore	123,393	4,388	.035	1,139,201	9.2
Total and Average	303,226	10,717	.035	2,834,968	9.3

Base metal production is minor and only the Veta Mines concentrates were assayed. Records show a total production from 173,282 tons of ore of 55,000 pounds of copper or .02%, and 118,000 pounds of lead or .03%.

Respectfully submitted,

A. George Setter, E.M.

A SUMMARY REPORT ON
THE ASH PEAK SILVER, GOLD, AND SILICA MINE
GREENLEE COUNTY, ARIZONA

Feliciano L. Leon
October, 1985

SUMMARY

The Ash Peak mine has sporadically produced silver, gold and silica since it was discovered in the late 1800's. Major mining companies have done work in the mine, producing substantial amounts of these commodities. The mine is now in the process of being acquired by a private group under the leadership of Mr. Wes Becker, Sr. who, together with several professionals in the mining industry, has recognized the economic potential of the property as a source of high quality silica flux and precious metals. The marketing strategy has already been planned, and potential buyers of silica flux have already been contacted.

The mine is along a system of quartz veins of at least two miles in strike length. The main vein is the Ash Peak, but parallel veins have been encountered and the possibility of finding additional veins is high. Exploration for these veins should be relatively inexpensive since the work will be done by trenching on the surface and, if successful, followed by drilling. These plans have to be discussed and carried out as mining of the existing underground reserves and treatment of existing tailings are in progress. The potential of the known veins with depth is excellent, and exploration for these extensions will also be carried out as mining operations are being carried out. The current ore reserves, including the tailings, amount to 512,000 tons of ore averaging 5.77 ounces of silver per ton and gold credits of better than 0.020 ounces per ton. It is important to note that extensive sampling done by Phelphs Dodge has encountered gold grades averaging as much as 0.030 ounces per ton. Additional sampling work is needed in some areas within the mine to define the gold grades conclusively.

Several options are open regarding the metallurgical processes to recover the precious metals. One option would be to sell the raw silica, with its metal contents, to as flux, and then get the credits for all commodities. A second option would be to recover the precious metals, at the same time upgrading the quality of the silica flux, and sell the clean silica flux to the smelters. A decision on this subject is pending. The marketing of the flux has already been investigated, and potential buyers have been secured.

INTRODUCTION

The Ash Peak mine is a well-known silver producer in the state of Arizona. It has been intermittently active since it was discovered in the late 1800's; the first claims in the area were patented in 1913. Up until 1968, a total of 303,226 tons of ore averaging 9.3 oz/ton silver and 0.035 oz/ton gold were extracted from the Ash Peak mines (Setter, 1968). The main companies responsible for this production were Veta Mines, Inc. and Inspiration Consolidated Copper, In the period 1968-1979, ores from the mine, mainly to be used as silica flus, were shipped to the Phelps Dodge smelter in Morenci, Arizona; the production record for this period totalled 17,607 tons with an average silver content of 4.045 oz/ton, for a grand total of 71,220 ounces of silver (GEM, 1972). Similar shipments for the period 1981-1984 amount to about 80,000 tons with average grades of 3.5 oz/ton silver and , in addition, Phelps Dodge has done substantial exploration work in the 1980-84 period, including diamond drilling.

This brief report discusses the geology and the economic potential of the Ash Peak mine with emphasis of the production of silica flux to supply the current smelter's needs in Arizona and New Mexico. Abundant information exists on this mine, and this brief report may not cover all of its merits. The very idea of marketing the silica along with its precious metal credits make this venture very attractive.

LOCATION

The property is about 25 miles south of Phelps Dodge's Morenci mine or 10 miles west of the town of Duncan in eastern Arizona.

GEOLOGY

The rocks in the area are Tertiary volcanics, mainly andesites, rhyolites and rhyolite tuffs. The Ash Peak system of veins has been emplaced along very strong fault zones trending northwest. The Ash Peak vein itself is in a fault zone that ranges from 25 to 60 feet in width and can be traced along its strike for more than two miles. In general, the veins are steep and their dips range from 70 degrees to nearly vertical. Parallel veins, such as the Green vein north of the Ash Peak vein, have been found, and it is highly possible that similar veins might exist in the property. The Ash Peak vein has been delineated at depth through extensive underground and surface drilling (by

Phelps Dodge) and it has also been extensively sampled in underground workings.

The veins in the property consist of massive quartz; siliceous material is also evident in the wall rocks adjacent to the veins where the rocks are strongly brecciated and silicified. It is evident that several stages of silicification have taken place along the pre-existing fault zones, or fissures.

The minerals in the veins, in order of importance, are chalcedony, quartz, calcite, rhodochrosite, argentite, pyrite and gold. Secondary minerals present in the veins are cerargyrite, malachite and gypsum. The silver-bearing mineral, argentite, is difficult to readily identify in the field; it is often observed as white "clouds" and in places is often associated with rhodochrosite and copper oxide stains. Very often, the only way to discern economic silver ore from waste is through assaying.

RESERVES

This property has virtually unlimited reserves of precious metal-bearing quartz veins. A well-planned exploration program done in conjunction with the exploitation of the known reserves will be needed in order to delineate additional reserves. The reserves, as known to date, are as shown on Table 1. The probable reserves can be converted into proven reserves with relatively minimum work, and this can be done as mining operations are in progress. The possible reserves will need substantial work in order to bring them up to the proven category.

The potential of the property also lies on the fact that it has never seriously been evaluated from a bulk-tonnage, open pit point of view. The potential of encountering additional veins, parallel to the Ash Peak vein, is very good. An inexpensive way to explore for these additional veins would be by trenching across the strike of the major veins. This possibility will be studied as work is done on the exploitation of the mine. The underground ore reserves will also be blocked out as mining progresses.

As mining is in progress, exploration both on the surface and underground will continue. Surface trenching will be done in order to uncover parallel veins or structures that can eventually be mined by open pit methods.

METALLURGY

The nature of the occurrence of argentite makes optimum recovery of the silver mineralization somewhat difficult. The reason is the fine-grained nature of the mineralization and its being encapsulated in the siliceous (quartz, chalcedony) host rocks. Optimum recovery, therefore, will be a function of the degree of grinding. Material ground up to -200 mesh will mean higher recoveries of silver and gold than material milled to a -3/8 mesh. The economics of working the Ash Peak mines will depend heavily on the metallurgical techniques that render optimum silver and gold recoveries. Alternate plans are in the investigation stages at the present time.

MARKETING

This venture has an unique approach to marketing the precious metal-bearing silica. The need for smelting flux in Arizona and New Mexico is presently very great; at least 60,000 tons of good quality silica flux, which the Ash Peak mine can easily supply, are needed by major smelting operations. These parties have already been contacted and the marketing of the products is assured. A decision has to be made as to whether the flux will be sold as unprocessed material, or as a processed, high-quality flux. Either way, the needs of the smelters will be met and the products will be sold. The mechanics of the transactions, insofar as to payment for the precious metals contained in the flux, have to be worked out.

TABLE 1

TENTATIVE ORE RESERVE CLASSIFICATION
ASH PEAK MINE, GREENLEE COUNTY, ARIZONA

ZONE	TONS	OZ/T Ag	OZ/T Au*	CLASSIFICATION
COMMERCE	56,000	5.70	NA	Proven
COMMERCE	166,000	5.70	NA	Probable
SHAMROCK	6,000	13.60	NA	Proven
SHAMROCK	88,000	8.00	NA	Probable
DEPTH	166,000	5.00	NA	Possible
TAILINGS	30,000	2.50	0.02	Proven

* Au content will average better than 0.02 oz/T overall.

TOTAL PROVEN	92,000 Tons @ 5.17 oz/T Ag.
TOTAL PROBABLE	254,000 Tons @ 6.50 oz/T Ag.
TOTAL POSSIBLE	166,000 Tons @ 5.00 oz/T Ag.
GRAND TOTAL	512,000 Tons @ 5.77 oz/T Ag.

MINING

The existing underground workings have been made very accessible by Phelps Dodge. Three ramps, each having a decline of about 12%, have been driven into strategic parts of the orebody. The underground workings are also accessible through three shafts: the Shamrock (975 feet), the Commerce (500 feet), and the Hardy (500 feet). Mineable tonnages have been, or can easily be blocked out for each of the existing stopes. The #6 stope off Ramp 3, for example, contains approximatel;y 50,000 tons of blocked out ore. A total of six stopes are ready for mining operations at the Ash Peak mine.

The existing 30,000 tons of tailings will be processed immediately, using the CIP (carbon-in-pulp) plant that is available at the site. This process will yield approximatley 20,000 tons of flux with a 90% silica content, about 60,000 ounces of silver, and about 300 ounces of gold.

PRELIMINARY REPORT OF INVESTIGATIONS;

ASH PEAK MINES

By Kevin Tod Karnei

March 31, 1986

INTRODUCTION

The purpose of of this report is to provide an overview of the Ash Peak Mine geology, feasibility of near-future development, and possibilities of long term development and exploration. Sources of stratigraphy, recent volcanics, regional correlations, and geochemistry are limited. However, much information has been obtained for future reference. Investigation techniques have been limited to review of sources from the University of Arizona and the Arizona Bureau of Geology and Mineral Technology. Preliminary field investigations as well as interviews with persons of past Ash Peak affiliations were conducted.

GEOLOGY - VOLCANICS

The volcanics seen in the area of Ash Peak are chiefly Rhyolite, ash flows and tuffs (Pyroclastics), and Andesite. Ash Peak itself is part of a complex tertiary eruptive center that was active between 21 and 24 million years ago. The uppermost unit is roughly 375 feet thick and consists of cilica rich, crystal poor rhyolitic flows, pink-grey brown in color with an occasional interbed of pyroclastic flows and tuffs. Underlying this unit is a sequence of silica-rich, pale yellowish-orange colored ash flow and air fall deposits. This unit attains a maximum exposed thickness of 300-400 feet. The significance of these two upper units is that they provided a highly permeable, silica-rich body in which meteoric, erosive ground waters could circulate. These fluids became rich in silica and associated minerals eventually leading to the emplacement of the veins. A great hydrothermal convection cell was needed to fully accomplish mineralization, but this can readily be explained by deep seated magma intrusion as a source of heat and a source of metallic enrichment. Note that the silica units mentioned above probably extended across the entire Ash Peak area and have been largely eroded to yield much silica than is evident by known veins.

The next unit down is an andesite of at least 300 feet in thickness which is part of a separate, but not necessarily older eruptive cycle, the Guthrie Peak - Turtle Mountain System. The andesite is a brownish-gray to grayish-red and has been dated from 21.8 to 22.6 million years. The significance of this outcrop is that it provided a medium in which known ore reserves were deposited within areas of faulting and/or brecciation. Underlying this andesite is a layer of thin bedded, reworked tuffaceous sandstone interbedded with airfall and other pyroclastic deposits. The maximum thickness is about 100 feet. Outcrops of this occur on the northeast side of the Ash Peak vein and is believed by the writer to show up in the number three declined adit. The significance of this unit is that it too has been brecciated and silicified in areas of faulting. The tuffaceous unit is generally believed to mark the lower end of the above mentioned andesite. However evidence of this has not as yet been viewed by the writer in the Ash Peak area and the thickness of the andesite is unknown.

Below the andesite and tuffaceous units is a crystal-rich rhyolitic flow sequence representing the earliest known unit of the Ash Peak - Rhyolite Peak eruptive center. The thickness of this unit or at exactly what depth it begins cannot be determined by current data. The significance is that it overlies older sediments of limestone, shale and sandstone either directly or indirectly. The possibility does exist that early crustal unrest deposited a layer of volcanics between the sediments and the rhyolite, but this is probably of insignificant thickness.

GEOLOGY - SEDIMENTS

Several sources including a Master's thesis and a Doctoral Dissertation indirectly concur that "favorable sediments" do correlate below the Ash Peak area. Favorable sediments are those that would initiate or facilitate the precipitation of dissoled metal ions from mineralizing solutions. Probably the most favorable beds are those of limestone because they cause drastic changes in the PH and other parameters of the solutions. These changes generally greatly reduce the solubility of metal ions resulting in their precipitation. Some of the richest ore deposits in the world occur as replacements in a setting such as this. One such example (and probably the most similar) is the El Potosi Mine, Santa Eulalia, Chihuahua, Mexico. The Santa Eulalia mineral district is famed for its production of over $600 million from nearly 500 miles of underground workings that have been developed since 1703.

Just for the record, the possible sequence of sediments is, from upper (younger) to lower (older), the cretaceous Pinkard formation of interlayered shale and sandstone, the Mississippian Modoc limestone, the Devoniah Morenci shale/limestone or the Martin limestone, the Ordovician El Paso limestone, the lower Ordovicain Longfellow limestone and the Cambrian Coronado Quartzite. Some of the units mentioned occur at the surface in the Clifton-Morenci area just 15-20 miles to the north of Ash Peak. The significance of these beds is obvious, provided they can be reached at a reasonable depth. Note that the Ash Peak Mines have been primarily developed as a precious metal bearing silica flux. No substantial exploration has been conducted below the 975 foot level of the mines.

GEOLOGY - VEINS

The veins themselves structurally follow northwest - southeast trending faults that were the main physical control of silicification. The Ash Peak vein is the most prominent at the surface striking N 60° west and dipping southwesterly 75-85°. Vein minerals are Chalcedony, Quartz, Jasper, Calcite, Rhodochrosite, Argentite, Pyrite and Gold.

The Chalcedony, Quartz, and Jasper represent silica minerals and make up the bulk of vein matter. They commonly occur in bands, as crystals, or as silicified matter in andesite. The term "Jasperoid" has been applied to veins such as this that resulted from a literal flooding of silica in various forms. The calcite in the vein may tend to dilute the ore because it is generally void or weak in precious metals, but should not present a problem except at depth. Rhodochrosite is a manganese carbonate which should present no problems at the smelter, so is insignificant. The Argentite is a silver sulphide which is not readily detectable because of its cloudy, or steaked nature in the vein. Pyrite, iron sulphide can present a problem with refining, but cannot be detected in the upper portions of the vein and probably is relatively insignificant at depth. Gold appears as submicroscopic, widely dispersed particles.

Along the hanging wall of the Ash Peak vein is an alterd zone of andesite, previously called diabase. Direct evidence of this actually being a post - minerlization dike cannot be observed at the surface. For this reason, I believe it to be simply an altered portion of andesite that occurred simultaneously with silification. The type of alteration may be referred to as argillic. Other similar altered andesites may indicate the presence of other veins in the area. This can provide a valuable exploration tool.

INITIAL REOPENING

Initial reopening, as has been discussed personally, will be limited to surface mining operations. A 580 foot long section of the vein will be taken out to an average depth of 50 feet. The vein ranges in width from 3 to 35 feet with a relative average of 13 feet. Excursions should yield over 31,416 tons of ore averaging 2.52 ounces Ag/ton with silica at 87% + - 2%. Gold should average 0.02 ounces/ton + - 0.005 ounces/ton. This should be economically feasible, depending on variations in buyer contracts. At a shipment rate of 200 tons/day, 157 shipping days will be in line from this open pit alone. Extraction will be relatively easy with little overburden and few obstacles.

Initial reopening of the shafts and underground workings should be limited to the 200 level of the commerce where 24,000 - 28,000 tons of ore in the number 6 stope (east and west) is easily accessible from the number 3 declined adit and ready to mine. Average silver is 4 - 5 ounces/ton. Development on this area should begin well before the ore of the proposed surface pit is depleted in order to allow time for maximum production in the stope. The mining techniques will be developed with further progression, but shrinkage stoping with utilization of a low-profile loader in the number 3 adit has been discussed.

The stage stage in development might be accomplished by the reopening of the number 1 declined adit. This reopening will be more costly than that of the number 3 adit, but should prove to be benificial. Roughly, 13,750 tons of 5.31 ounces Ag/ton is expected here above the 100 level of the commerce. Any further development of the properties should be initiated only after exploration has been utilized.

EXPLORATION

Exploration of the Ash Peak properties, including those recently aquired, should not be limited to one program, but rather several, each of which can be developed further as mining progresses. Starting immediately, further surface investigations should be completed to determine if other open-pit development can be extended further than that currently proposed. An accurate geologic map of the area should be made which may be updated as new areas of interest are discovered. One proposal is to carry out precious metal associated element studies and/or surface/mercury gas analyses. These may outline and consequently indicate other veins at shallow depths. Though these suggestions may at first be costly, they would greatly reduce the necessity of drill holes and subsequently reduce exploration costs.

Of course, a well planned drilling program should be conducted after operations have begun to assist future development. Part of this program should include diamond drill holes aimed to intersect the vein at great depths. Several holes should be aimed to intersect the vein below the 500 level of the commerce and below the 600 foot level of the area connecting the commerce to the Shamrock. These and others like them can be completed as mining progresses with minimal funding. However, at least two or three diamond drill holes placed strategically along the vein should be aimed to cut the vein at the 1,500 foot level or below. This may be costly, but indeed may open up a deepseated, rich ore body at or nearer to underlying sediments.

CONCLUSION

The Ash Peak mine potential is excellent considering that the availability and accessibility of known ore reserves initiates a low cost, low overhead production. However, care should be taken to locate and develope further reserves as the mine progresses in order to supply a continuous source of acceptable ore to prospective buyers. Care should also be taken to stockpile ores of varying grades. Mixture of these with currently mined ores as needed will insure consistency of shipment grade.

Please note that this report is a broad overview of preliminary investigations. Future investigations on areas of particular interest or for specific reasons may be completed in the future upon request.

Kevin T. Karnei,

Geologist

Dear Sir:

Because of the urgent need of the Miami Smelter for a steady source of supply of 50 to 80 tons daily of siliceous flux, an examination has been made of the Ash Peak Mine, special attention having been given to the Commerce workings as they present the best opportunity of starting production with a small initial investment. Shipments to Miami of over 15,000 tons from the Commerce during the past four years have shown the ore to be ideal as a smelter flux and have averaged over $9.00 in silver and gold, giving a better margin for the smelter than is readily obtainable at present from other siliceous ores in Arizona. Although siliceous ores offering a better margin might be discovered by detailed study of other mining districts, adequate investigation of the possibilities would consume several months, and the problem for the Miami Smelter must be solved immediately. Since the Commerce Mine appeared to offer the best solution to the present emergency, this examination was made.

CONCLUSIONS:

9,100 tons of positive and probable ore, averaging 4.7 feet in width and $8.40 in value, has been estimated in the Commerce Mine. This is ore which has been exposed and sampled on at least one side in drifts or raises. It may be considered as "ore in sight" and can be mined without undue difficulty by shrinkage stoping. The ore blocks range from a low of $7.20 to a high of $9.80. This grade of ore is considered satisfactory by Mr. Honeyman.

600 feet of new development is quite likely to uncover 6,000 to 15,000 more tons of commercial ore. Thus, if there was a foot of development for every 15 tons mined, the present reserves of over four months would probably be supplemented by an extra three to nine months' supply. Further prospecting might discover additional ore.

LOCATION:

The Ash Peak Mine is located on the western edge of Greenlee County in eastern Arizona. It lies just south of the paved highway connecting Lordsburg with Safford and is 9 miles west of Duncan and 25 miles east of Solomonsville, the rail point to which the ore is trucked.

PROPERTY:

The Ash Peak vein has been prospected by three main shafts. At the northwest end is the Hardy, the principal development being on the 500 and 600 levels. This mine is owned by Joseph Hardy and partners, is leased to Arthur Murphy, and is subleased to Robert Williams, who is mining it at present. About 2500 ft. to the southeast along the vein is the Shamrock shaft with extensive workings on the 500, 600, 700, 800 and 975 levels. About 1900 ft. southeast of the Shamrock is the Commerce shaft with extensive development down to the 500 level. The Shamrock, the Commerce, and the ground between and for some distance on each side is owned by the Ash Peak Mines Company, a corporation controlled by Arthur Murphy.

HISTORY:

Previous to 1916 Murphy and others sank the three shafts a few hundred feet and shipped some ore from this and other minor development. About 1916, Goldfields Consolidated took a working option on the Shamrock and Commerce and performed most of the development work done to date in both mines. In 1918 they stopped work, taking a minority share of the stock for the money spent.

In 1937, the Veta Mines, Inc., commenced stoping in all three mines and had produced by the time they shut down nearly three years later about 200,000 tons, the greater part of this having come from the Shamrock. About 170,000 tons of this was put through a flotation mill, and it is claimed the heads ran $9.36. The direct-shipping ore is supposed to have run better. The principal reason given for the closing of operations is the poor recovery obtained in the mill. In order to check this report, five samples were taken at 50-foot intervals across the tailings dump. These averaged 3.4 ounces silver and 0.01 ounces gold. Thus, with $9.36 heads, the Veta mill was losing over $2.75 in the tails. This is enough of a loss to have been an important factor in the failure of Veta's operation at Ash Peak.

After Veta shut down the mine, Arthur Murphy worked two stopes in the Commerce for a few months and shipped to Miami 3,400 tons of $8.61 ore. From the Hardy Mine Williams has shipped 1,095 tons of ore averaging $20.25.

FACILITIES:

The Commerce shaft is in fairly good condition and has a headframe and adequate water in the bottom for drilling needs. A good road leads from the paved highway to the ore bin. There is no pipe or track in the mine.

GEOLOGY:

The Ash Peak vein is continuous structurally in a northwest-southeast direction from the Hardy shaft to the Commerce and for some distance beyond in each direction, but much of it is too narrow or too low in silver to be ore. Over a considerable part of its extent the vein is marked by a prominent quartz outcrop. The vein dips southwesterly from 70 degrees to nearly vertical and cuts across flat-lying andesites.

Along the hanging wall of the vein from the Hardy to the Commerce is a dike a few feet wide of augite-andesite, locally called diabase. This dike is closely parallel to the vein but is later than the vein and cuts into it in places. In the Commerce workings the first foot of hanging-wall rock above

Mr. [illegible]

the vein is commonly fine grained like the footwall andesite. Apparently this rock is a chilled border of the dike.

The vein minerals are, in the order of abundance, white, brown and green chalcedony, quartz, white to black calcite, rhodochrosite, argentite, pyrite, and gold. Secondary minerals are found in spots and include cerargyrite, malachite, and gypsum.

Good ore is recognized by clouds of argentite and in places is associated with rhodochrosite and copper stain. Calcite is more abundant near the footwall than near the hanging wall, and values are low where calcite is prodominant. In ore of commercial grade, there is commonly three to six feet of chalcedony and quartz grading off in the footwall into two to ten feet of calcite. Although all of the quartz in the hanging-wall half of the vein may be silver-bearing, it is sometimes found that there is a streak a foot or two wide which is considerably richer than the rest. The footwall of the vein is, in most places, indefinite with calcite and quartz stringers penetrating fractured andesite for some distance.

Banding, particularly of chalcedony, quartz, and rhodochrosite is common, and there is much brecciation of the vein material and the footwall andesites. Brecciated vein matter is commonly recemented by later mineralization. In places the dike is brecciated. Narrow, nearly vertical cross fractures and veins are numerous, but apparently bear no particular relation to ore shoots. Nodules and vugs are common.

Slips and faults are uncommon near the vein except along the hanging-wall dike, where they are numerous but apparently of small magnitude and no importance, except in the Hardy Mine. In the Commerce these slips and fractures are closely parallel to the contact between the vein and the dike. They are accompanied by a little thin gouge, hematite, and kaolin. In many parts of the Commerce, the sheeting and slipping in the dike is a foot or more above the hanging wall of the vein and possibly marks a zone of weakness between the "chilled border" and the medium-grained core of the dike.

In mining the Ash Peak vein in the Commerce section, two geologic factors must be watched. First, the values are best near the hanging wall, and even where there is eight feet of vein, predominantly quartz, it is usually uneconomical to take more than five feet. Secondly, the sheeted dike offers a hanging wall which, when once started running into a stope, is difficult to stop. To avoid dilution and caving, therefore, it is good practice to try to leave a shell of solid rock between the sheeted dike and the stope. Where the sheeting and slipping is within the dike and a foot or two removed from the vein, it may be possible to mine clean to the dike. Where it is along the vein-dike contact, it is wise to try to leave 12 to 18 inches of the vein as a protective shell, even though in some cases this may result in a serious reduction in grade of ore mined. On the deeper levels where there is more moisture in the rock and at those points where the dike is much altered, the problem of sloughing, and consequent dilution, is more serious.

SAMPLING:

Fifty-three channel samples, weighing five pounds to the foot, were cut in the Commerce workings during the present examination. Sampling was limited to areas that gave promise of ore, although numerous footwall samples were cut. On the 50 and 200 levels, eight samples were cut as close as possible to old channels for which assays were available on an assay plan in Murphy's possession. The comparative results are given in the following table:

	No.	Ag	Au	Width	
Old Assay	5180	17.50	.07	5.0'	50 Level
New "	1	33.26	.06	4.6'	"
Old "	5181	9.70	.055	5.0'	"
New "	2	4.46	.015	3.7'	"
Old "	5182	4.60	.025	3.4'	"
New "	3	6.48	.02	3.8'	"
Old "	5189	3.78	.02	4.5'	"
New "	4	14.49	.11	3.5'	"
Average Old		9.42	.044	4.5'	$ 8.17 for 30' stretch
Average New		15.63	.051	3.9'	$12.80 " "
Old Assay	5261	5.02	.05	4.5'	200 Level
New "	20	8.59	.03	4.5'	"
Old "	5260	11.48	.055	4.4'	"
New "	19	7.76	.02	3.8'	"
Old "	5259	6.56	.045	4.0'	"
New "	18	14.57	.05	3.3'	"
Old "	5258	13.11	.05	4.4'	"
New "	17	11.44	.04	4.2'	"
Average Old		9.1	.05	4.3'	$ 8.15 for 25' stretch
Average New		10.4	.034	3.9'	$ 8.52 " "

Part of the discrepancy in the two averages may be attributed to the difference in width. These results and the results of other assays have led to the following conclusions: (1) the vein is very spotty, and numerous assays, closely spaced, are necessary to gain a representative average for a stretch of ore; (2) Murphy's assay map does not give too high a grade for the ore.

In Botsford's report of 1919 on Ash Peak is included a section with assays by Goldfields Consolidated. These check in a general way our sampling and Murphy's assays, but are so widely spaced as to be of no practical use in the present connection. Murphy's assay plan, however, gives assays every ten feet or closer over most of the mine, and has been used extensively in the present computation of ore reserves. Much of the sampling done in this examination was in drifts and raises run since the plotting of Murphy's map.

The present sampling and a study of the old and new assays lead to the following conclusions:

(1) Values are commonly in the first five feet of vein under the hanging wall, but where the vein is very wide, the best values occasionally are in the footwall of the vein, and the hanging wall is lean.

(2) Along strike the vein is very spotty, and a commercial stope will in most cases include a certain amount of low-grade ore.

(3) There is insufficient evidence on which to base conclusions as to the pitch or distribution of ore shoots in the Commerce.

(4) Occasional portions of the vein, which contain numerous horses of andesite are, nevertheless, good ore.

(5) Six-ounce ore cannot be distinguished with any certainty by eye from twelve-ounce ore.

(6) In a few places in the Commerce, drifts leave the ore in the walls.

(7) The relationship between average assay values obtained from channel sampling and the grade of ore mined from shrinkage stopes is not known with certainty.

ORE RESERVES:

In calculating ore in sight "positive ore" has been allowed to 25 feet above a drift which shows ore, and "probable ore" extends for the next 25 feet. Where there is any doubt as to the grade of a block or as to whether it will be mined, it has been made probable. No ore has been figured closer than 20 feet from the shaft or 20 feet below a level, or closer than 15 feet from a stope. No ore has been figured below the 500 level. The sole basis for calculating grade has been the assays from our sampling and from Murphy's plan. Blocks as low in average value per ton as $7.20 were figured because Mr. Honeyman believes such ore to be within the economic limit.

Following is a list of the individual ore blocks:

	POSITIVE					PROBABLE				
Place	Tons	Width	Ag	Au	Value	Tons	Width	Ag	Au	Value
50SE	520	4.2'	11.5	.045	$9.65	320	4.2'	11.5	.045	$9.65
"	550	5.9'	10.7	.034	8.73	330	5.9'	10.7	.034	8.73
200SE	1070	4.6'	11.9	.043	9.80	365	4.6'	11.9	.043	9.30
200NW						700	4.2'	10.3	.042	8.70
400SE						1060	5.1'	8.9	.027	7.20
400NW						670	5.3'	9.5	.038	8.00
500SE	840	4.5'	9.5	.036	7.95	1650	4.5'	9.5	.036	7.95
500NW	390	4.5'	8.2	.048	7.45	735	4.5'	8.2	.048	7.45
Totals	3370	4.7'	10.6	.041	$8.90	5730	4.7'	9.6	.038	$8.09
Positive						3370	4.7'	10.6	.041	8.90
Grand Total						9100	4.7'	10.0	.039	$8.40

The blocks listed above are shown on the section accompanying this report. Lack of satisfactory evidence as to grade has prevented the inclusion of the following probable blocks of ore:

Location	Probable Length	Probable Tonnage	Probable Grade
100 level-130' NW of Shaft, in FW	40'	1000	$8.00
300 " -120' " " " , above stope	50'	1000	7.50
400 " -250' " " " , " "	50' (plus)	1000	9.00
500 " - 90' " " " , below 400 stope	60'	1500	7.50

RECOMMENDATIONS FOR MINING ORE BLOCKS:

(1) 50 Level

The two shoots of ore on this level are of good grade and could be made ready for mining as quickly as any in the Commerce and probably could be mined right to the surface, taking as much of the outcrop as economical. Before stoping begins, the raise between the two shoots should be sampled every eight feet on each side to see if a single stope could be made of the 50-level ore. Also a few rounds should be taken in the southeast face to see if the ore extends in that direction any farther.

(2) 200 Level southeast

This stope has chutes and is one of the first that should be mined. The grade is good, but it is probable that the ore will not extend to the 100 level. Some pillars of leaner material may have to be left in this stope. A prospect raise on the best ore might be run up to the 100 level ahead of this stope.

(3) 200 Level northwest

This block should not be mined until the northwest face of the 200 level is advanced at least 140'.

(4) 400 Level southeast

The drift does not follow the best ore in all places under this block. Before mining starts, a drift should be advanced at least 40' southeast on the best ore from the southwest end of the crosscut. This block will be difficult to mine because of the brecciated hanging wall, the low grade, and the migration of values over a 20-foot width from footwall to hanging wall and back.

(5) 400 Level northwest

The northwest face should be advanced at least 40 feet before this ore is stoped.

(6) 500 Level southeast

This ore can be stoped long, as shown, and the grade kept at about $8.00, or it can be restricted in length and the grade raised to $9.00 or $10.00. It might be well to determine the extent of the shoot on the 400 level southeast before starting this stope.

(7) 500 Level northwest

This shoot, though low in grade, is better in gold than any of the others. It is very apt to lengthen out going up and produce much greater tonnage than shown.

POSSIBLE ORE:

In addition to the ore reserves of 9100 tons, there is apt to be developed by stoping and an adequate development program of say 5 to 10 feet a day, the following tonnage:

Location	Method of Development	Possible Tonnage	Probable Grade
Various	Stoping	3000	\$7.00-\$ 8.50
" (discussed under ore reserves)	Raises & Crosscuts	4500	\$7.50-\$ 9.00
"	Drifts 2,3,4 & others	5000	\$7.00-\$10.00
250' NW of shaft above 300	Drift 1	3500	\$9.00
" " 200	" 5	2500	\$9.00
300' or more SE of shaft (200L)	" 6	?	?

To obtain this additional tonnage, at least 800 feet of development may have to be done.

RECOMMENDED PROSPECTS:

Without attempting to describe all the possible prospects which are suggested above by the discussion of location of probable and possible ore shoots, six specific recommendations will be made. These are not necessarily the first six development faces to run, but they should be given consideration. They are indicated on the section in the order of preference from the point of view of developing good ore quickly.

(1) 300 drift northwest

By advancing the face 120' or more, it is very likely that a good stope above the 300 can be developed on the upward extension of the ore shoot in the northwest half of the northwest stope on the 400. Reports indicate this to be very good ore, and samples in the raise along the edge of the stope support this.

(2) 200 drift northwest

This face should be advanced at least 40 feet to see if there is a shoot of sufficient length to make a good stope. It should then be advanced another 100 feet to see if the ore stoped at the northwest end of the 300 level comes up to the 200.

(3) 400 drift northwest

This face should be advanced to the limit of ore, and at least 40 feet, to see if there is a sizeable shoot to stope here. Prospect #1 on the 300 might give some clue as to what to expect.

(4) 400 drift southeast

This face should be advanced out of the crosscut to see if there is a shoot of sufficient length, uniformity, and grade to be mined.

(5) 200 level northwest

Depending to a certain extent upon the findings of prospect #1 on the 300 northwest, this face should be advanced 200 to 400 feet from the shaft to look for the ore shoot below and as a general prospect.

(6) 200 level southeast

Surface indications suggest the possibility of a shoot to the southeast of the Commerce workings. By advancing this face 200 feet, this ground could be prospected, and the low-grade shoot known on the 400 southeast could be investigated.

THE SHAMROCK AND HARDY MINES AS POSSIBLE SOURCES OF FLUX FOR THE MIAMI SMELTER:

As compared with the Commerce, the Shamrock and Hardy mines have the following disadvantages for turning over to a sub-leaser to supply the Miami Smelter with siliceous flux:

Shamrock

(1) Bad condition of shaft.
(2) No head frame
(3) Greater depth
(4) No ore blocked out
(5) Warm air

Hardy

(1) Mine inspector requires 500 ft. surface.connection before doing any more development.
(2) No ore blocked out.
(3) Short shoots on numerous vein splits.
(4) Faulting
(5) Complicated ownership and lease.
(6) Ore below 500 must be handled twice.

It is quite possible that Williams, who is operating the Hardy, will be unable to continue because of the ruling of the mine inspector. Since the Hardy ore is of good grade, it might possibly be desirable to advance Williams small amounts against shipments to help him put through a raise on ore to the surface. This should not be done, however, without careful geologic and engineering supervision.

Respectfully submitted,

TAD:CW

cc-Messrs.

By Robert Sayer (?)

October 4, 1935.

PRELIMINARY REPORT ON THE ASH PEAK MINES

Property:

The Ash Peak mine proper is owned by the Ash Peak Mines Company, a Nevada Corporation. It consists of 5 patented mining claims — Summit, Commerce, Great Eastern, Homestead, Fraction. They cover the Ash Peak vein for 5,780 feet. The company also owns unpatented claims and mill sites which I have not yet investigated.

The Ash Peak Extension claims are owned by a prospector — Joe Hardy. He has several partners but the record title is in him. This property consists of 14 unpatented mining claims:

Last Chance #1, 2 and 3.
Midway #1, 2 and 3.
By Chance #1 to 7 inclusive.
Water Witch.

These claims cover 4,500 feet on the Ash Peak vein and 3,000 feet on the parallel Green vein. Both groups are shown on the accompanying map.

Location:

The mines are located, as shown on the accompanying road map, 10 miles northwest of Duncan, Greenlee County, Arizona, on the paved highway which leads from El Paso, Texas, through Duncan to Phoenix, Arizona. Duncan is on the Clifton branch of the Southern Pacific Railroad which leaves the main line at Lordsburg, New Mexico. The closest station on the railroad would be Sheldon, 5 miles to the east, but the former road from the mine to Sheldon is washed out. The closest available side track on the paved road is Fox Siding, about 2 miles north of Duncan and 8 miles from the mine.

Altitudes are as follows:

Mine,	4,665 feet
Duncan,	3,536 feet
Sheldon,	3,462 feet.

Duncan, Sheldon and the railroad are on the Gila River, which would furnish unlimited water for milling. The water would have to be pumped 5 miles against a head of something over 1,000 feet. Nearby springs furnish ample water for domestic purposes, and this water might be consolidated and developed to supply a pilot mill of possibly 75 tons capacity. A large mill would have to get water from the river.

The mine is well located in respect to smelters. 150 miles northwest is the Magma copper smelter at Superior. 140 miles south is the Phelps-Dodge smelter at Douglas. 200 miles southeast is the A. S. & R. smelter at El Paso. Each one may be reached by paved highway from the mine. Phoenix, the capitol and largest city of Arizona, is 216 miles distant by paved highway. Transportation from the mine to Duncan or Fox Siding is all down hill, and should cost considerably less than $1.00 per ton. The nearest towns of consequence are Lordsburg, 45 miles S.E., and Safford, 53 miles N.W.

The climate is nearly ideal as thetaltitude results in cool nights throughout the summer, and the latitude insures very mild winters. The mines are in rolling hills, devoid of trees or any but the most scanty desert vegetation.

<u>Geology:</u>

The Ash Peak vein is covered by the claims for 2 miles, and is possibly traceable another mile. The Green vein is covered by the Hardy claims for 3,000 feet. Both are strong quartz veins cutting Tertiary flows of rhyolite, tuff and andesite. Both veins strike north 60 degrees west, but dip away from each other at about 80 degrees from the horizontal.

The veins are contained in ledges of silicified andesite as much as 60 feet wide, and in places make prominent "hog-backs". In other places the ledges are not reflected in the topography at all. So far, ore shoots have been found only in these strong outcrops, but if the shoots are like those found in an area of similar geology at Oatman, Arizona, further development may well discover other shoots in areas not characterized by outcrops. The veins give evidence of several periods of faulting and silicification, followed by mineralization resulting in a peculiar "en echelon" arrangement of subsidiary lenses in the main ore shoots, which may have an important effect on the system of mining.

The veins (that portion of the ledge containing commercial values) usually follow the hanging wall of the ledge, and vary from 3 to as much as 18 feet wide. Stoping width will average at least 6 feet and may run up to 12. In the vein the best values are usually found near the hanging wall. In the Ash Peak proper a narrow diabase dike separates the vein hanging wall from the unaltered country rock, and presents somewhat of a mining problem due to its tendency to slack and slough when opened to the air.

Ores:

The typical Ash Peak ore is a dense chalcedonic quartz showing some flow structure. Silver occurs as clouds of very fine argentite (silver sulphide) or as streaks. There is practically no other sulphide in the ore. Occasionally brecciated andesite cemented by silica carries commercial values. The argentite is nearly always visible to the naked eye, and in fact real acquaintance with the mine should result in the ability to distinguish readily between ore and waste underground, and even to estimate quite closely the silver content.

The graduation of values from hanging to foot wall is important in that a narrower stope and more selective mining could be employed to raise the grade of the ore, should the price of silver or changing economic conditions require such a procedure.

Metallurgy:

Should a war abroad or other conditions push the price of copper up to a point where the nearby copper smelters would again be put into full operation, the smelters would furnish an almost ideal outlet for crude Ash Peak ores without concentration. The copper mines send their copper to the smelters in the form of heavy sulphide concentrates. Properly to flux these ores the smelters must have a proportionate charge of silica. The highly silicious Ash Peak ores would be ideal for this purpose, and possibly the smelters would purchase them, paying not only for the silver and gold but enough for the silica to nearly offset the freight and treatment charges.

If the ore is milled on the ground, water in the proportion of one or two tons to the ton of ore treated must be furnished, and this would require a pumping plant and pipe line from Gila River and would cost in the neighborhood of $25,000.00. The ores are amenable to direct cyanidation, but preliminary tests indicate that it floats beautifully and with a very high ratio of concentration, possibly 40 or 50 to 1. This would furnish a very high grade concentrate for shipment to the smelter, or possibly the concentrates could be cyanided to produce bullion on the ground. The hard quartz and the very fine distribution of the argentite will require expensive fine grinding.

History:

No mill has ever operated at Ash Peak. Production to date has all come from ore shipped direct to the smelters. Probably 1 ton has been shipped for every 20 that is now blocked out or on the dumps. The development of the Ash Peak proper was nearly all done by George Wingfield of Nevada and his Goldfield Consolidated Company. The story, as given to me, is that this company took over the property for an option price of $1,000,000.00. They spent some $250,000.00 in sinking the Commerce and Shamrock shafts, together with the accessory drifting, and then found that they could not afford to pay the purchase price. According to the story, they did offer $500,000.00 for the mine but the offer was refused, and they dropped their option. Under somewhat similar circumstances the Hardy 600 foot shaft was sunk. Since then the mine has been examined many times, and sampled several times, but either the prevailing price of silver or the consistently "hard-boiled" terms of the owners have prevented any deal going through.

Development:

Ash Peak:

Shamrock:

Shaft	800 feet
Levels	3,626 feet

Commerce:

Shaft	500 feet
Levels	2,530 feet

Extension:

Hardy Shaft (Last Chance #1):

Shaft	600 feet
Levels	300 to 600 feet (?)

Last Chance #2:

2 shafts each 40 feet

Green Shaft (By Chance #1):

Shaft	70 feet
Drifts	60 feet

On both properties there are some shallow workings not included in the above tabulation.

Production:

Total recorded production comes to 177 railroad cars, including 25 shipped from the dumps. Unrecorded production, mostly from the Extension property, might raise the total 300 tons or more.

Ash Peak:

Commerce and Shamrock:

	Cars	Tons		Gold		Silver
	122	3,866		.037		18.40
Dumps	25	1,399		.05		13.5
Extension:						
Hardy Shaft:						
	5 (?)	300 (?)		.08 (?)		21.04 (?)
	30	1,298		.08		21.04
		6,863	Average	.05	Average	18.00

Total value at present metal prices, $103,999.55
Average value per ton, $15.61

Ore Reserves:

We have the benefit of a number of reports made by a number of reputable engineers in past years. Several of these reports are substantiated by complete assay maps. Enclosed is a poor print of one of these assay maps showing details of the sampling on the 5th, 6th, 7th and 8th levels of the Shamrock Mine. In this preliminary report this map is presented only to show the type of detailed data available for careful study, checking and correlation. The Crowther report, for instance, figures proven tonnage on the basis of 812 channel samples, a gigantic job in itself in such a hard, wide vein. To reduce these reports to their simplest form, and for the purpose of comparison, the following tabulation gives the essential figures from each report.

Henry F. Crowther Report 1924:

Ore Blocked "A" Method (Selective)

	Tons	Oz. Au	Oz. Ag	Width	Value Au $35 Ag 77¢
Hardy	15,000	0.05	18.57	10.00	$ 240,600
Shamrock	90,000	0.05	15.71	7.0	1,246,500
Commerce	30,000	0.05	14.28	6.0	382,500
Dumps	20,000	0.05	12.14		222,000
	155,000				$2,091,600

Ore Blocked "B" Method (Straight Shrinkage Stope)

	Tons	Oz. Au	Oz. Ag	Width	Value
Hardy	19,000	0.05	16.57	13.00	275.500
Shamrock	130,000	0.05	12.86	10.00	1,514,500
Commerce	30,000	0.05	14.28	6.00	382.500
Dumps	20,000	0.05	12.14		222,000
	199,000				2,394,000
Indicated	300,000	0.05	12.86		3,495,000

TOTAL "A" METHOD $5,586,600
TOTAL "B" METHOD $5,889,000

H. V. Snell Report:

	Tons	Oz. Au	Oz. Ag	Value
Blocked	150,000	0.05	14.75	1,965,000
Probable	300,000	0.05	13.23	3,579,000
	450,000			5,544,000

J. W. Bible Report:

"A" Method (Straight Shrinkage Stope)

	Tons	Oz. Au	Oz. Ag	Value
Blocked	152,751	0.05	16.00	2,149,206

"B" Method (Very Selective - To Produce High-grade Shipping Ore)

	Tons	Oz. Au	Oz. Ag	Value
Blocked	30,000	0.05	26.00	653,100
Dumps	15,000	0.05	13.00	176,250
Probable	270,000	0.05	16.00	3,598,300

TOTAL "A" METHOD $5,924,356
TOTAL "B" METHOD $4,428,250

N. H. Peck Report:

	Tons	Oz. Au	Oz. Ag	Width	Value At $35 Ag 77¢
Blocked	160,000	0.06	15.00		$2,184,000
Probable	270,000	(0.06	15.00 assumed)		3,685,500
	430,000				$5,869,500

Average All Reports and Methods $5,540,284.00
" " " " " Ag 14,276 ounces
" " " " " 443,300 tons
Average Dumps 17,500 Tons @ 12.5 ounces Ag.

In September Setter and I sampled and estimated the tonnages in the Extension dumps. The Hardy shaft is caved in and not accessible, nor do we have assay maps. Presumably all material mined in the workings is either now on the dumps or was shipped to the smelter. We can thus arrive at an approximation of the grade of all material broken, although it must be understood that a considerable portion of this material must have come from nearly barren development outside of the ore shoots. The Hardy shaft, for instance, is supposed to have been started on a surface ore shoot which only persisted to a depth of 20 feet. Hardy states that the next shipping ore was encountered at 200 feet, and followed up on a separate vein from that developed by the shaft for 125 feet. Shipping ore was again encountered at the 450 foot level, and is said to be continuous from there to the bottom of the shaft at 600 feet. Accordingly, it is to be presumed that about 400 feet of the 600 foot shaft is out of the ore shoot. Nevertheless, we measured up only a little over 1,000 tons on the dump, so that 1½ tons of ore were actually shipped out of each 2½ tons broken, and the recorded shipping ore averaged over 21 ounces silver per ton. Calculations to arrive at the average grade of everything taken from this shaft follows:

Shipping record	1,298 Tons	Average Au. 082	Ag	21.04
Estimated excess	300 Tons	Average Au. 082	Ag	21.04 (assumed)
TOTAL	1,598 Tons	Average Au. 082	Ag	21.04
Dump	1,020 Tons	Average Au 0.03	Ag	5.90 (Sayre's sampling)

Average Grade of Ore as Mined

Gold		Silver	
300 x 0.08	24.00	300 x 21.04	6,312.00
1298 x 0.08	103.76	1,298 x 21.04	27,288.88
1020 x 0.03	30.60	1,020 x 5.90	6,018.00
2618	158.36	2,618	39,618.88

Average Gold = 158.36 ÷ 2618 = .06 oz.
Average Silver = 39618.88 ÷ 2618 = 11.31 oz.
Value per ton $10.80

Unfortunately we have no record of the production from the G reen shaft. A careful survey of the underground workings indicate that about 400 tons were raised. Approximately 300 tons are still on the dump assaying gold .04, silver 7.67. In the bin there are 15 tons of sorted ore, which have not been shipped, assaying gold .13, silver 41.42. Hardy has no record of the cars shipped, but thinks they averaged about 35 ounces. Assuming 25 tons shipped at 35 ounces, 15 tons sorted ore still on the dump, plus the dump of 300 tons as sampled, we arrive at a run-of-mine here averaging gold .056, silver 15.03, value $12.49 — total, $5,330.00.

Applying this method to the entire property, using Mr. Murphy's estimate of the amount, and value of the ore on the dumps, and our figure on the Extension dumps, we arrive at a tablution as follows:

Ash Peak:

Shipping Record	1,339 Tons	Au	.05	Ag	13.5	$16,997.85
	3,660 Tons	Au	.037	Ag	18.4	56,639.70
Remaining on dump	24,000 Tons	Au	.04	Ag	7.0	162,960.00
Extension:						
Shipping Record	1,598 Tons	Au	.08	Ag	21.04	30,362.00
Remaining on dump	1,020 Tons	Au	.03	Ag	5.90	5,701.80
TOTAL	31,683 Tons					$272,661.35

The average value at present metal prices, therefore, of all material broken in both properties, regardless of whether in ore shoots or not, would be about $8.60 per ton, quite a remarkable showing for all development work and from such a wide vein.

Estimated Costs and Profits:

Practically all of the former reports on Ash Peak agree on a mining and milling cost of $4.50 a ton. Personally, I am afraid that the very hard quartz ore will increase the costs of mining and milling above this figure. For the sake of conservatism, I am presenting some figures below based on mining and milling costs at $6.50 per ton. Actually the figure may eventually come somewhere between $4.50 and $6.50. Furthermore, my experience in a good many mines has led me to insert in my costs a large and fairly definite figure to cover the combined costs of mill losses, railroad freight to the smelter, deductions from the gross price of metals imposed by the smelter and smelting charges. The final check from the smelter after making these deductions I call the "economic value", and on this ore I estimate the "economic value" to be 75% of the gross value. Should we eventually be able to ship the ore crude to the smelter, and secure a substantial payment for the silica content, this very large deduction from the gross value would not apply. Also I am inclined to think that a modified system of selective mining is indicated at Ash Peak. In any event, the tabulation below shows the ore as given in the workmanlike Crowther report, both as mined selectively, the A method, and as straight shrinkage stope; the B method, and I show the results of applying the maximum and minimum costs.

Crowther "A" Method

135,000 tons Blocked Ore - Value	$1,769.600.00	
300,000 tons Indicated Ore - Value	3,495,000.00	
435,000 tons VALUE	$5,264,600.00	
Economic Value @ 75%	3,948,450.00	
Mining and Milling 435,000 tons @ $6.50 per ton		$2,827,500.00
Mining and Milling 435,000 tons @ $4.50 per ton		1,957,500.00

Net @ $6.50 per ton
$3,948,450.00
2,827,500.00
$1,120,950.00

Net @ $4.50 per ton
$3,948,450.00
1,957,500.00
$1,990,950.00

Crowther "B" Method

179,000 tons Blocked Ore - Value	$2,172,000.00	
300,000 tons Indicated Ore - Value	3,495,000.00	
479,000 tons VALUE	$5,667,000.00	
Economic Value @ 75%	4,250,250.00	
Mining and Milling 479,000 tons @ $6.50 per ton		$3,113,350.00
Mining and Milling 479,000 tons @ $4.50 per ton		2,255,500.00

Net @ $6.50 per ton
$4,250,250.00
3,113,350.00
$1,136,900.00

Net @ $4.50 per ton
$4,250,250.00
2,255,500.00
$1,994,750.00

Crowther Dumps

20,000 tons Value	$222,000	
Economic Value @ 75%	166,500	
Hauling and Milling @ $3.00 per ton		$60,000

Net on Dumps
166,500
60,000
$106,500

The Deal With the Owners

Ash Peak Mines Company

This company has a well-earned reputation of being very hard to deal with. If we can accept the stories as being true, they turned down the Goldfield

Consolidated in spite of a cash offer of $500,000.00. The price has come down since then, and I understand that the American Smelting and Refining Company turned down a deal for a straight lease on a sliding scale of royalty, from 15% as a minimum to 20% as a maximum. Within the year Murphy has been willing to deal on the basis of a $300,000.00 purchase price, but he required cash payments totaling $90,000.00 during the first year before the operator could expect to get any production at all. The arrangement I have finally closed with him is as follows:

Option price, $300,000.00
First payment, 30,000.00 December 11, 1935.

The balance of the purchase price to be paid out of royalty at the rate of 12½%.

Work required:

A. Connect the Shamrock and Commerce Shafts.

B. Install a suitable power plant of at least 250 horsepower, and

C. Work the mine with 500 shifts per month.

<u>Hardy—Ash Peak Extension:</u>

Purchase price, $100,000.00
First payment, 5,000.00 January 1, 1936.

The balance to be paid out of royalty at 12½%.

Other terms as to required development and minimum number of monthly shifts yet to be worked out, but I anticipate no trouble in this connection.

<u>Conclusion:</u>

The figures given above are based on the ore actually blocked out in the Commerce, Shamrock and Hardy shafts and probable ore, based on the complete development of these shoots, and an expected shoot which will be developed in making the connection between the Commerce and Shamrock shafts. All former reports on the property and my own preliminary inspection indicate the possibility of still other shoots as yet undeveloped. No tonnage has been estimated from the Green vein. Possible ore shoots in the Great Eastern and Homestead claims of the Ash Peak group, and in the Last Chance #2 claim would raise the total very materially. A possibility not discussed heretofore is only a possibility at present, but should be further investigated. By correlation with Clifton nearby, and exposures on the Gila River, it is indicated that sedimentary beds, particularly limestone, might underlie the Tertiary flows here exposed at a depth of 1,200 feet, or only 400 feet below the bottom of the Shamrock shaft. Such very strong, well-mineralized veins as the Ash Peak and Green might well be responsible for large deposits where they intersect the limestone. Eventually this possibility should be tried out by diamond drilling.

I now have the combined properties under option for $400,000.00, which represents less than 10% of the gross value of the indicated ore. After the first payments of $35,000.00, the balance is to be paid entirely out of royalty and presumably after the mines are in profitable production. It is estimated that $75,000.00 will be required to install the necessary machinery, camp and water supply, and complete the connection between the Shamrock and Commerce shafts. Possibly $50,000.00 more should be allotted to development from the Hardy shaft, and the necessary raises and other work required to put the mines in actual shape for production. On top of this, the first payment of $35,000.00 must be met, or a total of $160,000.00. Should the copper smelters then be in operation, and favorable contracts made for the sale of Ash Peak ores in the crude form, no further capital would be required to go into immediate profitable production for many years to come. Should a mill be required, the water supply from the Gila River must be developed and a mill erected at a cost of $150,000.00 to $200,000.00, making a total capital investment of $360,000.00.

All the above figures and estimates are based on my preliminary investigation made during September. We have 3 months to complete a thorough investigation before the first payment or a decision must be made. My immediate plans are to carry on with a thorough examination, which will include the repairing of the Hardy shaft and sampling its workings. So thoroughly has the Ash Peak proper been sampled and resampled that I anticipate checking this by only a little additional work. The question of titles and water supply must yet be investigated, and a more careful study made of all existing reports and maps, together with a correlation of all this data.

So far, Ash Peak looks like a really large silver deposit which can be secured on very reasonable terms, and put into production for very reasonable capital expense, considering the amount of ore which is indicated. Our 3 months examination period may also bring fresh developments, either favorable or unfavorable, in the silver situation, together with the outlook for copper which has an important bearing on the problem. Under the contracts we have secured, no decision need be reached about the mill until the development work is all completed, and the mine in shape for production. By this time, certainly, copper's immediate status should be pretty definitely settled.

Respectfully submitted,

December 27, 1935.

SUPPLEMENTARY REPORT ON THE ASH PEAK MINES

Forewords

This report supplements my preliminary report under date of October 4th, 1935, and I will not repeat the information therein contained on the location, geology, ore, history, production etc.

From that date to this we have carried on an examination of the property under the direct supervision of Mr. H. F. Nagel, Jr. and I have put in a considerable part of my time at the mine. Under Mr. Nagel have been six to eight men. Our resampling of the Shamrock in various spots chosen at random has checked former sampling close enough so that we feel justified in accepting the assay maps in our possession as being substantially correct. Reopening of the Hardy Shaft proved to be a much more difficult and lengthy proposition than we had anticipated and we have just within the last few days come to the bottom of the shaft. I am accordingly unable to submit complete data about this showing. Further study indicates that my former estimate of costs may have been a little high and my former estimate of economic recovery a little low.

As a whole the examination has resulted very favorably. Ash Peak is a developed mine to the extent of over 6500 feet of underground workings, nearly all of which is in ore. Only a few small stopes near the surface in the Shamrock and Commerce and one at the [illegible]00 foot level in the Hardy have been taken out. As proof of the values in the ore we have not only complete assay maps made with the expenditure of a great deal of time and money but we have the record of shipments produced during the development. Ash Peak represents in my opinion the best-proven deposit of silver ore in the Southwest, if not one of the best in the country today. We have an exceptionally favorable deal and the mine may be put into production at very reasonable expense considering its possibilities. We have one uncertain factor; the price of silver. Even here the Ash Peak deposit is remarkable in its selectivity. The occurrence is such that the grade of ore mined can be kept at almost any desired point. At the sacrifice of tonnage a campaign of very selective mining would produce such a high grade ore that even on a falling silver market a large part, if not all of the preliminary investment, could be recovered.

Property:

Beside the five patented claims listed in my preliminary report the Ash Peak Mines Company owns, and we have secured under lease and option, the following additional claims:

Patented

Commerce Mill Site
Summit Mill Site

Unpatented

Bonder
Arion
Isabelle
Queen
Defender
King
Tomboy
Yankee
Queen Mill Site
Arion Mill Site
Bonder Mill Site
Defender Mill Site
Tomboy Mill Site
Isabelle Mill Site
Yankee Mill Site
King Mill Site
Great Eastern Mill Site
Homestead Mill Site
Fraction Mill Site

The approximate disposition of these claims is shown on the accompanying map.

Explanation:

Certain 50 foot lengths and certain cross cuts on various levels of the Shamrock Mine were chosen at random for check resampling. A number of shallow surface workings were entered and sampled. All samples were channel cuts with hammer and drill. Samples were sent to Charles J. Parker & Company of Denver who did the assaying.

The Hardy Shaft proved to be in very bad condition from top to bottom. All former timbering had rotted away, the walls in many places were caving in and muck was hung up at a number of places in the shaft. We installed a gasoline hoist, hoist house and a new head frame. The upper [illegible] feet of the shaft was completely retimbered and new temporary timbering, ladders and skids were installed to the bottom. All available former reports and maps were checked over. We made a preliminary investigation of the local water supply. The road to the Hardy Shaft has been put into excellent condition and roads to the Shamrock and Commerce made passable. A camp site has been located. We have made preliminary inquiries regarding the availability of secondhand machinery and equipment in the general district.

Sampling:

The most thorough former job of sampling was done by the Arizona-Anaconda Mines Company which, as I understand it, was the name under which George Wingfield and Goldfield Consolidated Mining Company operated at Ash Peak. A photostat of their assay map showing 812 samples, and reduced about one-half in size, is submitted herewith. Also on this map are shown the location and results of our own check sampling.

On the following page is a tabulation showing a comparison of our samples with the former or Crowther samples.

The hard quartz ore contains its silver in the form of little streaks and clouds of argentite. There is no possibility with this type of ore of checking individual channel cuts nor can it be expected that even restricted areas in the mine will check closely. While our gold results were consistently higher than the former sampling it will be noted that our silver results average somewhat lower. ~~On the 200 level~~ and on the 400 we got higher silver results. By a rather remarkable coincidence the grand total of all Shamrock samples worked out into dollars and cents checked former sampling within one cent.

There is no question in my mind that the Arizona-Anaconda sampling was honestly done. We have run into no discrepancy which could not be expected in this character of ore. It would have been a foolish waste of time and a great deal of money for them to carry on any such campaign as cutting 812 samples unless they did the very best job they knew how. I think we are justified in accepting the former sampling and assay maps as substantially correct.

The surface and shallow workings sampling which we did did not show up anything of very great value other than to indicate certain areas along the vein where silver values were starting to come in.

Proven Ore:

In the Shamrock Mine, due to the nature of the deposit, there is some difficulty in translating even the most complete assay map into an exact estimate of tonnage or grade. The 500, 600, 700 and 800 foot levels are presumably driven the length of the ore shoot. The 50 foot and 100 foot levels are short; the 200, 300 and 400 foot levels are mere stubs. On the 500 foot level, due to the expense and time involved in driving on the hard quartz vein, the level was driven entirely in the soft hanging wall dyke. Crosscuts at 50 foot intervals penetrated the vein but did not give the more complete showing which is available in the levels below. The result has been also to have the level cave in badly and it is now only partly accessible. In the 600 foot level the drift has been driven rather crooked; in places it reached the hanging

Comparison of Samples - Shamrock Shaft

	Number Sample Taken		Average Width		Ounces Silver		Ounces Gold		Value per ton	
	Crowther	Nagel	Crowther	Nagel	Crowther	Nagel	Crowther	Nagel	Crowther	Nagel
700 W - Drift from 25 ft. to 75 ft. CC	10	10	-	3.68	12.295	10.76	.048	.127	11.14	12.73
700 W - Drift CC at 75 ft.	3	3	15.2	13.7	4.24	3.34	.011	.0225	3.93	3.82
700 W - CC at 25 ft.	3	3	14.2	14.4	14.71	8.255	.049	.104	13.04	8.46
600 E - Drift from 100 ft. to 150 ft. CC	11	11	-	4.54	18.66	170.25	.035	.063	16.59	15.21
600 E - CC at 100 ft.	3		13.9		10.66		.035		9.43	
	3	3	14.4	14.0	12.43	10.53	.045	.049	11.92	9.82
600 E - CC at 150 ft.	4		17.2		10.77		.067		10.64	
	4	3	17.1	17.3	10.52	15.03	.058	.104	9.93	15.21
400 E Drift	7	7	-	3.15	10.57	11.74	.028	.047	9.12	10.48
100 W - Drift	8	8	-	5.64	14.25	9.02	.03	.041	12.02	8.38
Total	56	48			13.02	11.59	.040	.072	Ag 10.03 Au 1.40 11.43	Ag 8.92 Au 2.52 11.44

wall dyke and in other places it strays out into the quartz ledge. The 700 foot level follows the ore more closely but as the mineable width is considerably greater than the width of the drift, we have used sampling at the crosscuts as giving more reliable evidence than depending entirely on the drift samples. We have not succeeded in getting down to the 800 foot level; the ladders and timbering below seven are rotten and it is practically out of the question to get at the necessary repairs until the shaft is equipped to hoist.

Our analysis of all the available information would indicate the following blocked out ore:

Shamrock -	102,200 tons at 13.50 oz. silver -	.05 oz. gold
Commerce -	24,300 tons at 12.8 oz. silver -	.05 oz. gold
Hardy -	10,000 tons	
Dumps -	15,000 tons	

Our difficulties at the Hardy shaft have not only delayed our sampling and study of this property, so as to give definite figures, but we have had to put our entire crew on two shifts work there so as to get the job done and this prevented our checking over the quantity and grade of ore available in the dumps. We have come so close, however, to checking former estimates on the Shamrock and Commerce that I feel we are safe in cutting down the amount formerly estimated as available at the Hardy Shaft and the dumps to the figures given above.

My estimate on the total assured ore, therefore, would be as follows:

150,000 tons at 13 ounces silver and .05 gold.

A study of the assay map indicates how easily the mine-run grade could be raised. Nearly all of the 7th level for the entire width of the vein should produce an ore averaging better than 15 ounces. In other levels mining a narrower width and stoping only the better areas would also produce a higher grade ore. Possibly 75 per cent of the 150,000 tons estimated above could be mined to keep an average grade of 15 ounces or better.

Possible Ore:

Former reports have classified as "indicated" or "probable", 270,000 to 300,000 tons of ore. It is my thought that Ash Peak will eventually produce more than this total but I am inclined to class this as "possible" rather than "probable" ore in the restricted engineering sense.

If further development were to prove that the area outlined in brown on the Shamrock assay map contained ore and if we project the Commerce ore shoot down to the level of the bottom of the Shamrock Shaft we would add to our ore reserves as follows:

Possible Ores

Shamrock	44500 tons
Commerce	57000 tons

Except for the Hardy Shaft 525 feet deep, accompanied by practically no lateral drifting, there is no serious development on any of the other indicated ore shoots. The proven and possible ore in the Shamrock amounts to 150,000 tons. The proven and possible ore in the Commerce amounts to 60,000 tons. If we assume as "possible" ore shoots as good as the Commerce the various places on the property which have surface indications of ore, we might tabulate as proven and possible ore the following:

Shamrock	150,000
Commerce	60,000
Hardy	60,000
Green	60,000
Last Chance #2	60,000
Fraction	60,000
Great Eastern	60,000
Grand Total	510,000 tons

Metallurgy:

Ash Peak ore presents, from first examination, only one serious metallurgical problem. This is the combination of silver in the form of very minute grains of argentite in a dense chalcedonic quartz. Grinding this ore will be expensive on account of its hardness. It will have to be ground very fine to release the particles of argentite. Once ground the balance of the treatment should be simple. The argentite will float readily and we should be able to make a high recovery with a very high ratio of concentration. Murphy of the Ash Peak Company insists that former flotation tests showed a ratio of concentration as high as 150 to 1. Should this prove to be the case it is readily apparent that a 150 ton mill would reduce a days run of ore to one ton of concentrates. To cyanide one ton of concentrates would require a strong cyanide solution but the tanks, buildings etc. which make up so large a part of the cost of the cyanide installation would be reduced to a very small size and all of that end of the operation could be handled by one man. Marketing the product in the form of an impure bullion containing both the gold and silver would probably cost less than the transportation and treatment charges on concentrates. Economic recovery (that is the actual check received for our product as compared to its gross metal content) should be higher - possibly as high as 85%.

We are starting work on the ore at once at the Colorado School of Mines Metallurgical Research Plant under the very able supervision of Mr. A.

J. Weinig, an outstanding expert in his line. Ash Peak ore is very similar to the Tonopah ores and many Mexican ores so that we have the benefit of proven metallurgical practice as a guide to our problem.

Water:

In the rolling country east of and between the mine and the Gila River we feel confident we can develop enough water for domestic purposes and for a mill of 100 tons capacity. The Ash Peak Mines Company owns two patented claims covering the drainage directly to the east of the mine, about one and a half miles away, and approximately 600 feet below. The upper well here, according to previous tests, makes about 8 gallons a minute. The lower well, below the junction with another gulch, makes 16 gallons a minute. The two wells could be joined by 1800 feet of one inch pipe with 150 feet of drop. Syphoning from the upper well and combined they should make 24 gallons a minute. Water would be pumped from the lower well to the mine. About two miles to the northeast is another well in still another drainage area, which might possibly be combined with the Ash Peak wells if the supply there was insufficient. Water from this last well would have to be pumped over a 75 foot divide, whence it could be piped by gravity to the Ash Peak lower well. There have been no tests on the actual capacity of this well but it is stated that the present pump and two inch pipe used to water stock has never lowered the water materially.

A larger operation and a larger mill will require either a pumping plant on the Gila River, or there is a possibility that permanent water level is not more than 100 to 400 feet below the bottom of the Ash Peak shaft. It is proposed to do some diamond drilling from the 800 foot level of the Shamrock shaft as soon as the shaft is equipped. If the drilling indicates water level a reasonable distance below us it would be quite possible to combine the development of sinking on the main Shamrock oreshoot with the development of our water supply right at the property.

Title:

Abstracts of all of the property under lease have been prepared and have been examined by our attorneys Grant, Ellis, Shafroth & Toll. While there is no complete filing of notices of assessment work on the unpatented claims nor have the notices of "intention to hold" been filed during the recent years when assessment work has not been required, no outsiders to our knowledge, have come into the district. In the absence of any conflicting claims it is always easy to rehabilitate title to unpatented property. Taxes on the patented claims have been paid up. As to the chain of title on both properties there are some flaws but nothing of apparent serious moment. Mr. McHendrie, from Mr. Ellis' office, is leaving for Arizona tonight to clean up the odds and ends, both in the title situation and in the inception of our lease and option contract.

Costs:

No two mines have quite the same operating problems. At Ash Peak there is no history of operation or stoping, and, accordingly, no past operating costs upon which to base future estimates. Under these conditions estimates of costs must be approximate, Subject probably to considerable change in actual practice, I itemize our costs as follows:

Mining:

Development	1.00	
Stoping	1.40	
Timbering	.10	
Tramming	.20	
Hoisting	.15	
Overhead and miscellaneous	1.15	
		$4.00
Milling:		2.50
Total		$6.50

The first item of $1.00 for development would not apply to already developed ore. I think we are safe in estimating mining and milling costs of $5.50 on the 150,000 tons now developed. The milling charge of $2.50 is high but probably cannot be beaten with our pilot mill, or until we go into operation on a larger scale. If we proceed at once with a development campaign on the outlying ore shoots, our costs would include the $1.00 for development, although it is not really applicable to the ore we expect to mine at first.

Plan of Operation and Financial Requirements:

It is proposed to start at once upon the following campaign:

1. Erection of camp and assay office.
2. Install water supply.
3. Install Power Plant.
4. Repair and equip Shamrock, Commerce and Hardy Shafts.
5. Connect the Shamrock 600 East with the Commerce 500 Feet. This involves 1250 feet of driving and 200 feet of raising.
6. Diamond drilling.

6A. Depending on the results of drilling-sinking the Shamrock Shaft.

7. Erection of pilot mill.

Details of this equipment and development with estimated costs are shown on the following tabulation:

Estimate of Equipment etc.

Camp	Office, Boarding House, Living Quarters		10000.00
Water Supply -	Clean out 3 wells	200.00	
	1 1/2 miles 2" pipe line	2800.00	
	Siphon - 3000 ft. 1" pipe	500.00	
	Pump - 25 gals. per min	500.00	
	Buildings over wells	500.00	
	Installation	500.00	5000.00
Assay Office -			3000.00
Power Plant -	250 HP Diesel engines with Generator & Switchboards	15000.00	
	Building, Installation	5000.00	20000.00
Shaft Repairs -	Shamrock		
	Retimber - track & guides for skids and counterbalance, $10.00 per ft.	8000.00	
	Head Frame & Sheave Wheels	700.00	
	Skip Pocket on each level 8 at $100 each	800.00	
	3" Air Line 800 ft. at 50¢	400.00	
	3/4" Water Line 800 ft. at 12 1/2¢	100.00	10000.00
	Commerce		
	Retimbering where necessary	500.00	
	New Head Frame & Sheave	200.00	
	Ore Pockets 2 at $50	100.00	
	2" Air Line 500' at 35¢	175.00	
	1/2" Water Line 500 at 12 1/2	65.00	
	Ventilator Line 500' at 20¢	100.00	1140.00
	Hardy		
	Timbering where necessary	300.00	
	Ore Pockets 2 at $50	100.00	
	2" Air Line 600 at 35¢	210.00	
	1/2" Water Line 600 at 12 1/2¢	75.00	
	Ventilator line 600 at 20¢	120.00	805.00
			49945.00

		49345.00
Shaft Equipment - Shamrock		
Electric Hoist and Motor	4000.00	
Compressor & Motor 260' 50 HP	1400.00	
Skip	250.00	
Blacksmith Shop	200.00	
Sharpener	1500.00	
Oil Furnace	200.00	
Forge	100.00	
3 Mine Cars	150.00	7800.00
Commerce		
Hoist & Motor	1000.00	
Compressor & Motor	1400.00	
2 Mine Cars	100.00	
Blower & Motor	150.00	2650.00
Hardy		
Compressor (gas driven) rent		
Compressor & Motor	1400.00	
Receiver	100.00	
Blower	75.00	1575.00
Portable Equipment-		
4 Machine Drill Outfits (drifters)	2000.00	
Rails, Pipe, Ventilator to surface	800.00	
Drill Steel	600.00	
Shovelling plates, picks, shovels, hammers, saws, axes	40.00	
Truck - station wagon or pickup	800.00	4140.00
Development - Shamrock		
Drift W - 600 ft. level 650 ft. at $12	7800.00	
Drift E 600 ft. level 1000' @ $12	12000.00	
Raise 600 E to connect Commerce 200' at $18	3600.00	23400.00
Commerce		
Drift W 500' Level 600' at $12	7200.00	7200.00
Hardy		
Drift E 600' level 1000' at $12	12000.00	
Raise to connect Shamrock 100 ft. at $18	1800.00	13800.00
		110510.00

		110,510.00
Sinking -	Shamrock	
	300 ft. at $50.00	15,000.00
Diamond Drilling -		
	1,000 ft. at $2.00	2,000.00
Payment on Properties		25,000.00
Mill -		50,000.00
Overhead & Miscellaneous -		17,490.00
		220,000.00

The closest present estimate of the time element in our financial requirements would be as follows:

December,	1935,	$50,000.00	(Already in hand)
January,	1936,	50,000.00	
February,		20,000.00	
March,		25,000.00	
April,		25,000.00	
May,		25,000.00	
June,		25,000.00	

Conclusion:

The above estimates contemplate a pilot mill of 60 to 75 tons daily capacity. As a matter of fact, we are just starting our metallurgical research work, and I am already inclining to the advisability of an 100-ton mill at the start. Should we decide on the larger mill, the total budget would have to be increased about $25,000.00, and these additional funds would be required during February, March and April, 1936. The entire matter of estimating the cost of our equipment is one of considerable difficulty. It is very fortunate for the Ash Peak operation that within a radius of 100 miles there have been within the past few years several ill-fated large mining enterprises. These have been stock-selling ventures, initiated without any real knowledge of the mining business or of their particular mine. Operations have lasted long enough to erect a big expensive surface plant, and then the whole enterprise has failed. At Dos Cabezas, 50 miles south of the mine, a recent venture of this kind "blew up" after purchasing and installing a new power plant, consisting of a series of large new Diesel engines, a mill and a complete layout of standard mining equipment. It is my understanding that these practically unused Diesel engines, of 280 HP each, and costing in the neighborhood of $15,000.00 apiece, can now be purchased for $6,000.00 or $7,000.00 apiece. The entire mine equipment and the grinding end of the mill and the flotation units might well fit in with our requirements. A similar enterprise at Stein's Pass, only 30 miles from the mine, has Diesel equipment and a 100-ton mill. The equipment was merely used to sink one lift of the shaft, as I understand it. One of our first jobs is to put a man in the field investigating every one of these situations, and we have every expectation of securing almost new suitable equipment at one-half to one-third of the new cost.

Under the circumstances it can be realized how difficult it is even to approximate our total investment in equipment. Also, in the purchase of this equipment, it is difficult to estimate how much will have to be paid for in cash and how much can be spread out over a series of months.

As a matter of efficient mining, and as required by Arizona law, actual stoping operations must be deferred until two separate exits from the mine are provided. The connection between the Shamrock and Commerce Shafts, involving 1,100 feet of drifting and [illegible] feet of raising must precede our going into production on a large scale. The installation of camp, water supply, power and rehabilitation of the Shamrock and Commerce Shafts must precede the starting of this development. The entire program will require four to six months. Careful metallurgical testing, the actual designing of the mill, and the purchase and assembly of the equipment must precede erection. If the mill should be completed before the connection is finished, it could start immediately on dump ore and ore produced from development, if we are in ore.

Once a pilot mill or half-size mill is installed, we are in a rather fortunate position to meet the exigencies which may arise from a fluctuating silver market. Should the market break, unless it crashes altogether, we can take advantage of our 6,500 feet of development, restrict mining to high grade occurrences only, and the ore already mined on the dumps, and carry on a strictly "salvage" operation. If we are uncertain even then about the silver market, the present blocked out ore would last a 100-ton mill for practically 5 years, and make an estimated profit of over $150,000.00 a year. Depending on the market, we can go to either a 200-ton or 300-ton operation, stepping up the returns accordingly, and lowering our costs.

There are still uncertain items in our cost estimates, but assuming that we can reach an 85% economic recovery, and total mining and milling costs of $[illegible].50 without development, we can pay royalty, and still make a net operating profit of $4.40 a ton on a 15-oz head. We can net $[illegible].68 per ton after paying royalty on a 12-oz head. To give some idea of the possibilities if silver goes to $1.29 an ounce, we could mine a 13-oz head, pay royalty, development at $1.00 a ton, and still net $9.71. Royalty should quickly pay the purchase price, and profit would then step up to $12.00 a ton.

In spite of our inability to estimate in advance accurately what our costs or recovery are going to be, and in spite of the uncertainties surrounding the whole silver situation, we have the safe-guard of a mine developed at a cost approximating our purchase price. We are purchasing it practically on a royalty basis. The vein is wide; the values are commercial; there is little chance of losing our preliminary investment under any conditions, and we can look forward to a successful operation if silver stays at its present price, and to a very profitable operation should the price of silver rise.

Respectfully submitted,

Robert H. Sayre

I. C. 7119

JUNE 1940

UNITED STATES
DEPARTMENT OF THE INTERIOR
HAROLD L. ICKES, SECRETARY

BUREAU OF MINES
R. R. SAYERS, ACTING DIRECTOR

INFORMATION CIRCULAR

MINING AND MILLING METHODS AND COSTS AT THE ASH PEAK MINE OF THE VETA MINES, INC., DUNCAN, ARIZ.

BY

HERBERT L. LINES

I.C. 7119.
June 1940

INFORMATION CIRCULAR

UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

MINING AND MILLING METHODS AND COSTS AT THE ASH PEAK MINE OF THE VETA MINES, INC., DUNCAN, ARIZ.[1]

By Herbert L. Lines[2]

CONTENTS

1/ The Bureau of Mines will welcome reprinting of this paper provided the following footnote acknowledgment is used: "Reprinted from Bureau of Mines Information Circular 7119."

2/ One of the consulting engineers, Mining Division, Metal Mining Methods Section, Bureau of Mines, and general superintendent, Veta Mines, Inc.

CONTENTS (Cont'd)

ILLUSTRATIONS

INTRODUCTION

This paper is one of a series on mining and milling methods and costs published by the Bureau of Mines.

The Ash Peak mine of the Veta Mines, Inc., Duncan, Ariz., is of particular interest in that the only metal of commercial value in the ore is silver. The silver is concentrated by flotation; the concentrate is shipped to a smelter for treatment.

ACKNOWLEDGMENTS

The writer is especially indebted to R. H. Sayre, president and general manager of Veta Mines, Inc., through whose courtesy this paper was made possible. Grateful acknowledgment is also extended to Harry E. Davis, mine superintendent, and Ralph Shiminin, mill superintendent, who kindly supplied details of operation. M. E. Volin, assistant engineer of the Bureau of Mines, assisted in preparing the paper.

SITUATION AND ACCESSIBILITY

The Ash Peak mine and mill are at the foot of Ash Peak in the Ash Peak mining district, Greenlee County, southeastern Arizona; it is 12 miles west of Duncan, a station on the Arizona & New Mexico Railroad, a subsidiary of the Southern Pacific Railroad running from Lordsburg, N. M., to Morenci, Ariz. Paved highway 70 goes through Duncan and passes within 1/4 mile of the mine, which is reached from the highway by a dirt road with an average 12-percent grade.

CLIMATE

Duncan has climatic conditions similar to those at the Ash Peak mine. According to the Weather Bureau,[3] the average daily temperature at Duncan over a period of 23 years was 65.9°, with a low average daily temperature of 44.5° in December and a high average of 85.2° in July. The lowest temperature recorded in 6 years was 4° in January and the highest temperature in the same period 112° in July.

The average annual precipitation in 8 years was 11.17 inches. The greatest average amount was 1.86 inches in August and the least, 0.25 inch in May.

The altitude of Duncan is 3,645 feet and at the mine 4,200 feet.

HISTORY

The early history of the Ash Peak mine is not known to the writer. According to a geological report made by Grant[4] in 1918, Goldfield Consolidated Mines Co. held an option on five lode claims and two millsites for which an application for patent had been made.

Development by the Goldfield company in 1918 and 1919 comprised an 800-foot shaft, the Shamrock; a 500-foot shaft, the Commerce; 110 feet of shallow shafts; and 6,167 feet of drifts and raises. Improvements to the property comprised roads, a water-supply system with its source at Ash Springs, living quarters, office and store buildings, and buildings for housing the mining equipment that was installed to develop the property.

The Veta Mines, Inc., took over the property in 1936 in substantially the condition described and commenced stoping in March 1937. There is no record of any silver concentrates being produced by milling ore from the Ash Peak mine until the present company began operations.

GEOLOGY

There are no sedimentary rocks in the vicinity of the Ash Peak mine except a little Gila conglomerate and recent wash. According to Grant, the formation consists of a series of surface flows and tuffs which have gentle southerly dips ranging up to 10°. There are also numerous dikes and volcanic plugs.

The Ash Peak vein occurs along a strong fault fissure of considerable displacement which shears the tertiary tuffs and flows of rhyolite and andesite; it is continuous for over 2 miles, forming hogbacks in places.

3/ Weather Bureau, Climatic Summary of the United States, Section 26, Southern Arizona: Pp. 11, 22-24.

4/ Grant, Wilbur H., Geological Report on the Ash Peak Mine, Duncan, Greenlee County, Ariz.: November-December, 1918.

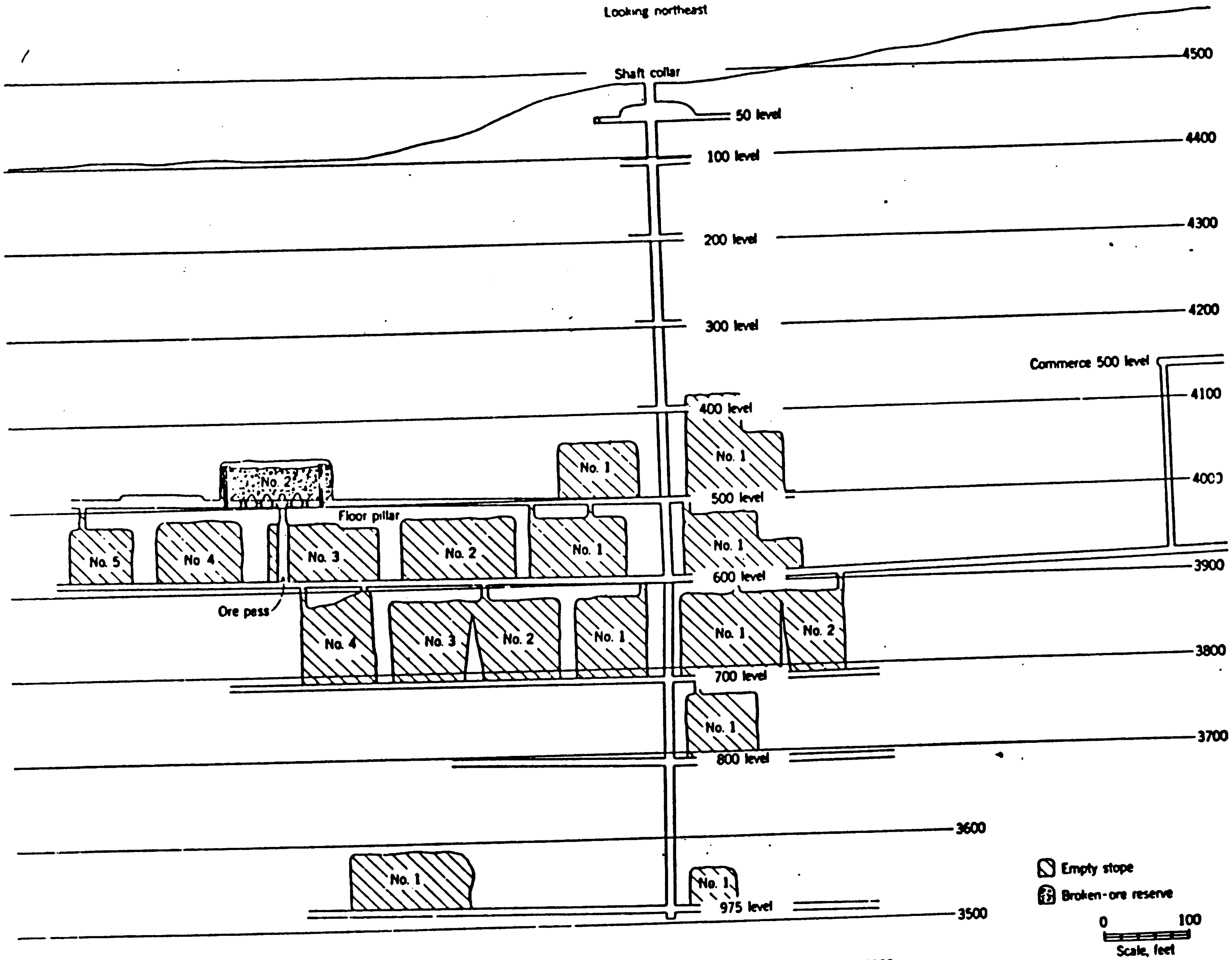


Figure 1.–Vertical projection, Shamrock mine, Veta Mines, Inc., June 10, 1939.

The vein strikes N. 60° W. and dips 80° N. Vein matter occupies the footwall side of the fissure.

A diabase dike, which possibly was a feeder to basalt surface flows now eroded away, separates the vein matter from the hanging wall of the fissure. This feature presents a complication in that the diabase sloughs and fractures easily, making it difficult to mine the ore clean.

The ore ranges from 3 to 18 feet in width, averaging 7 feet. It decreases in grade from the dike toward the footwall. Typical Ash Peak ore is made up of abundant dense banded chalcedonic quartz and a silicified andesite showing some flow structure, varying amounts of calcite, rhodochrosite, and pyrite, and small amounts of silver occurring as clouds of fine argentite or as streaks associated with the quartz, evidenced by their unusual hardness. The argentite is readily recognizable. The calcite occurs in various sizes of crystals in colors ranging from grayish white to deep black.

MINING

Physical Characteristics of Ores and Enclosing Rocks

The physical characteristics of the wall rocks and of the ore in the upper levels of the Ash Peak mine are well suited to shrinkage stoping. Below the 800-foot level the presence of excessive water may cause a change to a cut-and-fill method owing to sloughing of hanging-wall gouges and the diabase.

The vein is narrow, tabular, and nearly vertical; the walls are silicified andesite that stand well unsupported. The footwall of the ore body is an economic rather than a structural one. The hanging wall is kept within the limit of the ore to prevent dilution by the diabase. Drawing of ore in stopes must be done evenly to prevent piping through of the diabase, which sloughs to some extent in the partly emptied stopes.

Ore shoots are fairly continuous and consistent in grade. The hard, dense ore is difficult to drill, but it breaks into small fragments requiring no secondary blasting in stopes. In the relatively dry upper levels of the mine, broken ore flows readily from closely spaced chutes.

Prospecting and Exploration

Exploration comprises drifting on the vein and at intervals determining its width by crosscutting for short distances into the hanging and foot walls. The drifts and crosscuts are sampled by the usual methods; however, close sampling is not required, as the ore is uniform and easily identified.

Some prospecting is done by diamond drilling. Three thousand feet of diamond core drilling was done during 1938 at a cost of \$1.89 a foot, and from January to June 1938, 868.0 feet of diamond core-drilling was done, at a total cost of \$1,582.16, or \$1.82 a foot. At present (1939) all diamond drilling is contracted for at a rate of \$1.25 a foot for holes up to 150 feet deep and \$2.50 a foot for holes over 150 feet deep. A 5/8-inch core is recovered in shallow holes and a 7/8-inch core is obtained from the deeper holes.

Development

Figure 1 shows a vertical projection of development workings at the Shamrock mine. There are two groups of workings from which ore is mined, the Shamrock and the Commerce; the shafts are 2,000 feet apart on the surface. The 600 level of the Shamrock is connected to the 500 level of the Commerce to provide ventilation and outlets to the surface. The Shamrock has supplied about 75 percent of the ore and has been developed most extensively.

Entry to the Shamrock workings is by means of an 80° incline shaft in the vein footwall. The shaft is 975 feet deep; and the 10 levels, connected to the shaft by short crosscuts, are at 100-foot intervals, except for the 50 and 975 levels. The drifts driven on the vein for exploration are used as haulage levels. The present company has done most of its development on the 500, 600, and 700 levels.

The Commerce workings are opened by a two-compartment shaft 575 feet deep. The shaft is on an 80° incline in the footwall of the vein. The level interval is 100 feet, and crosscutting and drifting practice is similar to that in the Shamrock.

Development details

Shafts. - The Shamrock shaft is 9 feet, 6 inches, by 4 feet, 6 inches, in cross section inside the lining. It has three compartments, a 4-foot hoisting compartment, a 2-foot, 1-inch manway, and a 1-foot, 5-inch pipeway. The shaft is timbered with 6- by 8-inch Douglas fir sets throughout most of its depth. Where sets are not necessary, stulls of the same size are used. Lining is of 2- by 12-inch Douglas fir. Between compartments are full partitions of 2- by 12-inch Douglas fir hung on 4- by 6-inch fir dividers of the same. Manway landings are 18 feet apart, and ladders are staggered to conform to safety regulations.

The pipeway carries a 3-inch air line, a 1-inch water line, a water column, and electric conduits. The water line and a 2-inch air line extend to the various levels. Telephones are provided at each station.

The Commerce shaft has a hoisting compartment and a manway; the latter also serves as a pipeway. The full partition of 2- by 12-inch Douglas fir is hung on 6- by 8-inch stulls. The shaft is lined only where necessary. Hoisting is by bucket riding on skids.

Drifts and crosscuts. - The drifts driven in the vein along the footwall for exploration purposes also serve for development and ore extraction, the vein having no sharp turns. Most of the drifts are 5 by 7 feet in cross section. No support is required, as there is little pressure from the walls or back.

One-hundred-and-twenty-five-pound and 145-pound drifters mounted on 3-inch columns are used for drilling. Drill steel of 1-1/8-inch, round stock with lugged shank is hand sharpened. As loss of gage is excessive in drilling the abrasive silicified andesite, the steel is sharpened with 1/4-inch changes in gage. Starting bits have a gage of 2-3/8 inches and finishing bits a gage of 1-3/4 inches. Generally, a complete change is required for each 6-foot hole, using 18-inch changes. Detachable bits were tried but were unsuccessful because of the quick loss in gage. Used bits are ground to 1-3/4-inch gage and used with jack rods on the last change of drill steel for finishing up a hole. The purpose of this practice is to use up the supply of detachable bits on hand.

The average advance for a drift round is 4 feet. A standard round is not used as the holes are placed to take advantage of conditions at the face. Generally 18 to 20 holes are drilled and about 75 1-1/8-inch cartridges of 40-percent gelatin dynamite loaded for each round. All blasting is done at the end of the night shift.

Broken rock is loaded into cars by hand, except on the 500 level, where a mechanical loader is used in widening the drift in preparation for stoping. Tramming is done by hand.

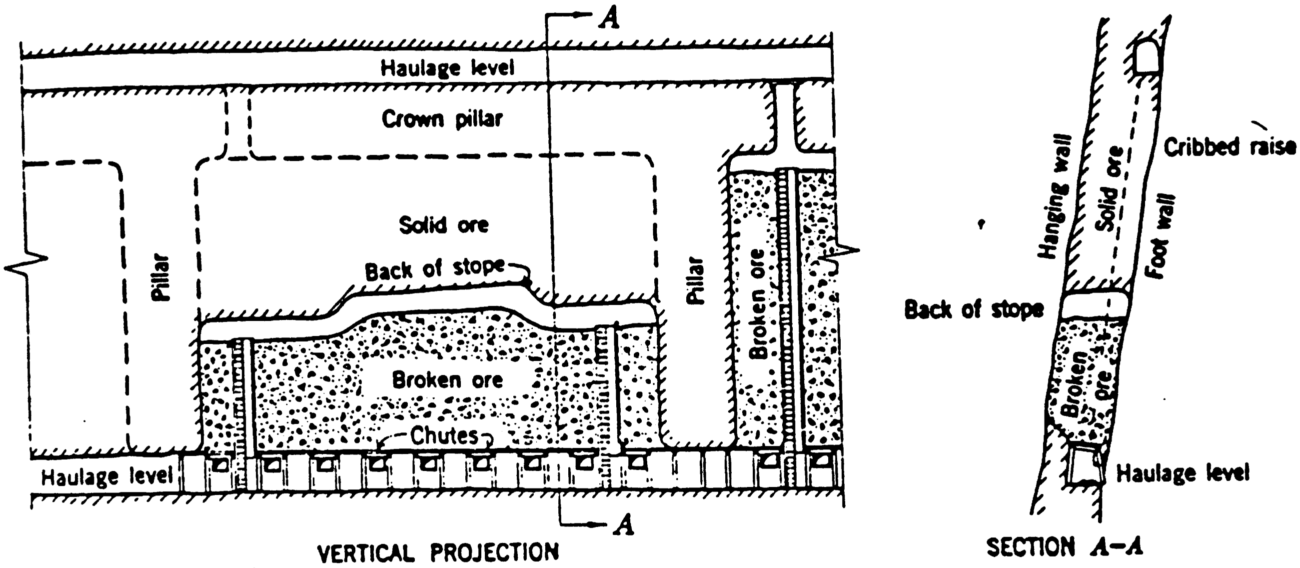
Most drifts are driven on contract at $8.00 a foot with a four-man crew, comprising a machineman and helper on one shift and two muckers on the opposite shift. The company supplies tools and compressed air.

Raises. - A raise was put up to connect the 600 level of the Shamrock workings to the 500 level of the Commerce workings. Short finger raises are put up to an undercutting level in beginning some stopes, but no raises are extended ahead of stoping.

Stoping

Ore is mined by shrinkage stoping. Stoping was begun in March 1937. In June 1939 ore was being drawn from two stopes on the Shamrock at the rate of 130 to 140 tons daily; one of the stopes was being drawn empty, while the swell was being drawn from the other. About 60 tons a day was being mined from the Commerce. A third stope filled with broken ore was held in reserve.

Formerly most of the ore was stoped on timbered-drift backs; the present practice is to stope on arch pillars, particularly in the wider ore bodies. Figure 2 illustrates the two practices. Maintenance and repair costs were found to be higher when stoping was done on timbered-drift backs in wide ore shoots with a bad hanging wall than on arched pillar backs.



SHRINKAGE STOPING ON TIMBER-DRIFT BACK

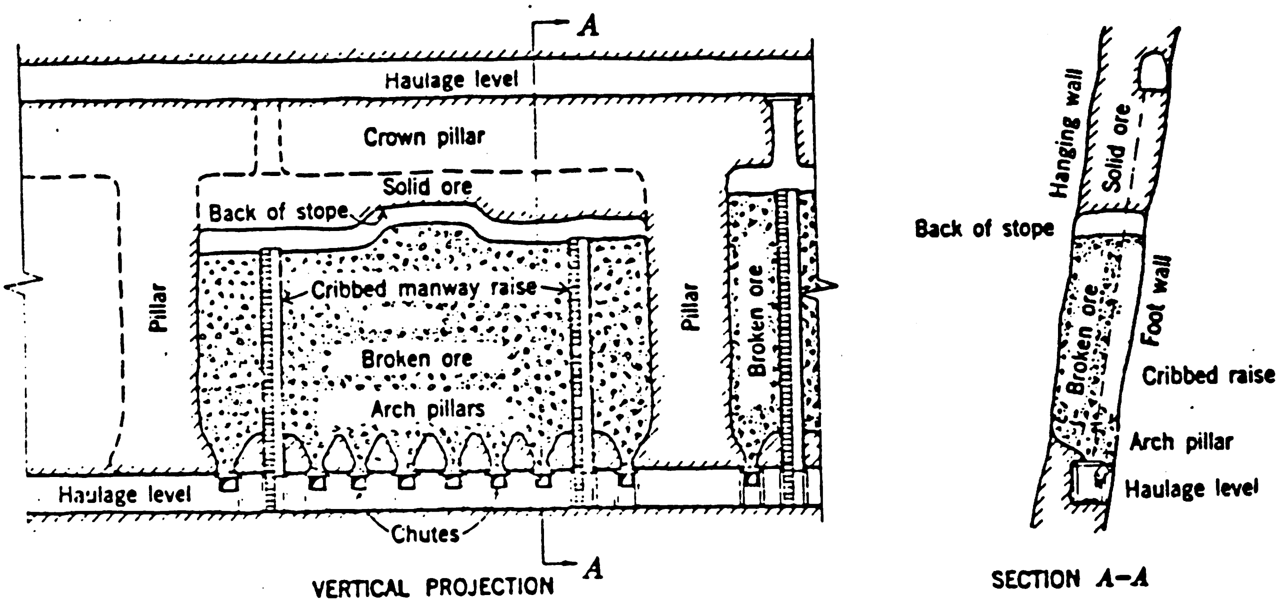


Figure 2.—Shrinkage stoping on arched-pillar back.

Stopes range in length from 100 to 130 feet. Pillars 10 to 20 feet thick, depending on the condition of the hanging wall, are left between stopes. Crown pillars 20 feet thick are left to support the haulageway on the next level above. No provision has been made to mine these pillars. Stopes are carried up on the width determined by sampling to be ore.

In narrow veins where the back of the development drift is in good ore, the drift is slabbed to the full width of the ore, and then a cut is taken out of the back. After the broken material is cleaned out, drift sets are put in on 4- to 5-foot centers, with chutes on 12- to 15-foot centers on the footwall side. The close spacing of chutes is necessary because the ore is damp enough to hang up in drawing. Drift sets are made up of 8- by 8-inch vertical posts, with 8- by 10-inch caps 8-1/2 feet above the track. Round lagging 4 to 5 inches in diameter supports the broken ore. Double posts are used where necessary. Plank spreaders are used instead of dapping the caps. Chutes are made of 3- by 12-inch material, and gates are 36 inches wide by 30 inches high. A feature of the chutes is the use of two lengths of 2-inch pipe, one on each side of the chute gates, to hold the gate boards. Timbered manways are carried up at each end of the stope along with stoping. These are 5 by 5 feet inside and have two compartments, one a manway and the other a timber slide. In wide stopes the manways are cribbed with 3- by 12-inch timber, and in narrow stopes stulls are used. A tight partition separates compartments in both types. There are 18-foot landings in the manways with staggered ladders.

To keep mining costs at a minimum, raises are not driven to the level above until the stope is nearly completed. This practice is permissible as the rock temperature is not high and natural ventilation is good.

Wide portions of the vein where the ore is lean above the back of the drift are mined by stoping on arch pillar backs. A pair of finger raises is begun at 12- to 15-foot intervals along the drift where the chutes are to be situated and driven in opposite directions in the plane of the vein on about 60° inclines. Raises from adjoining chutes intersect 15 feet above the back of the drift to form arch pillars for supporting broken ore. Chutes are installed in the footwall side of the stope on 6- by 8-inch vertical stulls or drift sets, depending on the width of the vein. The undercutting level is completed by slabbing down the ore in the V-shaped part of the stope above each chute.

Drilling is done with 120-pound automatic stopers, using 1-inch quarter-octagon hand-sharpened steel. Holes are drilled 7 feet deep, using 16-inch changes of steel.

The stope is advanced by taking a V-cut out of the center and then taking vertical slices advancing first toward one end of the stope and then toward the other. The miners stand on the broken ore to drill, and enough is drawn after each blast to leave 7 feet of headroom between the broken ore and the back. The rock breaks into small pieces, and no blockholing or bulldozing is necessary in the stopes. In 1938, 2.45 pounds of powder was consumed per ton of ore broken.

Stoping is contracted to a crew of eight men, four working on each of the two shifts. The usual arrangement is for a machineman and his helper and a timberman and his helper to work on one shift, and for another machineman and his helper and two trammers to work on the opposite shift. The day drilling-crew leaves the drill set up at the end of the shift; and the night drilling-crew completes the round, takes down the equipment, and loads and blasts the holes.

Depending on the tramming distance, the contract price for stoping is 80 to 90 cents a ton of 12 cubic feet measured in place. The contractors do all the drilling, carry up the manways, and tram all the swell. They also furnish their own explosives and pay their own compensation insurance.

All blasting is done at the end of the night shift, about midnight. From 30 to 60 holes are blasted in each stope, using 1-1/8-inch 40-percent gelatin dynamite. Air valves are left open to clear the stopes of fumes.

Underground Transportation

All tramming is done by hand with 16-cubic-foot cars, running on 18-inch gage track of 12-pound rails. The broken ore is drawn from the stopes and trammed to 25-ton ore pockets at the shaft. In 1938 the average tramming distance was 300 feet and in 1939, 500 feet. In the Shamrock workings, the ore pockets are situated on the 600,700, and 975 levels. Ore drawn on the 500 level is trammed to an ore pass in No. 3 stope and dropped through to the 600 level. Grizzlies made of 4-inch-diameter stamp stems spaced with a clear opening of 6 inches are situated over the pockets. One man for each two trammers breaks the oversize with a 16-pound hammer.

Ore is loaded into a 1-1/2-ton skip through air-operated gates and hoisted to the surface, where it is dumped automatically onto the pan conveyor leading to the coarse-ore bin. The skip serves all underground activity, including hoisting of men, supplies, and equipment. There is one skip tender on each shift to load the ore from the ore pockets, handle the supplies, and in general attend to proper operation of the skip.

Ore at the Commerce workings is hoisted in a bucket of 1,600 pounds capacity and dumped into a bin on the surface. It is loaded by gravity into a 4-ton truck and hauled one-half mile to the coarse-ore bin at the crushing plant. Truck haulage is done on contract at the rate of $0.20 a ton.

Percentage of Extraction

Nearly all the ore broken is recovered with little dilution in grade if the stopes are drawn completely empty in one operation and drawing is done evenly. No waste is sorted, either underground or on the surface. Where development or other workings are driven in country rock the broken material is loaded as waste and dumped into empty stopes if possible.

The number of man-hours worked during 1938 in mine leasing, exploration, development, and ore extraction follows:

Breaking	-	15,275
Timbering	-	12,580
Tramming and loading	-	40,450
Total		68,305

The following table shows the average distribution of employees in June, 1938, in the mine and on the surface, including the mill.

Average distribution of employees in June 1938 in the mine and on the surface, including the mill

Shamrock Mine	
Underground	23
Surface, including hoisting	3
Commerce Mine	
Underground	9
Surface (hoisting)	2
General	
Diamond drilling	1
Mill (including crusher)	8
Powerhouse	4
Shops (including steel sharpening	7
Warehouse	1
Assaying	1
Superintendence	2
Engineering	1
Truck transportation	3
Tailings dam	1
Water supply	3
Daily average for June	69

The wage rates in effect in June 1939 are shown in the following table:

Classification	Rate per 8-hour shift	Hourly rate for 6 hours	Hourly rate for overtime
	$ 3.50	$ 0.38	$ 0.61
Surface labor	3.60	.39	.63
	4.00	.44	.68
Muckers, trammers, and mill helpers	4.05	.44	.705
Hoistmen	4.28	.46	.76
Miners and timbermen	4.50	.48	.81

The total extraction of ore is about 85 percent where stoping is done on timbered-drift backs and about 75 percent where stoping is done on arched pillar backs.

Drainage

Underground water at the Shamrock workings is intercepted on the lower levels and collected in the shaft sump. About 30,000 gallons a day is collected under normal conditions. A duplex reciprocating pump with a capacity of 250 gallons a minute, driven by a 40-horsepower motor, handles the excess water in about 2 hours each shift.

Ventilation

A connection between the 600 level of the Shamrock workings and the 500 level of the Commerce workings provides good natural ventilation for both. Dead-end drifts are ventilated by means of electrically driven auxiliary blowers. The air is directed to the face through 8-inch canvas ventube. Raises and stopes are cleared by opening the compressed-air valves before blasting at the end of the night shift.

Mine Labor

As much of the mining as practicable is done on contract. It has been found that this practice attracts the best class of miners to the camp. The contractor pays compensation insurance and pays for his explosives. Contracts are made at the following rates:

Drifts, 5 by 7 feet in section..............	$ 8.00 per foot
Drifts, 7 by 9 feet in section..............	11.00 per foot
Raises, the company doing all loading and ore-drawing..............................	6.00 per foot
Timbering for stope preparation............	25.00 per chute
Timbering straight back stopes.............	2.00 per foot
Stopes - $0.60 to $0.80 per measured ton of 12 cubic feet. The $0.80 contract rate is made to a crew of 8 men, who do all breaking, tramming of swell, and timbering of manways.	
Tramming from stope and ore pass............	0.30 per ton

Surface workmen and part of the men working underground are on straight company time. Two 8-hour shifts are worked for 6 days a week. Time is figured on the basis of a 6-hour shift, with the two extra hours as overtime at one and a half times the hourly rate.

Safety, First Aid, and Fire Protection

The regulations set forth in the Arizona State Code of Mining Safety are observed and practiced. All manways have staggered ladders with landings, and full partitions are installed between the manways and timber slides.

As a means of promoting safety and efficiency, electric cap lamps are used for individual illumination underground. Sixty lamps are available for renting to the employees at $1.00 a month, which takes care of charging, maintenance, and repairs. The greatest repair items are lenses and globes. Lamps are checked out at the beginning and checked in at the end of each shift. A special room off the change house is provided for storage and charging of the lamps. The capacity of the charger is 50 lamps each 6 hours. A surface employee is responsible for proper maintenance of the lamps; he also cleans up the change room, makes primers, and trams the waste hoisted.

No trained first-aid teams have been developed up to the present, but many of the miners have had first-aid instruction.

There is little danger of fire underground because of the natural dampness. The connection between the Shamrock and Commerce workings provides an exit in case of fire. Water is available from taps into the waterlines at intervals on the levels. Two fire-fighting helmets are part of the standard mine equipment.

The housing of surface equipment is in nearly all instances wood framework covered with corrugated-steel sheeting. Dwellings, the office building, and the dining room and commissary building are the chief fire hazards, as they are of wood finished with stucco.

Mining Costs

Direct stoping costs per ton mined and milled, in units of labor, lumber and timber, power, water, explosives, and other supplies, are shown in the following table for 1938, when 54,709.8 tons of ore was mined and milled at the Ash Peak mine.

Direct stoping costs per ton mined and milled in units of labor, explosives, lumber and timber, power, water, and other supplies for 1938

	Cost per ton mined and milled
Labor	$ 1.1174
Explosives	.2042
Lumber and timber	.0978
Power	.1179 1/
Water	.0075 1/
Other supplies	.1439
Miscellaneous	.1749
Total stoping cost per ton mined and milled	$1.8636
Total operating cost, 1938, per ton mined and milled	$ 4.9394 2/
Percent stoping cost of total cost	37.7 percent

1/ Percentage of total consumption estimated.
2/ Includes leasing, exploration, development, ore crushing and milling, handling and hauling concentrates, administration, and overhead per dry ton mined and milled (see "Combined Costs" p. .)

The cost of development work from January to June 1938, inclusive, was $16,665.36 for 1,038.8 feet of drifting, crosscutting, and raising, or $16.04 a foot. The cost of development work for the entire year 1938 was $15.94 a foot; the cost per ton mined and milled was $0.26.

The cost of principal mine supplies follows:

Explosives:

40-percent gelatin dynamite, 1-1/8 by 8-inch cartridges, per 100 pounds, delivered	$ 11.75

Timber:

Native, sawed, per 1,000 board feet	28.00
Douglas fir, not sawed:	
Stulls, 12-inch diameter small end, per foot delivered	.12
Stulls, 8-inch diameter small end, per foot delivered	.10
Stulls, 6-inch diameter small end, per foot delivered	.08

MILLING

The crushing plant and mill are situated at the mine near the Shamrock shaft. Gravity flow is used in the design, except that the ore discharged from the crushing plant is elevated by conveyor to the fine-ore bin.

The buildings housing the crushing plant and mill are of conventional wood-frame construction covered with corrugated-iron sheeting. Milling operations were begun in March 1937. In June 1939, about 190 tons of ore was being treated daily by flotation, producing 1.7 tons of silver concentrate.

The combined flow sheet of the crushing plant and mill is shown in figure 3.

Crushing and Grinding

Ore from the Shamrock is delivered to the crushing plant by a 1-1/2-ton self-dumping skip. The skip discharges into a trough loading a 20-inch pan conveyor, which carries the ore up a 25 foot, 10-percent slope to a 40-ton, wood coarse-ore bin. Waste can be by-passed from the discharge end of the pan conveyor to a 20-ton, wood waste bin, from which it is loaded by a hand-operated chute into a 16-cubic-foot car and trammed by hand to a waste dump. A 25-ton wood bin beside the main coarse-ore bin has a common opening with it. Trucks hauling ore from the Commerce shaft dump through a grizzly with 10-inch spacings into this bin. The grizzly bars are old stamp stems, 3-1/2 to 4 inches in diameter. Oversize is broken manually.

The coarse ore is discharged through a hand-operated gate onto an inclined grizzly with 2-inch spacings which by-passes undersize, the oversize being fed into a 12- by 16-inch Buchanan jaw crusher driven by a 25-horsepower motor. The discharge is set at 2 inches, but the majority of the crushed product is 3/4 inch in size. The crusher jaw plates are of manganese steel. They are changed each week and the worn ones built up by welding on a hard-facing metal. The ore is very abrasive.

The crushed ore and grizzly undersize discharge onto an 18-inch conveyor belt 40 feet long, running up a 20-percent incline. It is driven by a 2-horsepower motor, at a belt speed of 150 feet per minute. The magnetic head pulley picks tramp iron from the circuit. The conveyor discharges onto a 30- by 48-inch single-deck vibrating screen with 1/4-inch openings, driven by a 2-horsepower motor. The oversize from the screen discharges into a 3-foot, short-head, Symons cone crusher driven by a 60-horsepower motor. The crusher is set at 3/4 inch, but the majority of the product is about 1/4 inch in size. Liners last about 6 weeks. The discharge from the crusher and the undersize from the screen drop onto a 16-inch horizontal conveyor belt 20 feet long, driven by a 1-1/2 horsepower motor, which discharges onto a 16-inch crossbelt driven by a 5-horsepower motor. The second belt conveys the ore up a 30-percent incline 175 feet to the fine-ore bins. A flap of discarded rubber belting is arranged near the loading end of the second conveyor belt to close an electric circuit and sound an alarm if there is no ore on the belt. A similar arrangement is placed on the feed end of the Symons crusher to sound a warning if the crusher becomes choked with feed.

Two 18- by 20-foot, 200-ton fine-ore bins are situated side by side at the head of the mill building. The 175-foot conveyor discharges directly into one of these bins and by-passes to the other bin by a 16-inch conveyor belt 20 feet long, driven by a chain from the 175-foot conveyor. The by-pass conveyor is supported by a framework mounted on four car wheels running on 30-inch-gage tracks of 16-pound rail. The auxiliary conveyor is moved over by hand to by-pass the ore stream into the second bin when the first is full. Both bins are filled by Saturday night, as the mine is not worked Sundays. The crushing plant operates about 12 hours a day.

Ore discharges from the fine-ore bins onto a continuous flat feeder belt, 20 inches by 35 feet in length, driven by a 5-horsepower variable-speed motor. Discharge is regulated through steel gates arranged in tandem, so that ore can be fed from either or both bins. A flap arrangement of the type described sounds a signal electrically when the belt feeder is empty.

Crushed ore discharges into the feed box of a 6- by 10-foot Stearns-Roger ball mill, driven by a 200-horsepower synchronous motor at 24 r.p.m. and loaded with 30,000 pounds of 3-inch forged-steel balls. Manganese-steel liner consumption is about 0.7 pound and ball consumption 4.2 pounds per ton of ore. Cast-iron balls were tried, but their use was discontinued when it was found that consumption was more than double that of forged-steel balls.

The pulp from the ball mill discharges at 72 percent solids through the trunnion to a Dorr Duplex classifier, Model F, 6 by 24 feet, 3 inches, driven by a 5-horsepower motor. The classifier is in closed circuit with the ball mill. A circulating load of about 800 percent is maintained.

A unit flotation cell was placed in the grinding circuit between the discharge end of the ball mill and the classifier in an attempt to improve recovery. Its use was found to be not applicable to this ore.

The approximate distribution of sizes in the classifier overflow follows:

	Percent
Plus 100 mesh	4
Minus 100 plus 150 mesh	12
Minus 150 plus 200 mesh	16
Minus 200 mesh	68
Total	100

Chips and pulped wood caught on the overflow screen of the classifier are collected and burned periodically. The ash, containing about 80 ounces of silver and 1/2 ounce of gold per ton, is screened, sacked, and shipped to the smelter.

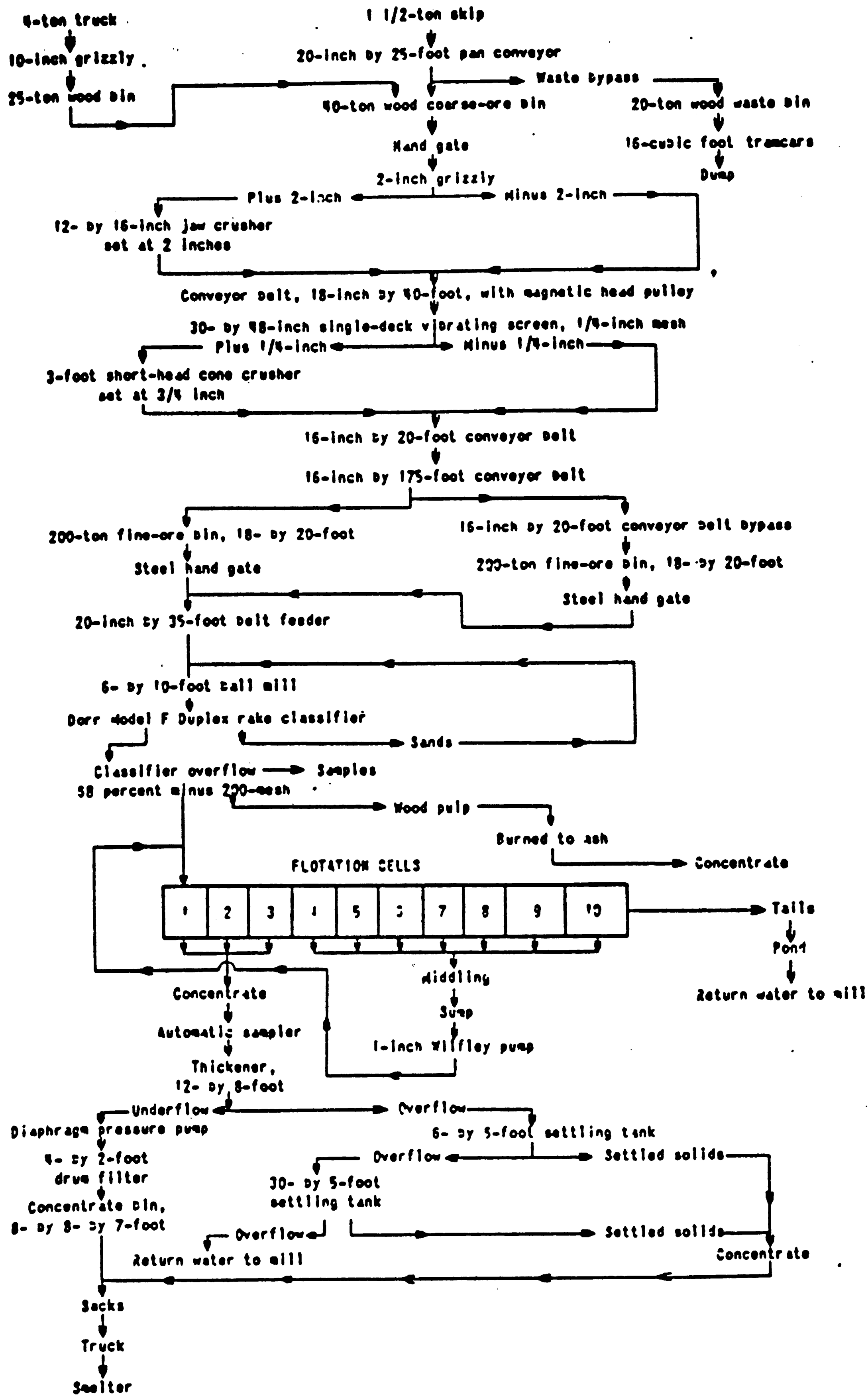


Figure 3.- Flow sheet of Ash Peak mill of the Vega Mines, Inc.; capacity, 100 tons.

Flotation

The classifier overflow passes into the No. 1 cell of a 21-inch, 10-cell Stearns-Rogers flotation machine of the Minerals Separation type. The impeller of each cell is driven by a 5-horsepower motor. A finished concentrate is taken from the first three cells, which are in series. The tailing from these cells is fed to No. 4 cell. The middling concentrate taken from the seven remaining cells, which are in series, is returned by means of a 1-inch Wilfley pump driven by a 3-horsepower motor to the feed into No. 1 cell. Positive aeration is furnished at 2-1/2 pounds pressure by a No. 615 Acme blower driven by a 3-horsepower motor. The pulp density in flotation is low, being only 18 to 19 percent solids. An automatic sampler cuts the concentrate stream from the flotation machine at 15-minute intervals to give a composite sample of the mill operation for each shift.

Reagents are fed to the ball mill, to the classifier overflow, and to the fifth cell of the flotation unit. A two-compartment wet reagent feeder of the disc and-cup type, driven by a 1-horsepower motor through a speed reducer, feeds 0.07 to 0.08 pound of Barrett No. 4 and 0.3 pound of pine oil to the discharge end of the belt feeder. A reagent made up of half pentasol xanthate and half ethyl xanthate is fed at a rate of 0.083 pound for each ton of ore into the feed box of the ball mill from one compartment of a three-compartment wet reagent feeder of the disc and-cup type. The other two compartments feed the same amount of the reagent to the classifier overflow and to No. 5 flotation cell, respectively. The feeder is driven from the classifier drive shaft.

Tailings Disposal and Handling of Concentrate

The tailings from flotation flow by gravity to the tailings pond in a nearby gulch. Tailings are impounded to conserve water, which is returned to the mill circuit.

The concentrate from flotation is washed into a 12- by 8-foot Dorr thickener. The rakes are driven by a 3-horsepower motor at a speed of 1/6 r.p.m. Copper sulfate is fed to the thickener as a settling agent at the rate of 0.03 pound per ton of original feed.

Overflow from the thickener contains 2 to 3 percent solids; it flows by gravity to a 6- by 6-foot steel settling tank and from there to a larger steel 30- by 5-foot settling tank. The overflow from this last tank is returned to the mill circuit. The settled solids are cleaned out of the large tank every 60 days and sacked as concentrate; about 900 sacks is recovered at each clean-up. This material contains about 300 ounces of silver per ton of concentrate. The small tank is pumped out weekly.

The underflow from the thickener at 50 percent solids is pumped by a 2-inch Door pressure diaphragm pump driven by a 3-horsepower motor to a 4- by 2-foot Door drum filter. This filter is driven by a 1-horsepower motor. A 7-1/2 by 6-inch Chicago Pneumatic vacuum pump driven by a 5-

horsepower motor maintains a vacuum of 20 inches of mercury. The cake is blown off the drum by air from the same blower that furnishes air for flotation and falls into sacks hung on racks for the purpose. Filled sacks are stored in the concentrate room. Filtrate is pumped from the receiver back into the mill circuit by a 1-1/2-inch centrifugal pump driven by a 2-horsepower motor.

A 1-inch centrifugal pump driven by a 1-horsepower motor returns waste water collected in the sump.

Metallurgical data

An analysis of the typical mill heads follows:

Ag	ounces per ton	10.97
Ag as chloride and bromide	do	.30
Au	do	.025
SiO_2	percent	85.8
Sulfur	do	.045
Fe_2O_3	do	3.21
Al_2O_3	do	3.28
CaO	do	5.07
Mn	do	.45
Moisture	do	2.1

An anlysis of the average concentrate follows:

Gold	ounces per ton	1.50
Silver	do	550.50
Lead	percent	.3
Copper	do	.18
Zinc	do	.5
Sulfur	do	.3
Alumina	do	1.5
Silica	do	75.4
Iron	do	6.3
Undetermined	do	13.22

The moisture content of the concentrate just after filtering is about 25 percent. During shipment to the smelter the content is reduced to an average of 18 percent.

The ratio of concentration is 110 to 1 and about 65 percent of the silver is recovered. Tests indicate that the recovery of silver can be raised somewhat by finer grinding, but such practice raises grinding costs excessively. The recovery by cyaniding the crude ore or by cyaniding the tailings could be raised to only 80 percent. Efforts to improve recovery by using different amounts and other types of reagents have failed.

Mill Control

An automatic sampler for mill heads was installed with the mill as originally built, but later was discarded. Samples are now taken by hand at the classifier overflow and automatically from the concentrate discharged from flotation.

There is a small metallurgical testing laboratory in the mill. Equipment includes a batch ball mill, laboratory flotation cell, electric hot plates and drying ovens, and an analytical balance.

The mill operator on each shift makes a daily report of the operation of the mill. The form of this report, filled in to show the actual operation on the day shift on June 9, 1939, is shown in the following table.

Form of daily report, showing operation of mill.

Date: 6/9/39 Shift: Day.

Time	Feed	Percent solids		Reagents, c. c. per minute					
		1/ C. O.	2/ B. M.	Z-6 and Z-3 B. M.	Z-6 and Z-3 C. O.	Z-6 and Z-3 No. 5 cell	Barrett B. M.	P. O. B. M.	P. O. C. O.
8	280	19	72	54	50	44	5	8	2
9	276	18	71						
10	276	19	72	54	50	50	5	8	3
11	272	19	72						
12	280	19	73	50	52	54	5	8	3
1	276	18	72						
2	276	18	73	52	54	54	5	8	4
3	276	19	70						
	2,212								

1/ Classifier overflow. 2/ Ball-mill discharge.

Average percent solids:

Wet tons: 66.4
Percent moisture: 2.8
Dry tons: 64.5
Hours run: 8

Concentrate in store: 22
Concentrate sacked: 13
Total sacks: 35

Remarks:

Marketing Concentrate

Concentrates are hauled by truck in 225-sack lots of about 6 tons by way of Lordsburg, N. Mex., to the American Smelting & Refining Co. lead smelter at El Paso, Tex. The freight rate is $6.00 a ton for the distance of 215 miles, making the cost per ton-mile $0.028.

Settlement was made at the following rates in June 1939:

Silver, 97.50 percent of domestic price of 64.64 cents per ounce for concentrate assaying 500 ounces or more of silver per ton; 95.00 percent of domestic price for concentrate assaying less than 500 ounces of silver per ton.
Gold, $32.81 per ounce.

The company attempts to hold the grade of concentrate above 500 ounces of silver per ton.

Deductions were as follows (June 1939):

	Per ton
Base charge	$ 5.09
Handling sacks	.50
Sampling charge, including assaying, $6.00 for each truck-lot of about 6 tons	1.00
Total	$ 6.59

Where an appreciable difference exists between mining company and smelter assays, a sample is taken by representatives of both companies and submitted to an umpire for analysis; the cost of this work is borne by the party whose results are greatest in error.

Until early in 1938 crude ore was shipped to the International Smelting & Refining Co. at Miami, Ariz. Shipments were made by truck to Solomonville, Ariz. The freight cost to this point (74 miles from the mine) was $1.25 per ton. The smelter paid the freight from Solomonville to Miami. The base charge was $3.25 a ton, and there were no penalties. Settlement was made at the following rates:

Silver, all at 95 percent of domestic quotation.
Gold, $32.20 an ounce.

Mill labor

The mill operates three shifts daily for 7 days a week. The following table shows the labor and supervision required to treat 190 tons daily:

Number	Classification	Rate	Total per day
3	Mill operators	$4.50	$13.50
3	Mill helpers	4.05	12.15
2	Crusher men	4.50	9.00
1	Superintendent	6.00	6.00
			$40.65

Mill supply costs

The costs of the principal mill supplies follow:

Item	Cost 1/
Reagents:	
Pine oil	$0.079 per pound
Potassium ethyl xanthate	.140 per pound
Potassium pentasol xanthate	.275 per pound
Barrett No. 4	.075 per pound
Copper sulfate	.819 per pound
Lubricating oil	.62 per gal.
Manganese-steel crusher-jaw plates	105.00 per set
Manganese-steel cone-crusher liners	380.00 per set
Manganese-steel ball-mill liners	.125 per pound
Forged-steel balls	80.00 per ton
Flotation impellers	31.00 each

1/ Delivered to mine.

The costs of grinding balls, mill liners, and reagents per ton of ore milled for 30 days in May 1939 is shown in the following table.

Item	Total Cost	Ore milled tons	Cost per ton ore milled
Grinding balls	$970.05	5,295	$ 0.1832
Mill liners	750.00	5,295	.1416
Reagents	510.00	5,295	.0963

POWER

Electric power for the mine and mill is generated on the property. The power plant is near the mill and is housed in a frame building covered with corrugated-steel sheeting. Equipment includes four Union Diesel engines of 250 horsepower capacity each, direct connected to 250-kv. a. alternators of which one unit is a spare.

Electricity is furnished at four different voltages - 2,300 volts for the crusher and ball-mill motors, 440 volts for all other motors rated more than 1 horsepower, 220 volts for large-wattage lamps, and 110 volts for general lighting circuit and fractional horsepower motors. Power distribution is as follows:

	Percent
Mine	57
Mill, of which 20 percent is used in coarse crushing	40
Camp	3
Total	100

Stations and main levels in the mine are lighted electrically. Electric lighting for the mill is provided from ceiling and drop-cord lamps. The automatic sampler is operated from the 110-volt circuit also.

The connected power load for the mill follows:

Motor	Voltage	Horsepower
Ball mill	2,300	200
Ore feeder	440	5
Reagent feeder	440	1
Reagent feeder	440	5
Classifier	440	5
Flotation cells, 5 horsepower on each	440	50
Blower	440	5
Wilfley pump	440	3
Filtrate pump	440	2
Vacuum pump	440	5
Thickener	440	3
Diaphragm	440	3
Filter	440	1
Sump pump	440	1
Total		289

Five men are required to operate the plant on three shifts. Labor cost, including supervision, is $22.50 a day. The cost of Diesel fuel, the principal item of supply, is $0.0625 per gallon delivered to the mine. The cost of operation for 1938 on the basis of 64,709.8 dry tons milled is shown in the following table.

Cost of operating power plant for 1938 in units of labor, supplies, and lumber.

Labor	$ 0.1603
Supplies	.2983
Timber	.0001
Total operating cost	$ 0.4587
Operating income	.0011
Total cost per ton milled	$ 0.4576

Outlying workings have independent power plants.

WATER SUPPLY

All the water supply is pumped from a well at Ash Springs sunk 5 feet by 5 feet in section a depth of 80 feet. A duplex reciprocating pump, driven by a 40-horsepower tractor Diesel engine, delivers the water through 7,000 feet of 3-inch pipe up a rise in elevation of 1,400 feet to a steel tank 30 feet in diameter by 12 feet in height.

The water for the mill is stored in two steel tanks 30 feet in diameter by 10 feet in height situated just above the mill. These act as surge tanks for water returned from the tailings pond. Additional water is drawn from the main supply tank as needed. The mill uses about 5 tons of water per ton of ore; about 50 percent is reclaimed.

An evaporative tower with a capacity of 3,000 gallons a day cools water for the Diesel engines and compressors.

Distribution of the total daily water consumption of 325,000 gallons follows:

	Percent
Mill	80
Mine	18
Camp	2
Total	100

The cost of supplying water for 1938 on the basis of 64,709.8 dry tons of ore milled is shown in the following table.

Cost per ton of ore milled of supplying water for 1938 in units of labor, supplies, and lumber

Labor	$0.0445
Supplies	.0416
Lumber	.0007
Miscellaneous	.0056
Total cost per ton milled	$0.0924

SURFACE PLANT

The surface plant is arranged to provide all the ordinary services required to keep the mine and mill in good operating condition. Buildings are mostly of wood frame construction covered with corrugated-steel sheeting. Besides the power plant already mentioned, the surface plant comprises the Shamrock shaft house, the Commerce shaft house, a machine shop, an electric shop, a change house, a warehouse, an assay office, and the administration office.

At the Shamrock shaft hoisting is done from a 60-foot steel head frame with a 6-foot-diameter drum hoist, driven by a 100-horsepower electric motor at a rope speed of 450 feet per minute. At the Commerce shaft hoisting is done with a 30-inch-diameter drum hoist driven by an automobile engine. The hoisted ore is dropped into a wood ore bin adjacent to the 30-foot wood head frame. Compressed air is supplied by a 400-cubic-foot-per-minute compressor driven by a 60-horsepower tractor Diesel engine.

Compressed air is supplied to the Shamrock workings by a 640-cubic-foot-per-minute compressor driven by a 100-horsepower electric motor and two 360-cubic-foot-per-minute compressors driven by 60-horsepower electric motors. This equipment is in the power house.

Machine-shop equipment includes a 40-volt, 200-ampere portable arc welder, a metal turning lathe with a 6-foot bed and 12-inch swing, a 21-inch drill press, a power cut-off saw, a power grinder, and a drill-steel sharpener remodeled to split diamond-drill core.

In the blacksmith shop are an air-operated drill-steel sharpener, a power grinder, a homemade oil-fired furnace, and a hand forge.

The electric shop is equipped to rewind motors and to do other electric repair work.

The change house is 20 by 40 feet in area and equipped with individual lockers and showers.

The warehouse contains supplies and replacement parts for the mining and milling equipment.

The assay office is equipped to make routine analyses by fire and wet methods for control of the mining and milling operations.

Fuel oil is stored in two steel tanks of 15,000-gallon and 5,000-gallon capacities.

LIVING ACCOMMODATIONS

Living accommodations for company employees comprise 11 four-room dwellings rented to individual families at $10 to $25 a month, two 40- by 60-foot bunkhouses with eight rooms each, and a 40- by 50-foot boarding house with dining room, kitchen, commissary, and storeroom. Board is furnished at the rate of $1.25 a day, and room in the bunkhouse at the rate of $4.00 a month.

ADMINISTRATION

Operations at the Ash Peak Branch are supervised by a general superintendent assisted by three shift bosses, and milling operations are directed by a mill superintendent. Also on the Company staff are a master mechanic, chief electrician, chemist, engineer, purchasing agent, and chief clerk.

SUMMARY OF COSTS

A summary of individual costs is shown in the following table.

Individual costs:

Exploration (diamond drilling) per foot	$ 1.8881
Development workings, per foot	15.9386
Ore extraction per dry ton mined and milled	1.8636

Combined operating costs for 1938 and total operating costs follow:

Combined costs, per dry ton mined and milled

Leasing, exploration, development, and ore extraction	$ 2.6831
Coarse crushing	.1665
Milling, general	.8074
Handling and hauling concentrate	.0910
Administration and overhead	1.2342
Total cost	$ 4.9822
Income from operation of camp	.0428
Total operating cost	$ 4.9394

Metals production during 1938 and cost per ounce of producing silver is shown in the following table.

Gold	ounces	1,751.86
Silver	do.	527,706.45
Copper	pounds	9,389.32
Lead	do.	26,246.97

Production cost per ounce of silver, $0.60463.

A summary of operating expense per dry ton of ore mined and milled at the Ash Peak mine for 1938 is shown in the following table.

Summary of operating expense per dry ton of ore mined and milled at the Ash Peak mine in 1938.

Dry tons mined: 70,274.8
Dry tons milled: 64,709.8
Dry tons shipped direct to smelter: 5,565.0

Account	Labor	Explosives	Power	Water	Lumber and timber	Other Supplies	Miscellaneous	Total	Percent of Total
Administration overhead and general	$0.4875	—	1/ $0.0283	1/ $0.0069	$0.0006	$0.1475	$0.5694	$1.2342	25.0
Mine leasing	.1611	$0.0336	1/ .0472	1/ .0028	.0111	.0461	.0905	.3924	8.0
Mine exploration	.0296	—	1/ .0159	1/ .0009	.0002	.0139	.0070	.0705	1.4
Mine development	.1391	.0670	1/ .0708	1/ .0046	.0008	.0181	.0562	.3566	7.2
Mine-ore Extraction	1.1174	.2042	1/ .1179	1/ .0075	.0978	.1439	.1749	1.8636	37.7
Coarse crushing	.0472	—	1/ .0377	—	.0002	.0786	.0028	.1665	3.4
Milling, gen'l.	.1961	—	1/ .1510	1/ .0739	.0007	.3556	.0301	.8074	16.3
H. & E. conc.	.0206	—	—	—	—	.0042	.0662	.0910	1.8
Camp	.0058	—	2/1/ .0142	1/ .0028	.0003	.0217	2/ .0532	2/ .0428	2/ .8
Total operating	2.2044	.3045	.4576	.0924	.1117	.8295	.9389	4.0391	100.0
Percent of total	44.6	6.2	9.2	1.9	2.3	16.8	19.0		

1/ Percentage of total consumption estimated.   2/ Operating income.

A summary of capital expense at the Ash Peak mine for 1938 follows:

Account	Labor	Explosives	Lumber	Other Supplies	Misc.	Total
Construction	$ 307.84	$ 55.03	$ 18.18	$ 183.10	$ 21.50	$ 585.65
Equipment	523.91	- -	285.96	3,078.21	4,981.06	8,869.14
Total capital	831.75	55.03	304.14	3,261.31	5,002.56	9,454.79