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PRINTED: 06/22/2001

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES AZMILS DATA

PRIMARY NAME: FOUR METALS

ALTERNATE NAMES:
- GUAJOLOTE LODE
- PHOENIX CLAIMS
- HILLSIDE CLAIMS
- RED HILL

SANTA CRUZ COUNTY MILS NUMBER: 119

LOCATION: TOWNSHIP 23 S RANGE 16 E SECTION 29 QUARTER W2
LATITUDE: N 31DEG 23MIN 53SEC LONGITUDE: W 110DEG 43MIN 54SEC
TOPO MAP NAME: HARSHAW - 7.5 MIN

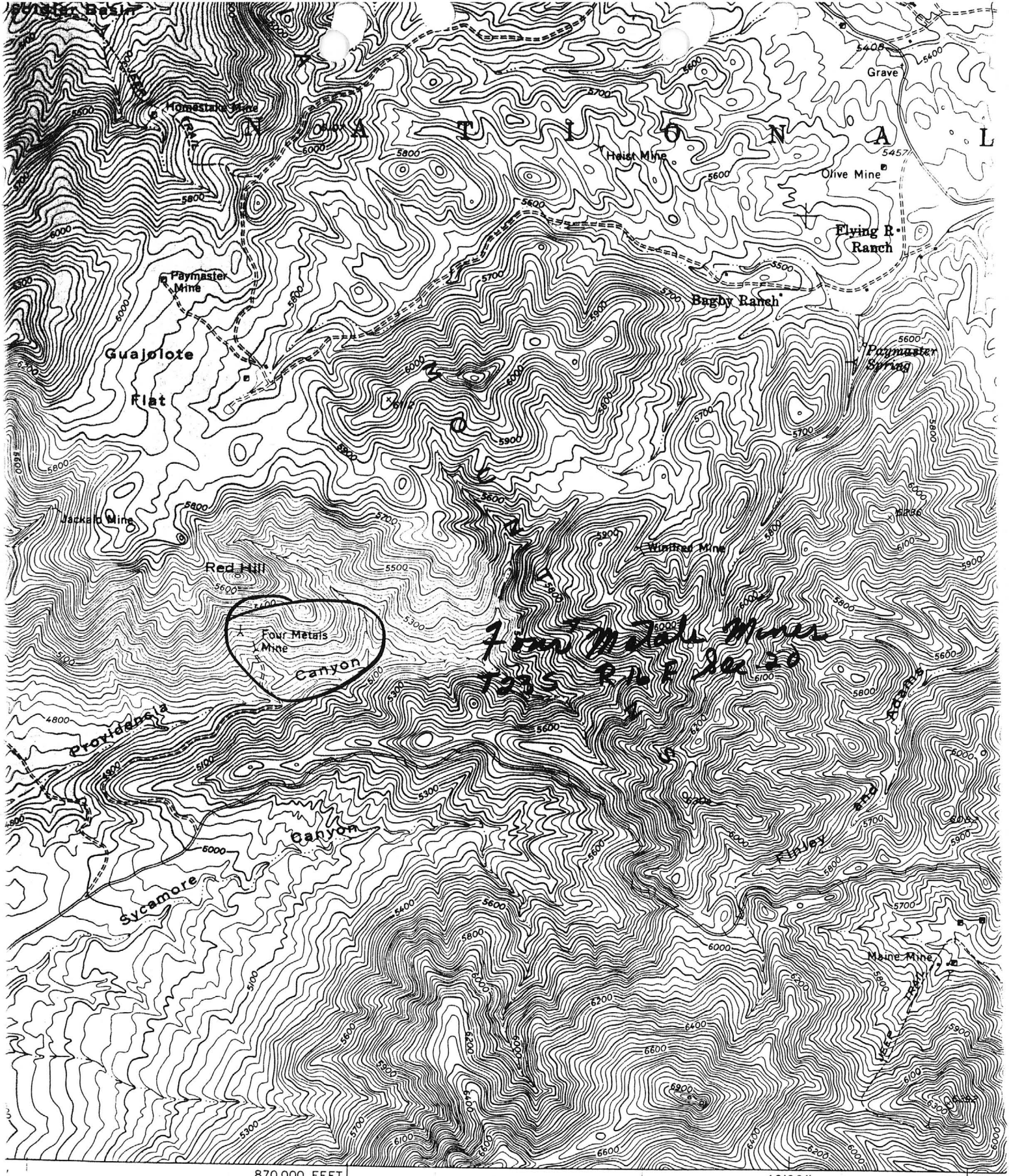
CURRENT STATUS: PAST PRODUCER

COMMODITY:
- COPPER SULFIDE
- SILVER
- GOLD
- LEAD SULFIDE
- ZINC SULFIDE
- MOLYBDENUM
- TUNGSTEN

BIBLIOGRAPHY:
- AZBM BULL. 191, P. 80
- ADMMR FOUR METALS FILE
- ADMMR "U" FILE CU 65 NOT MAPPED
- USGS BULL. 582, P. 317-320
- USBM RI 5650, P. 122
- USGS MAP I-762
- USBM MLA 94-22 p. 21-23
- USBM MLA 22-94 (SUMMERY & DESCRIPTION ATTACHED)

Update in MILS 10/09 S. Regalado

Also See Coronado Mines File



Harshaw, Az. 7.5

oped by the Army Map Service
ted and published by the Geological Survey
trol by USGS, USC&GS, and USCE
ography from aerial photographs by stereoplanigraph methods
al photographs taken 1946. Field check 1948
sed by the Geological Survey 1958
conic projection. 1927 North American datum
000-foot grid based on Arizona coordinate system, central zone

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ARIZONA COPPER RESERVES

COMPILED BY

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES

PROPERTY:

FOUR METALS

OPERATOR\OWNER:

Herb Duerr & John Prochnav DUERR, HERB + PROCHNAV, JOHN.
127 Cheney
Reno, Nv 89501

LOCATION INFORMATION:

TOWNSHIP 23 S RANGE 16 E SECTION ~~20~~ 29
COUNTY - Santa Cruz AZMILS - 119
DESCRIPTION - 15 miles NE of Nogales

ORE TYPE AND RESERVE INFORMATION:

Sulfide - 14 MILLION TONS AT 0.7% Cu OWNER RESERVE/RESOURCE ESTIMATE.

SOURCES:

Iso Mines Ltd. Annual Report 1965 (subsidiary of Noranda), ADMMR
Four Metals file, Personal Communication

FOUR METALS MINE SANTA CRUZ

Jo. S. Dreshsler, Jr., geologist, Noranda Exploration, 260 N. First Avenue, P.O. Box 50326, Tucson, Arizona, 85705, (602) 623-2505, was in to study files on properties in Santa Cruz County. Noranda presently owns the Four Metals Mine and a number of adjacent claims in Santa Cruz County. KAP WR 10/22/74

MG/WR 3/7/79 - Visited the Four-Metals Mine, no apparent activity. The road into property is in fairly good condition. 4/18/79 a.p.

MG/WR 11/21/79 - Mr. Robert Crist of ASARCO reports that ASARCO has an "agreement" with Noranda Mines Ltd. concerning the Ventura and Four Metals properties in Santa Cruz Co. Noranda is the owner of these properties.

MG WR 3/12/82: The Four Metals (Red Hill) mine in Santa Cruz County is within the Faro claim group. This claim group and the adjoining MM claim group is owned by the Sharon Steel Corp., Thomas Road, Hubbard, Ohio 44425, phone (216) 448-4011. Sharon Steel bought out UV Industries Inc.

CJH WR 1/25/85: James C. Jones, Certified Geologist, 720 N. Mann Ave., Tucson, Az. 85710, phone 298-3576. Researched mine file on Four Metals mine, Santa Cruz County. Held by Noranda who apparently has not filed assessment work for four years.

MG WR 7/12/85: The Four Metals mine (Santa Cruz Co) is now covered by the Precious Metals claim group owned by the Dore Mining & Milling Co., W. 601 1st Avenue, #507, Spokane, Washington 99204.

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine Four Metals Mine Date March 4, 1965

District Palmetto District, Santa Cruz Co. Engineer Axel L. Johnson

Subject: Field Engineers Report. Information from William Lundby and Boyce Cook.

References: Report of Nov. 5, 1964 and previous reports.

Present Mining Activity: Diamond drilling on the surface on contract to Metler Bros. Drilling Co. One diamond drill working two shifts. No underground drilling at present.

Review of Recent Operations: Since last report of Nov. 5, 1964, all the underground drilling on the 5090 ft. level of the mine has been completed.

THE FOUR METALS MINE

45 holes totaling 19,169' ; 3,000,000 tons of .82 Cu.

GI #### 9/16/66

Active Mine List April 1967 - Expl. - C.P. Jenny, Mgr. West Range Co., 400 Golf View Drive, Rte. #6, Tucson.
" " " Oct. 1967 - Expl.
" " " April 1968 - Expl. - E. E. Jones, Proj. Supervisor, Kerr-McGee Oil Industries, Inc., 1637 E. 18th St., Tucson
" " " April 1969 - Expl. - " " " " " " "
" " " October 1970 - Expl. - " " " " " " "

STATE OF ARIZONA
DEPARTMENT OF MINERAL RESOURCES
MINERAL BUILDING, FAIRGROUNDS
PHOENIX 7, ARIZONA

June 11, 1963

Mr. C. Philip Jenney
Consulting Geologist for West Range Co.
372 Lakeshore Hy. West
Oakville, Ontario, Canada

COPY

Dear Mr. Jenney:

Thank you for your letter of June 6th regarding and the accompanying photocopy of your corrected report of Axel Johnson on the Four Metals property. We will not put the report in our open files.

Your information is gratefully received and any request for its being kept confidential will be respected.

Sincerely yours,

FRANK P. KNIGHT,
Director.

FK:p

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine Four Metals Mine Date Sept. 2, 1964

District Palmetto District, Santa Cruz Co. Engineer Axel L. Johnson

Subject: Mine Visit. Information from Art Robinsonm, Mine Foreman

References Report of May 7, 1964, and previous reports.

Present Mining Activity Diamond drilling underground on contract to Metler Bros. Drilling Co. 3 diamond drill rigs now working, 2 of these are working 2 shifts, and the other one is working one shift. 12 men are employed on the diamond drilling operations -- 7 on days and 5 on nights. In addition, 2 men are working for West Range.

Review of Operations

(1) The adit, described in the May 7, 1964, was continued to a length of 900 ft., where it intersected the old adit, and old workings.

(2) 17 drill stations were cut from the sides of the new adit for diamond drilling operations.

(3) Diamond drilling was started from these drill stations on the 5090 ft. level the latter part of June. 14 drill holes have been drilled to date.

Proposed Plans

About 14 more drill stations will be cut on the 5090 ft. level for additional diamond drilling.

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine Four Metals Mine Date November 5, 1964

District Palmetto District, Santa Cruz Co. Engineer Axel L. Johnson

Subject: Mine Visit. Information from Art Robinson, Mine Foreman

Reference: Report of September 2, 1964.

Present Mining Activity: Diamond drilling underground on contract to Metler Brothers Drilling Co. One diamond drill now working two shifts. Also cutting drill stations on the 5090 ft. level for the additional drill holes. 10 men are employed on both operations.

Review of Operations: 38 holes have been drilled to date. The 39th hole is now being drilled. From 3 to 5 holes are drilled at different angles from each drill station. All of the holes except 3 have been flat plus or minus 3 degrees and have been from 350 to 500 ft. deep. The 3 exceptions were: 1 vertical, 1 at 45 degrees, and 1 at 35 degrees.

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine Four Metals Mine Date May 7, 1964

District Palmetto District, Santa Cruz Co. Engineer Axel L. Johnson

Subject: Mine Visit. Information from Art Robinson.

References: Report of March 5, 1964 and previous reports.

Present Mining Activity:
(1) Diamond drilling from surface on contract by Metler Bros. with 1 drill operating.
(2) Driving an adit on the 5090 ft. level on contract by Metler Bros.
A total of 17 men are employed - 2 men working on the drill rig, 13 men driving the adit, and 2 men working for West Range.

Review of Operations:
(1) Underground diamond drilling was suspended some time ago, and now only one diamond drill is working, and that one is drilling from the surface, day shift only.
(2) The adit on the 5090 ft. level, described in the Mar. 5, 1964 report is being continued, and this is now in a distance of 833 ft. from the portal. 13 men are employed in this work, working on 3 shifts. 2 Gardner Denver air leg drilling machines with Atlas Copco steel are used. The number of holes per round varies from 21 to 34, depending on the ground. 40% Ammonium Gelatin dynamite is used. A mucking machine is used for loading the mine cars, which are trammed out and dumped on the mine dump.

Proposed Plans:
(1) To extend the adit to a length of about 900 ft. where it will intersect the old adit. At the point of intersection, the new adit will be at a 12 ft. lower elevation than the old one.
(2) Drive crosscuts from the new adit.
(3) Make drill hole stations on this level for future diamond drill holes.

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine 'Four Metals Mine Date Mar. 5, 1964

District Palmetto District, Santa Cruz Co. Engineer Axel L. Johnson

Subject: Field Engineers Report. Information from William Lundby, Project Geologist.

References Report of Jan. 9, 1964, and previous reports.

Location See report of May 8, 1963

Owners & Operators West Range Co., subsidiary of Noranda Mines,
Four Metals Division,
C. P. Jenney, Mgr., 400 Golf View Drive, Rte. # 6, Tucson, Ariz.
William Lundby, Project Geologist
Art Robinson, Mine Foreman

Number of Claims 30 unpatented claims.

Principal Minerals Copper

Present Mining Activity
(1) Diamond drilling on the 5260 ft. level, on contract by Metler Bros.
(2) Driving a new adit on the 5090 ft. level, on contract by Metler Bros.

Review of Operations The following work is now being done:

(1) On the 5260 ft. level, 2 diamond drills are working, one working two shifts, and the other one on one shift. Most of the holes drilled are horizontal. Operators expect that this drilling will continue for another year. 9 men are employed on the diamond drilling operations.

(2) On the 5090 ft. level (lower level) the adit is being continued, and is now in a distance of 229 ft. It is expected that it will be driven a distance of about 870 ft. It is driven at a 0.5 % grade, and 20# rails are laid. Inside dimensions of the drift is 6' x 8' inside. The purpose of the adit is (a) to provide access to mineralized areas, where crosscuts will be driven and drill stations made in order to be able to do underground diamond drilling to thoroughly explore the level, and (b) to provide a main haulage level for future mining operations. 12 men are employed on the drifting operations, with 2 men doing general miscellaneous work.

Total men employed ---- 23.

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine 'Four Metals Mine — Date January 9, 1964

District Palmetto District, Santa Cruz Co. — Engineer Axel L. Johnson

Subject: Field Engineers Report. Information from Art Robinson & Personal visit.

References: Reports of Nov. 6, 1963, Sept. 5, 1963 & May 8, 1963.

Location: See report of May 8, 1963.

Owners & Operators: 'West Range Co., subsidiary of Norando Mines
Four Metals Division
'C.P. Jenney, Manager
'Art Robinson, Mine Foreman

Number of Claims: See report of May 8, 1963.

Principal Minerals: Copper

Present Mining Activity:
(1) Drilling on 5260 ft. level on contract by Metler Bros.
(2) Driving new adit on 5090 ft. level, on contract by Metler Bros.

Past History & Production: See report of May 8, 1963.

Old Mine Workings: See report of May 8, 1963.

Review of Recent Operations: The following work is now being done:
(1) On the 5260 ft. level 1 diamond drill now working 2 shifts, and one diamond drill working 1 shift, both drilling horizontal holes. The 15th hole is now being drilled on the 5260 ft. level.
(2) On the 5090 ft. level (lower level) a new adit is now being driven (started Jan. 7, 1964). The old portal is now being repaired. From the old portal, the adit will be driven straight, and not following the old adit, which has several bends and turns in it. The adit will be 6' x 8' inside, and will be driven a distance of 870 ft.
A mucking machine and 20# rails will be used.
Cross cuts and raises to follow.

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine Four Metals Mine Date November 6, 1963

District Palmetto District, Santa Cruz Co. Engineer Axel L. Johnson

Subject: Field Engineers Report. Information from Art Robinson & Personal visit.

References: Reports of Sept. 5 and May 8, 1963.

Present Mining Activity: Making drill stations and diamond drilling underground on contract to Metler Bros. Drilling Co. Art Robinson, Mine Foreman Metler Bros.
C.P. Jenney, Mgr., West Range Co.

2 drill rigs working two shifts, with 12 men working on the drill rigs.
Building change room and office, with 3 men working.

Review of Recent Operations: Since Sept. 5, 1963, the date of my last report, the following work has been done:

(1) Continuation of diamond drilling undergroundon the 5260 ft. level. One rig was used until this week when a second rig was moved in and started to operate. Both are large C.P. air drills. Mr. Robinson reports that the 7th hole is now being drilled, with several more planned.
(2) Making drill stations on the 5260 ft. level for additional drilling.
(3) Minor repairs on the 5260 ft. level.
(4) Building change room and office at the mine site.

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine Four Metals Mine (also called 'Red Mountain') Date Sept. 5, 1963

District Palmetto District, Santa Cruz Co. Engineer Axel L. Johnson

Subject: Field Engineers Report. Information from Art Robinson & Personal visit.

References Report of May 8, 1963

Present Mining Activity Making drill stations and diamond drilling underground on contract to Metler Bros. Drilling Co. Art Robinson, Mine Foreman. Stan Williams, Engineer in charge of operations for West Range Co.

7 men are working one shift---- 4 of these are making drill stations, and 3 are working on the drill rigs.

Review of Recent Operations Since May 8, 1963, the date of my last report, the following work has been done at the mine:

(1) Repairing and retimbering an additional 235 ft. on the 5090 ft. level (bot.lev.) from May 8 to June 1.

(2) Repairing and retimbering of 600 ft. of adit and 670 ft. of cross cuts on the 5260 ft. level, and laying track, pipe, and water lines, June 1 to date.

(3) Made 3 drill stations on the 5260 ft. level. 3 to 4 diamond drill holes will be drilled from each of these stations.

(4) Now diamond drilling and making additional drill stations. A C. P. diamond drill rig is being used. Horizontal holes are being drilled --- some 250 ft. long, some 300 ft. long, and others 350 ft. long. Cores are N, B and Ax.

Mineralization Some minerals are found in spots, and is usually found in narrow veins from 1 to 4 inches wide. Minerals are chalcopyrite, a few specks of bornite, and a little molybdenite.

Proposed Plans Operators plan on drilling at least 10 horizontal drill holes, possibly more. In addition to the horizontal, shallow holes, they expect to drill a few deep angle holes up to 1,000 ft. deep.

Operators also expect to repair the 5400 ft. level for an escape route and for ventilation, and may also drive a 400 ft. crosscut to the west on the 5260 ft. level.

* GENERAL REFERENCES

REFERENCE 1 F1 <DALE, V.B., STEWART, A. AND W.A. McKINNEY 1960, TUNGSTEN DEPOSITS OF COCHISE, PIMA AND SANTA CRUZ COUNTIES, ARIZONA; U.S. BUREAU OF MINES REPORT OF INVESTIGATIONS 5650 p. 122>

REFERENCE 2 F2 <SIMONS, FRANK S. 1974, GEOLOGIC MAP AND SECTIONS OF THE NOGALES AND LOCHIEL QUADRANGLE SANTA CRUZ COUNTY, ARIZONA; USGS MAP I-762 (1:48000)>

REFERENCE 3 F3 <SCHRADER, F.C., 1915, USGS BULL. 582 (GENERAL REFERENCE)>

REFERENCE 4 F4 <

K5< WIDE CONTAINS IRREGULAR PARTICLES AND MASSES OF BROWNISH TUNGSTEN MATERIAL OF UNKNOWN IDENTITY; TUNGSTEN MINERALS ALSO FOUND IN ADJACENT WALL ROCK >

N5< ROCK IN FAULT FISSURES CUTTING DIORITE AND QUARTZ MONZONITE>

N75< CRUSHED>

U.S. CRIB-SITE FORM

RECORD IDENTIFICATION

RECORD NUMBER B10 <> *RECORD TYPE B20 <X,1,M> DEPOSIT NUMBER B40 <>

REPORT DATE G1 <82,Y,04> (YR., MO.) *INFORMATION SOURCE B30 <12> *FILE LINK IDENT. B50 <>

REPORTER(SUPERVISOR) G2 <CALDER, SUSAN R. (last, first, middle initial)> (last, first, middle initial)>

REPORTER AFFILIATION G5 <AZGMT> SITE NAME A10 <RED MOUNTAIN CLAIMS>

SYNONYMS A11 <RED HILL CLAIMS, FOUR METALS, [illegible] OTHER PROSPECT, GUAJOLOTO LODE, HILLSIDE CLS, PHOENIX CLS.>

LOCATION

MINING DISTRICT/AREA A30 <PATAGONIA DISTRICT>

COUNTY A60 <SANTA CRUZ> *STATE A50 <AZ> *COUNTRY A40 <US>

PHYSIOGRAPHIC PROV A63 <12,Y>

DRAINAGE AREA A62 <15,05,03,01,Y, LOWER COLORADO> *LAND STATUS A64 <4,1,Y,,Y,(19,79)>

QUADRANGLE NAME A90 <LOCHIEL (1958)> *QUADRANGLE SCALE A100 <62500>

SECOND QUAD NAME A92 <HARSHAW (1948)> SECOND QUAD SCALE A91 <24000>

ELEVATION A107 <5750,Y,FT>

UTM

*NORTHING A120 <3474000>

*EASTING A130 <520000>

*ZONE NUMBER A110 <+12>

*ACCURACY

ACCURATE ACC (circle)

ESTIMATED (EST) USED USBM RI 5650, p. 122

GEODETIC

*LATITUDE A70 <__-__-__N>

*LONGITUDE A80 <__-__-__W>

CADASTRAL

*TOWNSHIP(S) A77 <023S:Y,,:Y,,:Y,,> *RANGE(S) A78 <016E:Y,,:Y,,:Y,,>

*SECTION(S) A79 <28 :Y, 29 :Y,,>

*SECTION FRACTION(S) A76 <SW, 28; SE, 29>

*MERIDIAN(S) A81 <GILA AND SALT RIVER>

*POSITION FROM NEAREST PROMINENT LOCALITY A82 <4.5 MILES SW OF HARSHAW>

*LOCATION COMMENTS A83 <CLAIMS LOCATED ON SE SIDE OF GUAJOLOTE FLAT; 1.0 MILE SE OF GUAJOLOTE MINE>

* ESSENTIAL INFORMATION
+ ESSENTIAL SOMETIMES OR HIGHLY RECOMMENDED

Tungsten molybdenum

COMMODITY INFORMATION

*COMMODITIES PRESENT C10 <W, Mo
*ORE MINERALS C30 < UNKNOWN
COMMODITY SUBTYPES C41 <
*GEN. ANALYTICAL DATA C43 <
COM. INFO. COMMENTS C50 <

SIGNIFICANCE

	PRODUCER	NON-PRODUCER
MAJOR PRODUCTS	MAJOR <	MAIN COMMODITIES PRESENT C11 < W
MINOR PRODUCTS	MINOR <	MINOR COMMODITIES PRESENT C12 < Mo
POTENTIAL PRODUCTS	POTEN <	
OCCURRENCES	OCCUR <	OCCURRENCES OCCUR <

*PRODUCTION

PRODUCER	NON-PRODUCER
PRODUCTION YES (circle) PRODUCTION SIZE SML MED LGE (circle one)	PRODUCTION (UNK) NO (circle one)

*STATUS

EXPLORATION OR DEVELOPMENT

PRODUCER	NON-PRODUCER
STATUS AND ACTIVITY A20 < >	STATUS AND ACTIVITY A20 < 2 >

*DISCOVERER L20 <
*YEAR OF DISCOVERY L10 < > *NATURE OF DISCOVERY L30 < > *YEAR OF FIRST PRODUCTION L40 < > *YEAR OF LAST PRODUCTION L45 <
*PRESENT/LAST OWNER A12 < KINO COPPER CO. (1960)
*PRESENT/LAST OPERATOR A13 <
EXPL./DEV. COMMENTS L110 < NO DEVELOPMENT OR PRODUCTION DATA

DESCRIPTION OF DEPOSIT

*DEPOSIT TYPE(S) C40 < STOCKWORK
DEPOSIT FORM/SHAPE M10 < PIPE ; IRREGULAR MASSES
*DEPTH TO TOP M20 < > *UNITS M21 < > *MAXIMUM LENGTH M40 < > *UNITS M41 <
DEPTH TO BOTTOM M30 < > *UNITS M31 < > *MAXIMUM WIDTH M50 < > *UNITS M51 <
DEPOSIT SIZE M15 <SMALL> M15 <MEDIUM> M15 <LARGE> (circle one) *MAXIMUM THICKNESS M60 < > *UNITS M61 <
*DIRECTION M70 < > *DIP M80 <
DIRECTION OF PLUNGE M100 < > *PLUNGE M90 <
DEP. DESC. COMMENTS M110 < STOCK OR PIPE OF PORPHYRY ABOUT 1200 FT IN DIAMETER ; ASSOCIATED SERICITE ALTERATION ZONE DIPS 20-25 N

DESCRIPTION OF WORKINGS

*Workings are: SURFACE M120 UNDERGROUND M130 BOTH M140 (circle one) *OVERALL LENGTH M190 < > *UNITS M191 <
*DEPTH BELOW SURFACE M160 < > *UNITS M161 < > *OVERALL WIDTH M200 < > *UNITS M201 <
*LENGTH OF WORKINGS M170 < > *UNITS M171 < > *OVERALL AREA M210 < > *UNITS M211 <
DESC. OF WORK. COM. M220 < TYPE AND EXTENT OF WORKINGS ARE UNKNOWN

GEOLOGY

*AGE OF HOST ROCK(S) K1 < T.E.R.T. , 58 ± 5 m.y. (SIMONS F.S, 1974)
*HOST ROCK TYPE(S) K1A < BIOTITE-HORNBLENDE GRANODIORITE
*AGE OF IGNEOUS ROCK(S) K2 < T.E.R.T. , 58 ± 5 m.y. (SIMONS F.S. 1974)
*IGNEOUS ROCK TYPE(S) K2A < PORPHYRITIC GRANODIORITE, DIORITE, APLITE DIKES
*AGE OF MINERALIZATION K3 < E.T.E.R.T.
*PERT. MINERALS (NOT ORE) K4 < SERICITE
*ORE CONTROL/LOCUS K5 < STOCK OR PIPE OF ACID PORPHYRY INTRUDING GRANODIORITE ; SERICITE ZONE ABOUT 5 FT
*MAJ. REG. TRENDS/STRUCT. N5 < E-W AND NE TRENDING QUARTZ VEINS AND ASSOCIATED BANDS OF CRUSHED MINERALIZED
*TECTONIC SETTING N15 < GUAYOLOTE FAULT BLOCK ; DOWNTHROW TO E
*SIGNIFICANT LOCAL STRUCT. N70 < NEAR NW-TRENDING INFERRED GUAYOLOTE FAULT ; FAULT SHEAR ZONE IS 200 FT WIDE
*SIGNIFICANT ALTERATION N75 < INTENSE SERICITIC ALTERATION - GRANODIORITE IS HIGHLY SHATTERED, SHEETED, AND
*PROCESS OF CONC./ENRICH. N80 < SURFACE OXIDATION ; OXIDIZED MOLYBDENUM COMPOUNDS ARE ABUNDANT IN MINERALIZED AREA
*FORMATION AGE N30 <
*FORMATION NAME N30A <
SECOND FM AGE N35 <
SECOND FM NAME N35A <
*IGNEOUS UNIT AGE N50 <
*IGNEOUS UNIT NAME N50A <
SECOND IG. UNIT AGE N55 <
SECOND IG. UNIT NAME N55A <
GEOLOGY COMMENTS N85 < IRREGULAR PARTICLES AND MASSES OF TUNGTEN REACH SEVERAL INCHES IN DIAMETER

GENERAL COMMENTS

GENERAL COMMENTS GEN <

C. PHILIP JENNEY
CONSULTING GEOLOGIST
372 LAKESHORE HY. WEST
OAKVILLE, ONTARIO

VICTOR 4-9413

June 6, 1963

Mr. Frank P. Knight, Director,
Dept. of Mineral Resources,
State of Arizona,
Mineral Building, Fairgrounds,
Phoenix, Arizona

Re: Report of Mr. Axel L. Johnson,
Four Metals Property, Santa
Cruz County

Dear Sir:

This will acknowledge your letter of May 27, 1963, enclosing a copy of the above report, dated May 8, 1963, and a blank Mine Owner's Report.

Mr. Johnson's report is substantially correct and I am returning a copy, herewith, with a few minor corrections for your records. With this report on hand, it seems unnecessary to fill out the Mine Owner's Report which covers the same information.

The property has been examined and sampled on many occasions during the past 15 years by a number of the large American companies and by some Canadian companies. While some of their geologists and engineers estimated the presence of certain tonnages and grades of copper, our geologists have been able to examine only the 5,400 level and, cannot therefore, make any estimates at this time.

Since the date of Mr. Johnson's report, we have decided to abandon the work on the 5,090 level and to reopen the 5,260 foot level for examination, sampling, and a possible drilling program.

As our program progresses, we will be glad to cooperate with you by keeping you informed of results. However, as the property is not for sale, we may request that you keep confidential certain information supplied in the future.

Thank you for your interest and assistance in our project.

Yours very truly,

C. P. Jenney
Consulting Geologist for
West Range Company

CPJ/ja
cc: Dr. Peter Price

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine: Four Metals Mine (also called Red Mountain)
Date: May 8, 1963
District: Palmetto District, Santa Cruz Co.
Engineer: Axel L. Johnson

Subject: Field Engineers Report. Information from Art Robinson & personal visit.
(19,20,29,30,32 - workings in 29) (additions as per C.P. Jenney 6-6-63

Location: Approximately Sec. 30, T. 23 S., R. 16 E. To reach property drive 5 miles north from Nogales on Hwy 82, turn right (east) and drive east for 9.3 miles on Nogales-Washington Camp road. Turn left (north) and drive north for 1.3 miles to the mine.

Owners & Operators: West Range Co., subsidiary of Noranda Mines
C. P. Jenney, Manager, Catalina Foothills Lodge
5250 N. Oracle Road, Tucson, Ariz.
Stan Williams, Engineer in charge of operations
Art Robinson, Mine Foreman

Number of Claims: (31)
30 unpatented claims (as per C.P. Jenney 6-6-63 other 30)
1 claim purchased from Manuel Herredia (covers part of same area as Other 29 claims located by the company.
30 " " 1 claim staked April 8, 1963

Principal Minerals: Copper

Present Mining Activity: Repairing adit on S side of Red Mountain - 3 men working.

Past History & Production: (1) The Four Metals group of claims (30 claims) was formerly a part of Coronado Mines, owned by Coronado Mines, Inc., and consisting of 10 mines with 163 unpatented claims. (See report of Coronado Mines under date of Dec. 3, 1953.) Prior to about 1942, these holdings were known as Kino Copper Company.
(2) In 1953, Duval Sulphur & Potash Co. put down several diamond drill holes on the Four Metals group of claims, at that time called "Red Mountain." (See report of Coronado Mines under date of Feb. 3, 1954.)
There is no record of any past production.

Old Mine Workings: (1) 1 tunnel on the 5360 ft. level (S side of Red Mountain) 185 ft. long
(2) 1 tunnel on the 5400 ft. level (N side of Red Mountain) 600 ft. long
(3) 1 adit on the 5260 ft. level (S side of Red Mountain) 750 ft. long with about 400 ft. of cross cuts.
(4) 1 adit on the 5090 ft. level (S side of Red Mountain) 1187 ft. long, referred to as "bottom level." This is now being repaired.
(5) 1 raise, about 140 ft. high, connecting the 5260 ft. level and the 5400 ft. level.
Much of the above old workings are caved in and in need of repair.

Review of Recent Operations: Operators started work on this property about April 1st. Since that time, about 224 ft. of the bottom adit, (5090 ft. or bottom level) has been cleaned out, repaired and retimbered. A contract has been let to Metzler Bros. Drilling Co. for underground diamond drilling, which work will start as soon as enough of the adit has been repaired.

Proposed Plans: (1) Underground diamond drilling by Metzler Bros.
(2) Geologic mapping and sampling on the bottom level.

Other Work in the Area: Metzler Bros. Drilling Co. drilled 2 diamond drill holes on contract for West Range Co. in March and April. These holes were put down NW of the Golden Rose and Buena Vista, approximately in Sections 1 & 26, T. 23 S., R. 15 E.

MINERAL APPRAISAL OF CORONADO NATIONAL FOREST, PART 7

PATAGONIA MOUNTAINS-CANELO HILLS UNIT, COCHISE AND SANTA CRUZ COUNTIES, ARIZONA

by

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Denver, Colorado

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

Tertiary age. The only data available concerning metallization are from Sansimon Mine and related prospects, about 0.5 mi to the south (fig. 22). These contain primarily lead, zinc, and silver, suggesting that metal distribution in this prospect area is quite distal to any hydrothermal alteration center at depth. While it cannot be ruled out that this area may see future exploration interest for copper porphyry or cupriferous breccia pipe deposits, the area must be considered less favorable than aforementioned areas at Red Bank well and Meadow Valley. This lesser favorability is based on the apparently smaller areal extent affected by hydrothermal alteration at the Kunde Mountain-Sansimon area, and less wide-spread metallization, particularly with regard to pyrite.

Porphyry-related metallization in the southern Patagonia batholith

The southern part of the Patagonia batholith is the most deeply eroded part of the intrusive body. It hosts one known copper-porphyry deposit, Four Metals Hill, which is the best delineated of all the known porphyries in the Patagonia Mountains-Canelo Hills Unit, but also, ironically, probably the smallest deposit of this type. Numerous alteration zones (unsampled) are in the southern Patagonia batholith (fig. 2), as are elevated molybdenum geochemical anomalies and small molybdenum occurrences and deposits. The area has possibilities for hosting other copper porphyry, some with recoverable molybdenum, but no particularly favorable target areas can be delineated with the sparse available data.

Four Metals Hill (Red Hill) copper-porphyry deposit (fig. 23-26)

Four Metals Hill is a small, low grade copper porphyry (fig. 23-25), in which chalcopyrite and large amounts of pyrite occur in disseminations and stockwork veinlets in a Tertiary-age quartz monzonite breccia. This breccia may be an intrusion into, or an in-place brecciation of Tertiary-age granodiorite that constitutes the bulk of the southern Patagonia Mountains.

The shallow blanket of supergene enrichment at Four Metals Hill constitutes 5 million st of 0.61% copper (AGDC, 1954?). Lacking additional data, these are classed by the USBM as inferred resources. The hypogene (primary) copper zone is slightly below and to the south of the supergene enrichment zone (fig. 24). The hypogene copper zone is the footwall part of the north-dipping quartz monzonite breccia which extends down the 45° dip slope for 1,000 ft. The breccia has apparently been replaced in part by non-cupriferous alaskite, especially along the northern periphery of the deposit. It contains indicated and inferred resources totalling 8.6 million st of 0.47% copper. A separate, near vertical zone of hypogene copper deposition is along the north perimeter of the breccia near the alaskite contact. Its dimensions are not well quantified, but it appears to be small (60,000 st). It could be readily mined in conjunction with stripping of the overlying supergene enrichment zone, but is too

small to be a solitary mining target. The grade estimate of the near-vertical hypogene zone is confidential (Farnham, 1953, appendix).

Molybdenum and tungsten content.--The southern periphery of the main, circular alteration zone of the Four Metals Hill deposit (fig. 23), has been observed to contain abundant, oxidized molybdenum compounds, and a 5-ft-wide sericitized zone with irregular particles and masses of an unidentified, brown tungsten mineral (Dale and others, 1960, p. 122), which may be scheelite or huebnerite. Tungsten is often associated with acidic, intrusive rocks. An anomalous geochemical molybdenum high is present in the southern part of the Patagonia batholith (see discussion below). There are no data that suggest either metal is present in quantities that would elicit economic interest, though available data are sparse.

Economics.--It should be noted that the most recent data used by USBM for this analysis are the coring study results from Noranda Mines, Ltd., circa mid-1960's. Metallic Ventures, Inc.'s (Tucson, AZ) early 1990's plan to open-pit mine the deposit may well be based on more recent, more favorable data. No such data were available to the USBM for this analysis.

The deposit could be mined by either open-pit or underground (stoping) methods. Economic modeling with data available to USBM suggests neither method would be profitable with the late 1993 copper price of $1.00/lb. An open-pit development of the supergene enrichment zone would be the least expensive mining method, but would result in high overall losses (a *negative* $47 million NPV at a 15% ROR). The deposit is too small to pay for infrastructure that would allow a high-tonnage mining rate, and too low in grade to support mining over a period of a decade or more. Open-pit development of three parts of the deposit (the supergene enrichment zone; the upper 900 ft of the inclined hypogene deposit; and the small, near-vertical hypogene deposit) would result in even higher losses (-$76 million NPV at 15% ROR) due to the impact of lower-grade hypogene rock and a needed larger infrastructure for deep open pit mining. Underground mining of the entire inclined part of the hypogene deposit (down to a depth of 1,000 ft) would incur losses similar to open pit mining (-$70 million NPV). Capital costs are less than for the deep open pit model, but per ton mining costs are much higher. More details are in appendix A, p. A88-A91.

One consideration that could help the viability of the property, should open-pit mining be attempted, would be to study heap leaching of the oxidized cap, because much of it would have to be stripped during open-pit mining of the copper deposit, which is lower. The oxidized cap overburden possibly could be leached after stripping, then used to backfill the open pit. A study of the mineralogy of this rock would be essential prior to any attempt to heap leach it; little is known now. The amount of remaining sulfide in the rock would have to be low. The grade of the leached cap was reported to be 0.15% copper (Cu) (AGDC, 1954?).

Future exploration.--The structural orientation of the Four Metals Hill copper porphyry suggests it may be faulted on the footwall side of its inclined, hypogene copper zone. If so, the resources have been tectonically moved to their present position after deposition, and additional resources may exist in a separate, concealed location. Emplacement of the rock mass containing the deposit via normal faulting would mean that any additional copper deposition would be higher in elevation, and thus has been removed by erosion. But emplacement via reverse faulting could allow the existence of a detached, possibly cupriferous root at depth. Outcropping areas of alteration (Simon, 1974, map) known to the north and the east of the Four Metals Hill deposit represent logical exploration targets for such a detached root, or for other, similar copper-porphyry deposits (fig. 23).

Copper porphyries in the southernmost Patagonia batholith (pl. 1, fig. 27-29)

A permissively favorable environment for copper porphyries with recoverable molybdenum exists in the granodiorite and possibly the dioritic phases of the Patagonia batholith that are between the south side of Sycamore Canyon and the Mexico border (metallization no doubt continues into Mexico, but data from there are lacking). On the U.S. side of the international boundary, this area includes about 13 mi^2 (pl. 1), all of which are in the National Forest. Data which support the possibility for copper-porphyry type mineralization come from several sources.

Keith and others (1983, map 18) denote virtually all of the metallization areas in this part of the Patagonia Mountains as indicative of a copper-porphyry environment that was in its depositional stages during the Cretaceous-Tertiary time boundary. A depiction of metal zonation in the Patagonia Mountains as a whole (Graybeal, 1984, p. 187, 189-190) details the relative abundance of molybdenum[12] in this southern part of the Patagonia batholith in comparison to the northern part of the batholith. The molybdenum variance is explained by the much deeper erosion of the Patagonia Mountains here, in comparison to the northern part of the Patagonia batholith, which is much narrower in outcrop (see geologic map, fig. 2)[13]. Deeper erosion into rocks of a copper-porphyry environment reveals core deposition zones, including the main areas of copper and molybdenum deposition. Veining, lead-silver deposition, and some zinc deposition will occur concentrically away from the copper- and molybdenum-rich core zone. Deposits of these types probably have been eroded away from the southern part of the Patagonia batholith.

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[12] Molybdenum is an important component of most copper-porphyry deposits. All of Arizona's molybdenum production (in 1994) is a byproduct of mining copper-porphyry deposits.

[13] The northern part of the Patagonia batholith is not smaller than the southern part; it is just much less deeply eroded (Graybeal, 1984, p. 187).

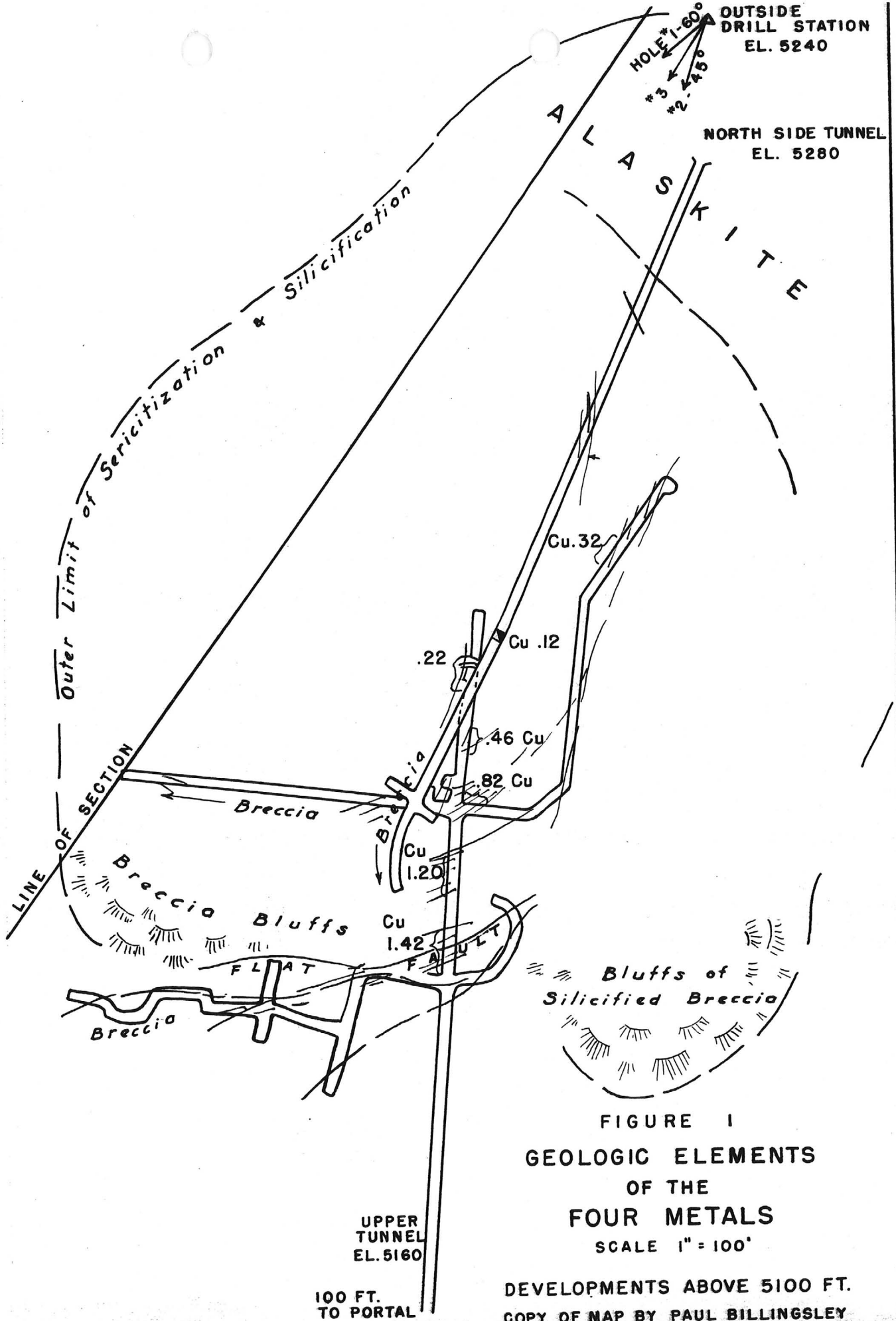


FIGURE 1

GEOLOGIC ELEMENTS

OF THE

FOUR METALS

SCALE 1" = 100'

DEVELOPMENTS ABOVE 5100 FT.

COPY OF MAP BY PAUL BILLINGSLEY

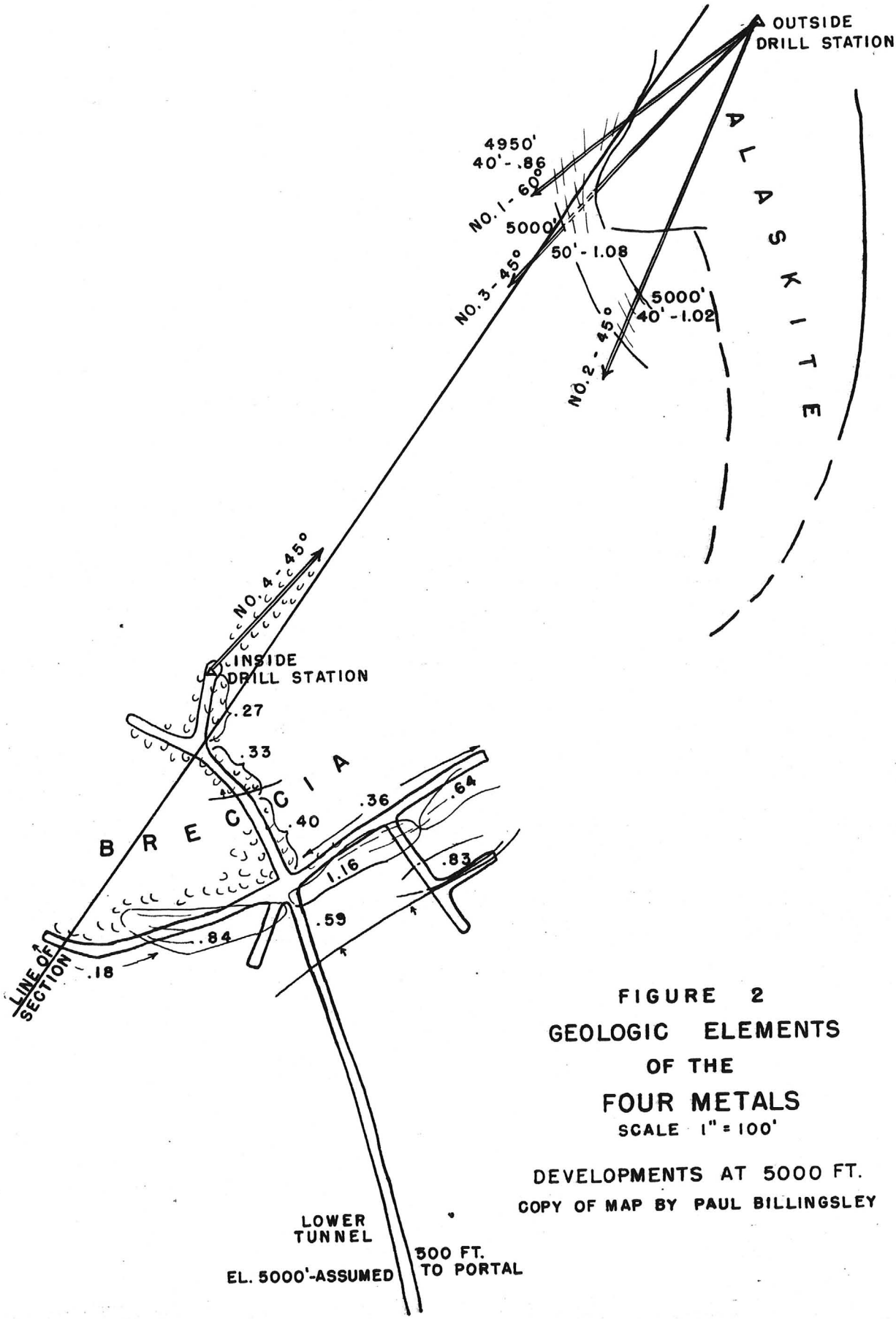


FIGURE 2

GEOLOGIC ELEMENTS

OF THE

FOUR METALS

SCALE 1" = 100'

DEVELOPMENTS AT 5000 FT.

COPY OF MAP BY PAUL BILLINGSLEY

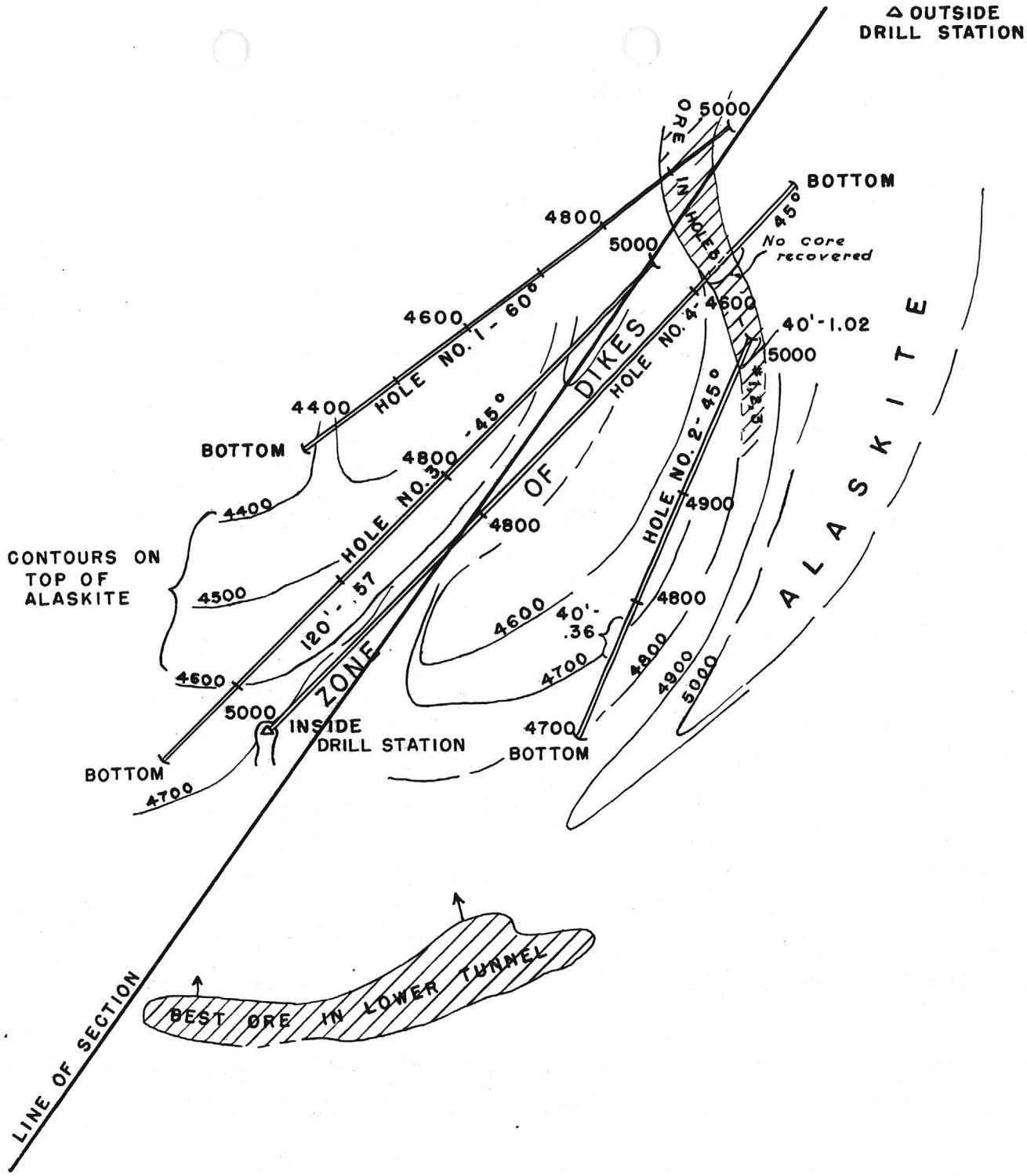


FIGURE 3

GEOLOGIC ELEMENTS

OF THE

FOUR METALS

SCALE 1" = 100'

DEVELOPMENTS BELOW 5000 FT.

COPY OF MAP BY PAUL BILLINGSLEY

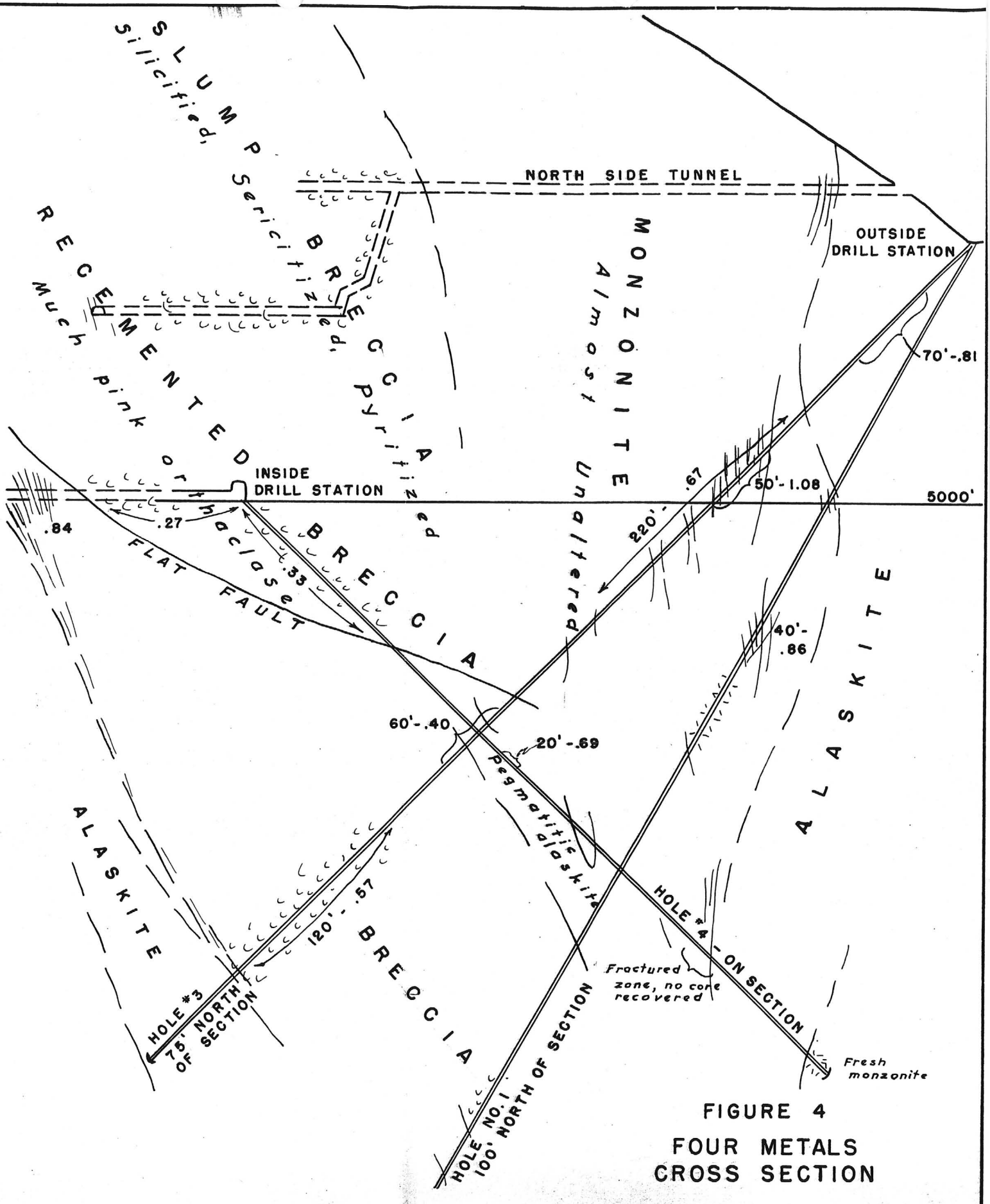


FIGURE 4

FOUR METALS
CROSS SECTION

COPY OF MAP BY PAUL BILLINGSLEY

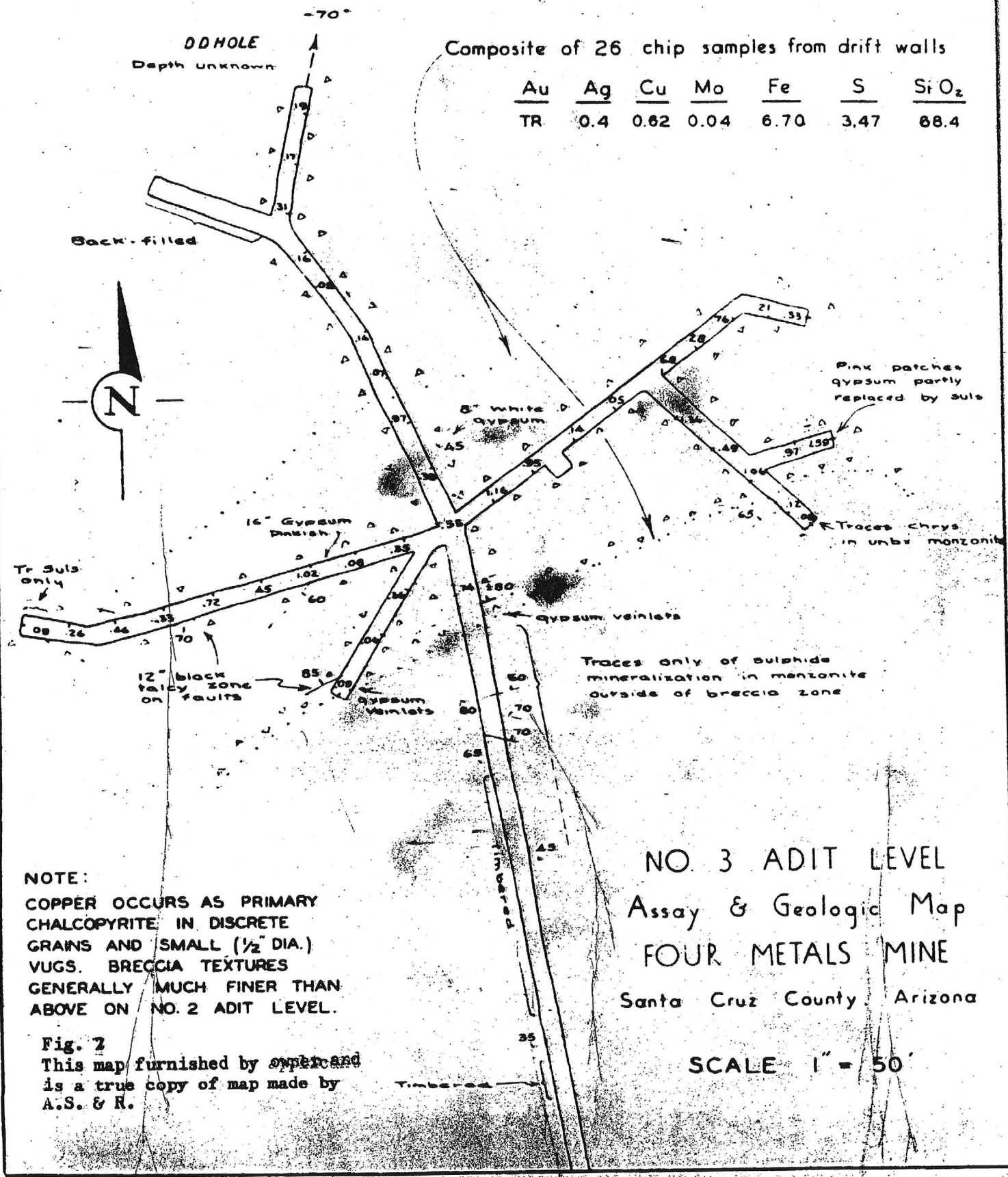
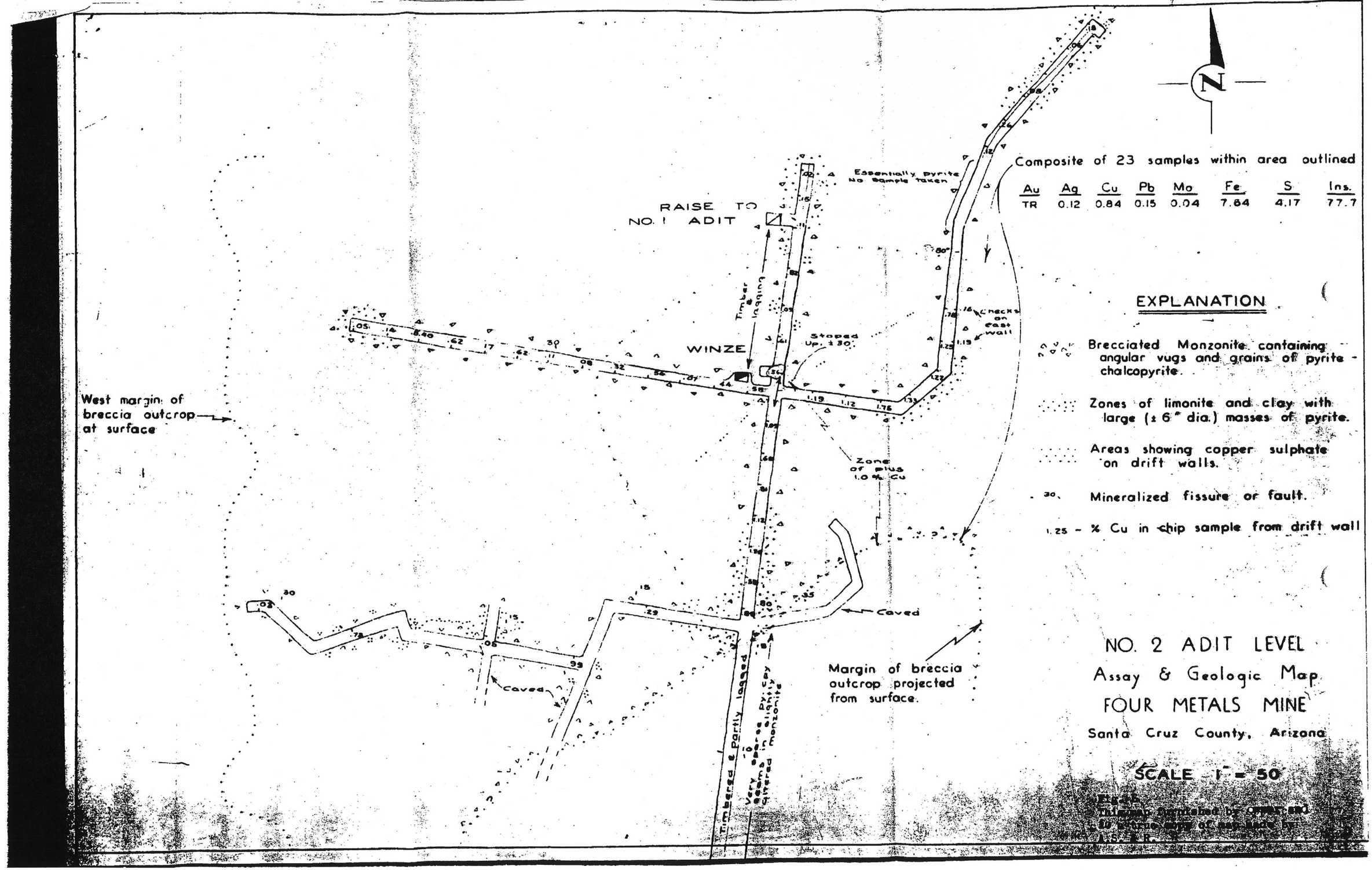


Fig. 2
This map furnished by owner and is a true copy of map made by A.S. & R.


RAISE TO NO. 1 ADIT
WINZE
Timber lagging
Stoped Up ± 30'
Essentially pyrite No sample taken
Checks on east wall
Zone of Plus 1.0 % Cu
Caved
Caved
Timbered & partly lagged
Very pyritic monzonite
Very altered
Margin of breccia outcrop projected from surface.
West margin of breccia outcrop at surface
N
Composite of 23 samples within area outlined
Au Ag Cu Pb Mo Fe S Ins.
TR 0.12 0.84 0.15 0.04 7.84 4.17 77.7
EXPLANATION
Brecciated Monzonite containing angular vugs and grains of pyrite - chalcopyrite.
Zones of limonite and clay with large (± 6" dia.) masses of pyrite.
Areas showing copper sulphate on drift walls.
30. Mineralized fissure or fault.
1.25 - % Cu in chip sample from drift wall
NO. 2 ADIT LEVEL
Assay & Geologic Map
FOUR METALS MINE
Santa Cruz County, Arizona
SCALE 1" = 50'