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PRINTED: 11/21/2002

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES AZMILS DATA

PRIMARY NAME: ASH PEAK

ALTERNATE NAMES:
PATENTED CLAIMS MS 3076A
HARDY
LONE CAMP
HELL FILE
COUGAR
FRAN
GRAND DUC
CROW
POSPOHOLA AND DANKWORTH
ARTHUR MURPHY
PARADISE & SPW CLAIMS
RIBBLE AND DANIELS
BLACK BEAUTY

GREENLEE COUNTY MILS NUMBER: 70

LOCATION: TOWNSHIP 8 S RANGE 30 E SECTION 3 QUARTER SE
LATITUDE: N 32DEG 45MIN 49SEC LONGITUDE: W 109DEG 15MIN 27SEC
TOPO MAP NAME: GUTHRIE - 15 MIN

CURRENT STATUS: PAST PRODUCER

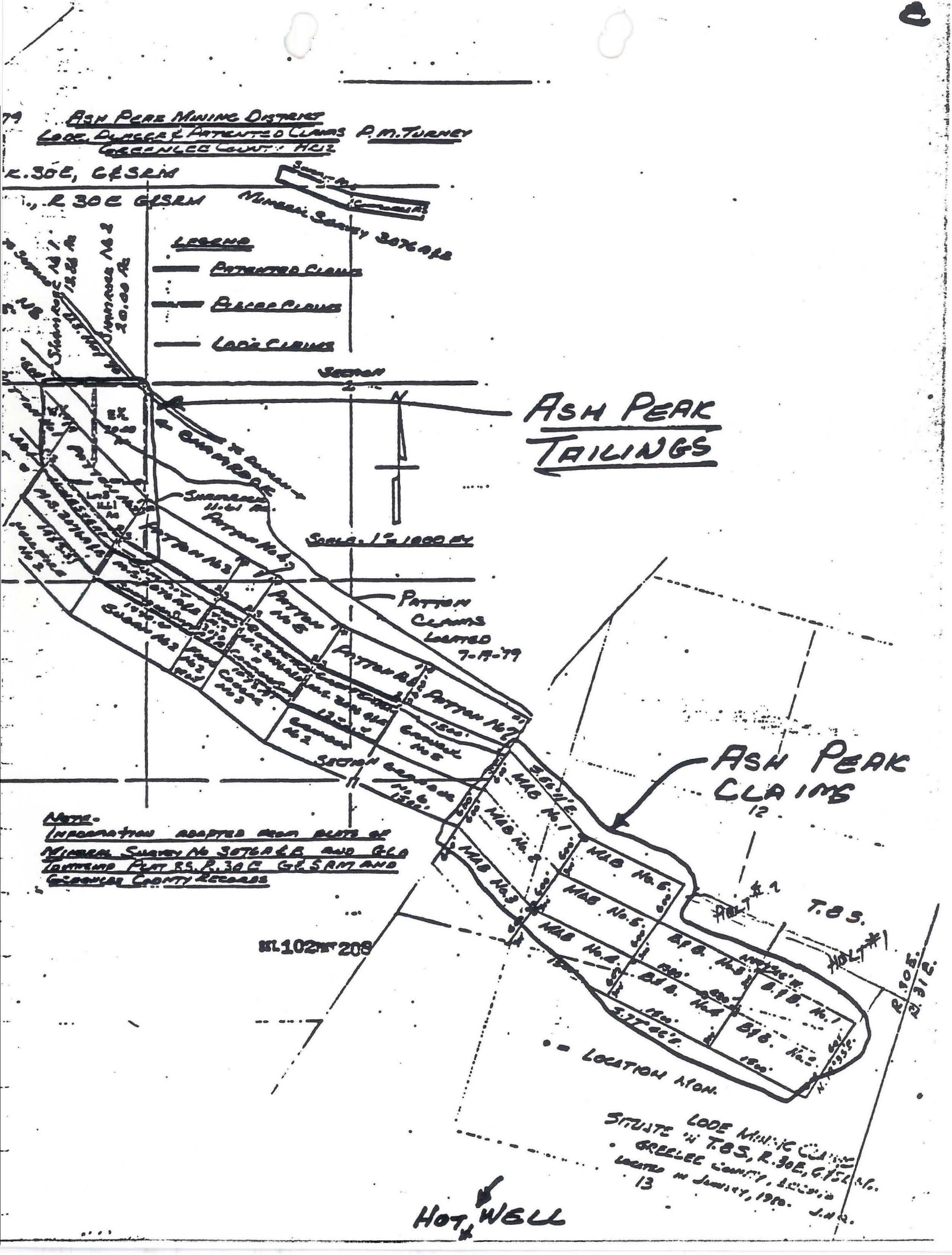
COMMODITY:
SILVER
MANGANESE
SILICON SMELTER FLUX
GOLD
COPPER

BIBLIOGRAPHY:
BLM MINING DISTRICT SHEET 851
PAT. CLAIMS EXTEND INTO SEC. 10 & 21, 11
USGS MINERAL RESOUCES OF THE US 1922, PART 1,
P. 506, 1907, PART 1, P. 168
ADMMR ASH PEAK MINE FILE
ADMMR ASH PEAK TAILING DUMP AND MILL FILE
MAPS - UPSTAIRS ROLLED IN BOXES
ADMMR "U" FILE

CONTINUED ON NEXT PAGE

CONTINUATION OF ASH PEAK

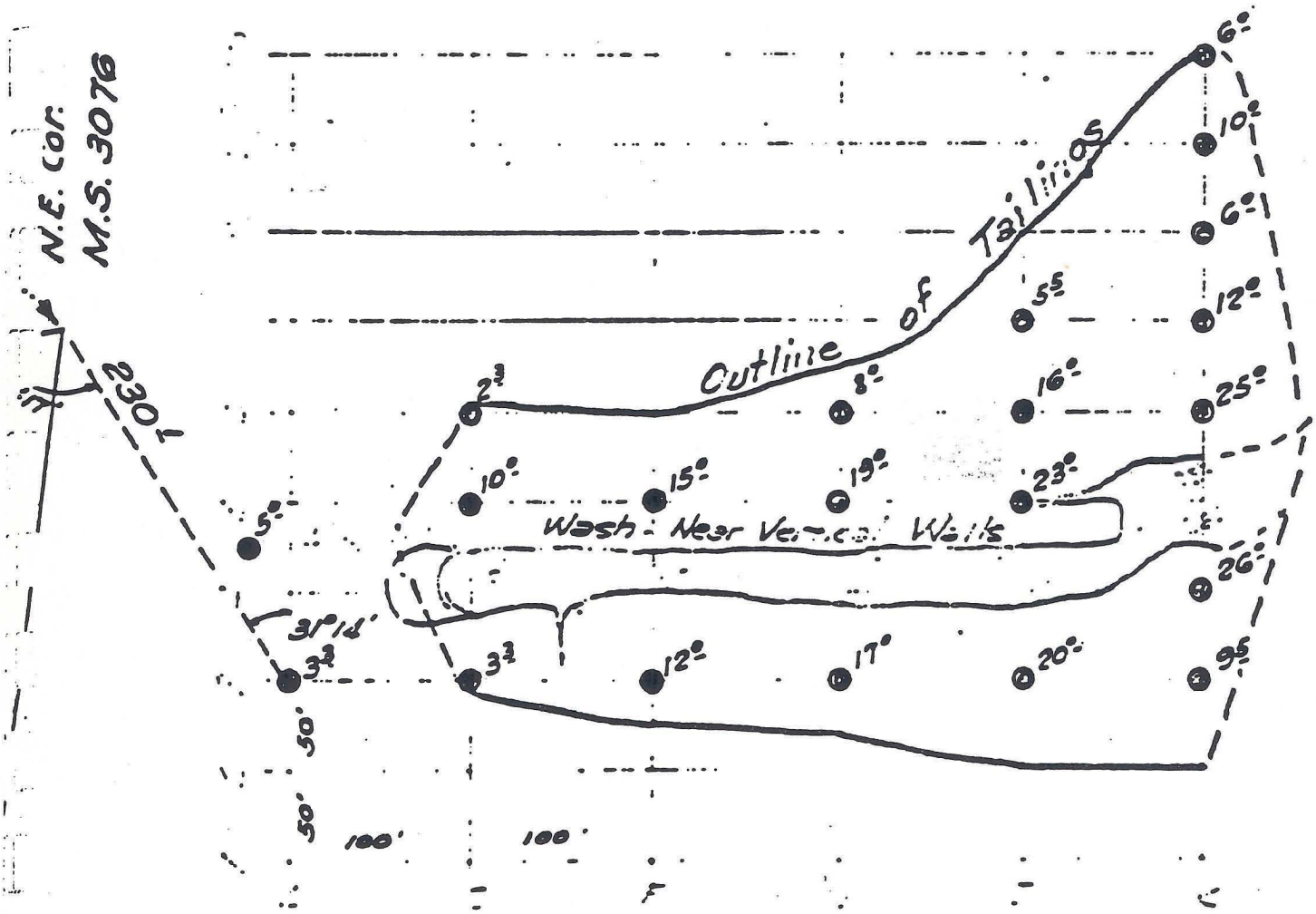
FARNHAM, STEWART & DELONG, MANGANESE DEPTS. OF EASTERN AZ. USBM IC 7990, 1961, P. 106
ADMMR U FILE
RAND, L.H., & STURGIS, THE MINE HANDBOOK, VOL. XVIII, 1931, P. 263
RECORD OF MINING COMPANIES STATE MINE INSPECTORS OFFICE 1947-1958
ADMMR ASH PEAK MINE COLVO FILE
USGS MAP I-1310-B, MINERAL DEPOSIT MAP OF THE SILVER CITY 1 X 2 QUADRANGLE, NEW MEXICO & AZ, RICHTER AND LAWARENCE, 1983, P. 5


ASH PEAK MINING DISTRICT
LODE, PLACER & PATENTED CLAIMS
P.M. TURNEY
GREENLEE COUNTY, ARIZ.
R.30E, G&SRM
R 30 E G&SRM
LEGEND
PATENTED CLAIMS
PLACER CLAIMS
LODE CLAIMS
SECTION
ASH PEAK TAILINGS
PATTON CLAIMS
ASH PEAK CLAIMS
MAB No. 1
MAB No. 2
MAB No. 3
MAB No. 4
MAB No. 5
MAB No. 6
T.8S.
R.30E.
LOCATION MON.
HOT WELL
NOTE:
INFORMATION ADAPTED FROM PLATS OF MINERAL SURVEY NO 3076 A&B AND OLD LORDSBURG PLAT R.5, R.30E G&SRM AND GREENLEE COUNTY RECORDS
SITUATE IN T.8S, R.30E, G&SRM.
GREENLEE COUNTY, ARIZONA
LOCATED IN JANUARY, 1980.
13

BY JQ DATE 7-15-63 SUBJECT 3½" DIA BORE HOLES SHEET NO. 1 OF 1

CHKD. BY _____ DATE _____ ASH PEAK TAILINGS JOB NO. _____

C



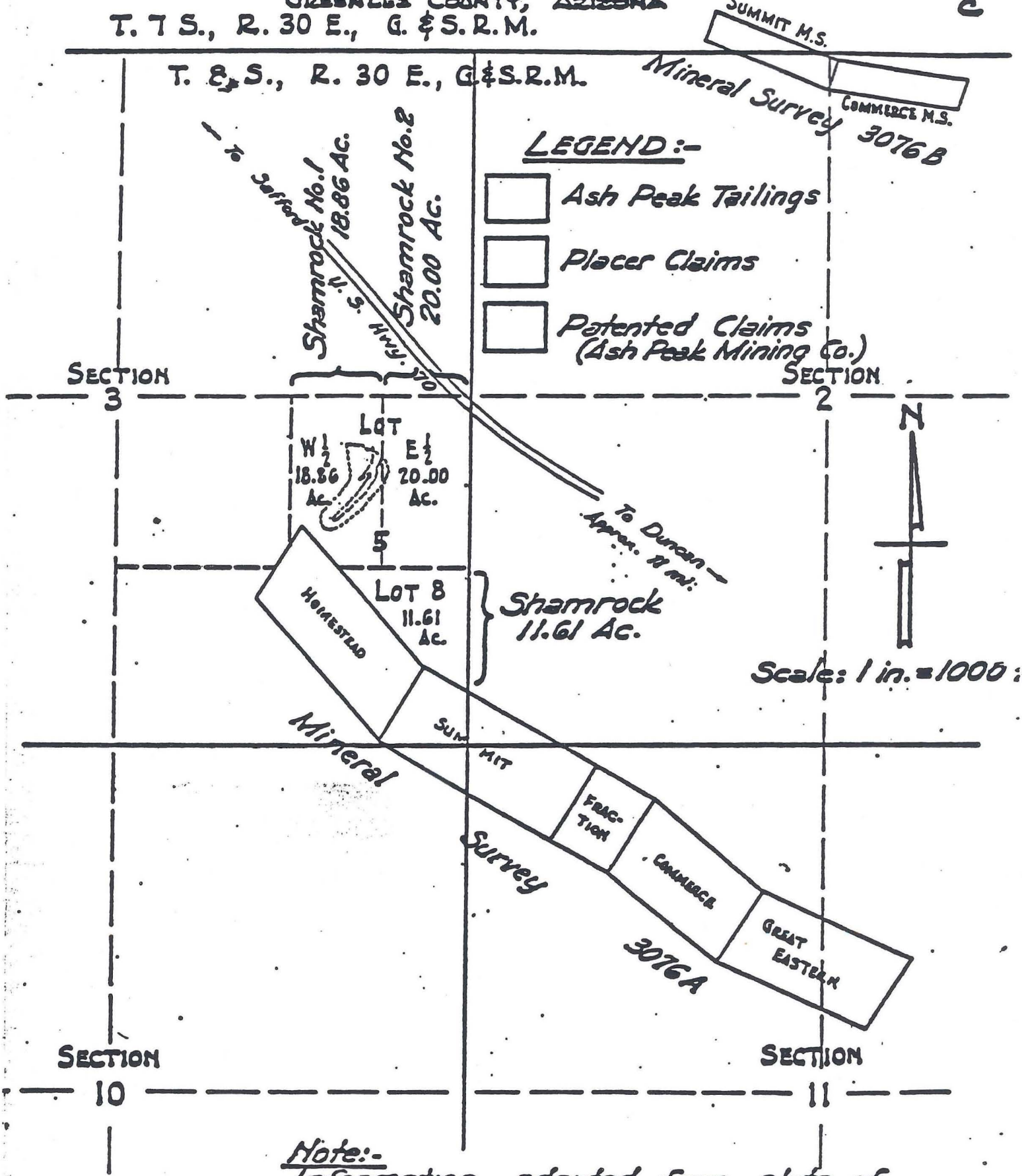
depth
3½" dia. bore hole

N

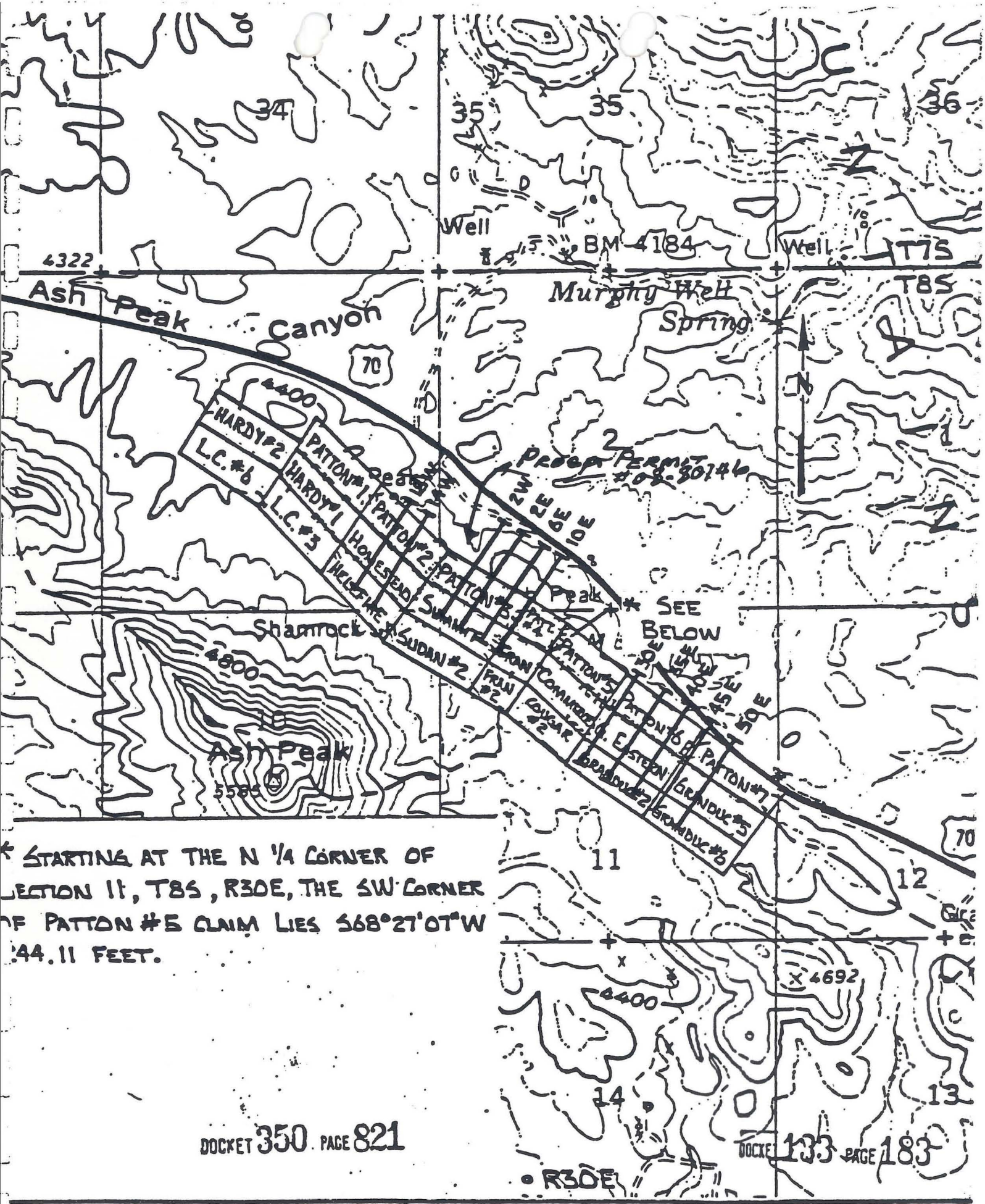
Total Footage = 253? ft.

Scale: 1 in. = 100 ft.

BY J.Q. DATE 11-3-63 ASH PEAK TAILINGS SHEET NO. 1 OF 1
CHKD. BY DATE PLACER LOCATIONS JOB NO. P.M. TURNEY
PATENTED CLAIMS.
GREENLEE COUNTY, ARIZONA



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.

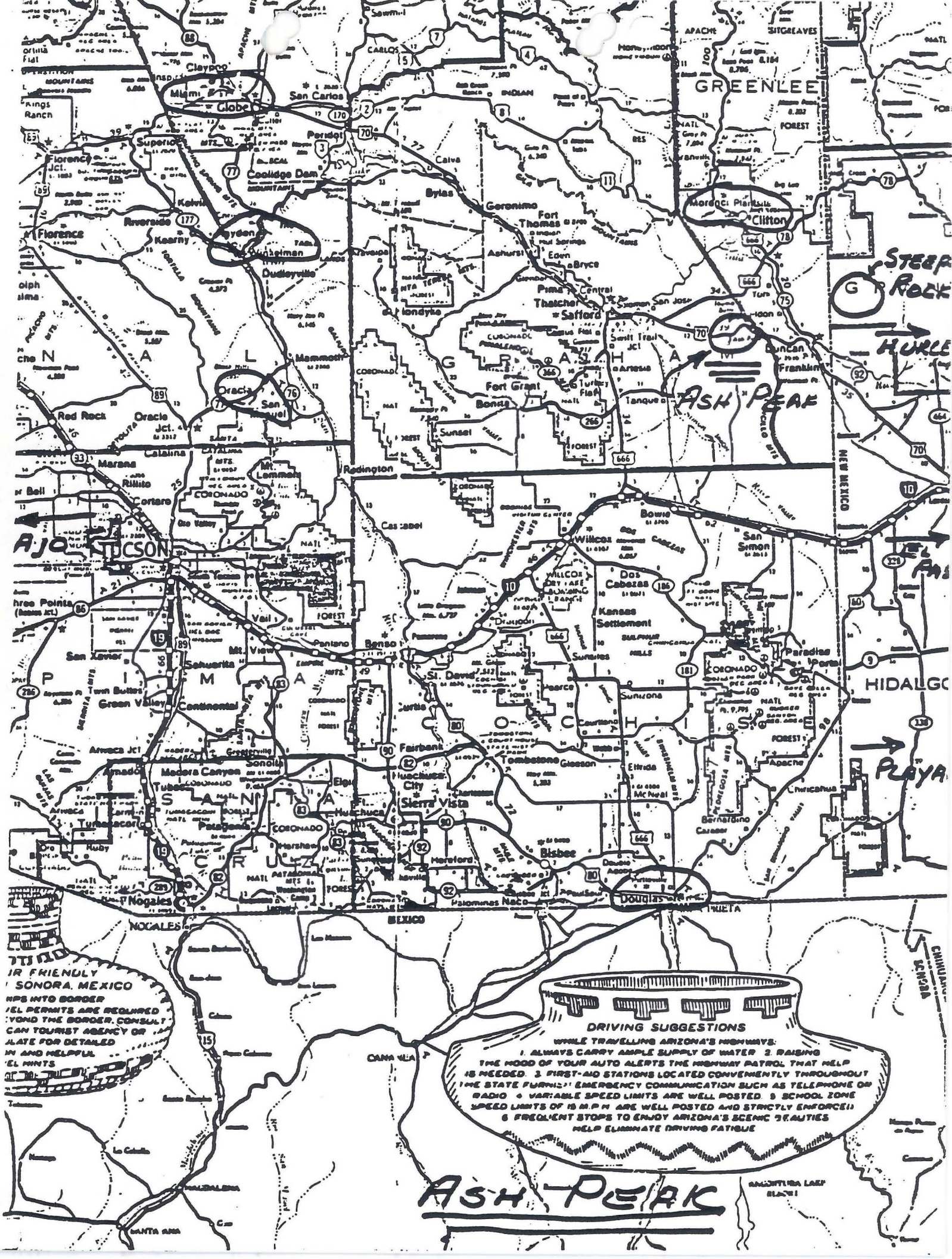


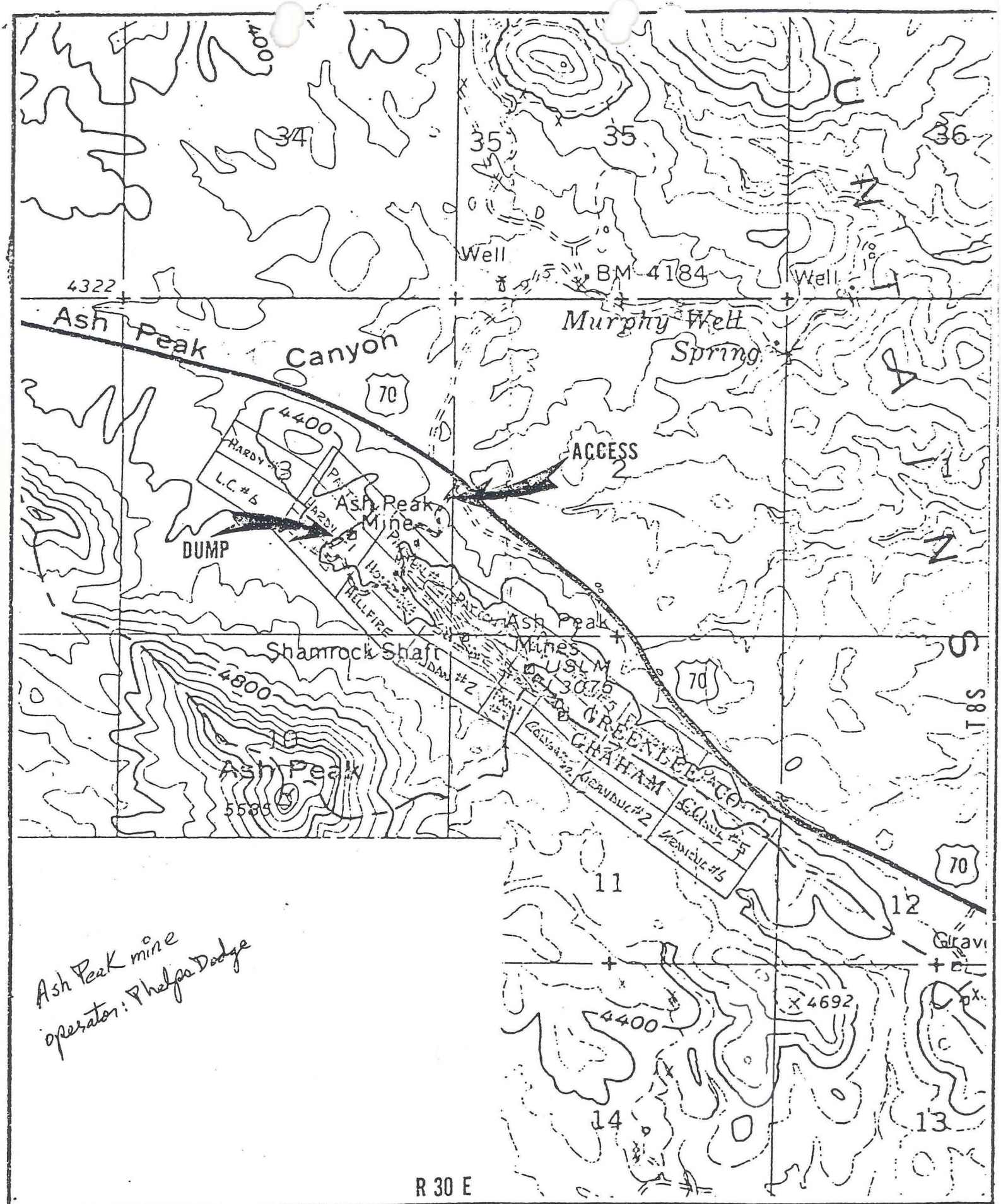
* STARTING AT THE N 1/4 CORNER OF SECTION 11, T8S, R30E, THE SW CORNER OF PATTON #5 CLAIM LIES S68°27'07"W 2444.11 FEET.

DOCKET 350 PAGE 821

DOCKET 133 PAGE 183

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


GREENLEE
Globe
Miami
Superior
Coolidge Dam
Florence
Kearny
Hayden
Winkelman
Dudleyville
Mammoth
Oracle
Red Rock
Marana
Catalina
Mt. Lemmon
Tucson
Vail
Sahuarita
Green Valley
Continental
Nogales
Patagonia
Sonoita
Elgin
Huachuca City
Sierra Vista
Fairbank
Tombstone
Bisbee
Douglas
Willcox
Bowie
San Simon
Safford
Clifton
Morenci
Duncan
Franklin
Fort Thomas
Fort Grant
Bonita
Sunsetsl
Redington
Cascabel
Benson
St. David
Pearce
Sunsites
Dos Cabezas
Kansas Settlement
Paradise
Portal
Apache
Chiricahua
Bernardino
Ashurst
Eden
Bryce
Thatcher
Pima
Central
Solomon
San Jose
Turn
Artesia
Tanque
Turkey Flat
Scott Trail Jct.
Calva
Bylas
Geronimo
Peridot
Claypool
San Carlos
Riverside
Kelvin
Florence Jct.
Oracle Jct.
Rillito
Cortaro
Three Points
Ajo
Tubac
Tumacacori
Rio Rico
Amado
Arivaca Jct.
Madera Canyon
Huachuca
Hereford
Palominas
Naco
Ft. Huachuca
Elfrida
McNeal
Sunizona
Courtland
Gleeson
Ash Peak
Steep Rock
Hurle
Playa
HIDALGO
NEW MEXICO
MEXICO
NOGALES
SONORA, MEXICO
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
ASH PEAK



Ash Peak mine
operator: Phelps Dodge

TITLE ASH PEAK CLAIMS	PHELPS DODGE CORPORATION GEOLOGY DEPARTMENT MORENCI BRANCH DATE 9/81	DRAWN BY DAD SCALE 1"=2000" No. SK-160

Greenlee County

ABSTRACTED FROM ADMMR ACTIVE MINES DIRECTORY, 1991

ARIZONA FLUX MINES INC.

1630 S. Alvernon, Tucson, AZ 85711 - Phone 881-2919.
President ..... Wes Becker Sr.
Secretary-Treasurer ..... Wes Becker Jr.
Ash Peak Mine T8S R30E Sec. 3
Employees: 10 - Underground mine producing precious metal bearing flux for smelters at 100 TPD.
General Manager ..... Mike Best

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Employees 20 - Underground mine producing precious metal bearing flux for smelters at 200 TPD.

General Manager ..... Les Billingsley

ABSTRACTED FROM ADMMR ACTIVE MINES DIRECTORY, 1988

ARIZONA FLUX MINES INC.

P.O. Box 26706, Tucson 85726 - Phone 881-2924.

President ..... Wes Becker Sr.
Vice President ..... Wes Becker Jr.
Secretary-Treasurer ..... Jim Hilkemeyer

Ash Peak Mine T8S R30E Sec. 3

Employees 20 - Underground mine producing precious metal bearing flux for smelters at about 200 TPD.

General Manager ..... Les Billingsley

Date: 1/9/47

Name of Mine Ash Peak Lease

Location Box 208 Duncan Ariz

Operator Howard Mottier

Address Duncan Ariz

Metals Produced Silver Ore

Developing ☒ Shipping ☒

Financing ☐ Planning Operations Soon ☐

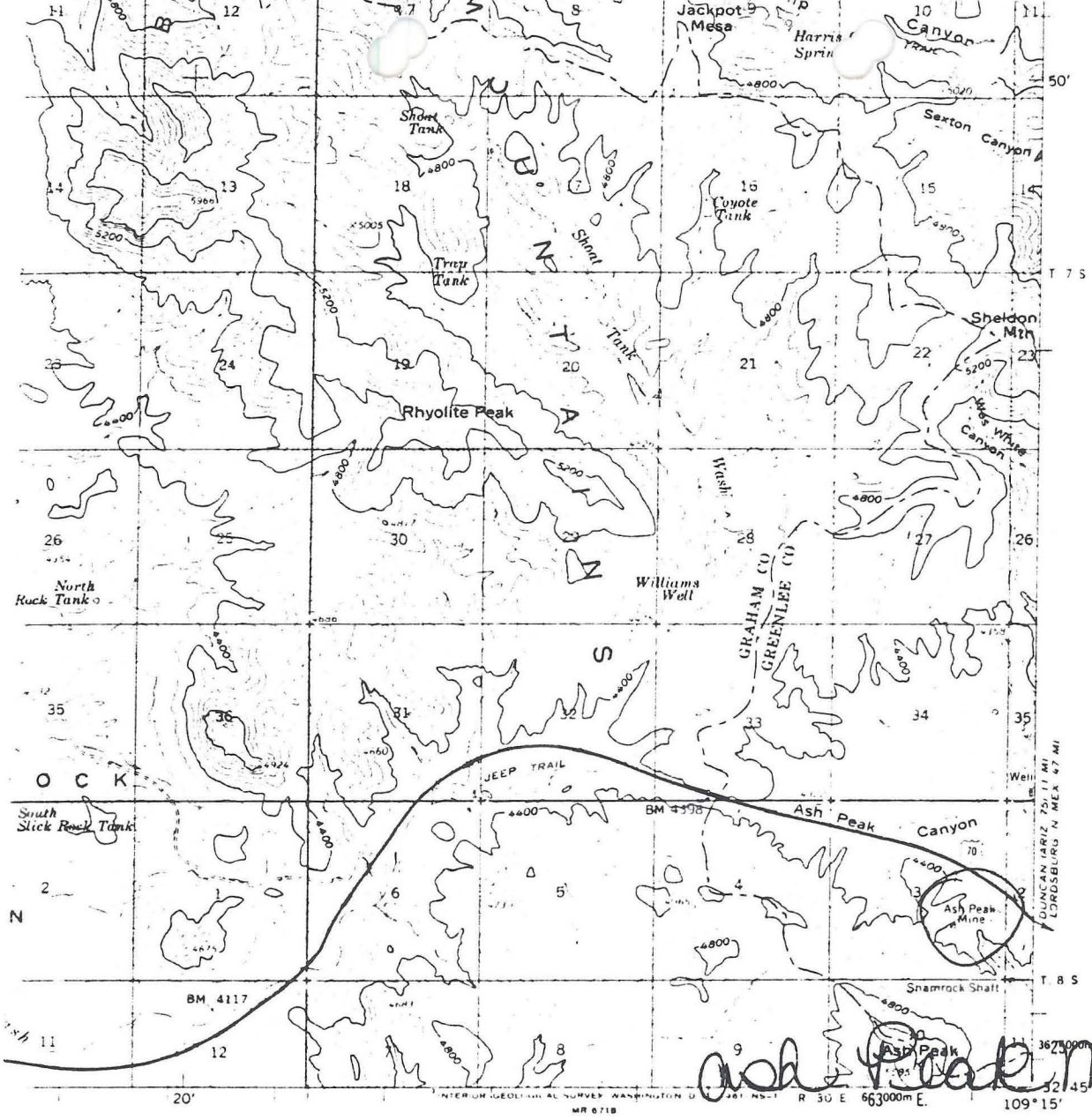
Idle ☐

See letter to Mr. Jas. F. McKale

See I.C. 7119 - Mining and Milling Methods and Costs at the Ash Peak Mine of the Veta Mines, Inc., Duncan, Ariz.

Mining World May 1953 p. 91

PAY DIRT 7/28/69



Ash Peak Mine

T8SR30E Sec. 3

4 MILES

18000 21000 FEET

5 KILOMETERS

ROAD CLASSIFICATION

Heavy-duty — Light-duty

Medium-duty — Unimproved dirt

U. S. Route

ARIZONA

QUADRANGLE LOCATION

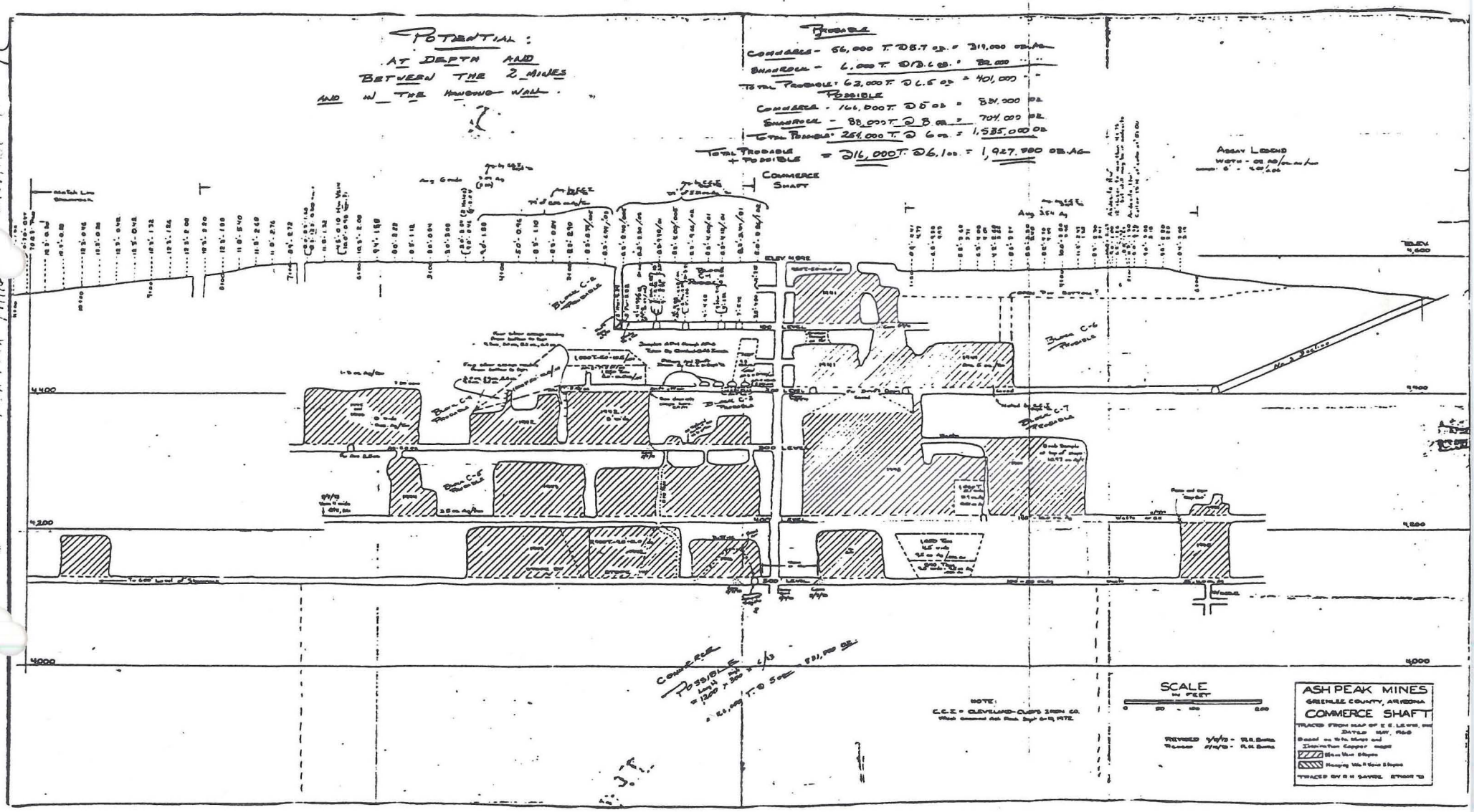
GUTHRIE, ARIZ. 9

N3245—W10915/15

1960

NGTON 25, D. C.
REQUEST

GM


POTENTIAL:
AT DEPTH AND
BETWEEN THE 2 MINES
AND W/ THE HANGING WALL.
PROBABLE
CONNABLE - 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
CONNABLE - 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. = 1,927,000 OZ. AG
COMMERCE SHAFT
ASSAY LEGEND
ELEV. 4,600
4,400
4,200
4,000
400 LEVEL
300 LEVEL
COMMERCE
POSSIBLE
NOTE:
C.C.I. = CLEVELAND-CLIFFS IRON CO.
SCALE
IN FEET
0 50 100 200
ASH PEAK MINES
GREENLEE COUNTY, ARIZONA
COMMERCE SHAFT

ASH PEAK MINE

GREENLEE COUNTY, ARIZONA

UPDATE

for

CANAMIN RESOURCES LTD.

J. R. Woodcock, P. Eng.
June 10, 1988

ARIZONA DEPT. OF MINES & MINERAL RESOURCES
STATE OFFICE BUILDING
416 W. CONGRESS, ROOM 161
TUCSON, ARIZONA 85701

JRW

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JRW

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JRW

ASH PEAK MINE

ARIZONA FLUX MINES, INC.

1.0 SUMMARY

CanaMin Resources Ltd., a British Columbia company, has agreed to acquire Arizona Flux Mines, Inc. and its Ash Peak silver-silica mine in consideration for 555,567 shares of CanaMin and other considerations. Southern Gold Resources Ltd., a privately held company of British Columbia and a company which manages CanaMin Resources Ltd. has lent Arizona Flux Mines $150,000 for which it would receive a monthly loan payment of 50% of net cash flow until payout and 13.1% of the issued capital of Arizona Flux Mines, Inc.

The Ash Peak Mine has epithermal, silver-bearing chalcedonic quartz veins which have been in production intermittently over the past 80 years, initially as a silver mine and in later years as a silver-bearing silica flux mine. The vein system strikes northwesterly and two veins have been in production, most of it coming from the Ash Peak Vein with a lesser amount from the Hanging Wall Vein. This system has been developed by three shafts with drifts therefrom and with stopes from the central Shamrock Shaft and the southeasterly Commerce Shaft. The vein system is reported to occur over a length of about three kilometers; the distance developed by the shafts is 1340 meters.

Most of the production has been from the Shamrock Shaft with some from the Commerce Shaft but a minimal amount from the Hardy Shaft to the northwest. The main production was by Veta Mines Ltd. when the ore was milled on the property and by Inspiration Copper when the ore was shipped directly to the smelter. These two stages of production amount to 303,750 tons with an average grade of about 8.5 oz/ton Ag and 0.032 oz/ton Au. Subsequently Beaver Mesa Exploration and Phelps Dodge Corporation produced silver-bearing flux from the property above the old workings, both from surface open cuts and from declines. This amounted to 97,201 tons with an average grade of about 4.2 oz/ton Ag and 0.02 oz/ton Au.

In 1986 Arizona Flux Mines, Inc. acquired the lease on the property and commenced limited production while rehabilitating the old workings. The Shamrock Shaft has been rehabilitated to the 325-level and active stopes on the 300-level are producing. A hoist and compressor and a semi-autogenous grinding circuit have been installed and the mine connected to the local utilities for power.

JRW

The mining method is by shrinkage stoping over a full width of the vein. Ore shoots will lead into the haulage levels and this will gradually be tracked for later development of additional stopes. Initially a slusher will be used to take the ore to the shaft from stopes close to the shaft.

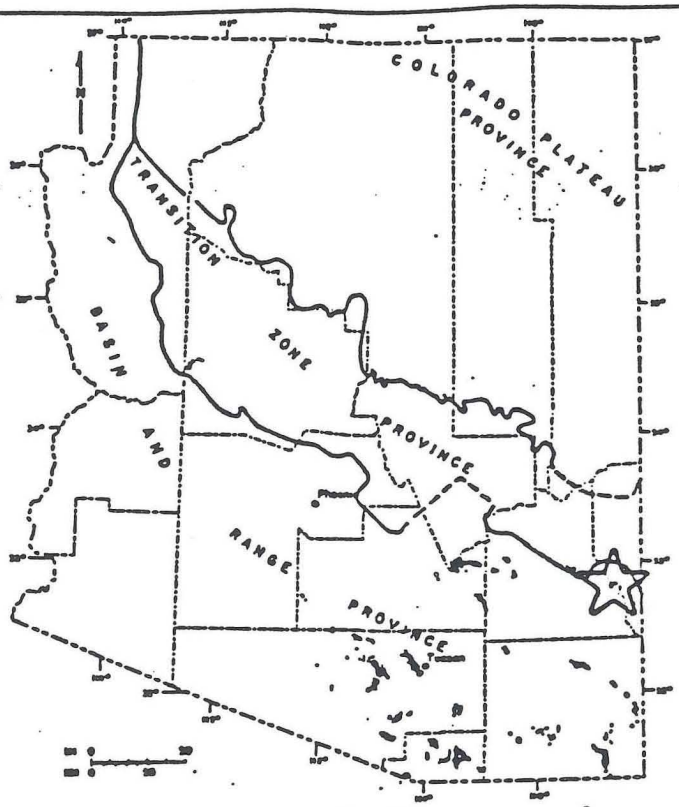
No geological maps are available for the underground workings; however the assay plans from Goldfields Consolidated have been obtained for the previous work. The control for the mineralization is not known; however there does seem to be an upper transition boundary to the higher grade portions that were mined in the past from the Commerce and the Shamrock shafts. There may also be a parallel lower bounding surface to the higher grade parts. Other more steeply dipping structures may also have controls over the distribution of the higher grade silver portions within the veins. In order to resolve the geological controls and conduct exploration for good grade zones it is necessary to have a full time geologist on the property.

Estimated ore reserves include 16,000 tons proven ore, 108,000 tons probable ore and 170,000 tons possible ore. However, the geological potential for more ore zones along this extensive structure is very good as practically no exploration has been done at depth away from the Shamrock Shaft.

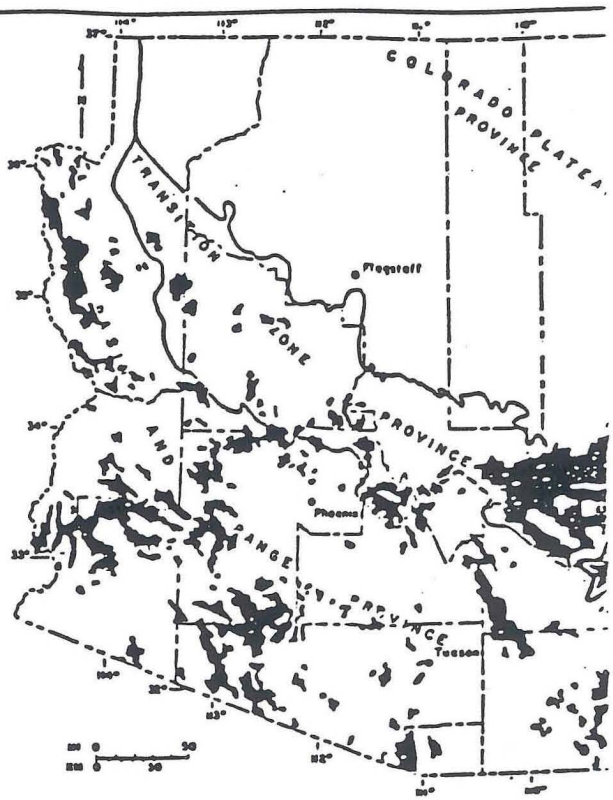
To make an economic appraisal of the property several scenarios were assumed. The most probable one with a grade of 5.5 oz/ton Ag, a mining rate of 300 tons per day and inclusion of book value of capital cost amounting to $550,000 shows a present value for a five-year life amounting to $2.4 million and for a ten-year life amounting to $3.7 million. In this appraisal a contingency of 25% was used on operating costs and a further contingency of 10% on total costs to cover possible fluctuations in prices, etc. The operators expect to improve the income of the operation through better product control and corresponding silver-silica flux prices and by introducing other operating efficiencies.

2.0 INTRODUCTION

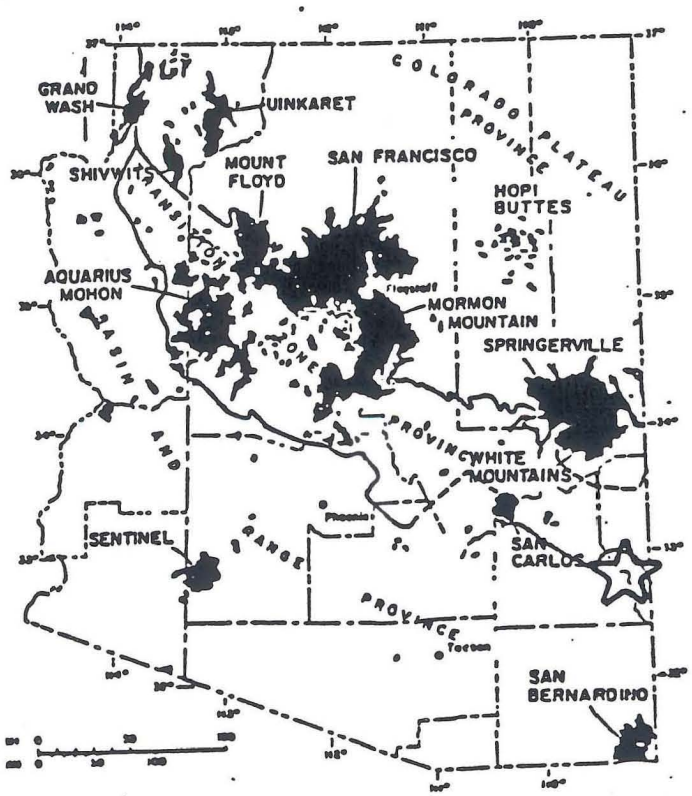
Southern Gold Resources Limited has acquired a 13% interest in the Ash Peak Mine in southeastern Arizona, through Arizona Flux Mines, Inc. This mine, which produces silver-bearing quartz flux for the large copper deposits in the region, is in production at a rate of approximately 200 tpd from two stopes and anticipates increasing to 300 tpd with development of a third stope.



DISTRIBUTION OF
LARAMIDE (80-50 m.y.) VOLCANIC ROCKS



DISTRIBUTION OF MID-TERTIARY (40-15 m.y.) VOLCANIC ROCKS



DISTRIBUTION OF UPPER CENOZOIC (0-15 m.y.)
VOLCANIC ROCKS AND VOLCANIC FIELDS

☆ ASH PEAK MINE

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
J. R. WOODCOCK

CANAMIN RESOURCES LTD.

NORTH VANCOUVER, BRITISH COLUMBIA

ASH PEAK MINE

GREENLEE COUNTY, ARIZONA

LOCATION MAP

SHOWING THE MAJOR GEOLOGICAL FEATURES OF ARIZONA

Work by:	Map Grid:
Drawn by:	Date: MARCH 1988
Scale:	Figure No: 1
J. R. WOODCOCK CONSULTANTS LTD.	

The writer was commissioned by CanaMin Resources Ltd. to examine the property and the available data and make a report with an evaluation of the project and recommendations for the ongoing program. The writer made a three day visit to Arizona in late February, 1988 to spend time at the offices of Arizona Flux Mines, Inc. in Tucson and to visit the mine to gather data. The visit to the mine entailed examination of surface facilities and examination of the geology on the surface and in the declines. The 300-level was being rehabilitated at the shaft and the hoist was undergoing some improvements; therefore the other underground workings were not examined. Rock specimens were collected from surface exposures and the declines for some preliminary petrographic studies. Observations and data gained from this visit were augmented by a number of prior reports which are listed in the "References."

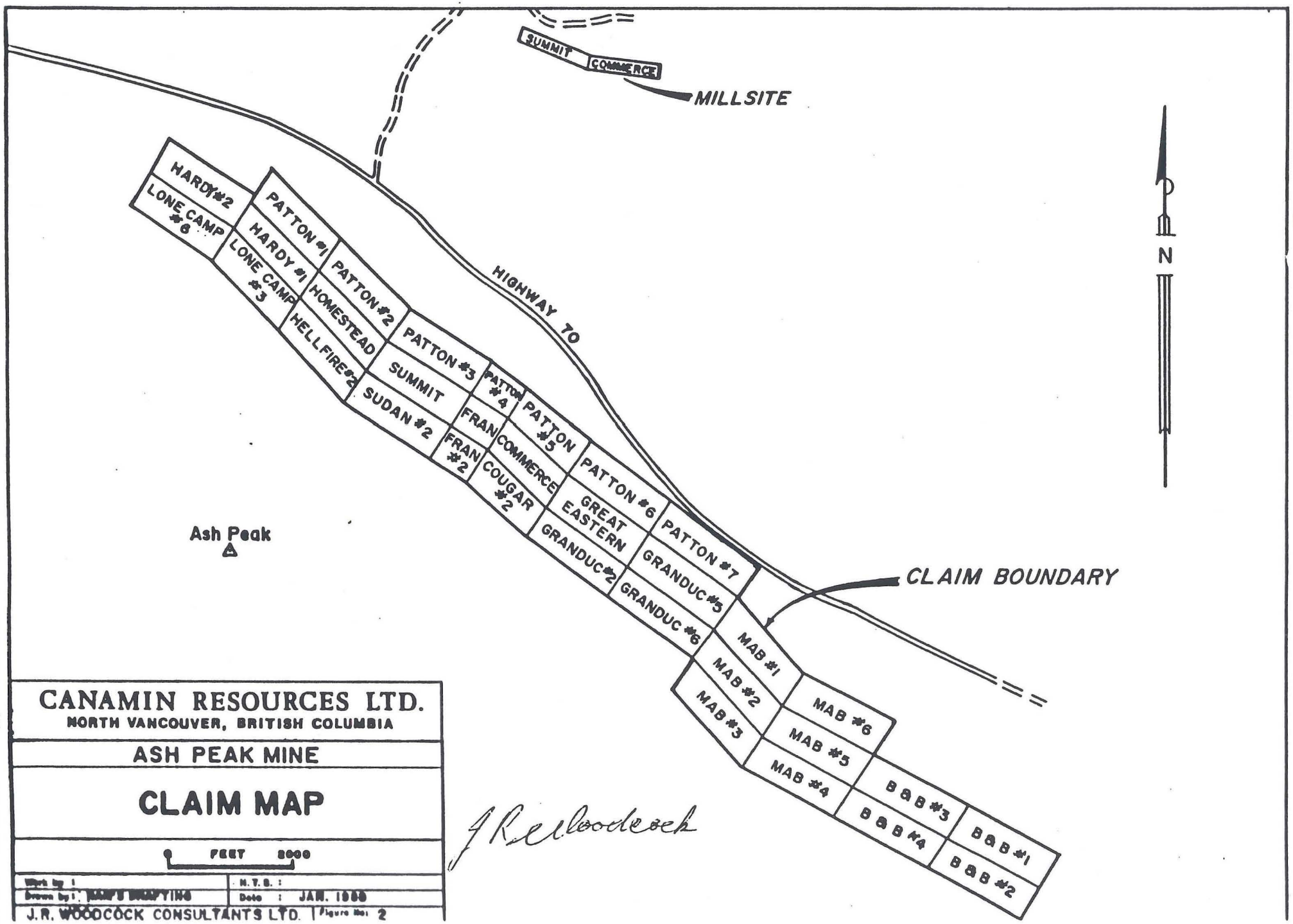
The first report, dated April 15, 1988, has been augmented by incorporation of data received from Sage Associates Incorporated. This included original assay plans from the work by Goldfields Consolidated. Data from the petrographic studies made by the writer has also been incorporated.

3.0 LOCATION AND ACCESS

The Ash Peak Mine is located 0.4 kilometers south of Arizona State Highway #70, 16 kilometers west of the town of Duncan in Greenlee County of southeastern Arizona. It is also 50 kilometers east of the town of Safford. Safford is 270 kilometers by road east of Phoenix and 215 kilometers by road northeast of Tucson. The area is well serviced by paved highways to all major supply centers and air and rail transport points are within reasonable distances. A large, trained labour pool is available from other mining districts in Arizona or nearby New Mexico. Supplies of electrical power and limited supplies of water are available on the property, sufficient for the current operations and the proposed expanded operations.

Within a radius of 200 kilometers there are four operating copper smelters, all of which use silica flux in their processes. The closest is the Phelps Dodge operation near Morenci, about 75 miles by road to the northeast.

The mine is at an approximate elevation of 1422 meters in an arid desert setting. The climate is mild all year around, permitting operations to be continued throughout the year.



CANAMIN RESOURCES LTD.
NORTH VANCOUVER, BRITISH COLUMBIA

ASH PEAK MINE

CLAIM MAP

FEET 2000

Work by :	N.T.S. :
Drawn by : [illegible]	Date : JAN. 1988

J.R. WOODCOCK CONSULTANTS LTD. | Figure No: 2

J R Woodcock

4.0 PROPERTY

The data for this section has been obtained from Mr. Stephen Quin, Vice President of Exploration for Southern Gold Resources Ltd. The writer has not investigated any aspects of the claim holdings or titles.

The property comprises five patented mining claims, two patented mill sites, and 33 unpatented mining claims as listed in Table I.

TABLE I

LIST OF CLAIMS

Name	Type	Status	Patent #	Date
Great Eastern	Lode	Patented	783751	7 Mar 1921
Commerce	Lode	Patented	783751	7 Mar 1921
Fraction	Lode	Patented	783751	7 Mar 1921
Summit	Lode	Patented	783751	7 Mar 1921
Homestead	Lode	Patented	783751	7 Mar 1921
Commerce	Millsite	Patented	783751	7 Mar 1921
Summit	Millsite	Patented	783751	7 Mar 1921
			BLM Serial #	
Shamrock	Placer	Unpatented	41275	19 May 1963
Shamrock #1	Placer	Unpatented	41276	19 May 1963
Shamrock #2	Placer	Unpatented	41277	19 May 1963
Patton #1-7	Lode	Unpatented	57278-84	14 Jul 1979
" (relocated)	Lode	Unpatented	(165054-165060)	24 Feb 1982
Hardy #1-2	Lode	Unpatented	n/a	9 Feb 1972
Lone Camp #3,#6	Lode	Unpatented	n/a	9 Feb 1972
Hellfire #2	Lode	Unpatented	n/a	9 Feb 1972
Suden #2	Lode	Unpatented	n/a	9 Feb 1972
Fran #2	Lode	Unpatented	n/a	9 Feb 1972
Cougar #2	Lode	Unpatented	n/a	9 Feb 1972
Granduc #2,#5-7	Lode	Unpatented	n/a	9 Feb 1972
Harmony #1	Lode	Unpatented	n/a	24 Feb 1982
B & B #1-4	Lode	Unpatented	100836-100839	13 Jan 1980
MAB #1-6	Lode	Unpatented	100840-100845	13 Jan 1980

The claims are held under option by Arizona Flux Mines, Inc. ("AFM"). AFM is required to make minimum monthly payments to the property owners of U.S. $6250 per month or to pay the equivalent of a net smelter royalty, whichever is greater. The effective rate of this NSR is approximately 8% to 10% as set out below:

TABLE II

VALUE OF ROYALTY

Net Metal Value	Royalty	Effective Rate
Less than $20/ton	$2/ton	10%
$20/ton to $52/ton	$2 + 6.25% of amount over $20	10% to 7.7%
$52/ton to $62/ton	$4 + 22.5% of amount over $52	7.7% to 10%
Greater than $62/ton	$6.25 + 37.5% of amount over $62	10% to 20%

5.0 INTER COMPANY RELATIONSHIPS

The following data has been supplied by Mr. Stephen Quin and/or taken from the share exchange agreement between the vendors of the property, Arizona Flux Mines, Inc. and CanaMin Resources Ltd. dated March 24, 1988 and effective April 1, 1988.

1. The vendors of the property include Shamrock Enterprises (an Arizona partnership), Ash Peak Mining Company, Inc. (an Arizona corporation), and Ash Peak Resource and Development Co. (a limited partnership).

2. According to a purchase option agreement entered into on June 25, 1986 (the "Shamrock Agreement"), Arizona Flux Mines acquired the exclusive right and option to acquire 100% right, title and interest in the property.

3. In 1987 Southern Gold Resources Ltd. loaned Arizona Flux Mines U.S. $150,000 for which it will receive 50% of net cash flow each month until payout of the $150,000. In lieu of interest Southern Gold received 10% interest in Arizona Flux Mines shares. At the same time Southern Gold acquired a further 4,500 shares of Arizona Flux Mines at U.S. $1.00 per share bringing Southern Gold's equity to 13%.

4. The authorized capital of Arizona Flux Mines consists of 3,000,000 shares of common stock of which 222,187 shares are issued and outstanding.

JRW

5. By the agreement of April 1, 1988, CanaMin Resources Ltd., a British Columbia company, the purchaser, with agreement from the vendors, agreed to purchase all of the issued and outstanding shares in the capital of Arizona Flux Mines, Inc. The evaluation for the Arizona Flux Mines shares and the consideration paid to all shareholders is 555,567 common shares of CanaMin with the valued price of $1.10 Canadian, being the closing price of the common shares as quoted on the Vancouver Exchange on January 28, 1988, plus other considerations. This is 2.5 CanaMin shares for each share of Arizona Flux Mines. As additional consideration, Mr. W. Becker, Sr. receives a finder's fee of 100,000 CanaMin shares plus possible bonus shares based on net cash flow in the period May 1, 1988 to May 1, 1989.

6. The authorized capital of CanaMin Resources is 10,000,000 common shares of which 2,592,029 are issued and outstanding, prior to the share exchange pursuant to the agreement of April 1, 1988.

7. Other pertinent aspects can be obtained from the agreement.

8. Southern Gold Resources agrees to convert its $150,000 loan into shares of CanaMin Resources at a rate C $1.10 per share or a total of 174,136 CanaMin shares.

9. As of April 1, 1988 CanaMin had $365,000 cash in its treasury and Arizona Flux Mines had accounts payable of $508,302.89, including $394,126.00 in long term debts for equipment.

10. The equipment in use at the Ash Peak Mine has a book value of approximately $500,000. This will have very little re-sale value after the life of the mine. In addition equipment not in use has a sale value between $50,000 and $120,000.

11. The total accounts payable as of April 1, 1988 will be $508,302.89, part of which is owed on equipment under lease. This will be offset by an infusion of up to $365,000 which CanaMin had in its treasury, leaving a maximum total of $143,302.89 in accounts payable.

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6.0 HISTORY

The Ash Peak Mine was discovered in 1899 and first developed in 1900. Goldfields Consolidated Company next optioned the property and from 1916 to 1918 sank six shafts totalling 625 meters. The deepest one, the Shamrock Shaft, reached 244 meters in depth and had 2026 meters of lateral development. Goldfields could not afford the purchase price of $1,000,000 and abandoned the property in 1918. Production for that period is estimated at 6663 tons at an average grade of 18 oz/ton silver and 0.05 oz/ton gold which was direct shipped to the smelter.

The property remained idle until 1936 when Veta Mines, Inc. took over the property and rehabilitated the three main shafts, constructed a 300 tpd flotation mill and connected the Shamrock and Commerce workings for ventilation purposes. The mill operated from September 1936 to January 1938, producing 173,282 tons of ore recovering 5.4 oz/ton silver and 0.02 oz/ton gold. Poor recovery was a problem as, according to Sayer (1935), the tailings assayed 2.5 oz/ton silver. The mine closed in 1938 when the price of silver was cut from $0.775 per ounce to $0.645 per ounce.

In 1941 the mine was re-opened by Inspiration Consolidated Copper Company and the ore direct shipped to their smelter at Miami, Arizona. Total production is estimated at 123,917 tons at an average grade of 9.23 oz/ton silver and 0.04 oz/ton gold. Up until this time all production had come from the Main (Ash Peak) Vein. Inspiration drove a crosscut into the hanging wall and discovered the "Hanging Wall" Vein which has since proven to be quite extensive and of similar grade to the Ash Peak Vein. However, it does not crop out at the surface (Setter, 1968).

In 1963 Sayer and Setter leased the property, and, in 1968, sub-leased it to Beaver Mesa Exploration. This company produced 17,606 tons averaging 4.04 oz/ton silver from open pits. The ore was direct shipped to the Phelps Dodge smelter. The company also commenced rehabilitation of the shaft.

In 1976, Sage Associates Inc. of Tucson staked large blocks of claims to the northwest and southeast of the ground held by the Ash Peak Partners. This organization compiled available data, did some mapping to select exploration targets and recommended further work.

During the early 1980's Phelps Dodge acquired an option on the property and drove three declines into the upper parts of the veins and produced 79,595 tons averaging 4.2 oz/ton silver and 0.02 oz/ton gold from the Ash Peak Vein, principally from open pits around the Commerce Shaft but also from underground. Phelps Dodge abandoned the property with the collapse of the price of copper and silver in 1983.

Arizona Flux Mines, Inc. acquired a lease on the property in June 1986. It commenced limited production immediately at 70 to 80 tpd from Phelps Dodge's declines while rehabilitating the old workings. Work was concentrated around the Shamrock Shaft with the intention of reaching a production of 300 to 400 tpd in 1988.

7.0 GEOLOGY

7.1 General

The data for this section was extracted from the prior reports listed in the References. Data on the stratigraphy is summarized from Karnie (1986) who studied available data at the University of Arizona and at the Arizona Bureau of Geology and Mineral Technology and from the Sage report. The writer's observations have also been added. Petrographic studies have been made by the writer on 25 thin sections and the results described in a separate report.

The Ash Peak vein structure strikes in a southeasterly direction and is flanked on the northeast by some low elongate hills which probably owe their existence to the resistant nature of the silicified breccias of this vein system. These resistant ledges crop out along much of the zone. To the southwest, across a slight depression, are the slopes of Ash Peak which extend up to bold cliffs of flat lying volcanic strata.

7.2 Rock Types

Ash Peak itself is part of a Tertiary eruptive center that was active 21 to 24 million years ago. Karnei (1986) reports that the strata of Ash Peak and the mine area fall into a number of broad units. The uppermost, capping Ash Peak, is approximately 975 feet (290 m) thick and consists of silica-rich, crystal-poor rhyolitic flows with some interbeds of pyroclastic flows and tuffs. Underlying this is a sequence of silica-rich, pale yellowish orange tuffs with a maximum exposed thickness of 400 feet (120 m).

Underlying these two acidic units is an andesitic unit which has been dated from 21.8 to 22.6 million years. This is brownish grey to greyish red in colour and at least 300 feet (90 m) thick. Underlying the andesitic unit is a sequence of thin-bedded, re-worked tuffaceous sandstones interbedded with airfall and other pyroclastic deposits with a maximum thickness of 100 feet (90 m). Karnie suggests that this is the unit that crops out on the northeast side of the Ash Peak Vein.

Below the andesite and tuffaceous units, which host much of the vein system, is a crystal-rich rhyolitic flow sequence of unknown thickness. This overlies the older sediments of limestone, shale and sandstone of Cretaceous and Palaeozoic ages.

The petrographic work has shown that the predominant volcanic rock types are sanidine trachytes and trachyandesites, formed predominantly of feldspar laths. These feldspars are mainly sanidine with from 0 to 50% twinned plagioclase. The matrix to these laths is generally aphanitic; the laths themselves can be easily observed with a hand lens. The rocks are generally greyish to reddish brown in colour, the colouration due to hematite scattered throughout. In addition some of the fractures have abundant brick red hematite which permeates the adjacent rock.

Many of the volcanic rocks are characterized by amygdules. These vary from rounded to distinctly ellipsoidal to those that are extremely irregular and compose much of the volume of the rock.

Volcanic clastics which occur adjacent to the Shamrock Shaft include tuffs in a variety of colours and grain sizes. Most of these are ash fall and reworked tuffs and most of them are characterized by angular fragments of the dark brown to reddish brown trachytes and trachyandesites. The matrix also has a pink tint due to the hematite.

7.3 The Intrusions

Several of the prior reports state that the strata are cut by numerous dikes and plugs. The Sage report indicates that these are especially abundant along the northwest trending zone of weakness that contains the Ash Peak Mine.

A number of the old reports mention a dike of augite andesite, locally called diabase, at the Hanging Wall Fault and one report suggests that the dike is later than vein because it cuts the vein. Karnie suggests that this may be part of the andesitic volcanic sequence.

Southeast of the Shamrock Shaft, small quarry exposes the hanging wall contact of the Ash Peak Vein System. The rock of the hanging wall has been highly sheared and faulted adjacent to the resistant silica vein. This zone of highly sheared rock with fault gouge has a banded appearance due to variations in the amount of shearing and pulverization of the rock. Bands up to 20 centimeters wide with practically no shearing do give the impression of dikes. Other banding is due to the variations in alteration and amount of shearing. Away from the fault the amount of shearing and alteration decreases so that it is considerably reduced at a distance of 15 meters from the fault.

Petrographic examination of the rocks from these surface exposures and also of underground rocks adjacent to the Hanging Wall Vein, show that they are trachytes and trachy-andesites that are conspicuously devoid of amygdules in contrast to the flow rocks. More studies are needed to determine whether the non amygduloidal rocks are all dike rocks. If so, then varying textures might indicate the presence of several dikes in the hanging wall and also some dike rock in the footwall northeast of the Ash Peak Vein.

7.4 The Vein System

The main vein and the one which has received most development in the past is the "Ash Peak Vein," originally called the "No. 2 Vein." In addition there is a small Footwall Vein (the No. 1 Vein) lying to the northeast and a Hanging Wall Vein (the No. 3 Vein) lying about 25 feet southwest of the Ash Peak Vein. The Footwall Vein and the Hanging Wall Vein are blind veins which were discovered underground. In addition there is a Green Vein which crops out about 1500 feet north of the Hardy Shaft and trends northwesterly, presumably intersecting the Ash Peak Vein System about 400 feet along strike to the northwest. The Sage report shows another vein that is parallel to and lies about 400 feet south of the Ash Peak Vein. In addition there are a number of quartz veins lying southeast of the Ash Peak System, some of which are likely extensions of this system.

The Ash Peak Vein occurs along a strong fault fissure for over two miles (3.2 km), forming hogbacks in places. The vein strikes N 60° W and dips 75° to 85° SW. Three shafts, the "Main" or "Shamrock Shaft," the "Commerce Shaft" to the southeast, and the "Hardy Shaft" to the northwest have been placed along these hogbacks in the silicified breccia. The distance between the Hardy and Commerce Shafts is 4400 feet (1340 meters). The distance between the extremities of underground workings is 5300 feet (1615 meters).

The Ash Peak Vein is a silicified fault breccia which contains fragments of a variety of volcanic rocks in addition to fragments of chalcedonic silicified rock, indicating several stages of faulting and silicification. The silicified zone ranges generally from 3 to 18 feet (1 to 5 m) in width and averages about 7 feet (2.1 m).

The vein minerals are largely chalcedony of a variety of colours from grey to reddish, quartz, white to black calcite, argentite, pyrite, and traces of gold. Secondary minerals such as cerargyrite, malachite and gypsum are also present. The occurrence of malachite and also the recovery of some copper from the flotation (Setter, 1968) indicate presence of a copper mineral in the hypogene zone. A few veinlets of amethyst cut the silicified rock.

Banding of the vari-coloured chalcedony is common in much of the silicified vein system. This banding can occur around fragments, in places a somewhat botryoidal structure is present.

There have been suggestions that good ore is recognized by clouds of argentite and in places it is associated with amethyst and copper stain. Calcite is more abundant near the footwall than near the hanging wall and values are low where calcite is predominant.

Lines (1940) gives the chemical content of the ore as follows:

Ag	11.27 oz/ton	Al_2O_3	3.28%
Au	0.025 oz/ton	Fe_2O_3	3.21%
SiO_2	85.8%	CaO	5.07%
S	0.045%	H_2O	2.1%
Mn	0.45%		

7.5 Hydrothermal Alteration

The petrography and the field observations indicate that the main alteration is silicification of the host trachytes and the breccia fragments from these host rocks. This forms an extremely fine-grained quartz mixture which does contain some extremely fine-grained sericite. Introduction of quartz into the vein and the spaces around the silicified breccia fragments has produced the veins that are presently being mined.

Carbonate, probably mainly calcite, has mixed with the quartz vein material in places and also forms an alteration product in some of the rocks.

Probably the most widespread alteration product is hematite. Fine-grained specular hematite occurs throughout most of the trachytes and also occurs as an alteration product adjacent to fractures. This red colouration occurs in most of the trachytes that have been examined and also in the tuffaceous rocks near the vein system. Insufficient petrographic studies have been done away from the vein system to determine whether this alteration product is related to the faulting and the vein system or whether it is part of the original volcanic phenomena.

Early alteration, which is evident in some of the productive parts of the vein, has included quartz adularia. In parts of the vein system fragments of this early alteration product are now cemented by later fine-grained quartz or chalcedony.

An amber coloured, somewhat opaque, extremely fine-grained alteration product occurs in some of the specimens that were collected adjacent to the vein. Additional studies are needed to determine if this is secondary biotite. Also epidote has been detected in a specimen of so-called dike rock collected about 50 feet southwest of the Ash Peak Vein.

The rocks (possibly trachytic dikes) along the hanging wall have been highly sheared and much of this has been subsequently altered to a greenish product, probably a chlorite, and in places a white product, probably argillic alteration.

The Sage report stresses the presence of zones of quartz and quartz-calcite veinlets that are locally altered to clay and chlorite and may indicate the presence of underlying ore bodies. The report states that the Ash Peak Vein crops out continuously from the Commerce to the Shamrock Shaft and is exposed locally from the Shamrock Shaft to a point 1000 feet northwest of the Hardy Shaft. Further northwest the vein consists of broken rock with quartz and quartz-calcite veinlets and associated alteration. Also 300 feet south of the Ash Peak Vein there is a zone of chlorite alteration and diffuse quartz veining which parallels the Ash Peak Vein for more than 8000 feet along strike; this may represent the top of a buried vein.

7.6 Structure and Structural Control

Ash Peak and the extensions therefrom form a linear ridge or feature that extends in a northwesterly direction approximately parallel to the Ash Peak Vein. The Sage report states that the strata dip gently westerly. Locally there are some flexures in this general trend; the bedded tuffaceous rocks that lie northeast of the Ash Peak Vein and a short distance to the northwest of the Shamrock Shaft appear to dip southerly at about 10° (S. Quin, 1988).

The fault structure which contains the Ash Peak Vein System can be traced for at least 12,000 feet, with branching and deflecting additional veins further to the southeast. At the mine workings, the Ash Peak Vein dips steeply (about 80°) to the southwest.

The top of the better grade silver zones, as indicated in the Commerce, Shamrock, and Hardy workings plunges about 10° or 12° northwesterly. Such a limiting cap or boundary could indicate some thermal control related to a palaeo surface. However a more logical explanation would be a stratigraphic control at the intersection of favourable beds with strong quartz veins that dip steeply southwesterly but strike in a slightly different direction.

A similar lower boundary with the same plunge to the northwest appears to also mark the lower limits of the higher grade parts of the ore in the Commerce and the Shamrock Mines This could also be a similar lower stratigraphic control. These controls and other limiting controls are discussed in Section 8.4.

8.0 PRODUCTION AND ORE RESERVES

8.1 Production

The history indicates that production at this property took place under six different companies including the present operator, Arizona Flux Mines, Inc., which is in the process of revitalizing the operation. In all cases, excepting for the Veta Mines production, the ore was directly shipped to the smelters. Production for the past phases of operation are listed in Table III. Explanatory notes follow this table.

TABLE III

SUMMARY OF PRODUCTION

Notes	Company	Years	Comments	Production (short tons)	Silver Grade (OPT)	Gold Grade (OPT)
1.	Goldfields	1916-18		6,663	18	.05
2.	Veta Mines	1936-38	Recovered	173,282	5.4	.02
3.			Tailings		2.5	.01
			Heads		7.9	.03
4.			Dir. Ship.	6,551	7.6	.029
5.	Inspiration	1941-54		123,917	9.2	0.035
6.	Beaver Mesa	1968-70		17,606	4.04	.02
7.	Phelps Dodge	1981-84		79,595	4.2	.02

1. From 1935 report, probably by Sayer. This came from high grade shoots.

2. From production records of U. S. Bur. of Mines (Setter, 1968). Setter also states that the 173,282 tons of ore yielded 55,000 lbs. copper (.02%) and 118,000 lbs.lead (.03%).

3. A report with unknown author dated 1941 states that 5 samples from the tailings dump averaged 3.4 OPT silver and 0.01 OPT gold. The figure used on Table III is 2.5 from Setter's report (1968). Thus the heads could have slightly higher silver than 7.9 OPT.

4. From Setter, 1968.

5. From Setter, 1968.

6. The tons shipped and silver content are from Leon, 1985 who quotes GEM, 1972.

7. Compiled by GEM (probably George E. Moorehouse) from Phelps Dodge settlement sheets (1972).

8.2 Ore Grades

From the production statistics of Table III one can draw some conclusions on typical precious metal grades:

1. The production by Veta Mines and by Inspiration Copper took place largely from the Shamrock Shaft between levels 300 and 700 and from the Commerce Shaft between levels 200 and 500. This included 303,750 tons with an average grade of 8.42 oz/ton Ag, if one uses the grade of 2.5 oz/ton for mill tailings (Setter, 1968) or 8.93 oz/ton if one uses the value of 3.4 oz/ton Ag for surface sampling of the tailings pond. Gold content would average 0.032 oz/ton.

2. The production by Phelps Dodge was from above the 200-foot level and mainly from the Commerce Shaft area and this totalled 79,595 tons with a silver grade of 4.2 oz/ton and a gold grade of 0.02 oz/ton.

   Phelps Dodge, in its mining from surface and from declines, worked mainly above the 100-foot level at the Shamrock Shaft and above the 200-foot level and northwest of the shaft in the Commerce Shaft area.

   The production by Beaver Mesa (17,606 tons with 4.04 oz/ton Ag and 0.02 oz/ton Au) is similar in grade to the Phelps Dodge production. It also came from open cuts.

3. These comparative figures indicate that the values increase below the 200-foot level. Such a "top" of the better grade vein material would dip about 10° to the northwest and could explain why reports indicate that good values in the Hardy Shaft area are only encountered in the lowermost part of the workings. This could also be the reason for the relatively low values in the shallow drill holes placed by Phelps Dodge between the Shamrock Shaft and the Hardy Shaft and to the northwest of the Hardy Shaft.

4. The small amounts of ore extracted by Goldfields were from high grade shoots with a reported average grade of 18 oz/ton Ag and 0.05 oz/ton Au.

   Four pages of the results of car shipments to a number of smelters made between 1906 and 1909 show that nearly all shipments graded better than 10 oz/ ton Ag and 0.03 oz/ton Au and that many of these shipments were over 20 oz/ton Ag, with up to 30.5 oz/ton Ag, and up to 0.055 oz/ton Au. The Sage report states that this early production came from the Green Vein and from the Hardy Shaft.

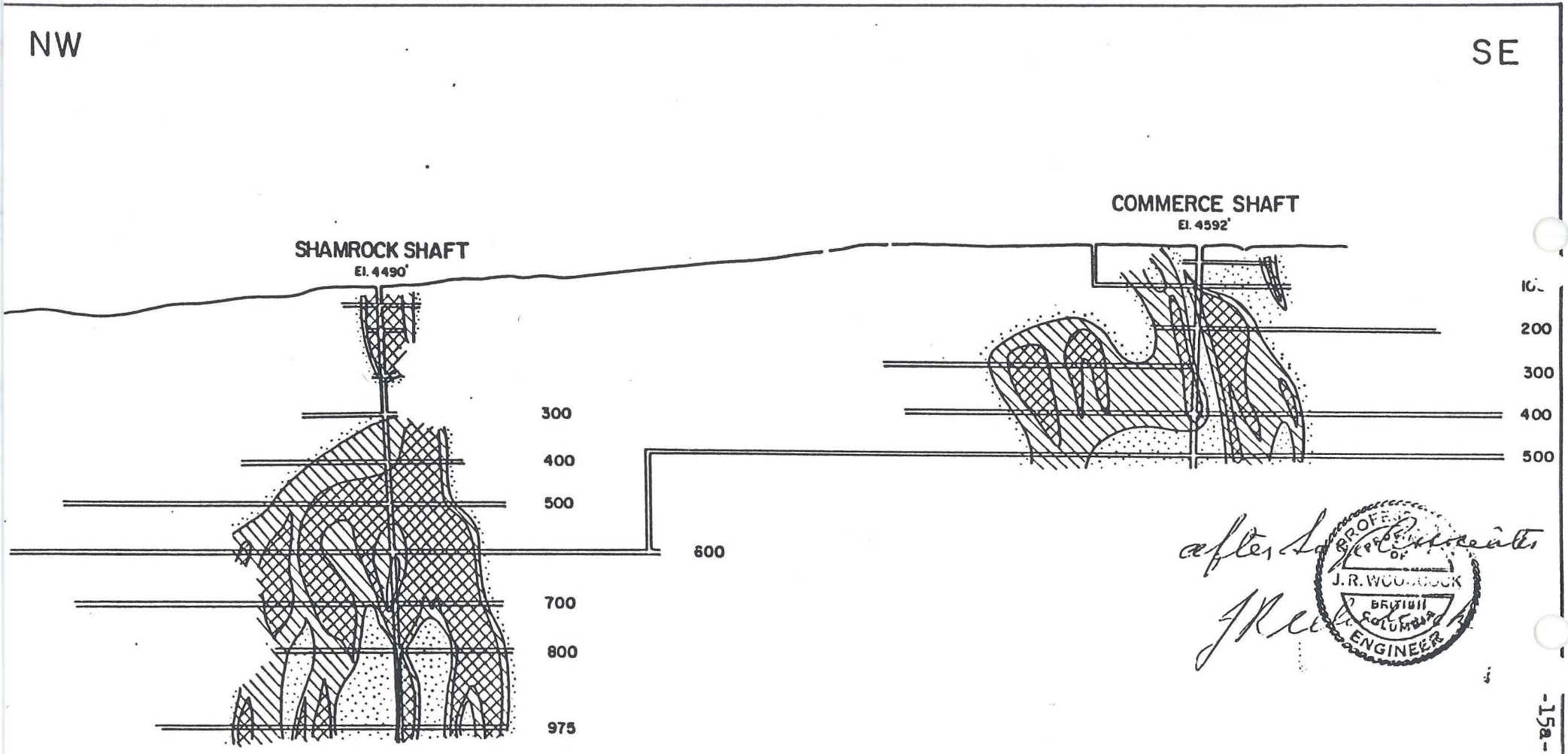
5. Based on the above data, silver grades expected for much of the future mining will vary between 4 and 8 oz/ton. Accordingly three cash flow projections have been made using silver grades of 4, 5.5 and 8 oz/ton.

6. The limited detailed assay data on hand, namely the Phelps Dodge data from the upper parts of the veins, indicate that, in detail, grades are quite erratic along the veins. Areas of relatively low grade material can have occasional high grade values within them and areas of generally good grade material can have numerous spots of very low grade material. Such observations have also been stated in some of the old reports.

8.3 Vein Widths

Mining operations throughout the history of this mine have taken place on three veins. The No. 2 Vein, now called the Ash Peak Vein, has been the source of most of the ore. Lying 15 feet to the northeast is the No. 1 or Footwall Vein. Minor old operations took place on the No. 1 Vein; however there is no specific record of the amount. About 1948 Inspiration discovered the No. 3, or Hanging Wall Vein, and it became the main producing vein. It is 25 to 30 feet southwest of the Ash Peak Vein and is reached by crosscuts from the shaft or from the drifts on the Ash Peak Vein. Only the Ash Peak Vein crops out on the surface; the other two veins are "blind" (H. Foard, 1953).

A number of average widths are quoted for the past mining history on the Ash Peak Vein. Herbert L. Lines (1940, p. 4) states that the ore ranges from 3 to 18 feet in width, averaging 7 feet. However, he also states that grade decreases from the hanging wall to the footwall and that the footwall of the ore body is an economic cut-off rather than a structural one. There is also the added factor that in the mining by Veta Mines a skin of quartz, about one foot wide, was left at the hanging wall to prevent sloughing from the fault zone adjacent to this hanging wall contact. Thus, average width quoted from the past production might be a minimum and might be increased under the present economic and mining condi-



after Lawrence

J R Woodcock

PROFESSIONAL ENGINEER OF BRITISH COLUMBIA J.R. WOODCOCK

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CANAMIN RESOURCES LTD.
NORTH VANCOUVER, BRITISH COLUMBIA

ASH PEAK MINE
GREENLEE COUNTY, ARIZONA

SHAMROCK-COMMERCE SHAFTS
CONTOURED SILVER GRADE

0 200 400 600 FEET

Work by :	Map Grid :
Drawn by :	Date : June 1988
Scale : As shown	Figure No. 4
J R. Woodcock Consultants Ltd	

tions. The value of the silica for flux might allow one to extend further into the footwall and the plan to mine very close to the hanging wall, leaving relatively small pillars, might also increase the economic mining widths under today's planned operation.

The report of October 4, 1935 from which the author's name has been eradicated, possibly by Robert Sayer, also states that the vein varies from 3 to 18 feet in width with a stoping width of at least 6 feet and which may run up to 12 feet. In this same report he quotes reserve estimates by three authors, Henry F. Crowther, H. V. Snell, and J. W. Bible. It is interesting to note that Crowther, who presents ore reserves for two mining methods, does quote shrinkage stope widths of 13 feet for the Hardy Shaft area, 10 feet for the Shamrock Shaft area and 6 feet for the Commerce Shaft area.

Very little information is available on the width of the Hanging Wall Vein. Setter (1968, p. 2) states that in the work of Inspiration Copper, a crosscut driven on the 500-foot level from the Ash Peak Vein encountered the Hanging Wall Vein and a later crosscut from the 600-foot level intersected the vein which, at that place, was 50 feet wide with an average of 5.6 oz/ton Ag. The plan of the 500-foot level shows stope width from 8 feet to 25 feet, averaging about 15 feet.

8.4 Extent of Veins, Ore Zones, and Ore Shoots

The Ash Peak Vein has a proven length of several thousand feet as indicated by surface exposures and underground workings from three shafts. The Hanging Wall Vein, of equally good grade and widths where encountered, is a blind vein with no surface exposures and with investigations largely limited to the vicinity of the Shamrock Shaft between the 350 and 500-foot levels. However Phelps Dodge exposed the Hanging Wall Vein in a decline in the Commerce Shaft area and detected it in drill holes between the Commerce and Shamrock shafts, albeit not of good grade.

Most of the comments on ore limits will thus be based on work done on the Ash Peak Vein. The limits of the ore within the vein are governed by assay boundaries rather than sharp structural cut-offs. Also, there has been a tendency to mine ore that is close to the existing shafts as the underground tramming was done by hand. Mechanized tramming, operating costs that should come with small mine operators, and changing economic conditions should change such assay boundaries.

The change from lower grade (e.g. 4 oz/ton shipped by Phelps Dodge) in the upper levels in comparison with the higher grade values from the lower levels (about 8.5 oz/ton mined by Veta Mines and Inspiration Copper) has been discussed. This transition boundary, if actually present, would plunge about

10° to the northwest. It appears that the values in the Commerce Shaft area below the 500-foot level and in the Shamrock Shaft area below the 700-foot level are probably of lower grade than the values encountered immediately above these levels. A line indicating this possible lower transition is also included on Figure 3. This line would be parallel to the upper transition line and the vertical distance between these two lines is 400 feet. (Fig. 3 is not present.)

Other possible controls may also be present. Foard (1953) mentions some structures in the Hanging Wall Vein. A fault which bounds the higher grade zone on the west has been detected on the 300-level and on the 550-level. The trace of this fault within the vein would dip about 36° northwest. Similarly, a subparallel fault bounds the higher grade portion on the southeast. It was detected on the 400-foot level and on the 600-foot level and the trace of this fault would dip 57° northwest. There are indications in the reports that the Hanging Wall Vein does extend northwesterly from the bounding fault where it has lower grades; in fact a stope on the 500-foot level is largely to the west of this projected fault trace. Also there is no indication to date that this fault has affected the Ash Peak Vein. Thus it is quite possible that this fault is pre ore and has had some control on the distribution of the silver values. It is necessary to determine just how real or how important the faults are.

The Sage report, using silver values from the plans of Consolidated Goldfields, presents a somewhat different picture for the Ash Peak Vein. The contoured values (Figure 4) show that the ore zones include a number of shoots that plunge about 75° southeasterly. The picture for the Shamrock Shaft is quite impressive in that one of these shoots, along the eastern part of the ore body, plunges throughout almost the total vertical range of the mine from the surface down to the 975-level. It is only discontinuous at the 300-level where information is lacking; however it is at the 300-level that the operation is presently finding good silver values. Thus this strong eastern ore shoot with its sharp southeastern cutoff, has extended from surface to the 975-level.

Presently the operations of Arizona Flux Mines are concentrated above the 300-foot level. Stopes have been prepared immediately southeast of the shaft where the muck has silver values between 7 oz/ton and 14 oz/ton as indicated by a MAP analyser. Also the operators have drifted northwest in the footwall on the 300-foot level, to bypass an old stope and develop ore about 200 feet northwest of the shaft. Muck samples indicate a silver grade of about 8 oz/ton using the MAP analyser. Smelter returns on shipments correlate satisfactorily with the indicated MAP values.

Additional encouraging information concerns the area between the Commerce and the Shamrock Shafts. Oral reports from people who worked on the connecting drift state that all of the development muck went through the mill in spite of the fairly long distance for hand tramming. They also state that a very high grade ore shoot was encountered. The mine plans do show a small stope on the connecting 500-level drift half way between the two shafts.

8.5 Ore Reserves

Because the data from past production is lacking it is impossible to accurately determine the distribution of silver within the veins. The bulk of the ore which was mined by Veta Mines and Inspiration Copper had an average of about 8.5 oz/ton Ag and 0.032 oz/ton Au. That mined from near the surface by Phelps Dodge had a grade of 4.2 oz/ton Ag and 0.02 oz/ton Au. There is no data in the report indicating the cut-off grades used by Veta Mines and Inspiration Copper. However, the fact that Phelps Dodge did mine near surface vein material with an average silver grade of 4.2 oz/ton adjacent to the old workings does indicate the possibility of at least an envelope of this lower grade material around the old mine workings.

The possible upper cap to the higher grade zone, i.e. the line dipping 10° to the northwest, is also based on somewhat flimsy data. This data includes the distribution of the old stopes, a few assay values in the old workings, the lower values in the Phelps Dodge shallow drill holes, and the results of surface sampling. This upper capping surface and a possible parallel lower limit to the high grade band will guide the estimates of reserves in spite of the fact that future work might disprove such guides. Some more steeply dipping crosscutting faults may control the higher grade portions of the deposit and also the envelopes of the lower grade material (i.e. four ounce material). It is only for the Hanging Wall Vein that such cross structures are suggested by Foard, but the certainty of such structures is not known.

On the basis of such considerations one can conclude:

1. There is limited proven ore.

2. Some probable ore can be suggested for areas in the vicinity of the old workings at the Shamrock Shaft for both the Ash Peak Vein and the Hanging Wall Vein.

3. Possible ore can be suggested for the area between the Commerce and the Shamrock workings and west of the Shamrock workings.

4. The main encouragement here is the great geological potential for additional ore zones at depths sparsely explored by the surface drill holes between the Commerce and the Hardy Shafts and also to the northwest of the Hardy Shaft.

5. With the present state of our knowledge estimates of ore reserves have little meaning. The property is in production and, as with many precious metal mines, the reserves must be found and developed as production proceeds. One can merely estimate a potential profitability for this deposit and base the value of the property on such estimates.

The estimated proven, probable and possible reserves are given in Table IV and the ore reserve blocks are indicated on Figure 3. Notes concerning the support for such estimates follow the table.

TABLE IV

ORE RESERVES

Reserve Block	Vein	Width	Tonnage
Proven Ore			
J	Ash Peak	7'	13,000
K	Ash Peak	5'	3,000
			16,000
Probable Ore			
A	Ash Peak	7'	32,000
A	Hanging Wall	7'	8,000
B	Ash Peak	7'	9,000
C	Hanging Wall	12'	40,000
D	Ash Peak	7'	6,000
L	Ash Peak	6'	13,000
			108,000
Possible Ore			
E	Hanging Wall	12'	60,000
F	Ash Peak	7'	40,000
G	Ash Peak	6'	56,000
H	Ash Peak	7'	14,000
			170,000

Notes

(A) Good values have been obtained in the Ash Peak Vein adjacent to the shaft which runs through the middle of this block and also in the stopes above and adjacent to the shaft. In addition, present mining indicates good values (in the order of 8 oz/ton) in the muck obtained just southeast of the shaft and about 150 feet northwest of the shaft on the 300-foot level.

In addition, present work along the 300-level east of the shaft, has encountered good ore and widths in the Hanging Wall Vein. Extent is unknown, but 8000 tons has been allowed.

With further work some of Block A might be upgraded to the proven category.

(B) This block lies above the 400-foot level; the stoping of the past has been continuous below this block.

(C) Because, at the close of operations by Inspiration Copper, mining was proceeding above the 500-foot level on the Hanging Wall Vein, it is quite likely that values would also be found below this level. Also it is adjacent to the part of the Ash Peak Vein that has been stoped over the whole length and it lies between the west and east bounding control faults.

(D) This block on the Ash Peak Vein lies below the 700-level; past mining has been continuous above this level throughout the length of this proposed block.

Setter (1988) states that Cliff Smith, former superintendent for Inspiration Copper Co., informed him that the Veta Mines operation used the Shamrock Shaft below the 600-foot level to "gob" their waste rock. The shaft is, therefore, filled up below this point and Inspiration never cleaned it out.

According to Foard, superintendent for Inspiration (1953), long-hole drill sampling failed to discover ore of commercial grade, but he did not state the extent of the drilling or what cut-off was used for commercial grade at that time. However, the assay data from Goldfields Consolidated indicate some good values below the 700-foot level.

The fact that the Ash Peak Vein was stoped continuously for a length of 800 feet above the 700-level and the fact that there are shafts, drifts, and some stopes established below the 700-foot level would lead one to suspect that good silver values are likely to occur in some of the area below the 700-foot level.

(E) This lies in the Hanging Wall Vein. It has the same characteristics as Block C of the probable ore, excepting that it is another 100 feet further removed from the ore that was mined on this vein.

(F) This block is below Block D (probable ore). It is placed as possible ore because it is 50 feet further removed from the stoped area, no ore is mined below it. The longitudinal sections reveal limited stopes on the 800 and 975-levels and a plan of a portion of the 800-level shows 32.7 feet of drift with an average of 11.8 oz/ton Ag and 0.04 oz/ton Au. However past reports do not indicate the average grades or positively state why very little mining took place between the 700 and 975-foot levels. Until this is firmly determined, the reserve should remain in the possible category.

(G) This large area of the Ash Peak Vein lies between the workings of the Commerce Shaft and the Shamrock Shaft. Oral reports state that ore from the development drift was milled and that an unusually high grade lens was stoped. These imply that mineralization is present between the two sets of workings. In this case the average width used (6 feet) is more in line with the widths of the Commerce workings. Only one quarter of the indicated vein area of the block has been included in the possible reserves.

(H) Block H is merely a bounding area west of the Shamrock Shaft workings and stopes. Presumably there will be some lower grade material in this area and eventually some exploration will be needed to determine the grade and extent.

(J) The assay plans from Goldfields Consolidated gives silver-gold values from muck samples taken along some of the lower drifts. In particular, 265 feet of drifting on the 700-foot level gives an average muck value of 13.5 oz/ton silver. Similarly, 265 feet of drifting on the 800-foot level gives an average much value of 5.6 oz/ton. Thus the reserve between these two levels (Block J) has an average silver value of 9.5 oz/ton. About one-third of the 800-foot level has an average value of 3.7 oz/ton; thus some selected mining would achieve a higher

grade with somewhat lower tonnage. The widths for the vein in this part of the mine are unknown. A width of seven feet as used in the other parts of the Ash Peak Vein, has been assumed.

(K) Muck values for the 700-foot level above Block K averaged 21.2 oz/ton silver; muck values along the 800-foot drift below Block K averaged 15.7 oz/ton silver. In this calculation an average value of 18.9 oz/ton is suggested. Although the actual vein width is not known, a width of 5 feet has been used.

The Goldfields Consolidated assy data also shows a limited amount of chip sampling along part of the 800-foot level. A weighted average indicates 11.37 oz/ton over a width of 4.06 feet. This would correspond to 16.9 oz/ton silver over a length of 40 feet obtained from the corresponding muck samples. Such a comparison indicates that caution is necessary when using the results of the muck sampling; however the data is insufficient to enable one to make a reliable corrective factor when treating the results of the muck samples.

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to the underlying higher grade material. There may also be an underlying parallel surface at which the values in the vein decreasewith depth; however this is even less certain.

In addition, two westerly dipping faults, which seem to control the higher grade mineralization within the Hanging Wall Vein have been reported. There has been no mention of such structures for the Ash Peak Vein.

A contoured silver assay longitudinal section by Sage Associates shows that ore shoots within the Ash Peak Vein plunge steeply southeast.

7. Practically no exploration has been done at depth away from the Shamrock Shaft and the potential to the northwest is good, especially below the Hardy Shaft which was beginning to get into some ore grade material before operations ceased.

8. The mine is now in production while the workings are being rehabilitated. Rehabilitation to the 300-foot level and the establishment of the surface support facilities are complete.

Plans call for shipping a silver-bearing flux to the local copper smelters and the demand for such flux appears to be greater than that which can be supplied by the mine.

9. Estimated ore reserves include 16,000 tons proven, 108,000 tons probable and 170,000 possible. However the geological potential for more ore zones in the structure is very good.

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11. Silver bearing flux will be shipped to the local copper smelter where demand is sufficient for anticipated production. The rate of smelter return presently being used is based on shipments that are somewhat erratic in time, and in

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sizing and grade control. Indications are that the prices will be greater with a more consistent size control and it is expected that this will be achieved with the use of the semiautogenous crusher and the triple screening.

12. Exploration, development and mining have carried on intermittently at the Ash Peak Mine for more than 70 years and practically no data is available on geology. In most precious metal quartz veins, the veins thicken and thin and the good ore occurs in zones or shoots with intervening large areas of quartz with relatively low values. It is important to outline the distribution of the grade within the quartz veins in order to plan for the future and to optimize profitability. At this mine it is important to know what controls the distribution of quartz within the faults and what controls the distribution of silver within the veins. Possible controls that may have some effect are the flat lying and changing sequence of volcanics, cross structures which may be important to the changes in silver content, changes with depth which may be related to old palaeosurfaces. These unknowns should be resolved so as to make exploration drilling efficient.

13. For such work it is necessary to have a full time geologist on the property as the manager will not have time to devote undivided attention to outlining the grade distribution. This geologist will need help from an assistant and also from a part time surveyor who can be hired locally. The geologist must be primarily concerned with mapping the geology and getting it compiled in useful form. He should not become merely a grade control guide for the miners. The geologist should also supervise the compilation of the assay plans and obtaining the assay results whether they be by the use of the MAP machine or by sampling and assaying.

14. One of the more difficult aspects of mapping is geological identification of rock types and one of the greatest helps in this identification will be a sawn surface. Thus a diamond rock saw is essential for this mapping. Initially and intermittently a small amount of petrographic studies and thin sections will be needed to help classify the rock types.

15. One of the keys to unravelling the geology of the area is an accurate stratigraphic column. This will have to be compiled from diamond drill data as the operation proceeds. Thus, underground drill holes whether they be placed in the hanging wall or footwall of the vein and especially those that are inclined at a more acute angle to the vein should proceed beyond the vein to get some stratigraphic information on the opposite side. A conscientious effort to optimize the stratigraphic information from each drill hole will eventually lead to a good stratigraphic column.

16. The limited assay data on hand, namely the Phelps Dodge data from the upper parts of the vein, indicates that grades are very erratic along veins and that areas of relatively low grade material can have occasional high grade values and that areas of generally good grade material can have numerous spots of very low grade material. Thus one drill hole directly through a vein will not necessarily yield a reliable result. This can be overcome by drilling a fairly large number of holes, especially if the holes are short ones from underground workings. In exploration further out, however, it might be wise to drill steeply dipping holes at an acute angle to the vein so that, for each intersection, the core of the vein will be considerably greater than the true thickness of the vein. Whereas the resulting information would not give an exact indication of the width of the vein, it should be more efficient in locating the higher grade parts of the vein.

17. Plots of the cumulative net cash flow against variations in production cost, production rate, metal price, smelter payment, and grade, have been made by S. Quin. These graphs show that by far the greatest improvement in cash flow comes with improvement in grade. Other important factors are the metal price variations and the production costs. The production rate and the percentage of the gold included in the smelter payments have considerably less effect in the variation. Thus one can readily see that it is very important to get some exploration work done in the vicinity of the present workings but also in the areas away from the present workings and along strike.

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* Except for the report by H. Lines, all reports are unpublished.

CERTIFICATE

June 10, 1988

I, John Richard Woodcock, with business address at 806 - 602 West Hastings Street, Vancouver, British Columbia, V6B 1P2 do hereby certify that:

1. I graduated from the University of British Columbia in 1951 with a Bachelor of Applied Science degree and from the California Institute of Technology in 1953 with a Master of Science degree.

2. I am a professional engineer registered with the association in the Province of British Columbia.

3. I have been engaged in mineral exploration in Canada, the United States and foreign countries since graduation and have been consulting in mineral exploration since 1969.

4. The report on the Ash Peak Mine is based on a review of the available data plus a two-day visit to the property.

5. I have no direct nor indirect interest in CanaMin Resources Ltd., Southern Gold Resources Ltd., or Arizona Flux Mines, Inc.

6. CanaMin Resources Ltd. is granted permission to use this report for its requirements at the Vancouver Stock Exchange and at the Superintendent of Brokers Office.

Respectfully submitted,

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