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File

Mr. Courtright

AMERICAN SMELTING AND REFINING COMPANY
SILVER BELL UNIT
Silver Bell, Arizona

June 17, 1969

W.E.S.
JUL 3 1969

MEMORANDUM TO: Mr. D. R. Jameson, Superintendent

Subject: MONTHLY REPORT, SILVER BELL UNIT DRILLING PROGRAM PORTLAND RIDGE AND WEST OXIDE AREAS, JUNE, 1969

Two skid and one truck mounted diamond drills were operated two shifts per day, six days per week, throughout the month of May, 1969. Holes F-183 and F-189 were completed in the West Oxide area. All of the remaining eight holes were drilled on Portland Ridge. Five holes on Portland Ridge, three on the east end and two on the west, contained enough mineralization to carry the overburden.

The footage drilled and the average direct drilling costs for May, 1969, are:

Drill	Footage	Advance Per Shift	Average Direct Cost Per Foot
Diamond - Truck	1,275.7	27.7	$ 7.00
Diamond - Skid	1,682.7	26.7	9.27
TOTAL	2,958.4	Combined Avg:	$ 8.29

The attached table summarizes the drilling results.

WEST OXIDE AREA

The last in a series of five holes west of Oxide Pit and north of the Precipitation Plant was completed in May. Although the first two holes encountered ore thicknesses and unusually strong molybdenite, the strongly mineralized area was found to be too small to warrant further drilling at this time.

F-189 This hole was collared in weak to moderately altered, hematite stained alaskite. Monzonite dikes cut the alaskite in the intervals 31.0 - 42.0 and 113.5 - 117.0. Monzonite was again entered at 123.9 and continued to the bottom of the hole.

The interval from 164.0 to 191.0 assayed 1.06/0.55 with the non-sulfide fraction being in the form of malachite, cuprite and native copper.

PORTLAND RIDGE

The completion of three additional ore holes on the east end of Portland Ridge, as shown on the accompanying map, has increased the width of this ore zone. Approximately 1.5 million tons of ore have been developed in this zone during April and May by holes F-180, 184, 188, 192 and 195. The ore is thicker and higher grade to the south where it terminates against a thick prominent quartz vein. Several additional holes are planned in this area. The footages drilled in May are described below:

F-185 This hole was located between previously drilled sites to improve the accuracy of ore reserve estimates.

T-W

Monzonite was drilled from the collar to 149.0 and from 392.0 to the bottom of the hole at 451.2 feet. The interval between was occupied by fine grained, silicified syenodiorite (?). Clay and sericite alteration were stronger in the monzonite, both at the top and bottom of the hole, than in the syenodiorite.

Chalcocite enrichment extended from 114.0 to 401.0 and contained enough ore to carry the overburden.

F-191 This hole was also drilled on the west end of Portland Ridge. Fine grained, silicified, syenodiorite was cut by several dikes of an unusually porphyritic rock containing about 20% phenocrysts of up to 1/2" in length. This is probably a phase of the monzonite.

T-W

Completely leached capping exists from the collar to 50 feet and is followed by partially oxidized rock to 179 feet. Enrichment is less than 100 feet and although the 52.7 foot ore intercept carries the overburden, no further drill holes are planned in the vicinity.

F-188 Drilled entirely in strongly altered syenodiorite. Strongly oxidized capping containing traces of pyrite in addition to jarosite, alunite and some live limonite extended from the collar to a sharp sulfide contact at 82.6 feet. Chalcocite enrichment was observed from 82.6 to 407.0 feet and contained a total of 266.0 feet of ore. Primary mineralization averaged only about 0.08%, suggesting that much of the chalcocite has formed from solutions laterally migrating into this location.

T

F-190 Drilled in dacite except for syenodiorite (?) in the interval from 84 to 117.4 feet. A transitional sulfide contact occurred from 47 to 84 feet and was followed by chalcocite enrichment down to 186 feet, which contained two thin ore intervals. Clay and sericite alteration was moderate overall, but stronger near the ore intercepts.

T

F-192 This hole was advanced in syenodiorite which was cut by monzonite in the interval from 275 to 366 feet. The sulfide contact was again transitional with oxidation extending to 80 feet. Enrichment extended from 80 to 275 feet and contained two ore intervals totalling 115.0 feet in thickness. The best ore values occurred where chalcocite had partially replaced pyrite veins.

T

F-193 This hole on the north edge of the ore zone was drilled entirely in syenodiorite. A sharp sulfide contact was encountered at the shallow depth of 39 feet. Low grade enrichment, containing only four thin plus 0.4% intercepts, was found from 39 to 270 feet. Pyrite content was above average, for areas outside the main ore bodies, at 3 to 4% by volume.

in progress

F-194 This hole, located south of the previously mentioned prominent quartz vein, was at 93.5 feet in leached syenodiorite (?) at the end of the month. (No ore and only minor enrichment was later found in this hole).

F-195 This hole was located immediately north of the quartz vein and contained unusually high grade ore. This hole also contained syenodiorite which was cut by monzonite in the intervals from 0. to 6 feet and 60 to 172 feet. Breccia and gouge separated the monzonite and syenodiorite from 172 to 187 feet.

Oxidation extended down to 132 feet. Enrichment extended from 132 feet to 313 feet where the hole was prematurely stopped. The first 93.0 feet of enrichment averaged 1.39/0.02% copper.

The following 58.5 feet of lower grade ore reduced the averaged to 1.01/0.01% for 151.5 feet. The high grade intervals, of which the highest was 3.47/0.06%, resulted from the replacement of over half the pyrite by chalcocite.

Strong clay and sericite alteration was noted in the monzonite. However, the syenodiorite at the bottom of the hole was less altered to clay and sericite but was strongly chloritized. This had the effect of masking the weaker enrichment and the hole was stopped too soon.

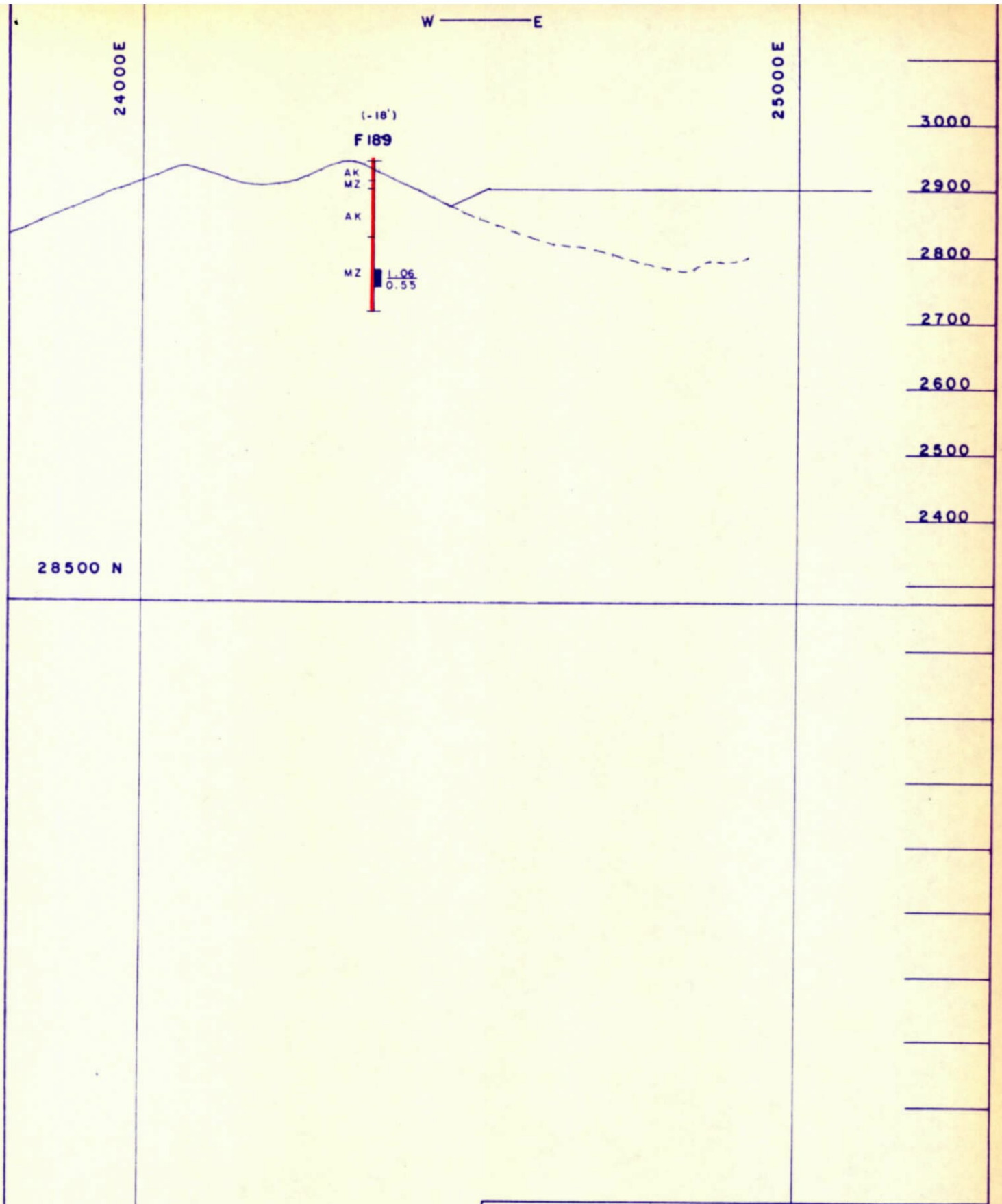
R. C. Edmiston

R. C. Edmiston
Resident Geologist

RCE:jca

DIAMOND DRILLING PROGRESS REPORT

	Hole No.	Approx. Elevation	Approx. Coordinates North	East	+0.40% Copper Lenses Depth to Top	Thick-ness	Avg. % Cu Total	N.S.	Ft. Drill. During Mo.	Depth End Mo.	Final Depth
	F-183	2762.22	28,033.96	24,207.67	No +0.40% intervals				101.0	301.0	301.0
✓	F-185	3136.62	28,449.22	27,669.85	✓ 114.0	54.6	0.46	Nil	431.0	451.2	451.2
					✓ 260.5	65.2	0.66	Nil			
✓	F-188	2981.16	28,582.01	29,487.86	✓ 82.6	190.4	0.67	0.01	456.2	456.2	456.2
					✓ 311.5	76.6	0.61	0.01			
	F-189	2942.86	28,482.50	24,349.35	164.0	27.0	1.06	0.55	229.0	229.0	229.0
	F-190	2916.13	29,047.20	29,483.24	94.1	12.9	0.52	Nil	247.0	247.0	247.0
					165.4	20.5	1.14	0.03			
✓	F-191	3035.10	28,531.79	27,210.27	✓ 206.0	52.7	0.71	0.02	391.2	391.2	391.2
✓	F-192	2907.20	28,858.92	29,657.05	✓ 105.0	69.0	0.79	0.01	386.0	386.0	386.0
					✓ 229.0	46.0	0.71	0.01			
	F-193	3017.04	28,905.09	29,332.60	67.0	7.8	0.66	0.01	310.8	310.8	310.8
		-			135.7	9.3	0.51	0.01			
	F-194	2967.41	28,325.17	29,339.99	No +0.40% intervals				93.5	93.5	
✓	F-195	2924.72	28,457.16	29,620.53	✓ 132.0	151.5	1.01	0.01	312.7	312.7	312.7
								TOTAL	2,958.4		



+0.4% Total Copper

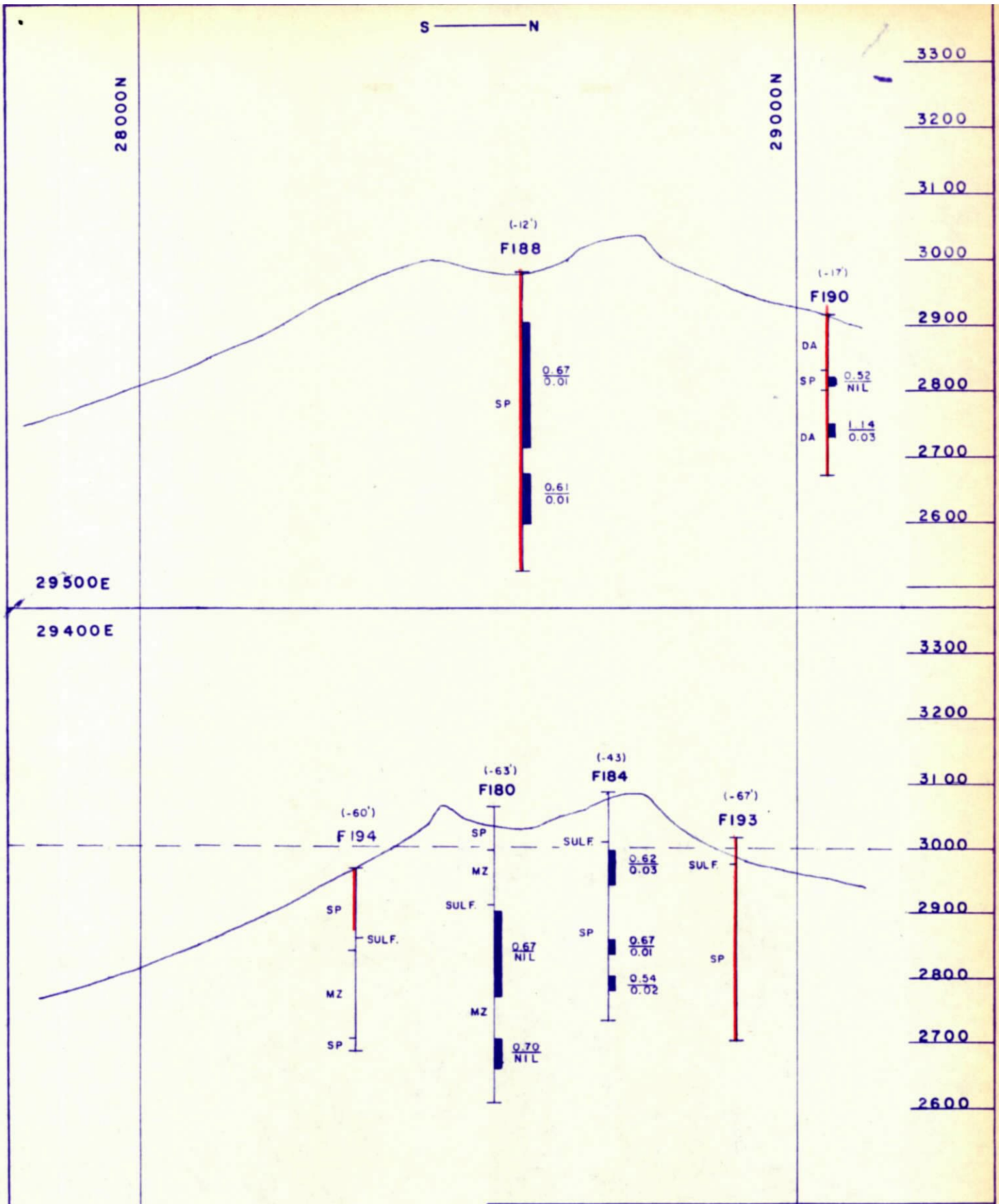
Advance for month

Note: Rock Types Generalized
Cu Assay is Total Cu/Non Sul. Cu

AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT

WEST OXIDE AREA
DRILL HOLE PROJECTIONS

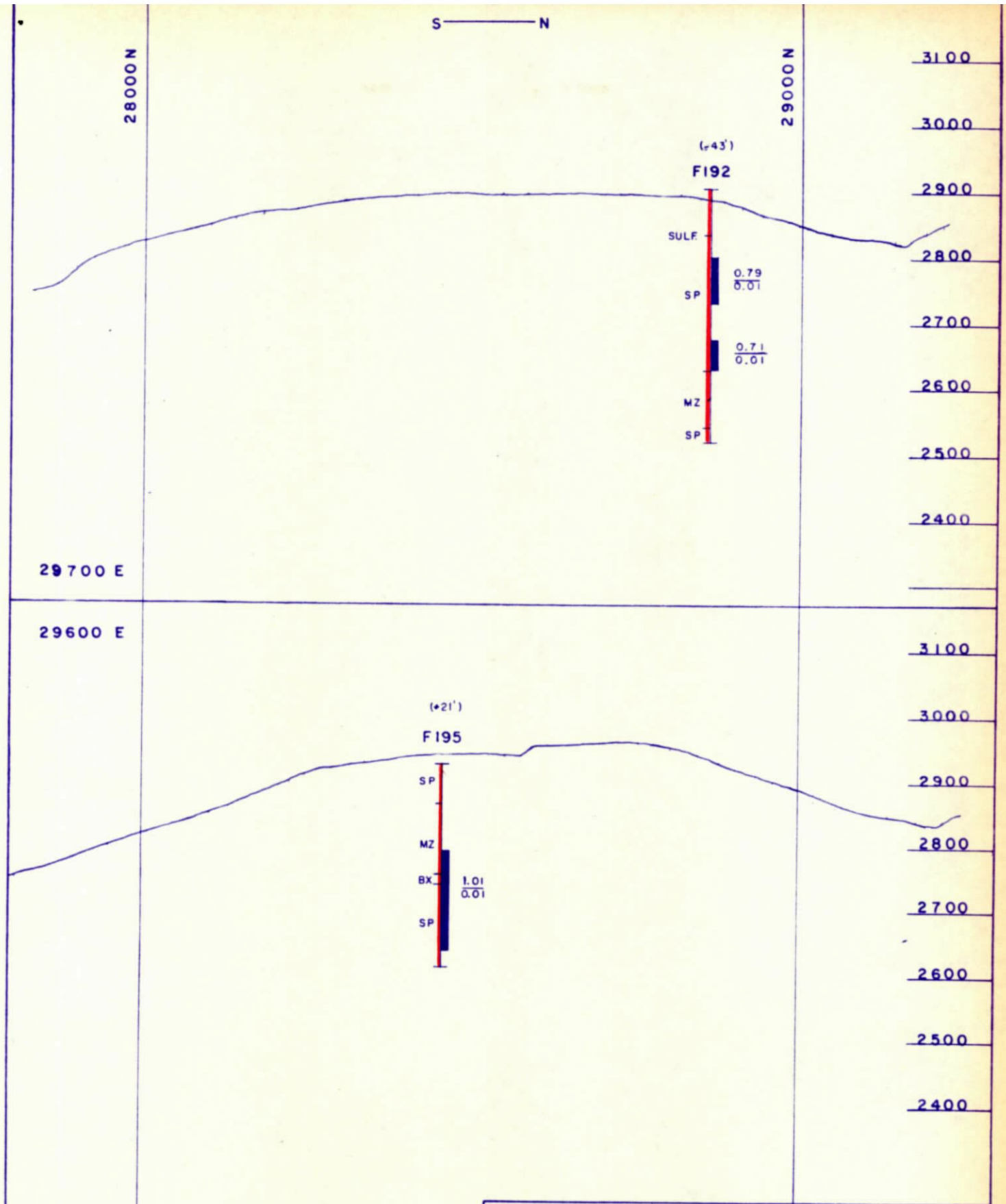
SCALE	DRAWN	DATE	FILE
1" = 200'	RCE	JUN 1 1969	S 121 A



AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT

PORTLAND RIDGE
DRILL HOLE PROJECTIONS

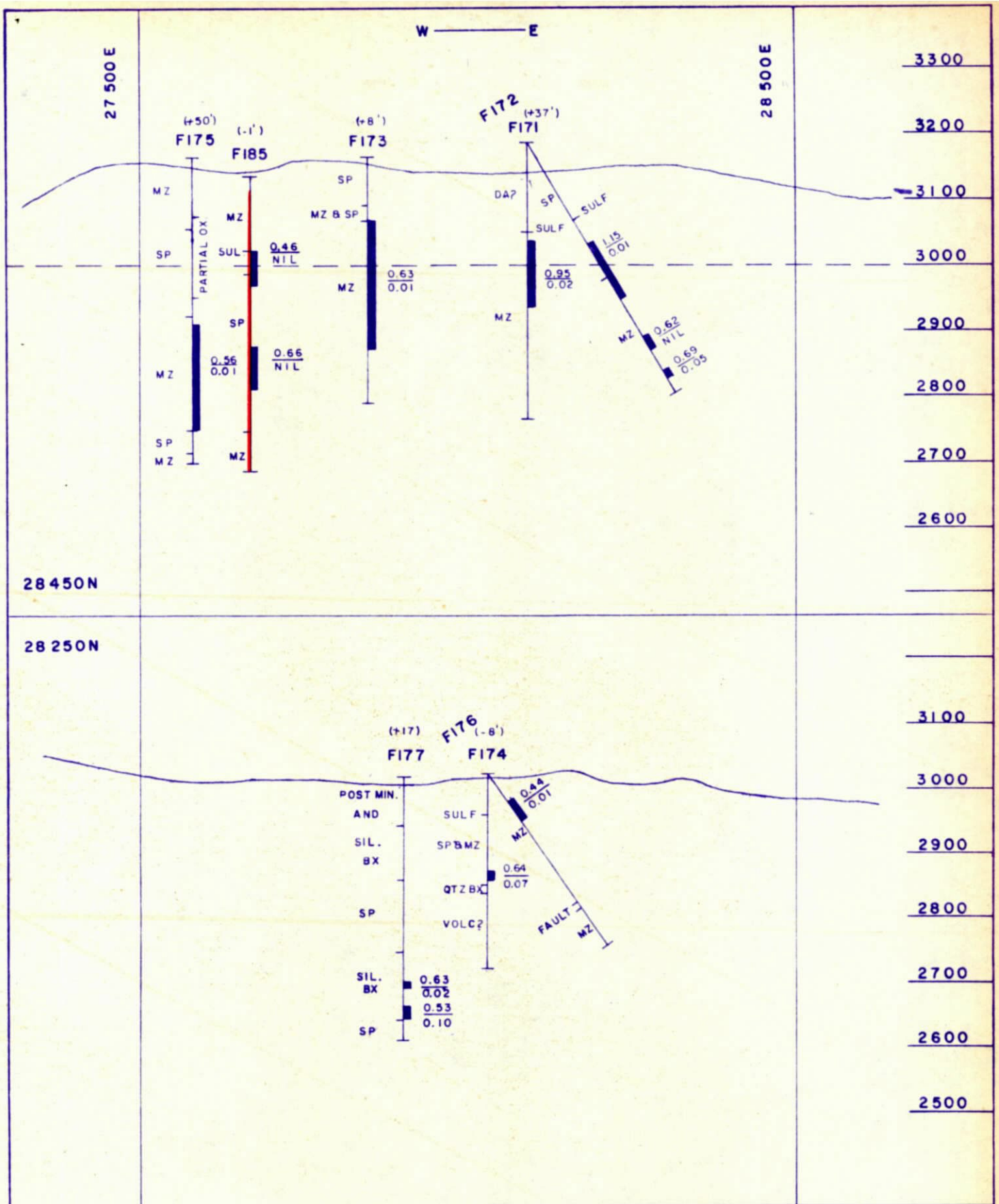
SCALE	DRAWN	DATE	FILE
1" = 200'	RCE	JUN 1 1969	S 121 A



AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT

PORTLAND RIDGE
DRILL HOLE PROJECTIONS

SCALE	DRAWN	DATE	FILE
1" = 200'	RCE	JUN 1 1969	S 121 A



■ + 0.4% Total Copper

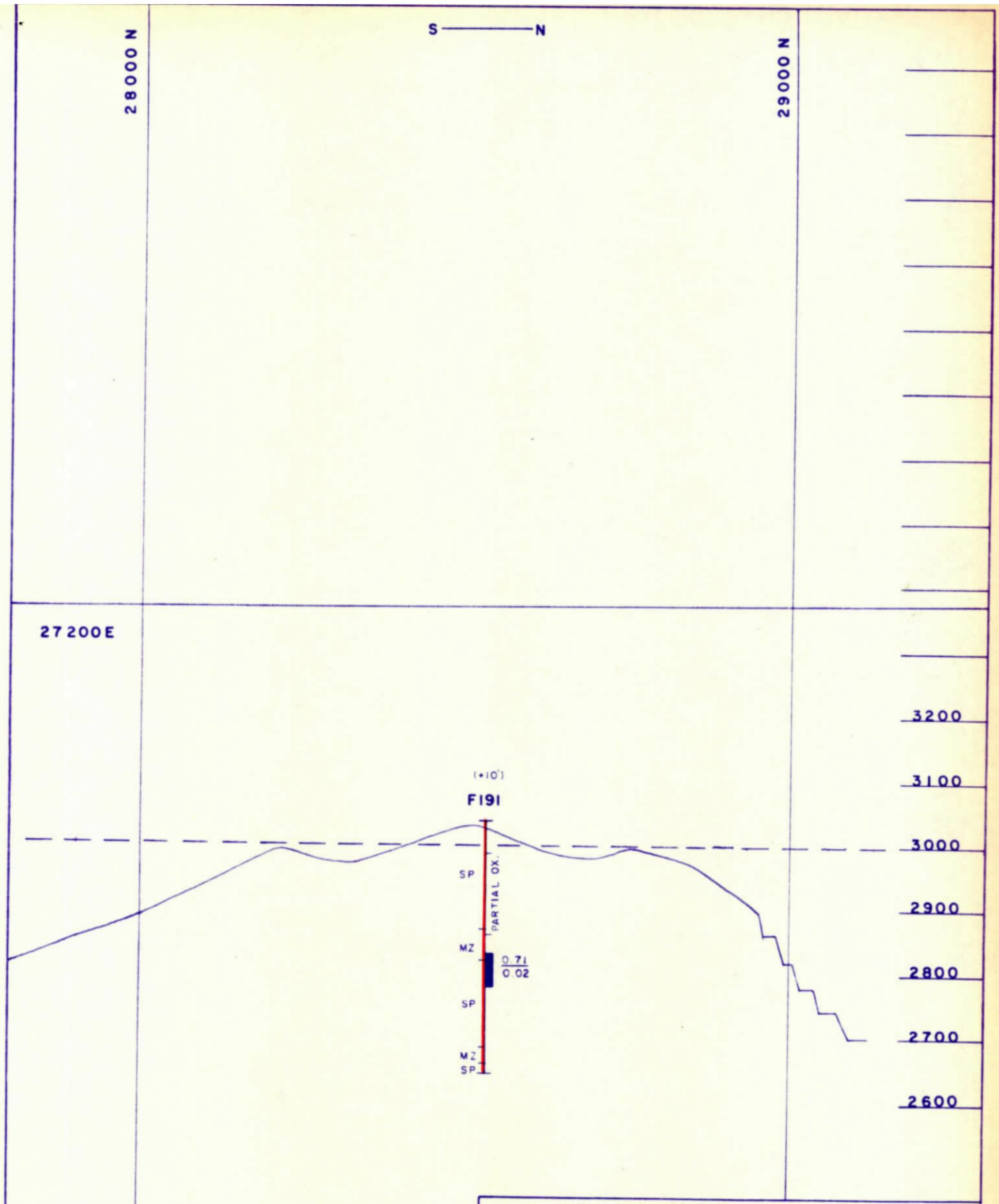
| Advance for month

Note: Rock Types Generalized
Cu Assay is Total Cu/Non Sul. Cu

AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT

PORTLAND RIDGE
DRILL HOLE PROJECTIONS

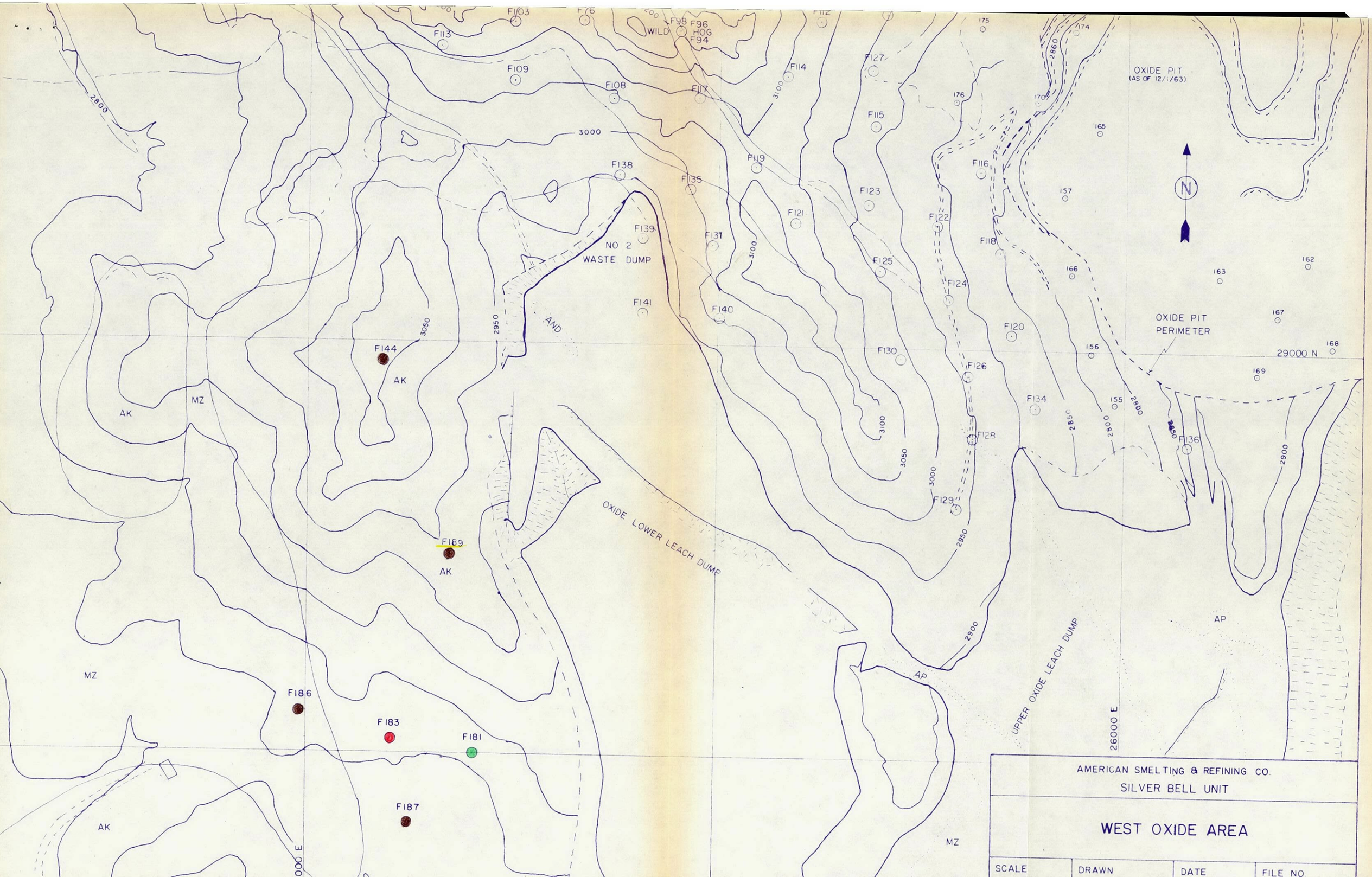
SCALE	DRAWN	DATE	FILE
1" = 200'	RCE	JUN 1 1969	S 121 A



AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT

PORTLAND RIDGE
DRILL HOLE PROJECTIONS

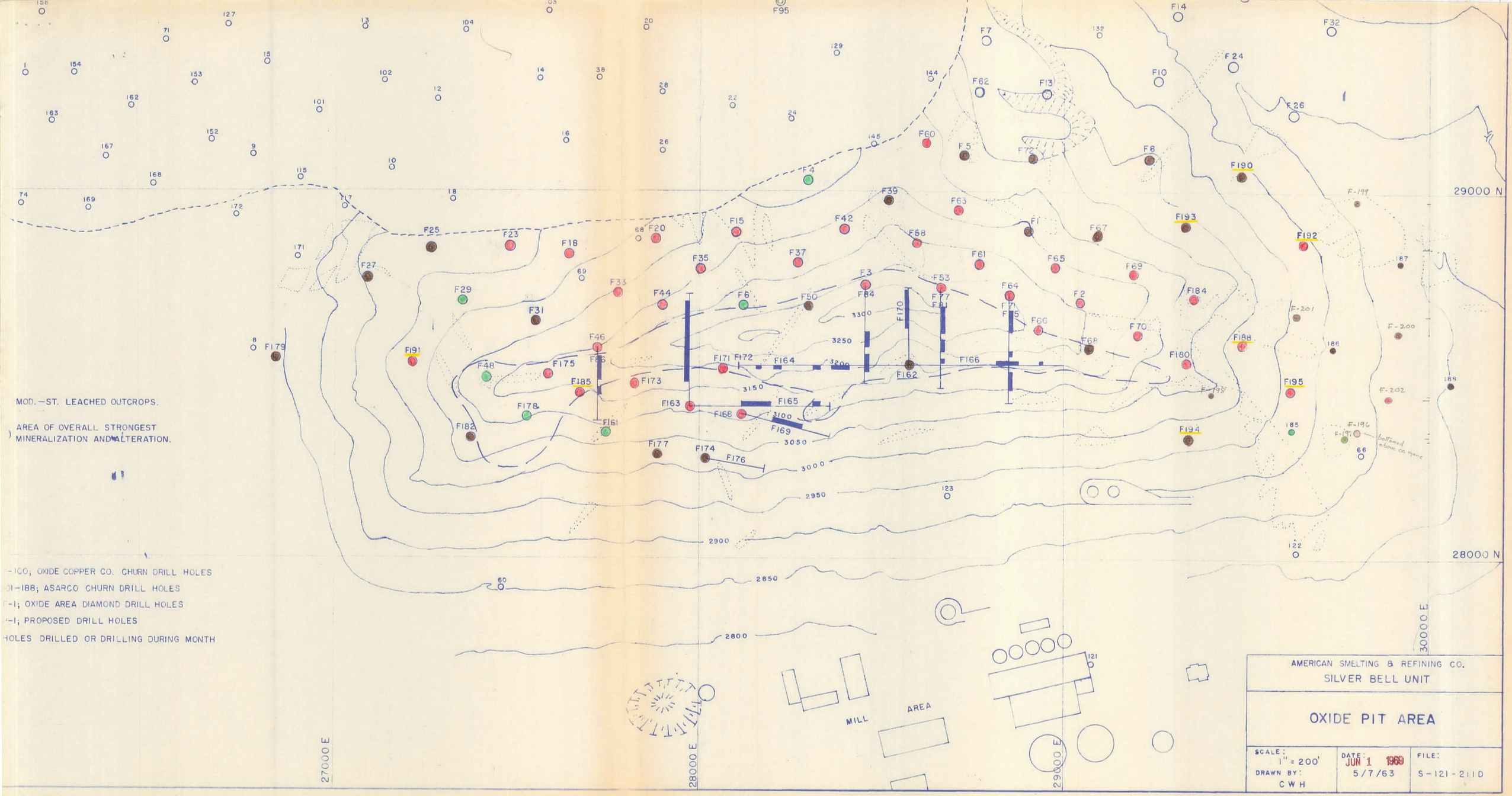
SCALE	DRAWN	DATE	FILE
1" = 200'	RCE	JUN 1 1969	S 121 A



AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT

WEST OXIDE AREA

SCALE	DRAWN	DATE	FILE NO.


MOD.—ST. LEACHED OUTCROPS.
AREA OF OVERALL STRONGEST MINERALIZATION AND ALTERATION.
-100; OXIDE COPPER CO. CHURN DRILL HOLES
01-188; ASARCO CHURN DRILL HOLES
-1; OXIDE AREA DIAMOND DRILL HOLES
-1; PROPOSED DRILL HOLES
HOLES DRILLED OR DRILLING DURING MONTH
29000 N
28000 N
27000 E
28000 E
29000 E
30000 E
MILL AREA
3300
3250
3200
3150
3100
3050
3000
2950
2900
2850
2800
AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT
OXIDE PIT AREA
SCALE: 1" = 200'
DRAWN BY: CWH
DATE: JUN 1 1969 5/7/63
FILE: S-121-211D

Mr. Courtright

J. H. C.

AUG 27 1969

AMERICAN SMELTING AND REFINING COMPANY
SILVER BELL UNIT
Silver Bell, Arizona

August 21, 1969

MEMORANDUM TO: Mr. D. R. Jameson, Superintendent

Subject: MONTHLY REPORT, SILVER BELL UNIT DRILLING PROGRAM, PORTLAND RIDGE AND OXIDE PIT AREAS, JULY, 1969

One drill was operated throughout the month of July and a second was in use only from the first through the twelfth. Drilling was carried out two shifts per day, six days per week throughout the month. Drill Hole F-204 was completed on Portland Ridge. The first of two holes intended to test the altered Paleozoic sediments in Oxide Pit, F-207, was completed, while the second, F-208, and angle hole was in progress at the end of the month. (F-208 was completed in August to a final depth of 414.4 feet. The diamond drilling program was terminated on August 15, 1969).

The footage drilled and the average direct drilling cost for July, 1969, are:

Drill	Footage	*Advance Per Shift	Average Direct Cost Per Foot
Diamond - Truck	812.1	26.2	$ 6.86
Diamond - Skid	523.5	23.8	10.21
TOTAL	1,335.6	Combined Average	$ 8.17

* Does not include moving time but does include all other delays.

The attached table summarizes the drilling results.

PORTLAND RIDGE AND ADJACENT AREAS

Drilling on Portland Ridge and the area east of Portland Ridge and Oxide Pit was concluded in July. F-204 located on the east end of Portland Ridge had the effect of further narrowing the elongate ore zone which has been traced southeast from Oxide Pit. Although the termination of this zone has not been found, no further drilling is planned due to its narrow width of 100 to 200 feet.

Two holes east of Oxide Pit were completed on molybdenum geochemical anomallies with no success. In all three holes alteration was moderate to strong in the leached capping and weak in the primary. Enrichment was very weak and thin in all holes.

F-203

This hole was at a depth of 193.0 at the beginning of the month and was stopped at 271.5. The hole was in syenodiorite cut by monzonite from 109 to 150 feet. Enrichment was noted only from 111 to 154 feet. Primary mineralization was slightly above average for fringing areas. Pyrite was low at about 1%.

F-204

This hole was drilled entirely in strongly altered syenodiorite. Oxidation persisted to 176 feet and enrichment followed to a depth of 240 feet. Primary mineralization was less than 0.10% copper. Pyrite content was about 3%.

In adjacent holes the base of oxidation has been shallower, 80-90 feet, and the enrichment thicker.

F-205

Collared in strongly altered monzonite. A fault zone occurred from 28 to 38 feet and was followed by syenodiorite to the bottom of the hole. The base of oxidation at 76 feet was followed by 17 feet of weak enrichment and a primary zone averaging less than 0.02% copper.

F-206

This hole was collared in syenoriorite and entered a fault zone at 23 feet. Gravel size breccia and gouge extended to 61.5 feet, where strongly altered syenodiorite was again found. Syenodiorite continued to the bottom of the hole except for some zones containing a coarser grained silicified rock with vague texture.

The base of oxidation was at 74 feet and was followed by weak enrichment to 105 feet. Primary mineralization averaged 0.05% copper.

Alteration was logged as strong from 10 to 94 feet, moderate from 94 to 165 feet, and weak below 165 feet. Traces of epidote occurred from 94 to 155 feet.

OXIDE PIT

A vertical hole, F-207, and an angle , F-208, were drilled in Oxide Pit to further test for mineralization in the altered Paleozoic limestones. The meta-sediments encountered in these holes included fine grained hornfels, quartzite and marble. Mineralization in the sediments averaged about 0.3% while mineralization in intrusives cutting the sediments was less than 0.1%.

In general the sediments adjacent to the intrusive bodies in Oxide Pit are not as strongly altered or mineralized as those in El Tiro Pit.

F-207

This was collared in fine grained dark green to brown hornfels but encountered monzonite at 43 feet. Weak chalcocite enrichment was present in the monzonite. The remainder of the hole was in monzonite with short, less than 20 foot, intervals of hornfels. One low grade ore intercept occurred in the

hornfels. Unenriched monzonite contained from 0.01 to 0.09% copper. The hole was stopped at 329.6 feet in monzonite.

F-208

This angle hole was drilled due north at 45°. Fine grained, tan to green hornfels with thin intervals of quartzite and small patches of garnet extended to 51 feet. Relatively uniform light tan to olive green hornfels with locally strong epidote continued to 133 feet. Accessory minerals included siderite, smithsonite, and wulfenite. Below 133 feet the sediments were cut by several thin weakly altered syenodiorite porphyry dikes. Marble and dolomite were first encountered at 211 feet and from there to the bottom of the hole the metasediments consisted of limey hornfels mixed with marble and dolomite. Two thin low grade ore intercepts were encountered in the hornfles. Chalcopyrite was the only copper mineral noted in the hole.

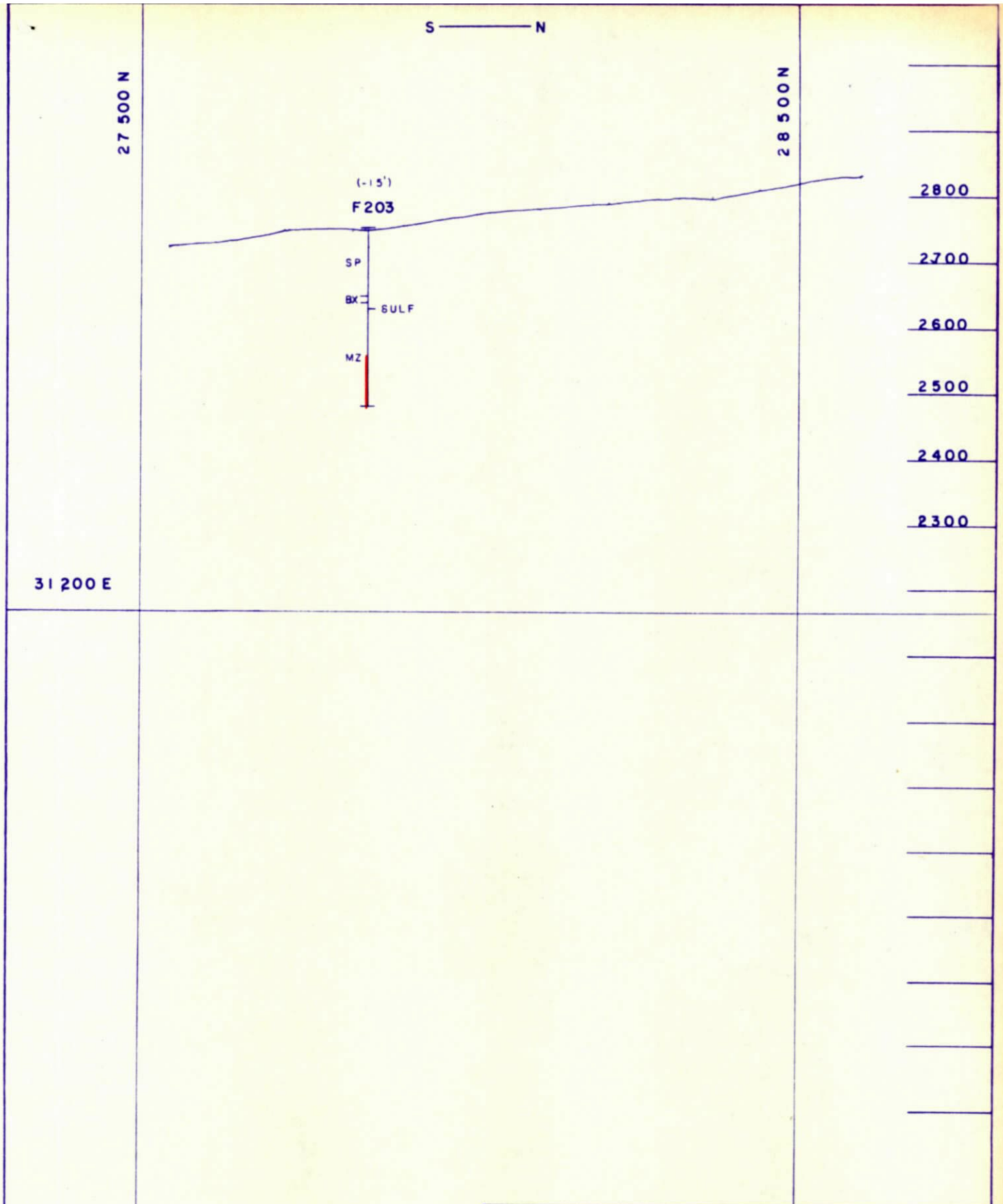
J. W. Cameron

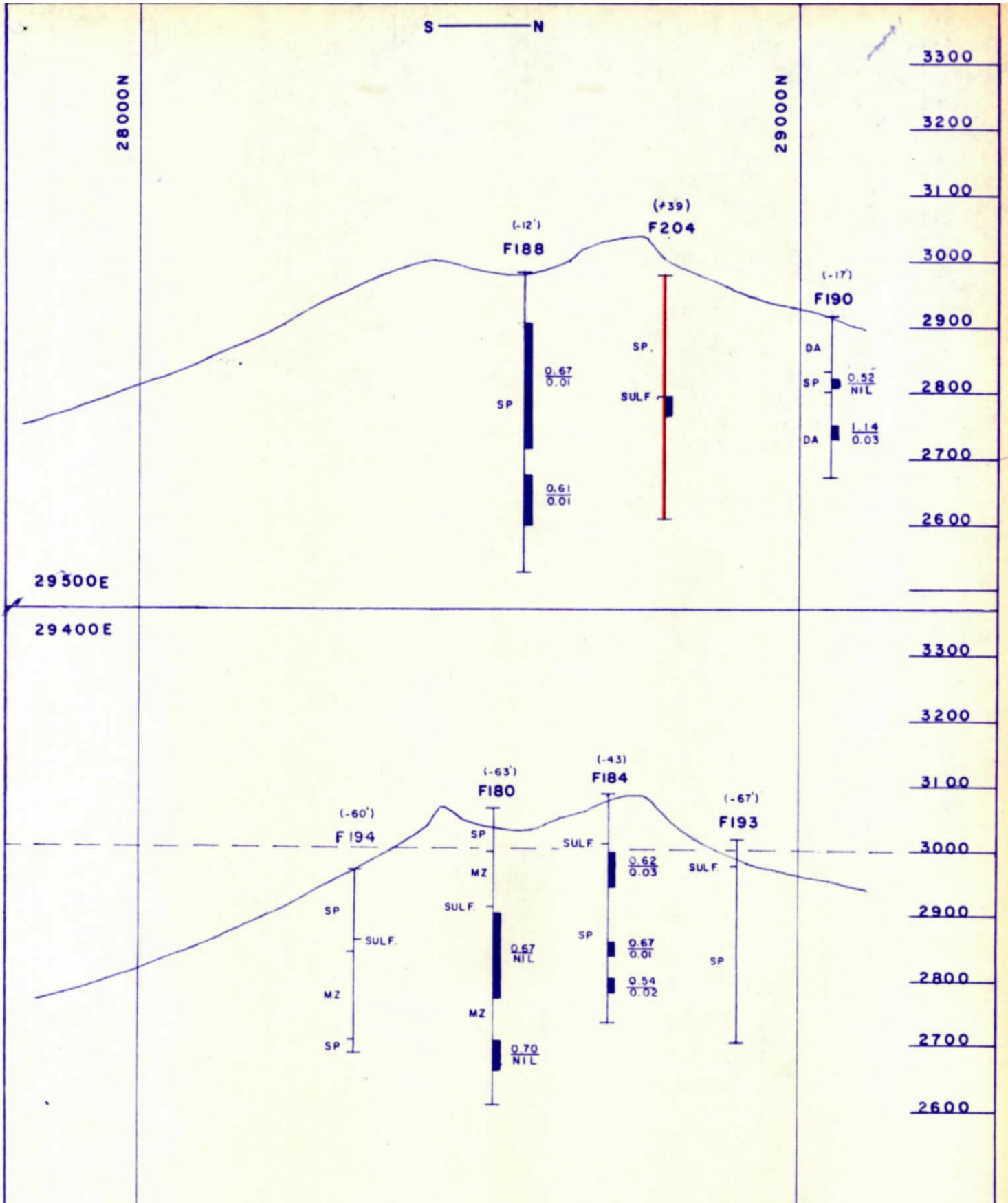
J. W. Cameron

RCE/JWC:jca

DIAMOND DRILLING PROGRESS REPORT

Hole No.	Approx. Elevation	Approx. Coordinates North	Approx. Coordinates East	±0.40% Copper Lenses Depth to Top	Thickness	Avg. % Cu Total	Avg. % Cu N.S.	Ft. Drill. During Mo.	Depth End Mo.	Final Depth
F-203	2751.59	27,847.78	31,185.46	No plus 0.40% intervals				78.5	271.5	271.5
F-204	2976.22	28,796.99	29,539.48	176.3	30.4	0.53	0.03	370.0	370.0	370.0
F-205	2764.22	28,506.14	30,585.34	No plus 0.40% intervals				195.0	195.0	195.0
F-206	2984.56	30,169.23	29,547.27	No plus 0.40% intervals				209.0	209.0	209.0
F-207	2660.97	30,086.55	26,870.78	251.6	11.4	0.44	-	329.6	329.6	329.6
F-208	2661.41	29,996.51	27,117.94	211.0	10.0	0.44	0.01			
				238.8	9.0	0.45	0.01	153.5	153.5	414.4
						TOTAL		1,335.6		


S
N
27 500 N
28 500 N
(-15')
F203
SP
BX
SULF
MZ
2800
2700
2600
2500
2400
2300
31 200 E
+ 0.4% Total Copper
Advance for month
Note: Rock Types Generalized
Cu Assay is Total Cu/Non Sul. Cu
AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT
EAST OXIDE AREA
DRILL HOLE PROJECTIONS
SCALE
1" = 200'
DRAWN
RCE
DATE
AUG 1 1969
FILE
S 121 A



■ + 0.4% Total Copper

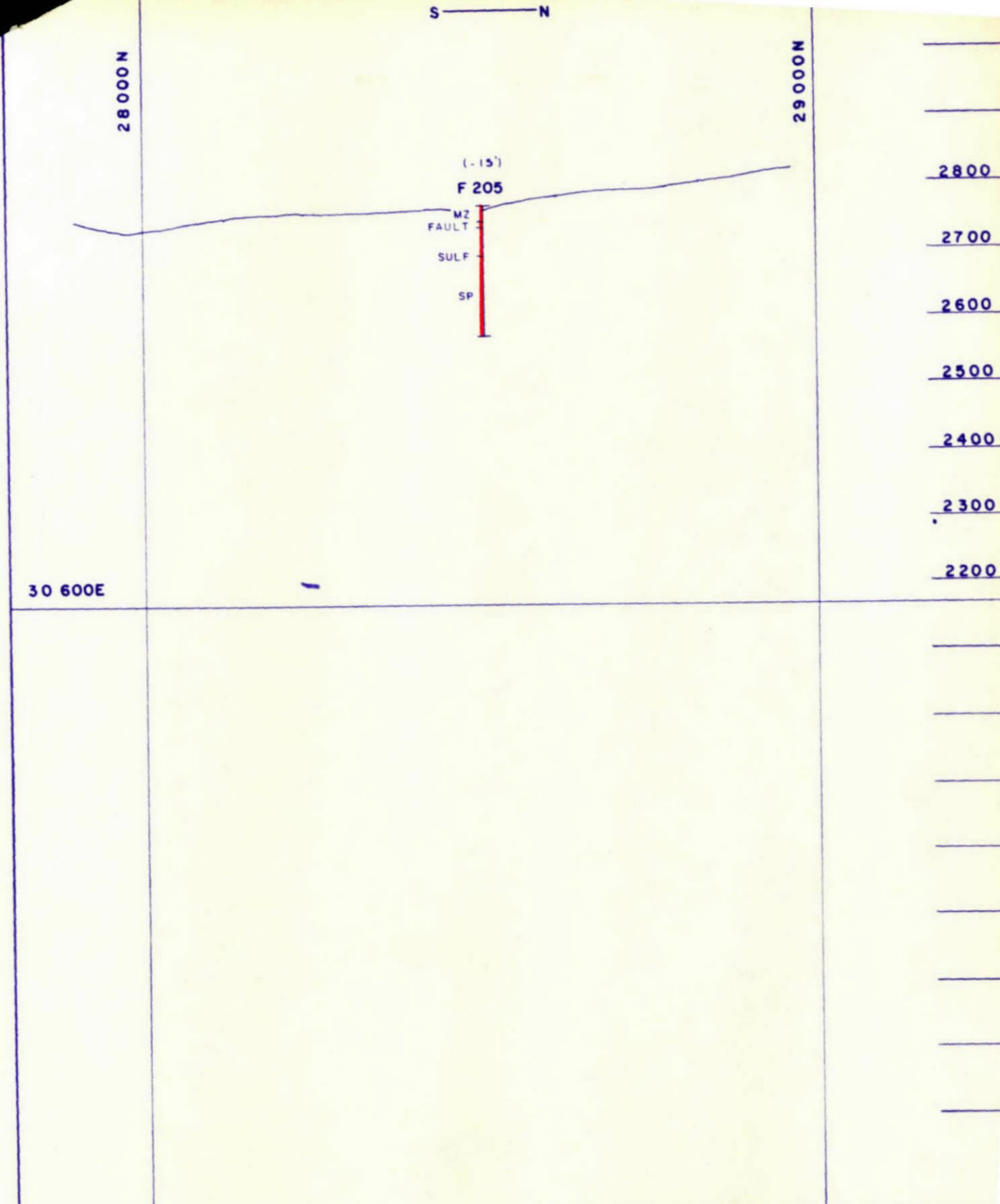
| Advance for month

Note: Rock Types Generalized
Cu Assay is Total Cu/Non Sul. Cu

AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT

PORTLAND RIDGE
DRILL HOLE PROJECTIONS

SCALE	DRAWN	DATE	FILE
1" = 200'	RCE	AUG 1 1969	S 121 A



+ 0.4% Total Copper

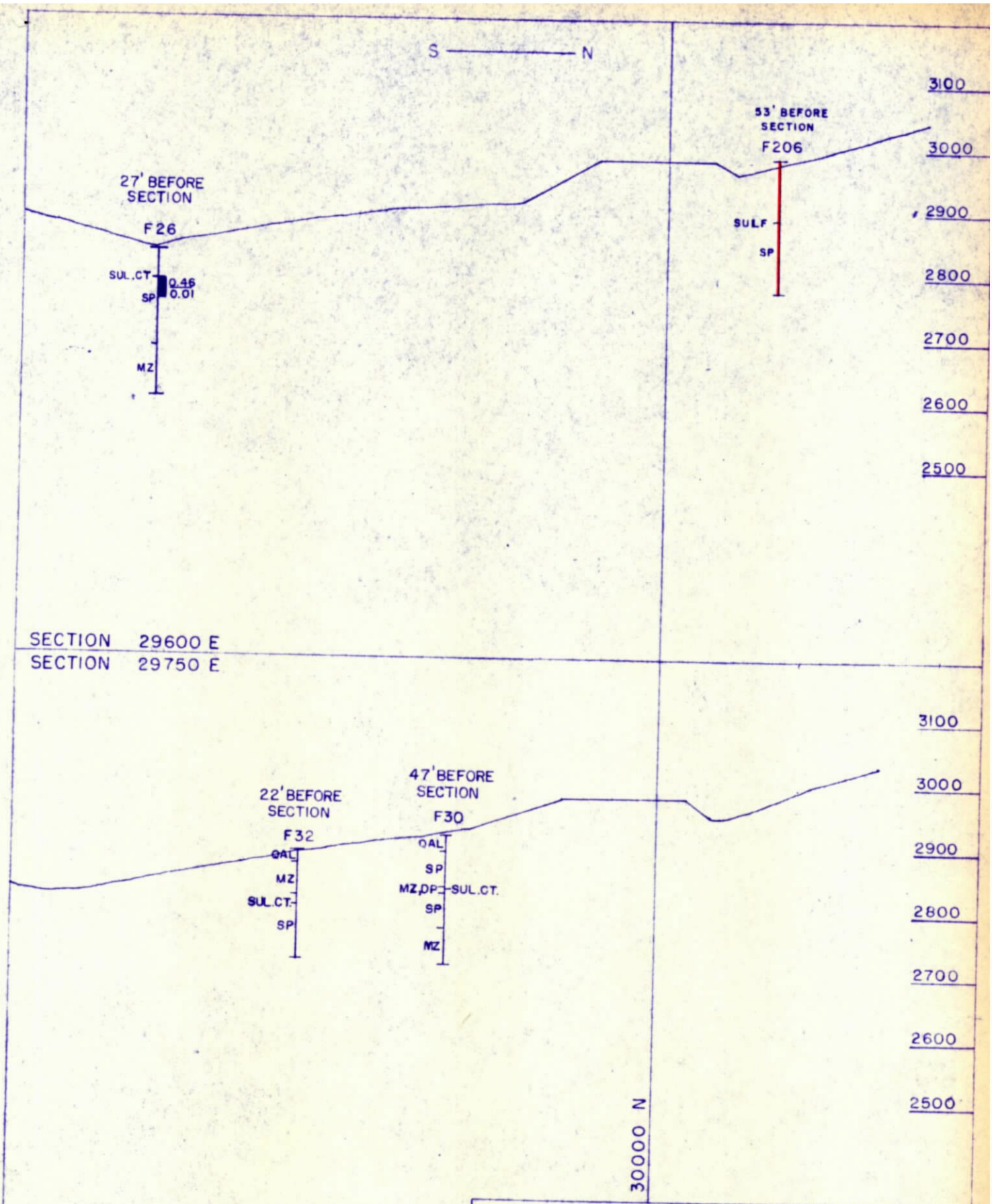
Advance for month

Note: Rock Types Generalized
Cu Assay is Total Cu/Non Sul. Cu

AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT

EAST OXIDE AREA
DRILL HOLE PROJECTIONS

SCALE	DRAWN	DATE	FILE
1" = 200'	RCE	AUG 1 1969	S 121



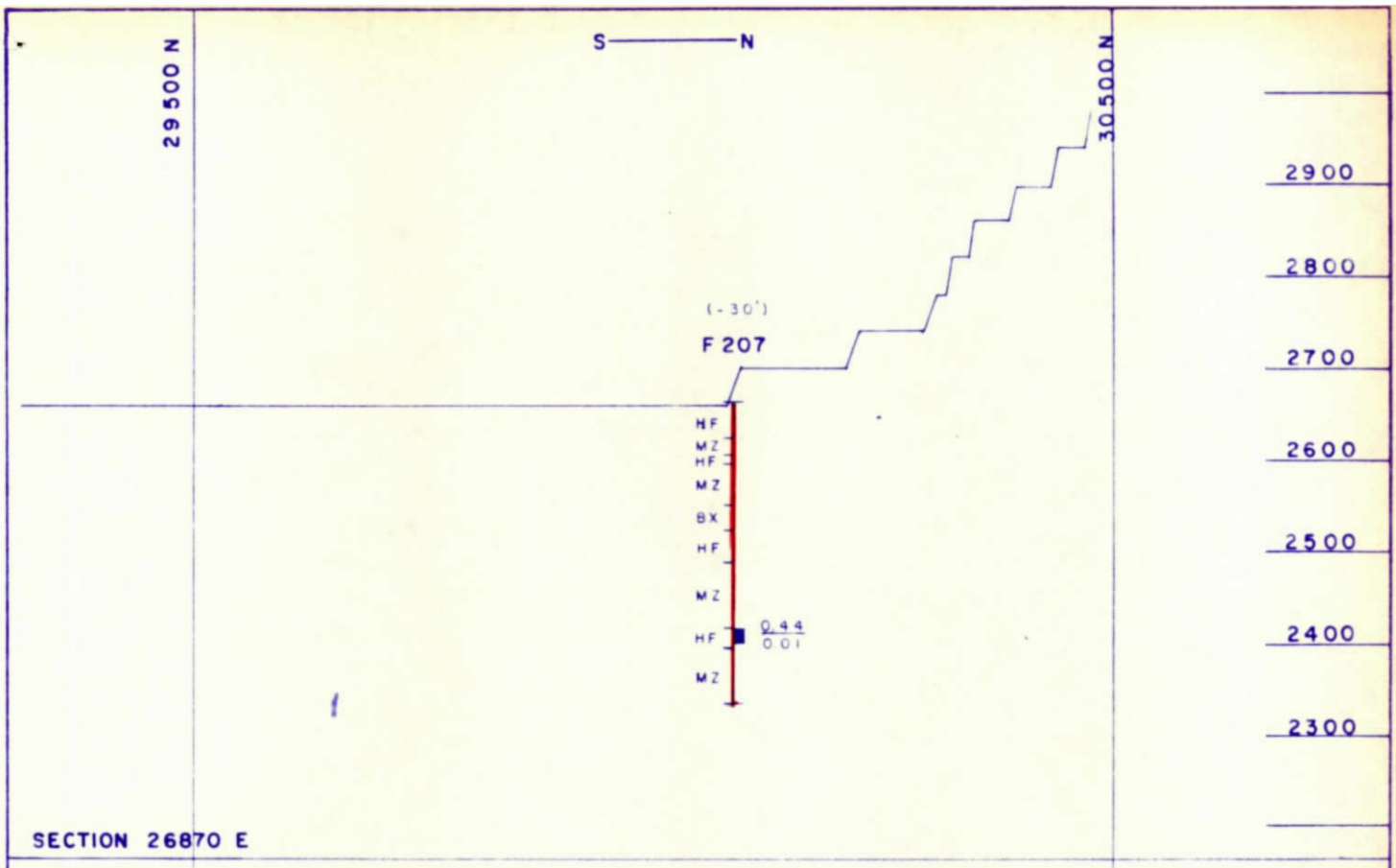
▮ +0.4 % Total Copper
| Advance for month

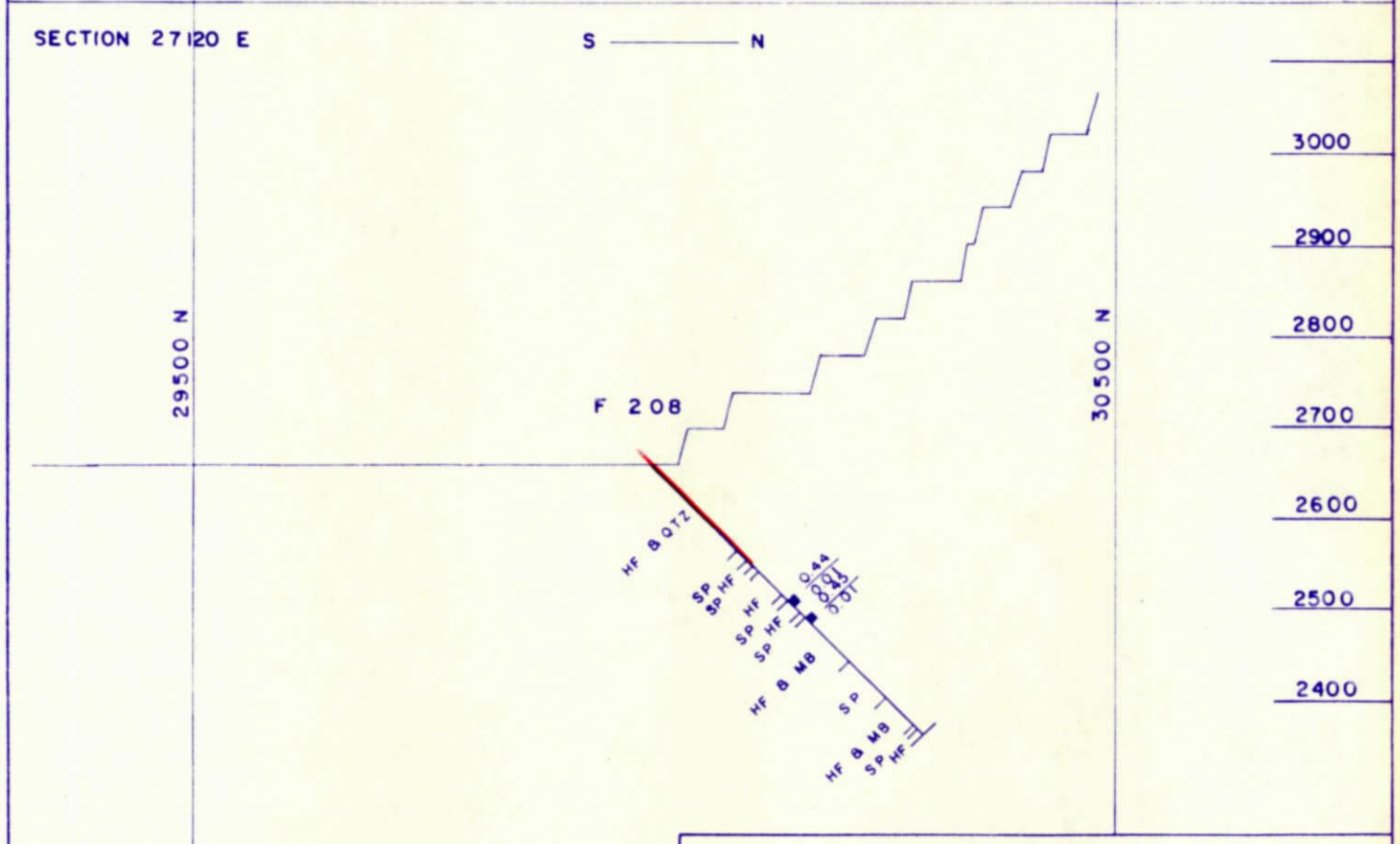
Note: Rock Types Generalized
Cu Assay is Total Cu / Non Sul. Cu

AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT

OXIDE AREA
DRILL HOLE PROJECTIONS

SCALE	DRAWN	DATE	FILE
1" = 200'	CWH	AUG 1 1969	S-121- A





■ + 0.4% Total Copper

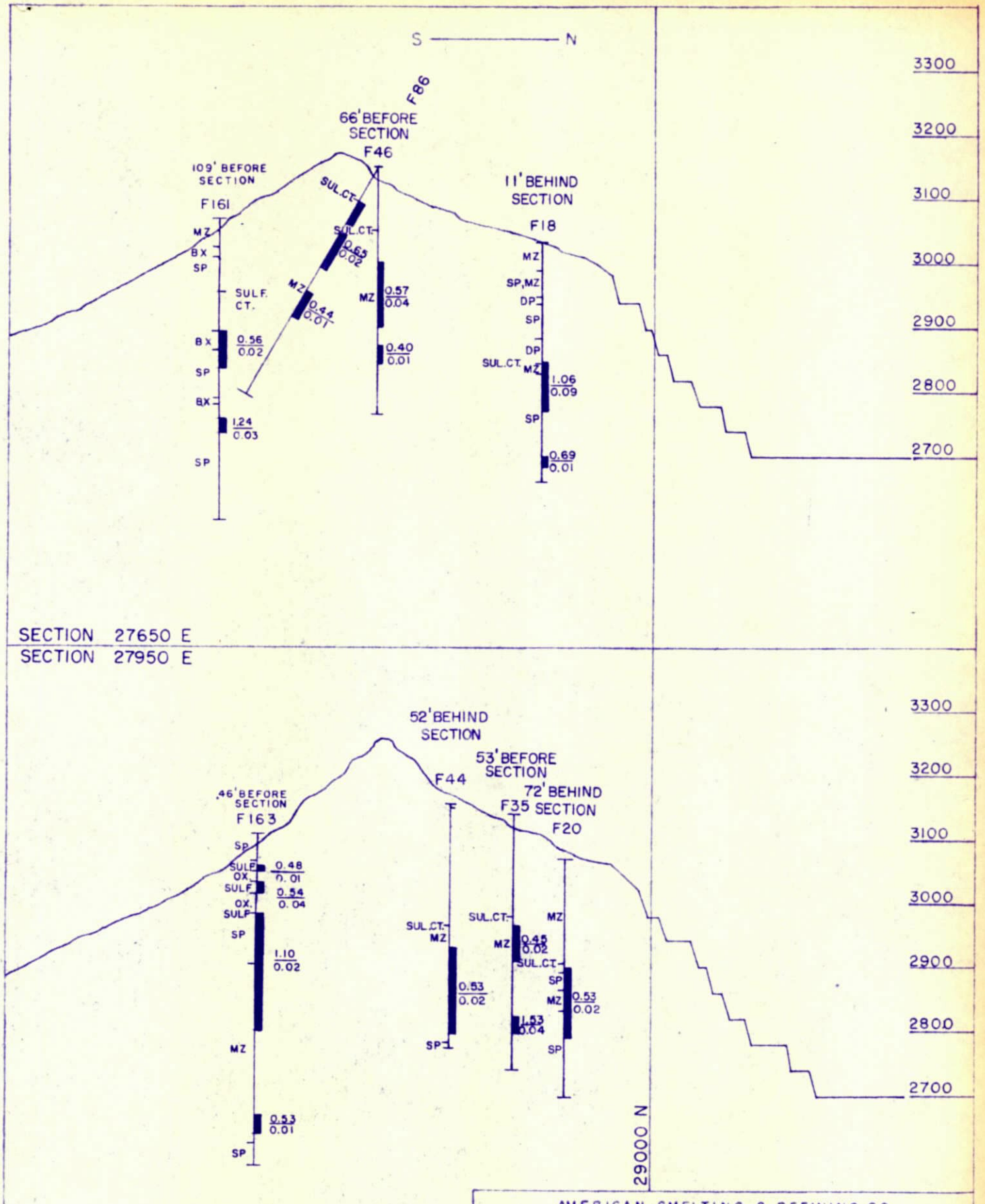
| Advance for month

Note: Rock Types Generalized
Cu Assay is Total Cu/Non Sul. Cu

AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT

OXIDE PIT
DRILL HOLE PROJECTIONS

SCALE	DRAWN	DATE	FILE
1" = 200'	RCE	AUG 1 1969	S 121 A



▮ +0.4 % Total Copper Advance for month

Note: Rock Types Generalized
Cu Assay is Total Cu / Non Sul. Cu

AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT

OXIDE AREA
DRILL HOLE PROJECTIONS

SCALE	DRAWN	DATE	FILE
1" = 200'	CWH	AUG 1 1969	S-121- A

EXPLANATION FOR PLAN MAPS

D-2??

○ Holes drilled during month

P-??

● Proposed holes. Those holes colored are those of the original grid pattern that will probably be drilled.

D-Series Recent drilling program started with hole number D-218.

E-Series Churn drill holes drilled starting around 1956.

COPPER CONTENT

D-231

● 125'-115.0' @ 1.17/0/05 Hole contains sufficient thickness of +0.4% material to carry overburden.

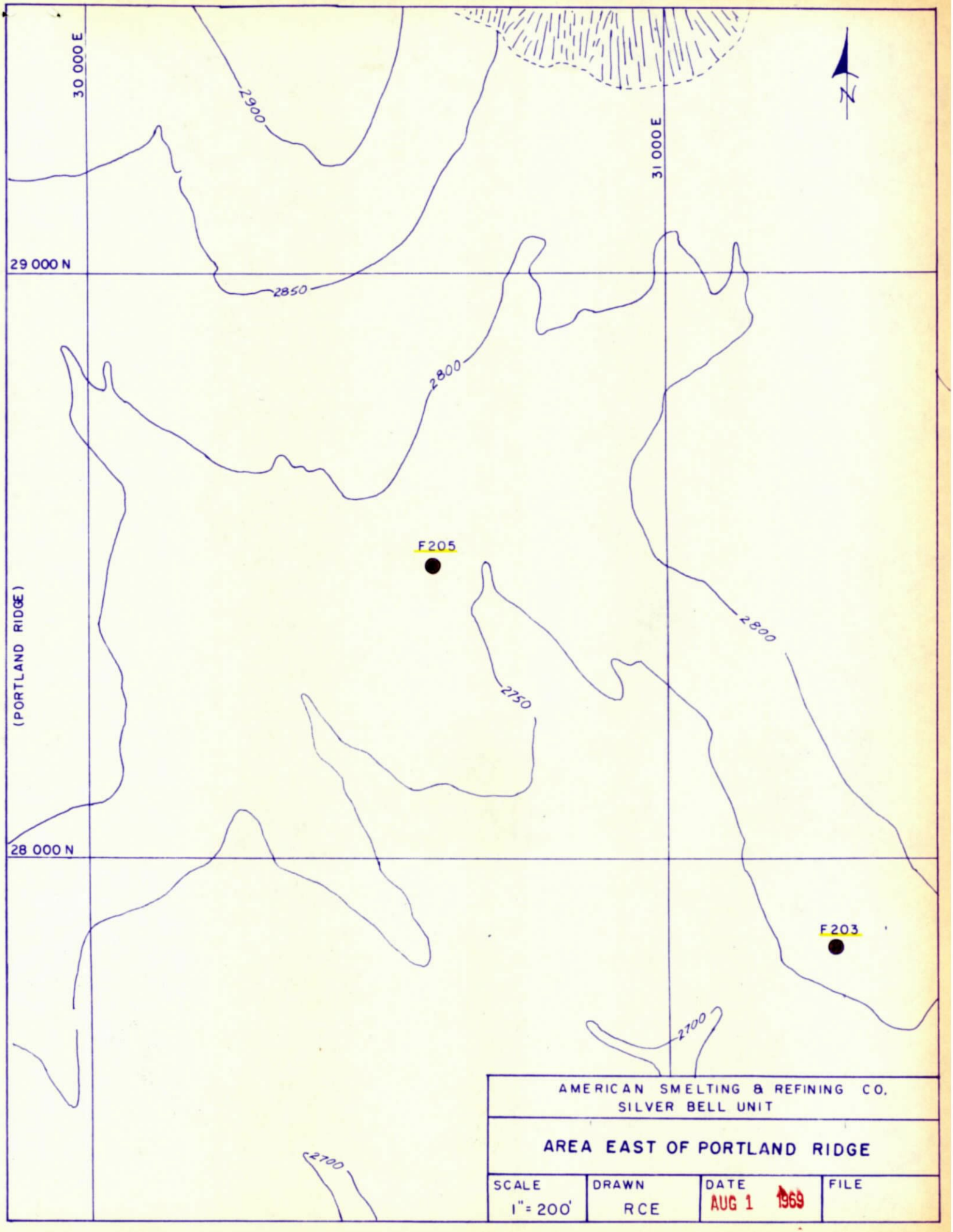
To be read - Starting at 125' there is 115.0' of material which assays 1.17% total copper and 0.05% non-sulfide copper.

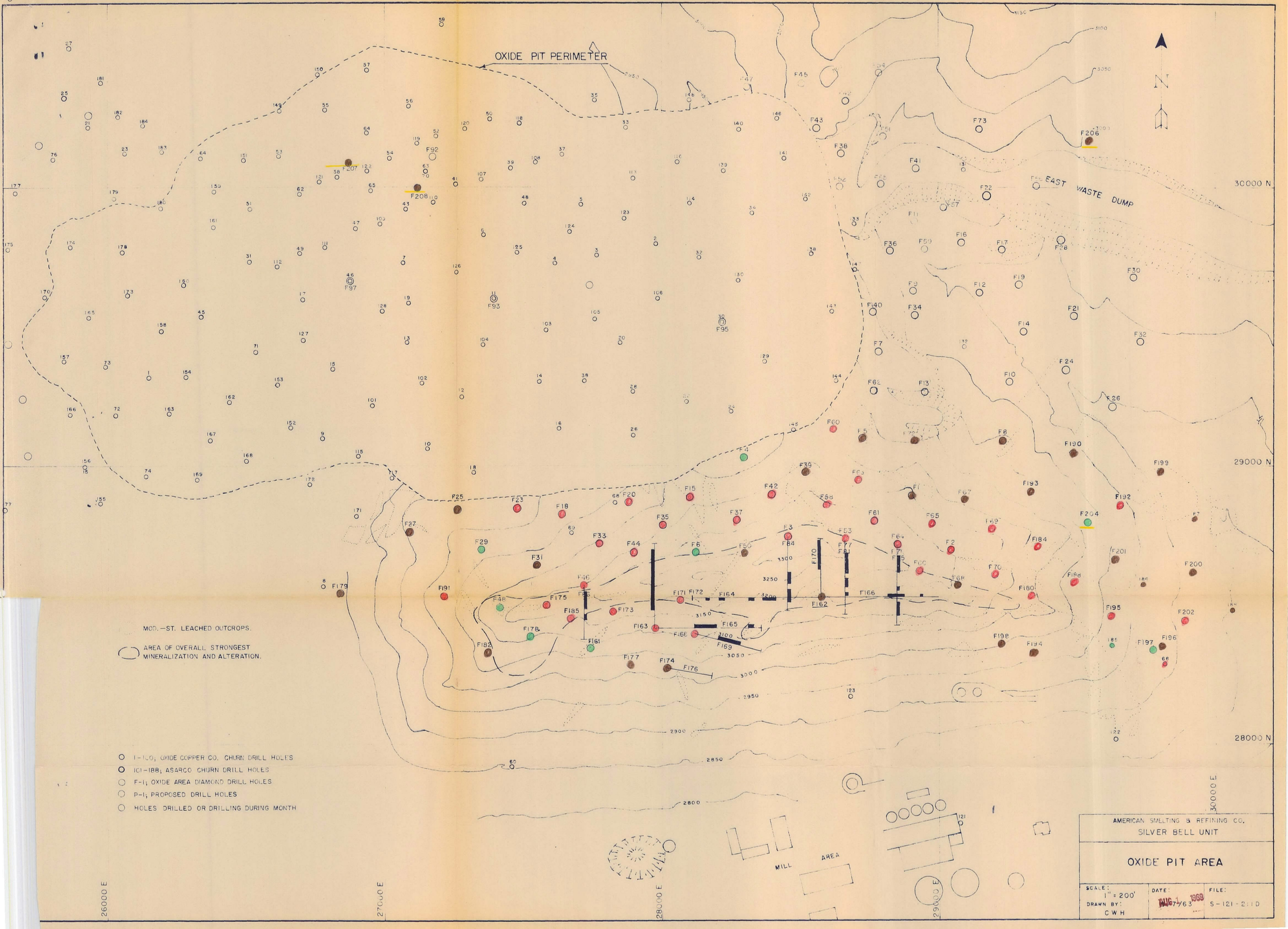
D-2??

● Marginal hole. Insufficient thickness and/or grade of material to carry stripping.

D-2??

● None to thin +0.4% copper intervals.


30 000 E
31 000 E
29 000 N
28 000 N
(PORTLAND RIDGE)
N
2900
2850
2800
2800
2750
2700
2700
F205
F203
AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT
AREA EAST OF PORTLAND RIDGE
SCALE
1" = 200'
DRAWN
RCE
DATE
AUG 1 1969
FILE


OXIDE PIT PERIMETER
EAST WASTE DUMP
MILL AREA
30000 N
29000 N
28000 N
26000 E
27000 E
28000 E
29000 E
30000 E
MOD.—ST. LEACHED OUTCROPS.
AREA OF OVERALL STRONGEST MINERALIZATION AND ALTERATION.
1-100; OXIDE COPPER CO. CHURN DRILL HOLES
101-188; ASARCO CHURN DRILL HOLES
F-1; OXIDE AREA DIAMOND DRILL HOLES
P-1; PROPOSED DRILL HOLES
HOLES DRILLED OR DRILLING DURING MONTH
AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT
OXIDE PIT AREA
SCALE: 1" = 200'
DRAWN BY: C W H
DATE: 7/63
AUG 1 1969
FILE: S-121-2:1D

JHC Desk

Mr. Courtright

AMERICAN SMELTING AND REFINING COMPANY
SILVER BELL UNIT
Silver Bell, Arizona

W.E.S. AUG 4 1969

J.H.C. AUG 12 1969

July 21, 1969

MEMORANDUM TO: Mr. D. R. Jameson, Superintendent

Subject: MONTHLY REPORT, SILVER BELL UNIT DRILLING PROGRAM PORTLAND RIDGE, JUNE, 1969.

During the month of June, 1969, one skid and one truck mounted diamond drill were operated two shifts per day, six days per week. All drilling was done on the east end of Portland Ridge. Eight holes were completed and one additional hole was in progress at the end of the month. Only one hole, F-202, contained enough ore to carry the overburden. Three or four more holes are planned to complete the drilling south and east of Oxide Pit for the present time.

The footage drilled and the average direct drilling costs for June, 1969, are:

Drill	Footage	Advance Per Shift	Average Direct Cost Per Foot
Diamond - Truck	1,310.8	26.8	$ 7.11
Diamond - Skid	853.4	25.9	9.09
TOTAL	2,164.2	Combined Avg.	$ 7.89

The attached table summarizes the drilling results.

Drilling during the month of June showed a continuation of the narrow zone of above average grade mineralization which has extended 2000 feet southeast from Oxide Pit on a strike of S 70° E, parallel to the southern limit of hydrothermal alteration. Drill holes F-194 and F-198 show that the ore ends to the south against a large quartz vein.

Drilling to the east was complicated by the occurrence of two thick, steeply dipping post-mineral latite porphyry dikes which were encountered by holes F-196, 197, and 200. Drill hole F-201, which contained no ore, reduced the width of this zone as it was located between two holes which do contain ore.

One additional hole is planned to complete the drilling pattern on the east end of the ridge. An additional three holes are planned in the area east of Oxide Pit at the present. No further drilling in this area is anticipated if none of these holes contain ore.

Since September, 1968, when the current phase of diamond drilling was begun on Portland Ridge, a total of 24 vertical holes have been completed, of which 12 contain minable ore thicknesses. In addition six of eight angle holes have contained significant ore intercepts.

The footages drilled in June are described below:

F-194 Drilled in syenodiorite and monzonite south of the above mentioned quartz vein. The highest assay in this hole was 0.24% copper. Unenriched primary averaged less than 0.10% copper. Alteration was weak to moderate throughout the hole.

F-196 This hole was collared in alluvium. A post-sulfide latite porphyry dike was encountered at 23 feet and continued until the hole was stopped at 105.6 feet. The drill was then moved to the nearest visible outcrop of pre-mineral rock, about 30 feet away, and hole F-197 was collared.

F-197 This hole was collared in syenodiorite and encountered sulfides at 85 feet. Ore grade enrichment extended from 125.7 to 182.0 feet where the post-sulfide latite dike was again encountered. The hole was stopped in the latite at 228.5. There are two post-sulfide dikes outcropping in this area and both are thick and steeply dipping, so that several hundred feet of drilling would have been required to penetrate them.

F-198 This hole was collared west of F-194 and south of the large quartz vein. Monzonite was cored from the surface to 106 feet and from 292 to the bottom of the hole at 306.2 feet. The interval between was syenodiorite. Sulfides were found at 43 feet although oxidation persisted to 133 feet. Enrichment was very weak (less than 0.10%) down to 230 where it becomes stronger. Two thin ore intervals were penetrated between 230 and 293 feet.

F-199 This hole was collared in an arroya at the base of Portland Ridge. Pyrite and chalcocite were encountered at the surface. Weak enrichment, partially oxidized, extended from the collar to 143 feet. The interval from 143 to the bottom of the hole at 266 averaged 0.06% copper. The hole was advanced in monzonite except for syenodiorite from 115 to 136 feet. It appears that erosion at this point has proceeded faster than the rate of oxidation and readjustment of the chalcocite blanket.

F-200 This hole was collared in alluvium. Syenodiorite was penetrated at 40 feet and continued to a fault zone at 140 feet which was followed at 146 feet by post-sulfide latite. A sharp sulfide contact occurred in the syenodiorite at 103 feet. Enrichment was weak except for one thin ore interval. No oxidation was noted in the syenodiorite from 103 to 140, however, the post sulfide latite below the fault was weakly oxidized. The latite did contain traces of pyrite, some with thin chalcocite coatings.

F-201 This hole was drilled entirely in syenodiorite. Sulfides were encountered at 47 feet although oxidation continued to 162 feet. Weak enrichment extended from 162 to 300 feet and contained one thin ore intercept. Primary mineralization was less than 0.10% copper.

F-202 This hole is located on the above mentioned narrow, southeast trending ore zone and was the only hole drilled during the month which contained strong mineralization. The hole was drilled through monzonite and syenodiorite. Sulfides occurred at 55 feet and a 114 foot ore intercept averaging 1.12/0.04% began at 76 feet. Clay alteration was moderate to strong, becoming weaker near the bottom of the hole, while sericite was weak throughout. Primary mineralization averaged 0.15% copper.

F-203 This hole is located about 1200 feet east of Portland Ridge in an area of limited outcrop exposures. Alluvium extended 23 feet below the collar. Strongly altered and oxidized syenodiorite was then cored down to a fault zone beginning at 106 feet. Monzonite occurred from 109 feet to 150 feet and was followed by syenodiorite to the bottom of the hole. Weak enrichment began at 123 feet and ended at 153 feet. Primary mineralization was above average for areas away from the pits at 0.2% to 0.3% copper.

The occurrence of strongly altered capping and relatively strong primary mineralization with only weak enrichment between is unusual and suggests rapid erosion or a fluctuating water table. (Similar conditions were encountered in an adjacent hole in July.)

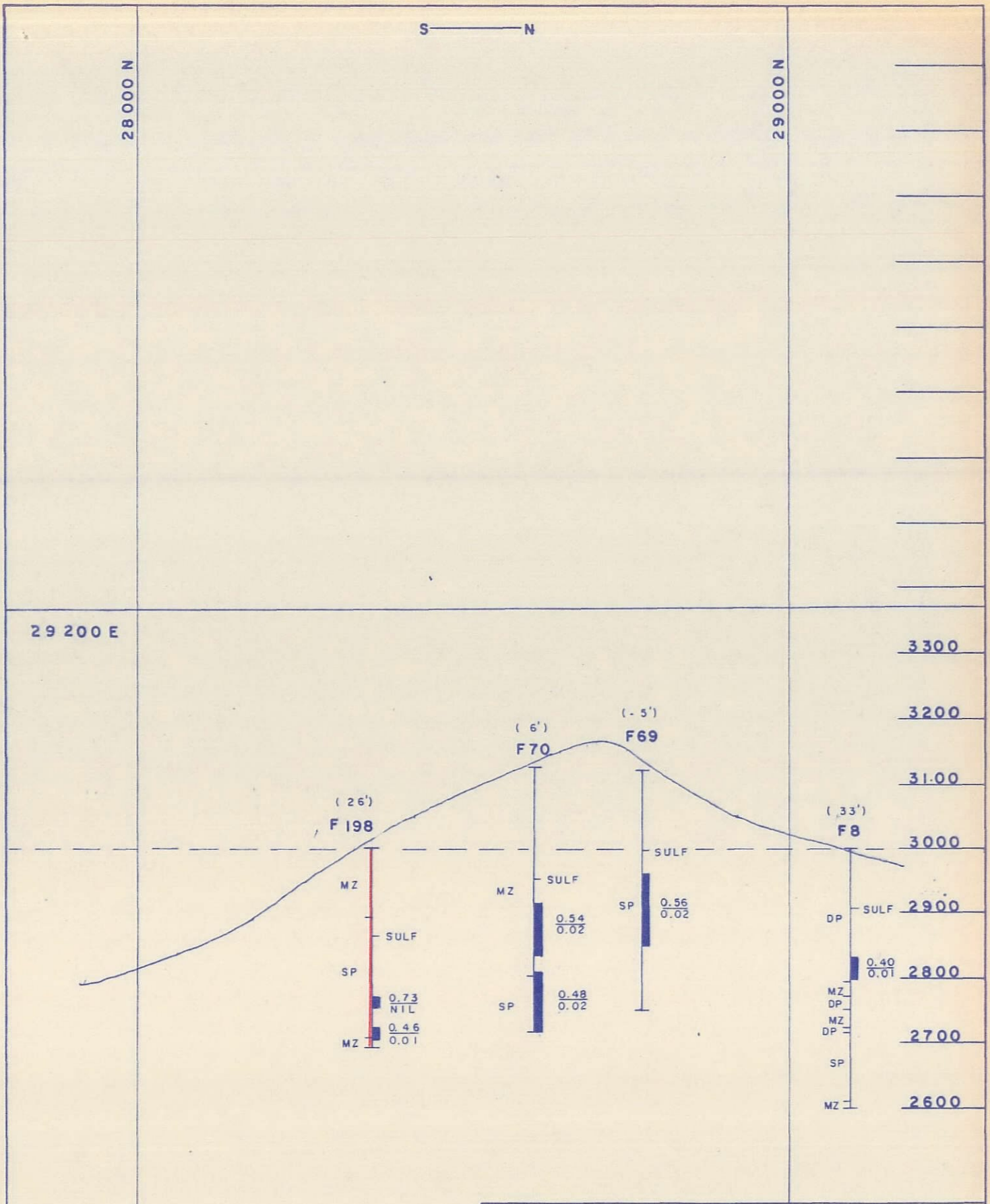
R. C. Edmiston

R. C. Edmiston
Resident Geologist

RCE:jca

DIAMOND DRILLING PROGRESS REPORT

Hole No.	Approx. Elevation	Approx. Coordinates North	East	+0.40% Copper Lenses Depth to Top	Thickness	Avg. % Cu Total	N.S.	Ft. Drill. During Mo.	Depth End Mo.	Final Depth
F-194	2967.41	28,325.17	29,339.99	No plus 0.40% intervals				187.5	281.0	281.0
F-196	2858.31	28,351.43	29,803.07	" " " "				105.6	105.6	105.6
F-197	2859.77	28,335.69	29,771.50	125.7	56.3	0.48	Nil	228.5	228.5	228.5
F-198	3001.49	28,360.87	29,225.54	229.2 274.9	18.4 18.5	0.73 0.46	Nil .01	306.2	306.2	306.2
F-199	2820.32	28,980.42	29,803.41	No plus 0.40% intervals				265.8	265.8	265.8
F-200	2826.05	28,619.45	29,917.87	134.1	8.9	0.74	Nil	247.4	247.4	247.4
F-201	2931.43	28,665.81	29,637.27	247.2	8.5	1.76	Nil	359.7	359.7	359.7
F-202	2830.31	28,441.98	29,887.53	75.8	114.3	1.12	0.04	270.5	270.5	270.5
F-203	2751.59	27,847.78	31,185.46	No plus 0.40% intervals				193.0	193.0	-
							TOTAL	2,164.2		



■ + 0.4% Total Copper

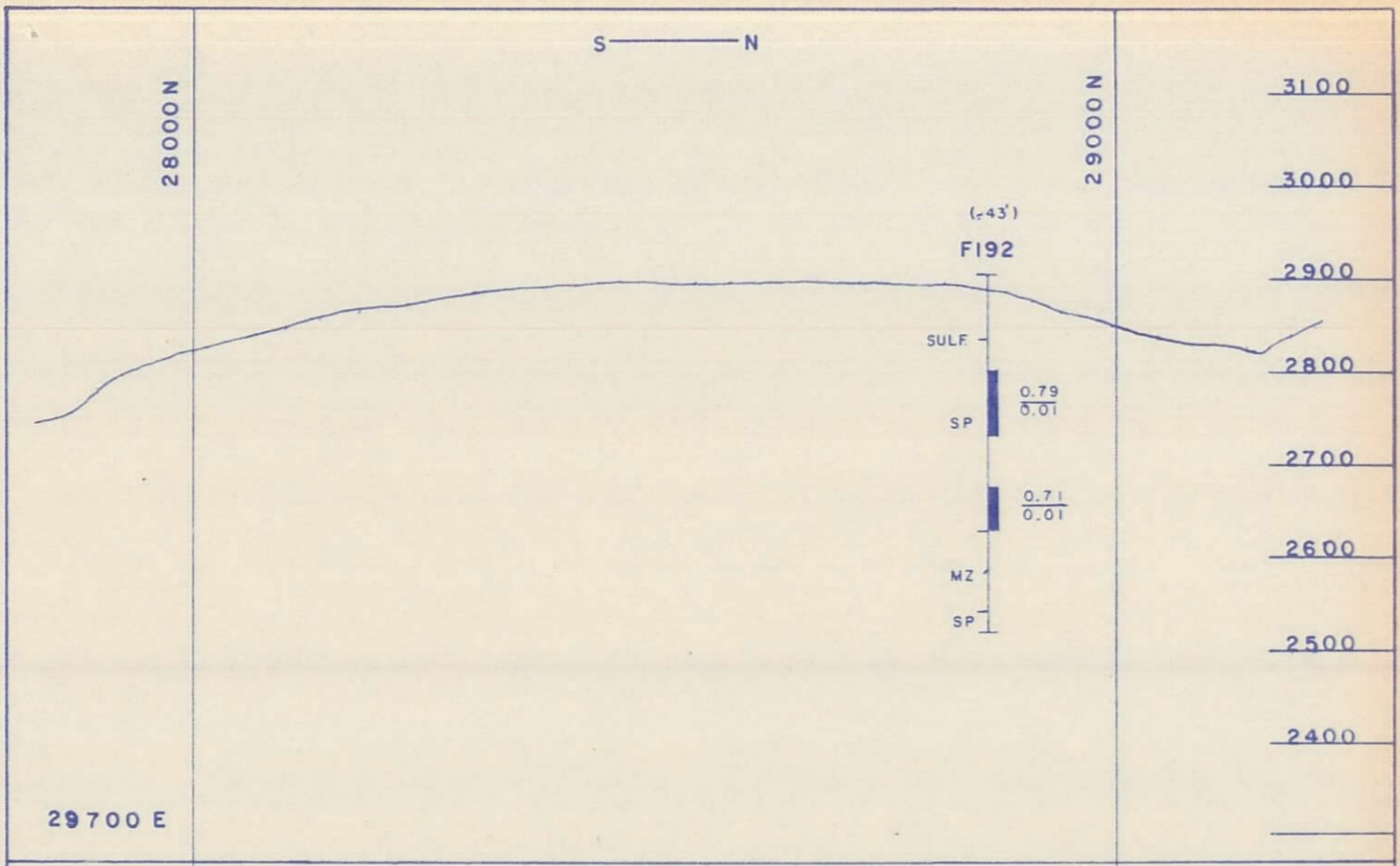
| Advance for month

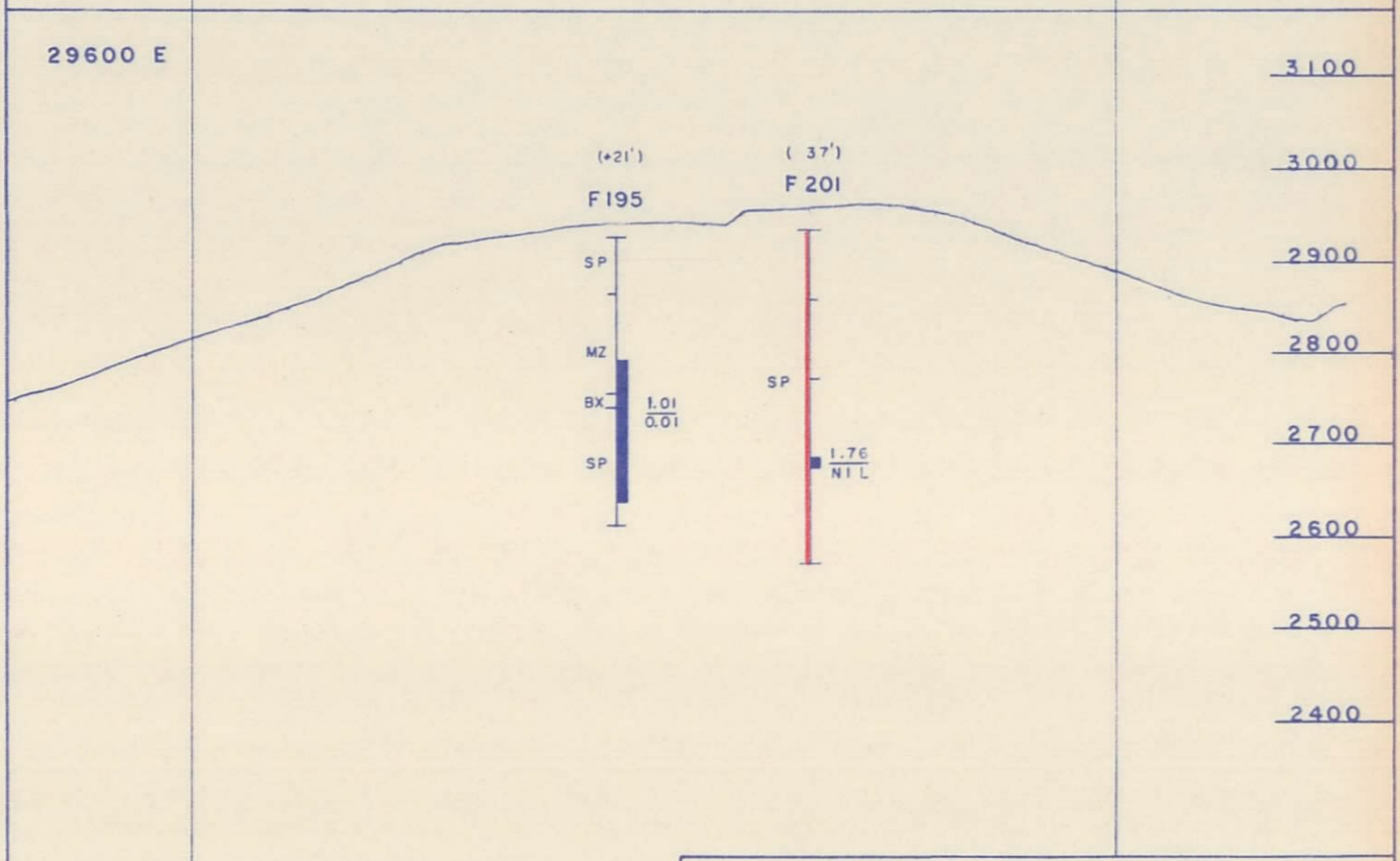
Note: Rock Types Generalized
Cu Assay is Total Cu/Non Sul. Cu

AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT

PORTLAND RIDGE
DRILL HOLE PROJECTIONS

SCALE	DRAWN	DATE	FILE
1" = 200'	RCE	JUL 1 1969	S 121 A





+ 0.4% Total Copper

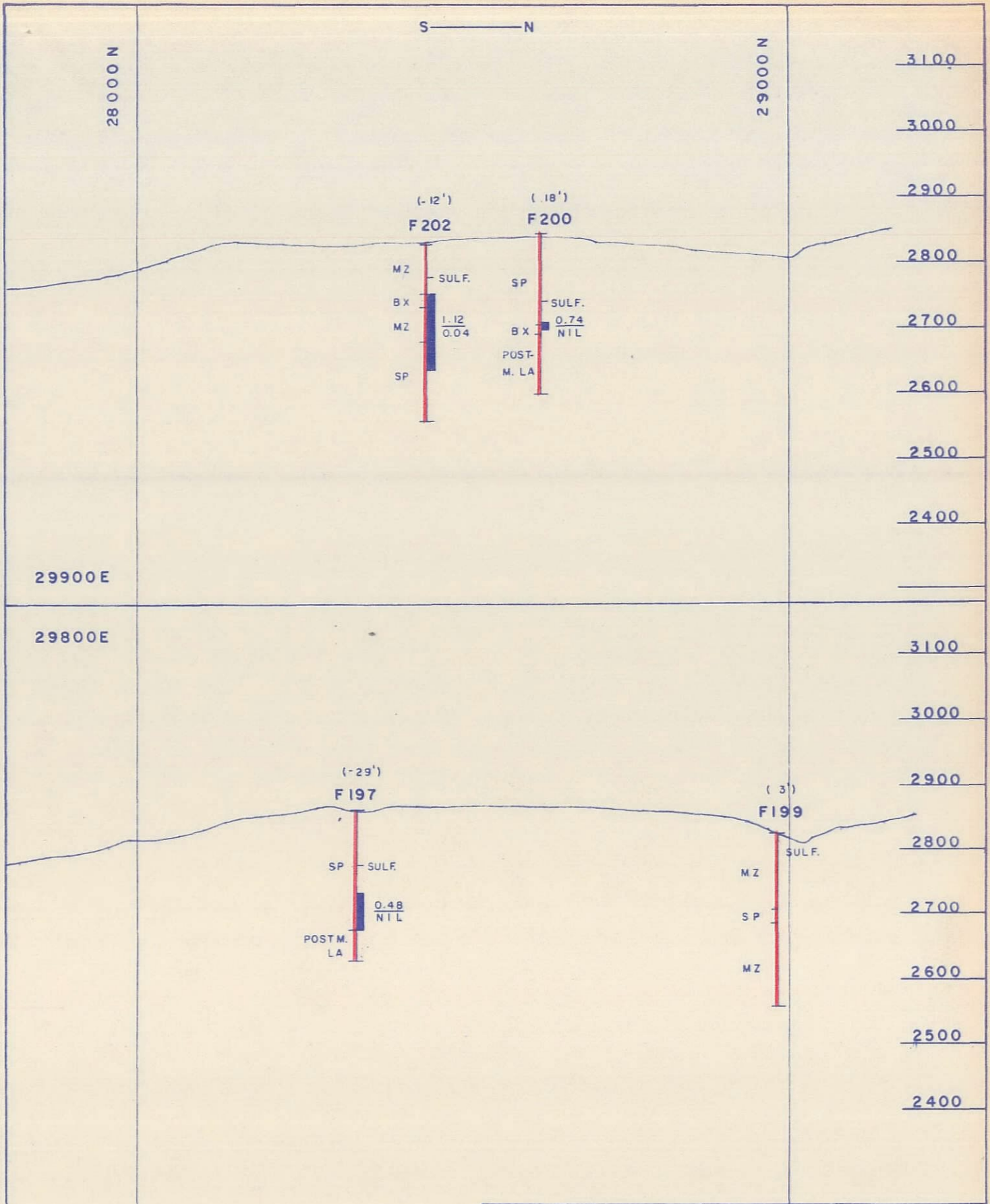
Advance for month

Note: Rock Types Generalized
Cu Assay is Total Cu/Non Sul. Cu

AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT

PORTLAND RIDGE
DRILL HOLE PROJECTIONS

SCALE	DRAWN	DATE	FILE
1" = 200'	RCE	JUL 1 1969	S 121 A



+0.4% Total Copper

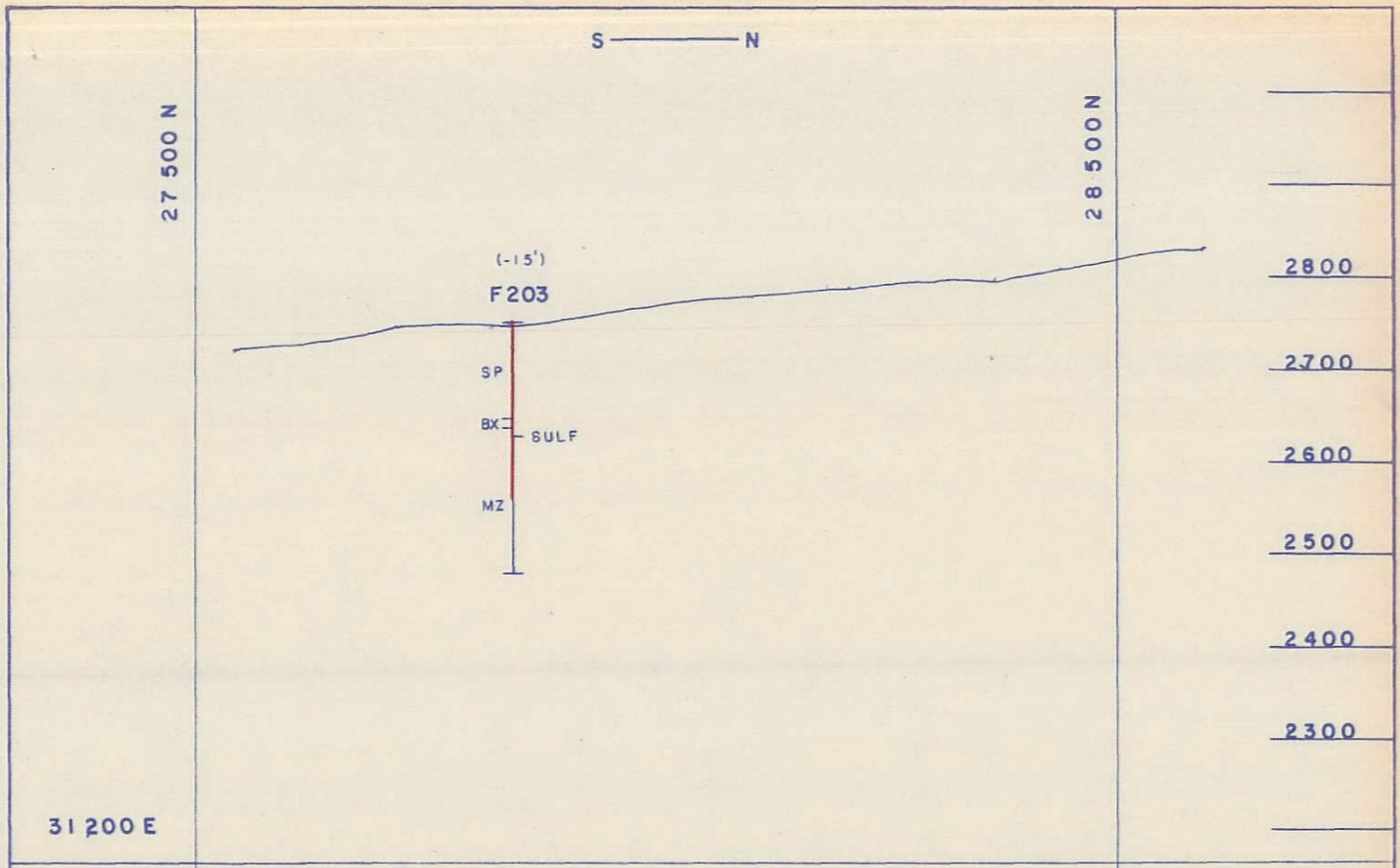
Advance for month

Note: Rock Types Generalized
Cu Assay is Total Cu/Non Sul. Cu

AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT

PORTLAND RIDGE
DRILL HOLE PROJECTIONS

SCALE	DRAWN	DATE	FILE
1" = 200'	RCE	JUL 1 1969	S 121 A



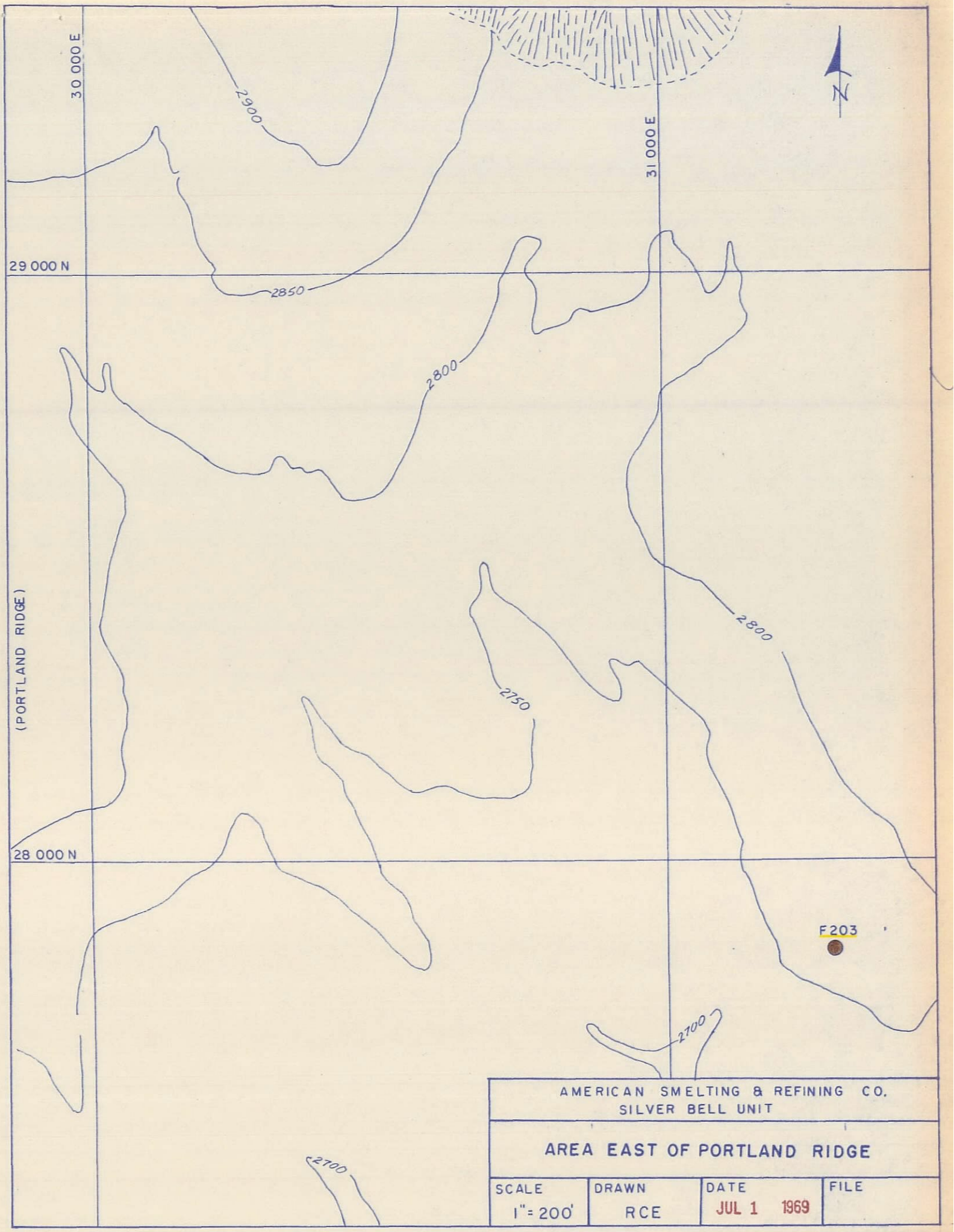
■ + 0.4% Total Copper
| Advance for month

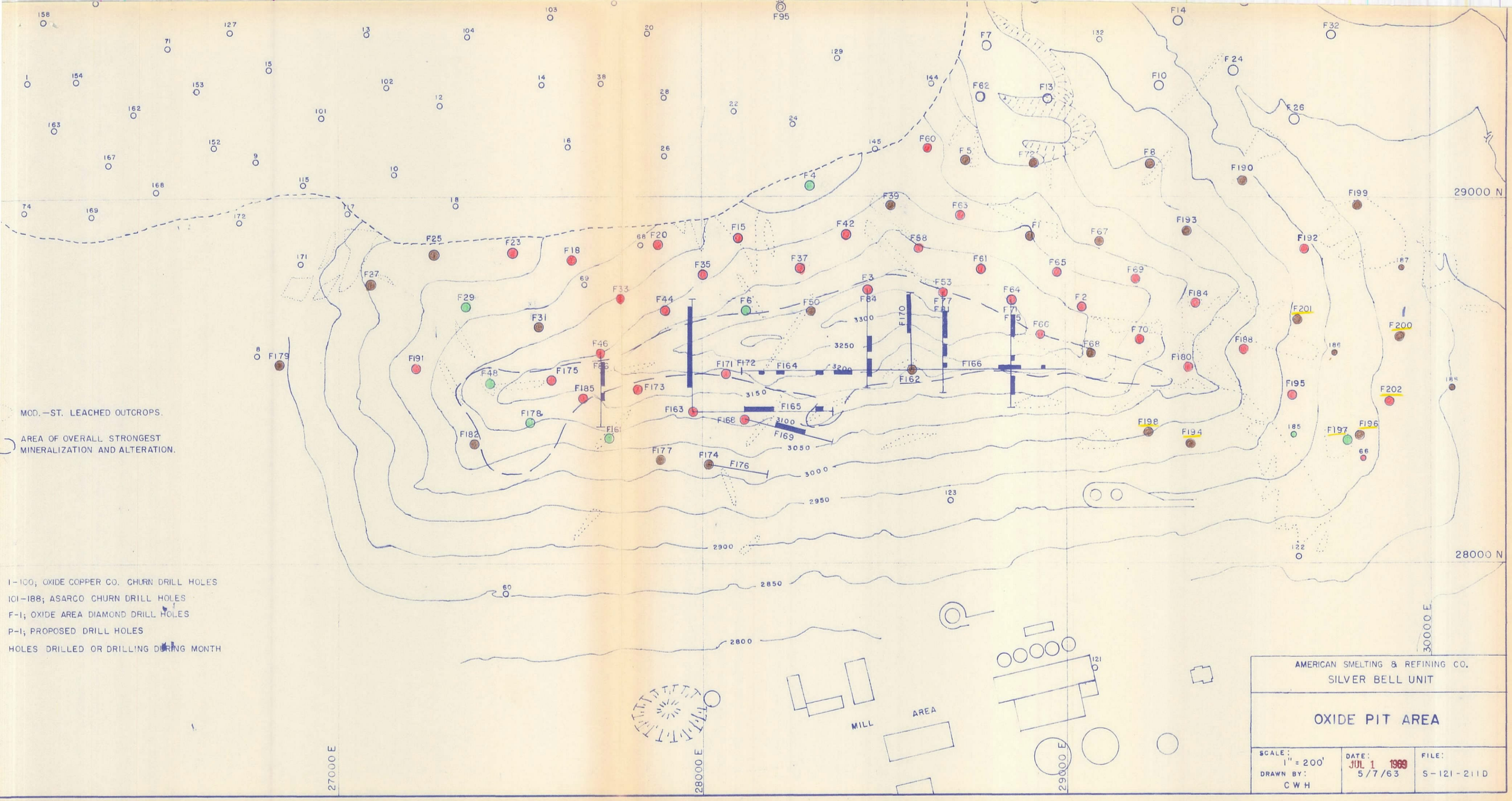
Note: Rock Types Generalized
Cu Assay is Total Cu/Non Sul. Cu

AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT

EAST OXIDE AREA
DRILL HOLE PROJECTIONS

SCALE	DRAWN	DATE	FILE
1" = 200'	RCE	JUL 1 1969	S 121 A


30 000 E
31 000 E
29 000 N
28 000 N
(PORTLAND RIDGE)
N
2900
2850
2800
2800
2750
2700
2700
F203
AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT
AREA EAST OF PORTLAND RIDGE
SCALE
1" = 200'
DRAWN
RCE
DATE
JUL 1 1969
FILE


MOD.—ST. LEACHED OUTCROPS.
AREA OF OVERALL STRONGEST MINERALIZATION AND ALTERATION.
1-100; OXIDE COPPER CO. CHURN DRILL HOLES
101-188; ASARCO CHURN DRILL HOLES
F-1; OXIDE AREA DIAMOND DRILL HOLES
P-1; PROPOSED DRILL HOLES
HOLES DRILLED OR DRILLING DURING MONTH
29000 N
28000 N
27000 E
28000 E
29000 E
30000 E
MILL AREA
3300
3250
3200
3150
3100
3050
3000
2950
2900
2850
2800
AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT
OXIDE PIT AREA
SCALE: 1" = 200'
DRAWN BY: CWH
DATE: JUL 1 1969 5/7/63
FILE: S-121-211D

AMERICAN SMELTING AND REFINING COMPANY
SILVER BELL UNIT
Silver Bell, Arizona

July 23, 1969

MEMORANDUM TO: Mr. D. R. Jameson, Superintendent

Subject: QUARTERLY GEOLOGY REPORT OF OXIDE AND EL TIRO PITS

Digenite ($Cu_{1.68 \text{ to } 1.80}S$) was identified in El Tiro and Oxide ores using a mineragraphic microscope. The digenite is doubtlessly as important an ore mineral as chalcocite at Silver Bell; but the differentiation between digenite and chalcocite apparently was not previously recognized. The digenite commonly occurred as secondary replacements of chalcopyrite and pyrite. Primary digenite may also occur, but, more information is needed to verify its presence.

OXIDE PIT

Geology of the 2660 level in the Oxide Pit consisted of a pitward extension of hornfels from the north wall area. The hornfels were bounded on the south with monzonite along an ENE trending contact. Farther south the monzonite was bounded by syenodiorite along a NE trending contact. The syenodiorite extends uninterrupted across the floor of the pit to the southern perimeter. The large north trending breccia zone runs along the western edge of this area. Faults and joints had NNW to NNE trends.

The igneous rocks mined in the Oxide pit carried an ore grade content of sulfide minerals. However, the hornfels to the north of the igneous rocks were generally of leach grade.

EL TIRO PIT

Recently mapped geology of the 2630 level in the El Tiro Pit consisted of a northwestward trending block of hornfels. They were bounded on the southwest by monzonite. In the southwestern portion of the area mined this quarter, the sediments were apparently surrounded by and left as pendants in the monzonite. The east side of the hornfels were in contact with dacite. The dacite also had been intruded by monzonite dikes in the southeastern area. Dominant structures were NE trending high angle faults and joints.

Geology of the 2590 bench in El Tiro was similar to that of the previous quarter. All ore mined was monzonite. Dominant structures were high angle faults and joints striking northeast. The joints were frequently closely spaced, forming sheeted zones.

The ore mined in the El Tiro pit was very patchy, as shown on the assay map. Grade ranged from waste to ore.

UNION RIDGE AREA

Geology of the 3080 bench on Union Ridge consisted of sediments intruded by monzonite, as shown on the accompanying El Tiro Pit Geology Map. The intrusive bodies were generally east-west trending dikes. The sediments included limestone, marble, hornfels, and tactites. Their contacts generally paralleled the intrusive bodies.

Geology of the 3035 bench on Union Ridge included a generally northwest trending contact between the monzonite on the southwest and sediments on the northeast. There are monzonite stringers extending northeastward into the sediments. The sediments included marble, hornfels and tactite, as shown on the Pit Geology Map.

Material mined in the Union Ridge area on both the 3080 and 3035 levels was generally classed as leach ore due to the extensive oxidation of the ore minerals, even though total copper values ranged well above 0.4%. A few smaller areas were waste. Sulfide copper content reached ore grades in several small areas.

J. W. Cameron

Jon W. Cameron
Geologist

SLOPE STABILITY

OXIDE PIT

No new developments were observed on the slide zone in the southeast corner of Oxide Pit. No additional major movement has occurred since the slide formed in December, 1967. However, the loose material at the crest has been creeping continually and new cracks have opened from time to time behind the previous slide.

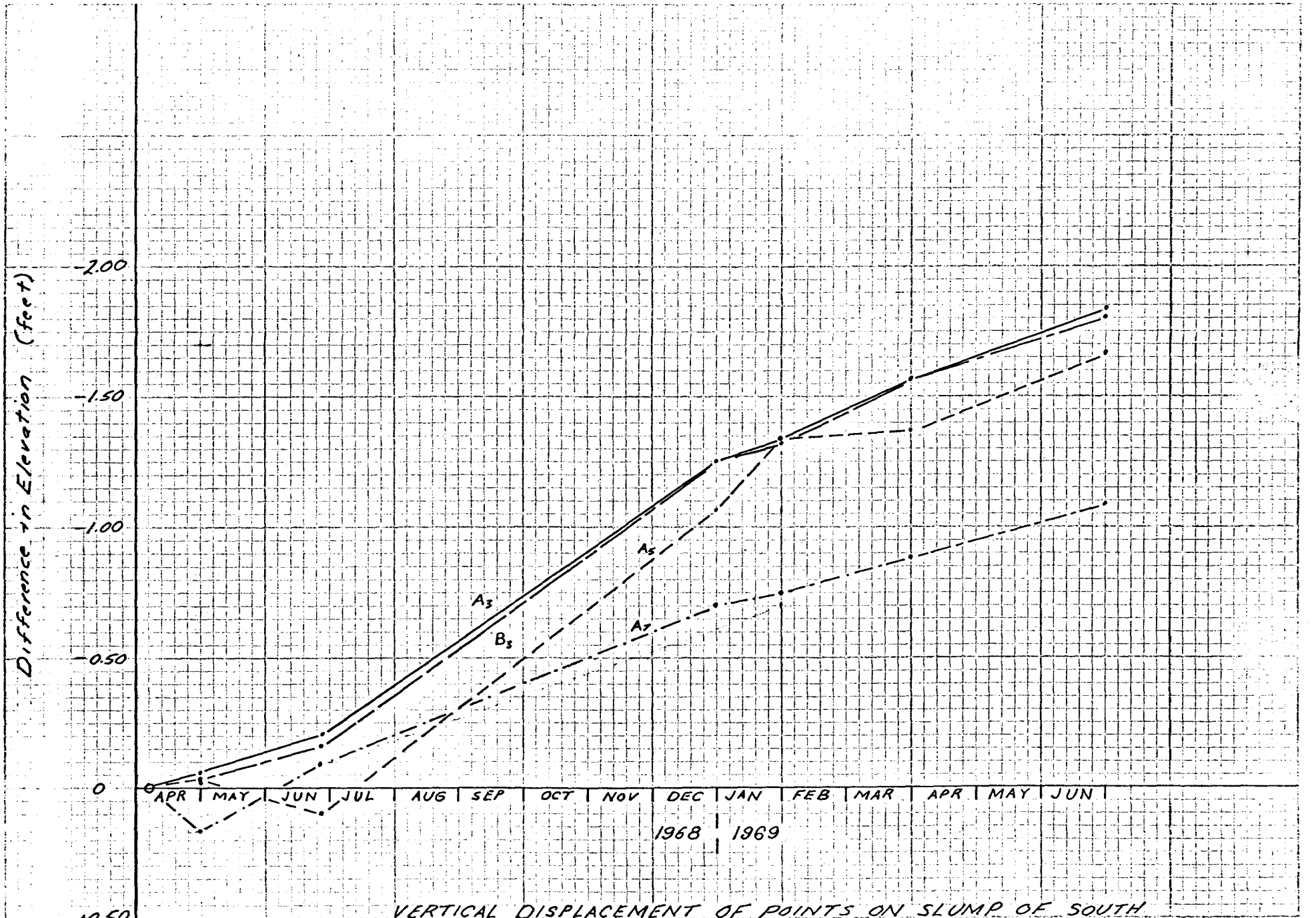
EL TIRO PIT

The south perimeter of El Tiro Pit continued to slump during the past quarter. The attached graph shows the vertical displacement of pins located on the crest of the upper two levels relative to stable points located behind the movement. Points A3, A5 and A7 are located on the crest of the highest level while B3 is on the second level. It is significant that all points are moving at nearly the same rate, currently 1.5 feet per year. This indicates that driving and resisting forces are fairly uniform over the zone and that if a failure should occur the entire zone would probably fail at the same time.

R. C. Edmiston

R. C. Edmiston
Resident Geologist

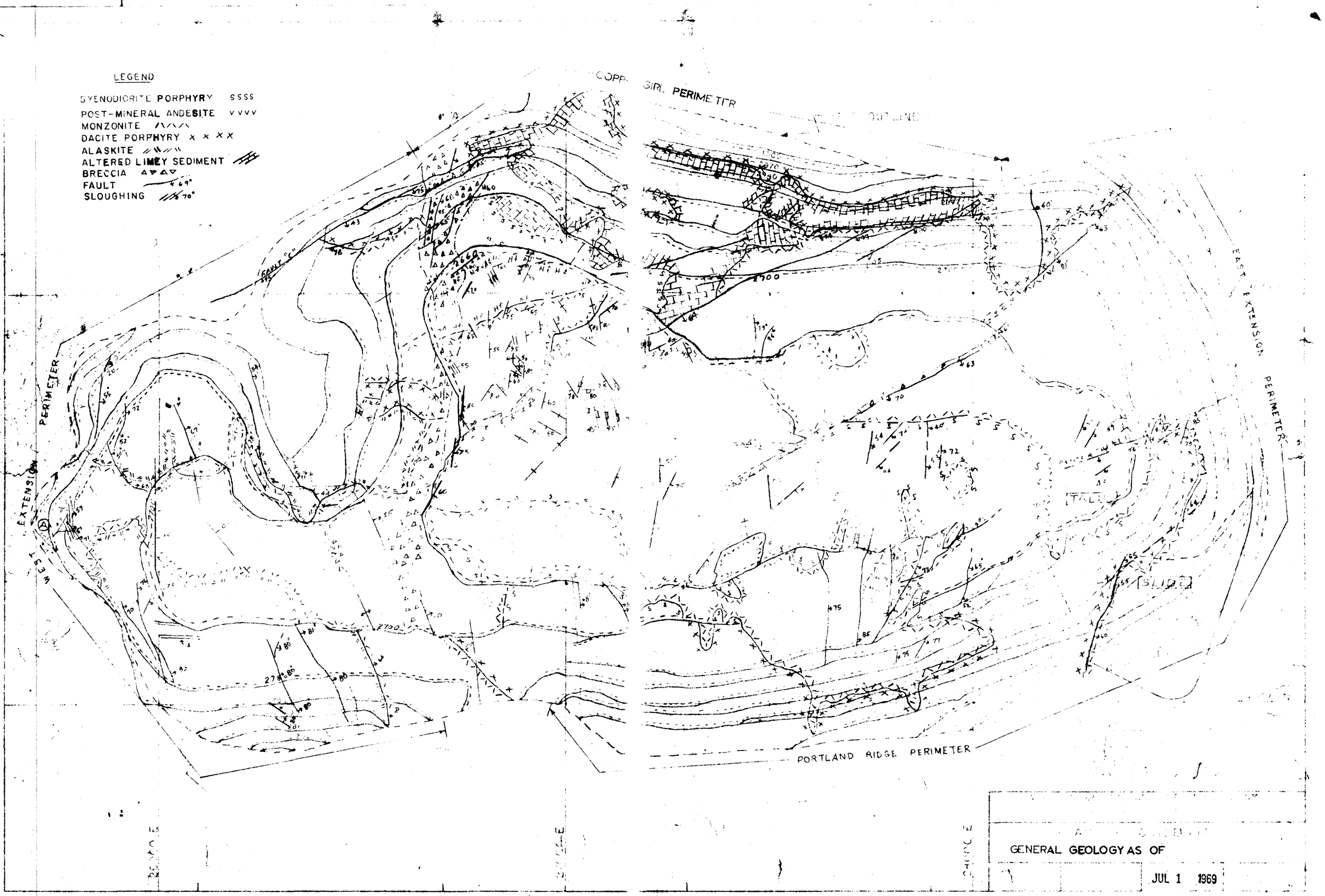
JWC/RCE:jca

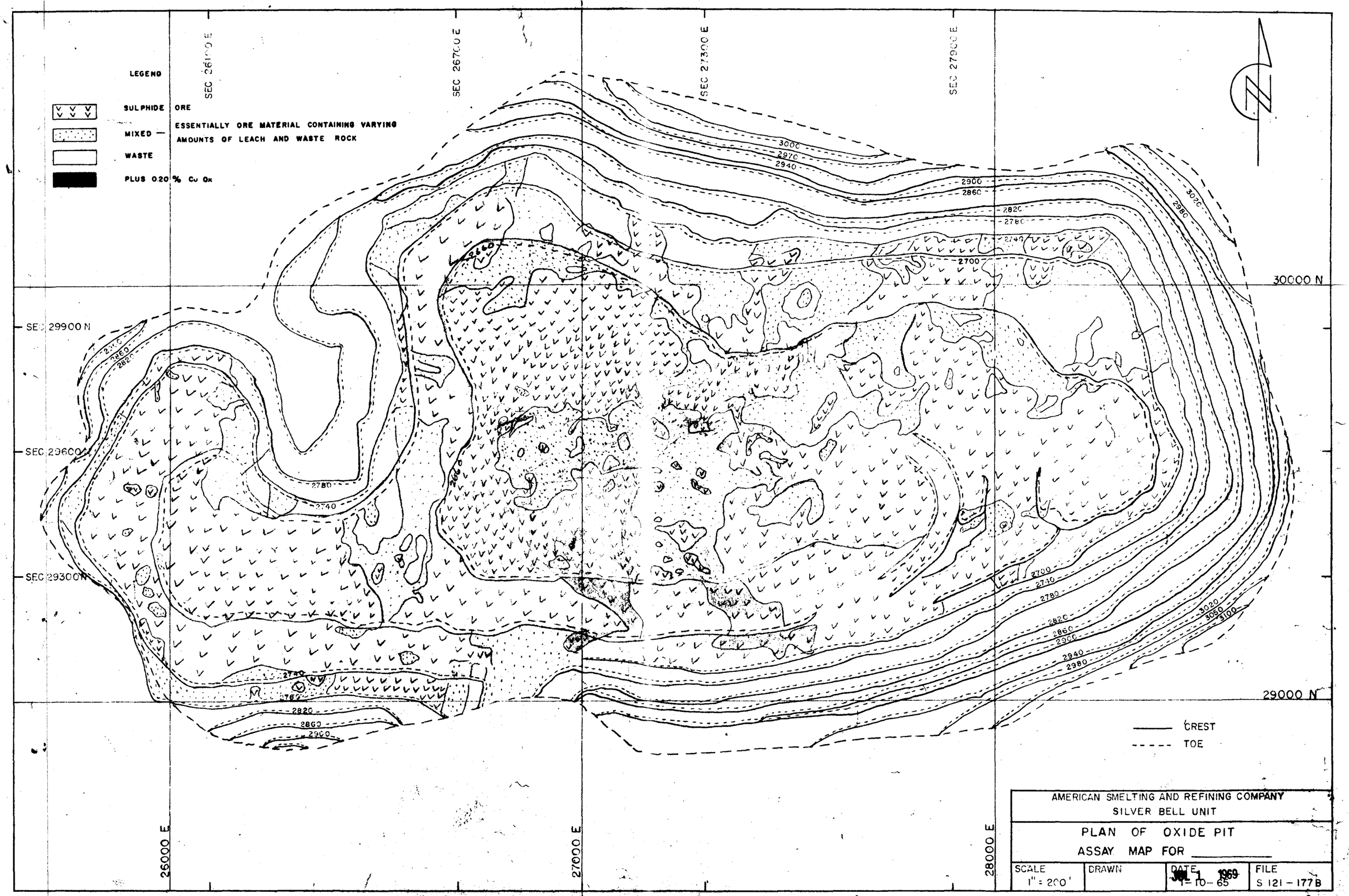


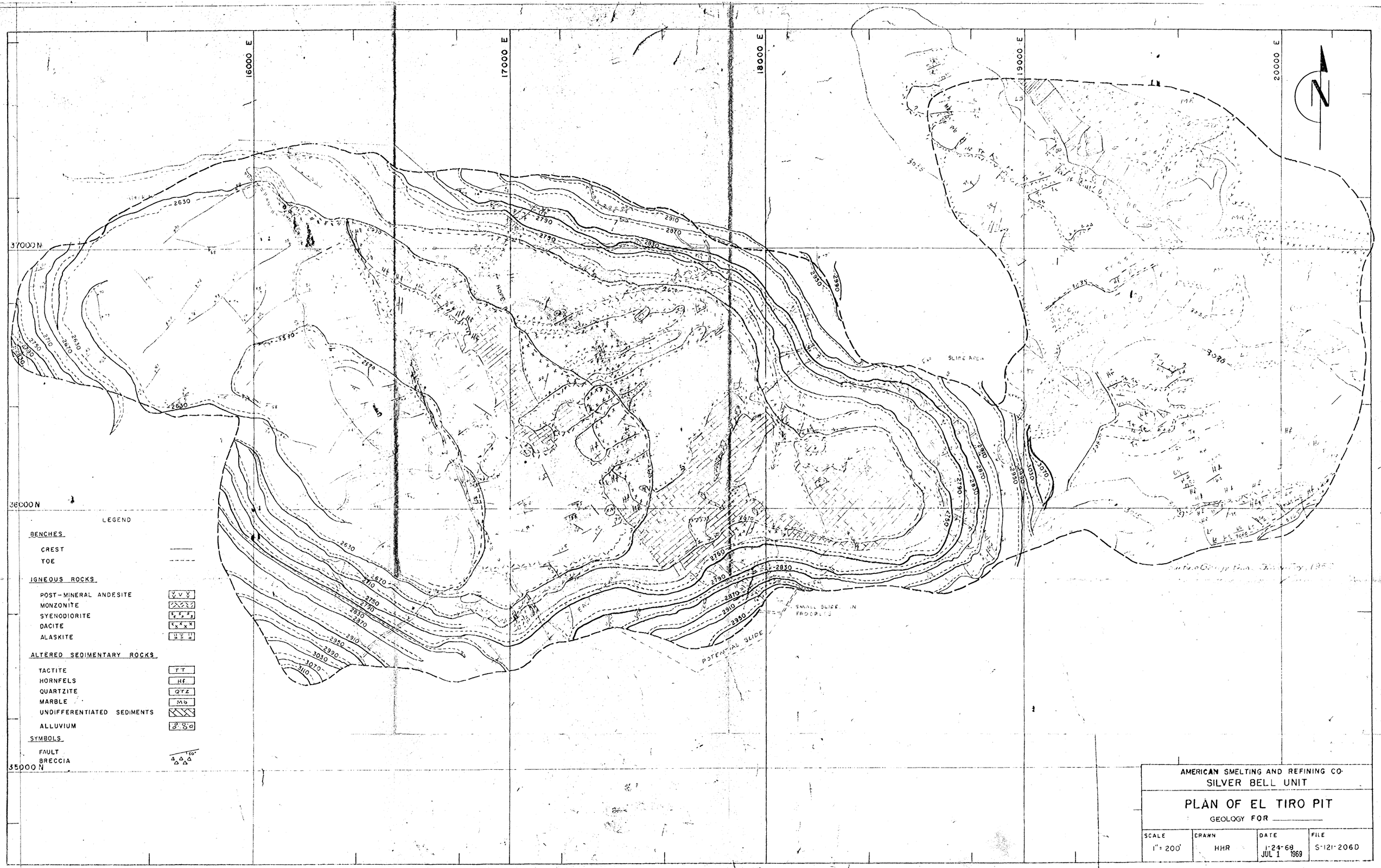
VERTICAL DISPLACEMENT OF POINTS ON SLUMP OF SOUTH PERIMETER OF EL TIRO PIT

R.C. Edmiston, 7-22-69

KEUFFEL & ESSER CO.
10 X 10 TO THE INCH 46 0202


LEGEND
SYENODIORITE PORPHYRY SSSS
POST-MINERAL ANDESITE VVVV
MONZONITE
DACITE PORPHYRY X X X X
ALASKITE
ALTERED LIMEY SEDIMENT
BRECCIA
FAULT
SLOUGHING
COPP.
GIRL PERIMETER
OUTLINE
FAULT "C"
WEST EXTENSION PERIMETER
EAST EXTENSION PERIMETER
TALUS
SLIDE
PORTLAND RIDGE PERIMETER
GENERAL GEOLOGY AS OF
JUL 1 1969


LEGEND
SULPHIDE ORE
MIXED — ESSENTIALLY ORE MATERIAL CONTAINING VARYING AMOUNTS OF LEACH AND WASTE ROCK
WASTE
PLUS 0.20 % Cu Ox
SEC 26100 E
SEC 26700 E
SEC 27300 E
SEC 27900 E
SEC 29900 N
SEC 29600 N
SEC 29300 N
30000 N
29000 N
26000 E
27000 E
28000 E
CREST
TOE
AMERICAN SMELTING AND REFINING COMPANY
SILVER BELL UNIT
PLAN OF OXIDE PIT
ASSAY MAP FOR
SCALE 1" = 200'
DRAWN
DATE JUL 1 1969
FILE S 121 - 177 B


16000 E
17000 E
18000 E
19000 E
20000 E
37000 N
36000 N
35000 N
N
SLIDE AREA
SMALL SLIDE IN PROGRESS
POTENTIAL SLIDE
HOPE
LEGEND
BENCHES
CREST
TOE
IGNEOUS ROCKS
POST-MINERAL ANDESITE
MONZONITE
SYENODIORITE
DACITE
ALASKITE
ALTERED SEDIMENTARY ROCKS
TACTITE
HORNFELS
QUARTZITE
MARBLE
UNDIFFERENTIATED SEDIMENTS
ALLUVIUM
SYMBOLS
FAULT
BRECCIA
AMERICAN SMELTING AND REFINING CO.
SILVER BELL UNIT
PLAN OF EL TIRO PIT
GEOLOGY FOR
SCALE
1" = 200'
DRAWN
HHR
DATE
1-24-69
JUL 1 1969
FILE
S-121-206D

S-1.1

J. H. C.

MAY 8 1969

AMERICAN SMELTING AND REFINING COMPANY
SILVER BELL UNIT
Silver Bell, Arizona

May 6, 1969

Mr. J. H. Courtright, Chief Geologist
Southwestern Mining Department
American Smelting and Refining Company
P. O. Box 5795
Tucson, Arizona 85703

Dear Sir:

The coordinates appearing on several diamond drill logs which you have received from Silver Bell are in error. The corrected coordinates are:

Hole	Corrected Coordinates North	East	Elevation
F-161	28,340.94	27,740.88	3066.04
F-163	28,414.40	27,973.75	3113.67
F-165	"	"	"
F-167	"	"	"
F-168	28,392.66	28,113.72	3110.96
F-169	"	"	"
F-171	28,518,75	28,063.47	3187.13
F-172	"	"	"
F-173	28,474.91	27,822.38	3165.57
F-174	28,269.88	28,016.93	3016.83
F-176	"	"	"

Very truly yours,

D. R. Jameson

D. R. JAMESON
Superintendent

RCE:jca

Mr. Courtright

J. H. C.
MAY 1 1969

AMERICAN SMELTING AND REFINING COMPANY
SILVER BELL UNIT
Silver Bell, Arizona

April 10, 1969

MEMORANDUM TO: Mr. D. R. Jameson, Superintendent

Subject: MONTHLY REPORT - SILVER BELL UNIT DRILLING PROGRAM
PORTLAND RIDGE, MARCH 1969

Two skid mounted diamond drills were operated two shifts per day, six days per week throughout the month of March, 1969. In addition, one truck mounted drill was in use the last week of the month. Five vertical holes and one angle hole were completed, all on Portland Ridge. Only one hole, F-175, encountered an economic thickness of chalcocite ore.

The footage drilled and the average direct drilling costs for March, 1969, are:

Drill	Footage	*Advance per Shift	Avg. Direct Cost/Foot
Diamond - Truck	390.5	32.6	$ 7.00
Diamond - Skid	1,631.6	18.4	8.97
TOTAL	2,022.1	Combined Avg.	$ 8.59

* Does not include moving time but does include all other delays.

The attached table summarizes the drilling results.

Definite limits to the mineralization under Portland Ridge began to form during the month of March with the completion of F-174, 176, 177, and 179. At least four more holes are planned to complete the drilling on Portland Ridge.

Additional holes planned in other areas include one hole north of the Precipitation Plant, two holes for assessment work in the North Silver Bell area and one hole in Oxide Pit.

The footages drilled in March, 1969 are described below:

F-174

This hole was at 258.0 feet at the beginning of March and was completed to 300.0 feet. The advance was in a fine grained silicified rock, tentatively logged as a volcanic. Mineralization was weak throughout the hole with all but three intervals assaying less than 0.20% copper.

F-176

This is an angle hole drilled on a bearing of S 80°E from F-174 at an angle of 55° to the horizontal. This was done because the drill could not be moved in this direction to drill a vertical hole. This hole was advanced mostly in monzonite with a quartz vein from 101-105 and a strong fault zone from 243-253. The hole was bottomed at 340.3 feet. An enriched interval assaying 0.44/0.01 was found from 45.2-79.5. Weak oxidation continued to 198.2, however. At about 175 feet there was a transition from moderate clay and sericite alteration to moderate chloritic alteration with weak clay and weak to absent sericite. This indicates that most of the clay and sericite in this area is of supergene origin.

F-175

This hole was completed from 47.0 feet to a final depth of 468.4 feet in March. Most of the advance was in monzonite except for the intervals 111-245 and 414-452 which were occupied by syenodiorite. The sulfide contact was transitional from 93-213 feet. Enrichment began at 204 feet and became ore grade at 254 feet. The following 160.9 foot intercept averaging 0.66/0.01 was sufficient to carry the overburden. Weak enrichment persisted to the bottom of the hole with only traces of chalcopyrite noted. Pyrite was visually estimated at 2-3% by volume.

F-177

This hole encountered a complex of quartz veins, breccia zones, faults and post-mineral andesite. Although the post-mineral dike does not outcrop the other structural features have an east-west trend at the surface and it appears that this system of faulting and veining forms the southern limit of ore grade mineralization in this area.

A post-mineral andesite dike was encountered under 12 feet of overburden and was followed at 76 feet by a silicified breccia and quartz veining. Fine grained syenodiorite cut by several faults occupied the interval 160-272 and was followed by a quartz vein extending to 300. Alternating intervals of syenodiorite and silicified breccia continued to the bottom of the hole.

Low grade chalcocite was present from the base of the post-mineral dike to the bottom of the hole. Although most of the intervals between 162 and 399 feet assayed over 0.20% only two small plus 0.40% intervals were found.

F-178

This hole was advanced mostly in syenodiorite with short intervals of silicified breccia and post-mineral dikes. The first interval assayed contained 30 ppm moly. Traces of pyrite were found from the collar on down

although oxidation persisted to 118 feet. Low grade chalcocite was present throughout the sulfide zone to the bottom of the hole at 436.4 feet. Ore intervals were encountered from 216.6-249.5 and 315.5 to 371.9. The interval from 275.7 to 315.5, laying between the ore intercepts averaged only 0.06% copper. Silicification was the most dominant type of alteration.

F-179

This hole was located on the extreme west end of Portland Ridge, near the entrance to Oxide Pit. Several leached veinlets containing live limonite were observed on the surface around the hole. Monzonite was cored from the collar to 26 feet and was followed by a strong fault zone to 59 feet. The fault zone contained gravel size breccia fragments in a clay matrix. Below the fault there was 3 feet of vein quartz followed by fine grained alaskite (aplite). The grain size increased until at 138 feet the rock was a typical coarse grained alaskite. The hole continued to 390.5 feet in alaskite, except for another fault zone from 350-362.

Chalcocite enrichment was poor throughout with only one interval assaying over 0.20%.

This is believed to be the easternmost occurrance of alaskite found to date.

R. C. Edmiston

R. C. Edmiston
Resident Geologist

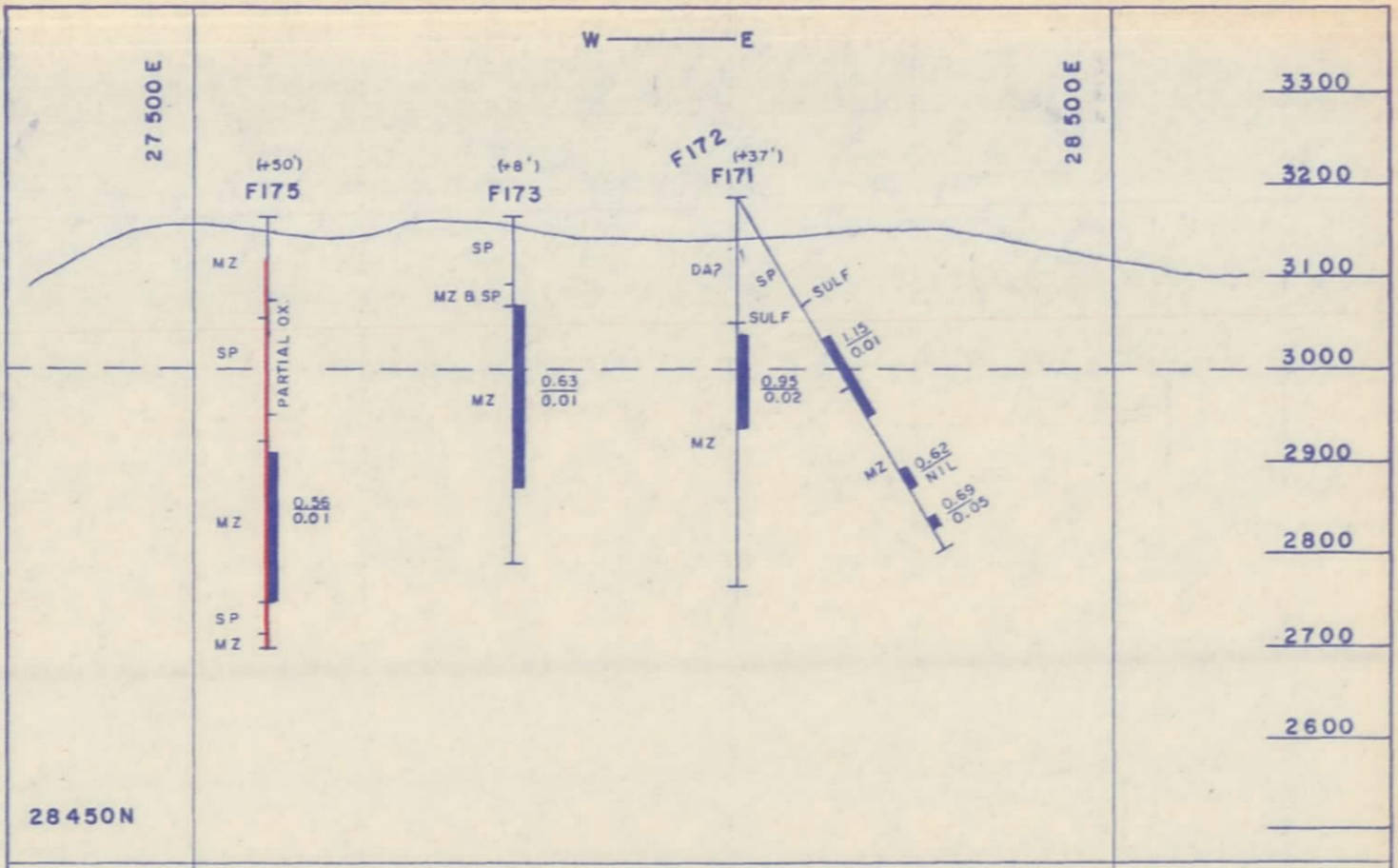
RCE:jca

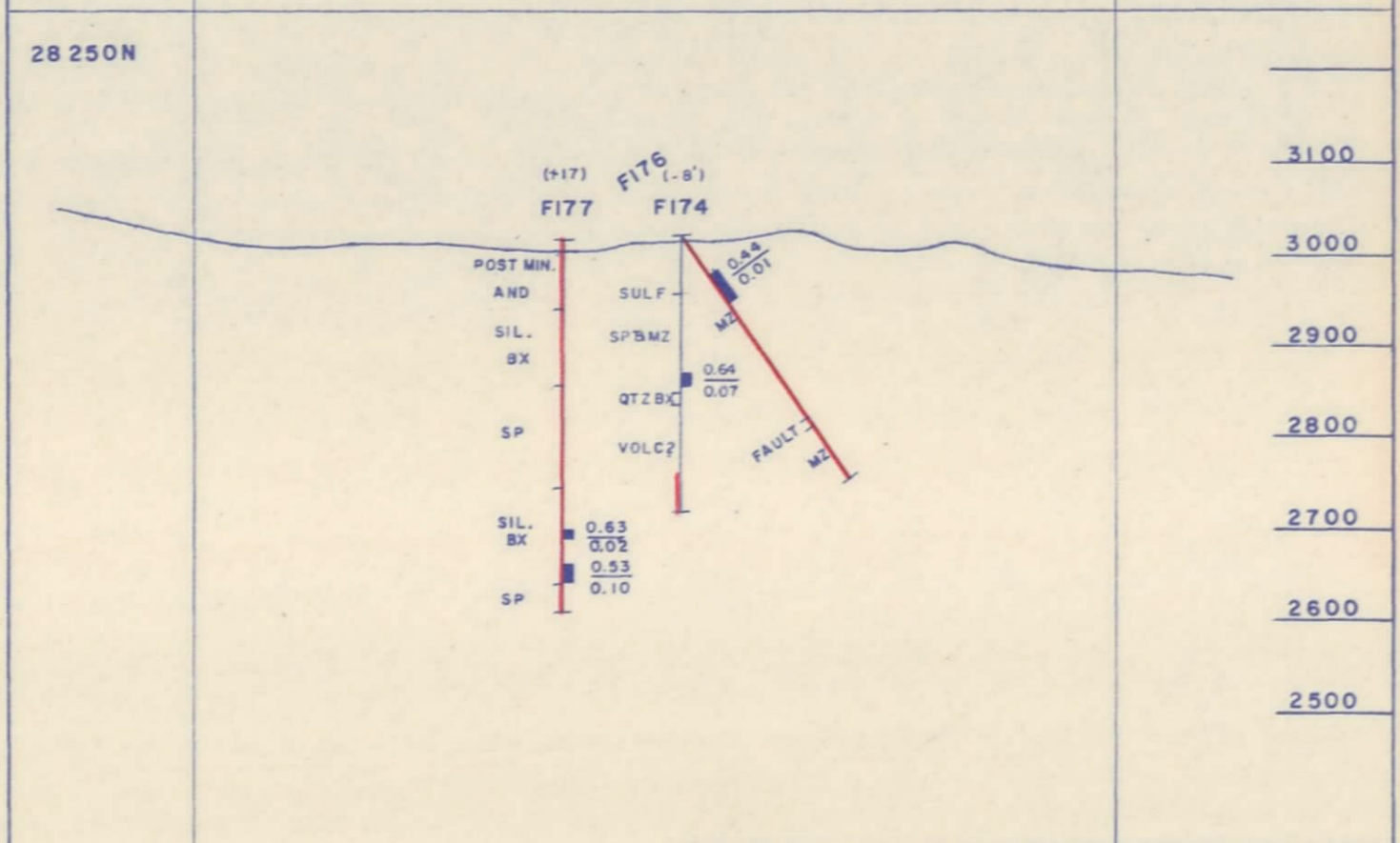
cc: JHCourtright

DIAMOND DRILLING PROGRESS REPORT

Hole No.	Approx. Elevation	Approx. Coordinates North	Approx. Coordinates East	+0.40% Copper Lenses Depth to Top	Thickness	Avg. % Cu Total	Avg. % Cu N.S.	Ft. Drill. During Mo.	Depth End Mo.	Final Depth
F-174	3016.42	28,241.76	28,030.81	No plus 0.40% intervals				42.0	300.0	300.0
F-175	3164.82	28,500.01	27,581.14	254.0	160.9	0.66	0.01	421.4	468.4	468.4
*F-176	3016.42	28,241.76	28,030.81	45.2	34.3	0.44	0.01	325.3	325.3	325.3
F-177	3016.87	28,266.78	27,901.60	317.4	9.4	0.63	0.02	406.5	406.5	406.5
				352.2	19.8	0.53	0.10			
F-178	3096.60	28,385.79	27,543.59	216.6	32.9	0.55	Nil	436.4	436.4	436.4
				315.5	56.4	0.48	Nil			
F-179	2841.23	28,541.40	26,836.91	No plus 0.40% intervals				390.5	390.5	390.5
							TOTAL	2,022.1		

* F-176 drilled S80°E from F-174 at an angle of -55°.





▮ + 0.4% Total Copper

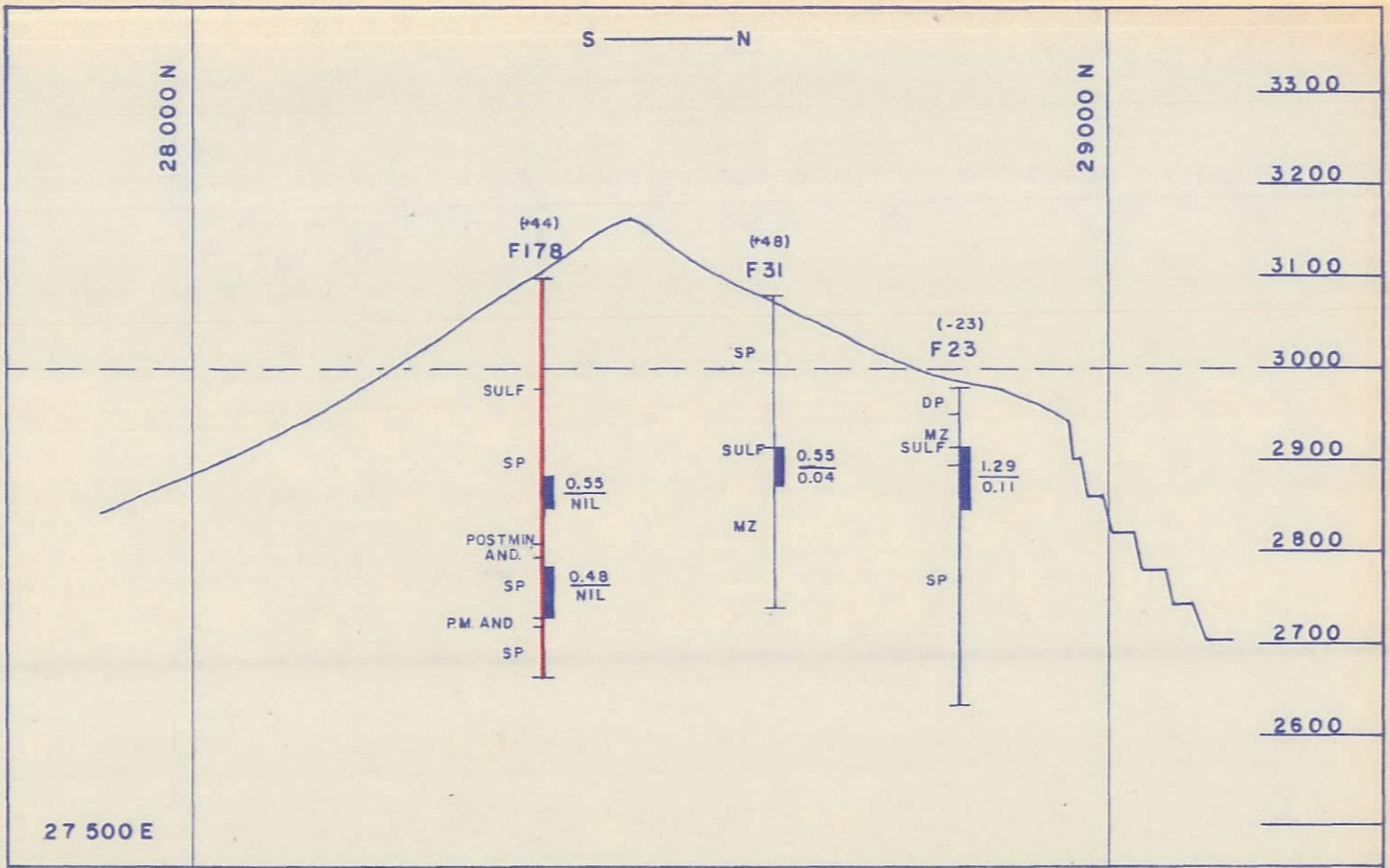
| Advance for month

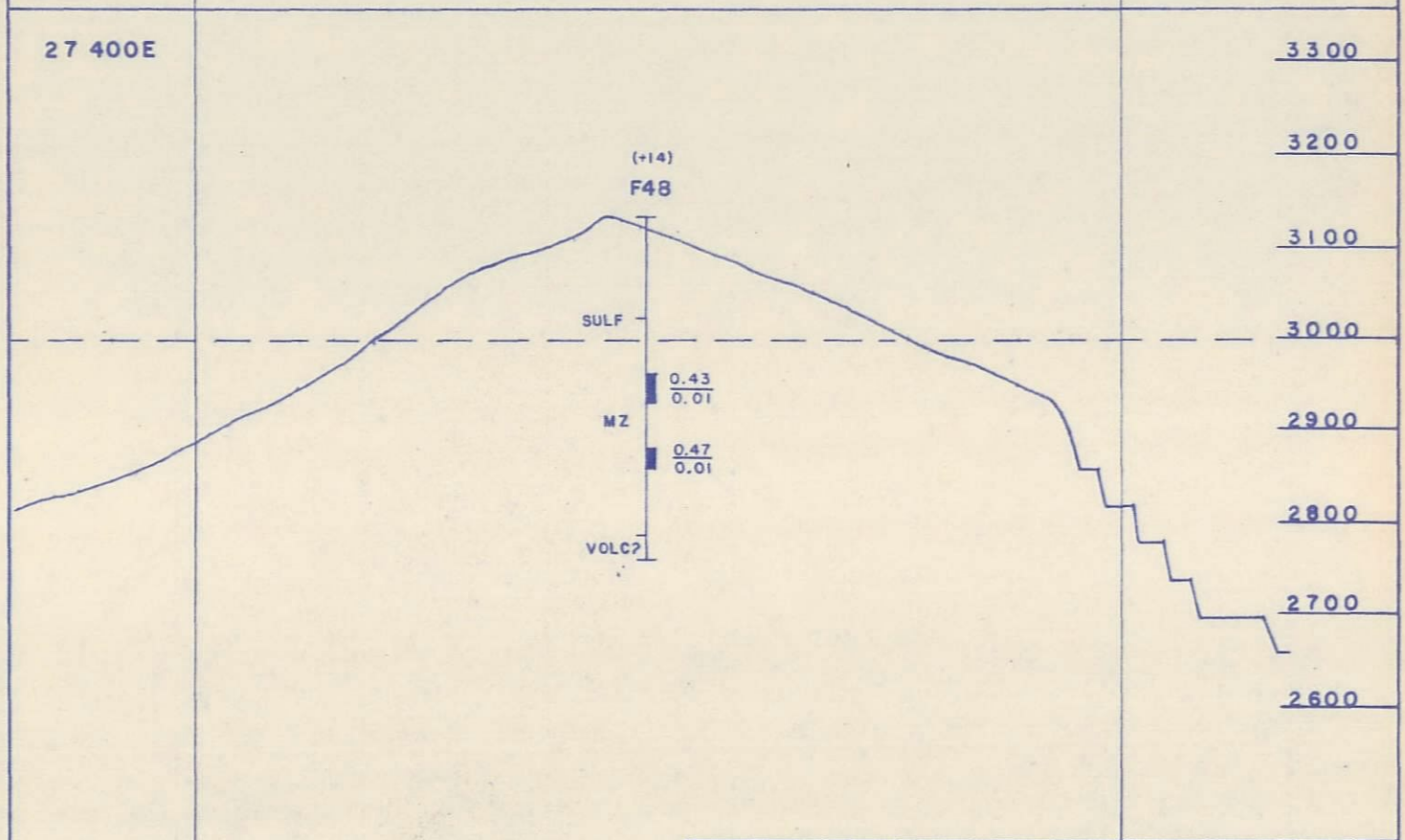
Note: Rock Types Generalized
Cu Assay is Total Cu/Non Sul. Cu

AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT

PORTLAND RIDGE
DRILL HOLE PROJECTIONS

SCALE	DRAWN	DATE	FILE
1" = 200'	RCE	APR 1 1969	S 121 A





+ 0.4% Total Copper

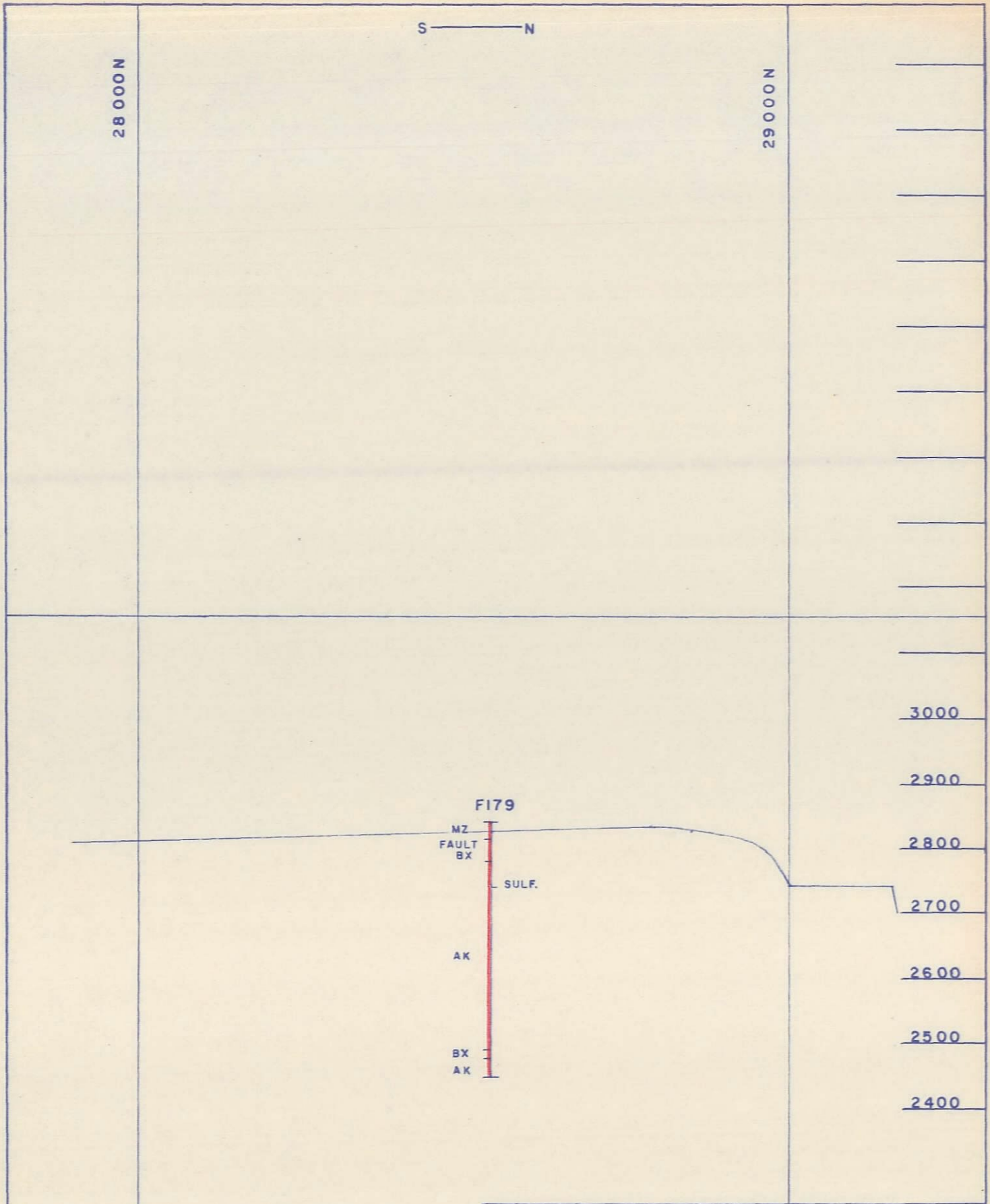
Advance for month

Note: Rock Types Generalized
Cu Assay is Total Cu/Non Sul. Cu

AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT

PORTLAND RIDGE
DRILL HOLE PROJECTIONS

SCALE	DRAWN	DATE	FILE
1" = 200'	RCE	APR 1 1969	S 121 A



■ + 0.4% Total Copper

| Advance for month

Note: Rock Types Generalized
Cu Assay is Total Cu/Non Sul. Cu

AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT

PORTLAND RIDGE
DRILL HOLE PROJECTIONS

SCALE	DRAWN	DATE	FILE
1" = 200'	RCE	APR 1 1969	S 121 A

Blue

- 1-100; OXIDE COPPER CO. CHURN DRILL HOLES
- 101-188; ASARCO CHURN DRILL HOLES
- F-1; OXIDE AREA DIAMOND DRILL HOLES
- P-1; PROPOSED DRILL HOLES
- HOLES DRILLED OR DRILLING DURING MONTH

green

- WILL CARRY OVERBURDEN[1]
- WILL NOT, BUT HAS AT LEAST ONE BENCH OF ORE
- WILL NOT, AND HAS LESS THAN ONE BENCH OF ORE
- 4 NUMBER OF ORE BENCHES

[1] BASED ON 38¢ COPPER AND 19¢ STRIPPING COST

AMERICAN SMELTING AND REFINING COMPANY
SILVER BELL UNIT
Silver Bell, Arizona

April 16, 1969

MEMORANDUM TO: Mr. D. R. Jameson, Superintendent

Subject: QUARTERLY GEOLOGIC REPORT

OXIDE PIT

Mining during the first quarter was conducted solely on the 2660 level and advanced to the North and Northwest in ore grade monzonite and syenodiorite. Chalcocite with barite was noted along fractures in the strongly silicified monzonite. Grade was high, ranging from 0.4% Cu to 1.50% Cu with a few small pods of plus 1.50% copper. Further expansion to the North should encounter increased amounts of high grade ore material.

EL TIRO PIT

During the past quarter mining was carried out on the 2670 and 2630 levels and the 3080 and 3035 level on Page Hill and Union Ridge.

2670

Mining on the 2670 level was principly cleaning up to final toe in monzonite, dacite and occasionally small pods of acid reactive hornfels. The monzonite and dacite were in general, strongly silicified and of leach and waste grade. Ore grade material was encountered in the El Tiro fault zone with oxide values of plus 0.2% copper.

2630

The 2630 level was pushed to the East and South during the past quarter. The Southward expansion was in ore grade alaskite and monzonite. A two foot wide vein of chalcopyrite, pyrite, chalcocite, and tetrahedrite was noted at 35,750N, 16,950E. Mining along the East face encountered acid reactive hornfels, dacite and monzonite with about equal amounts of leach and ore values. Further expansion to the East should encounter increased amounts of altered sediments.

PAGE HILL & UNION RIDGE

PAGE HILL

Mining was conducted on the 3080 level in strongly faulted tactites and hornfels cut by monzonite dikes. Most of the visible copper was in the form of malachite and "copper pitch". Grade was mostly leach and waste with a few small pods of ore near the southeast perimeter.

UNION RIDGE

During the past quarter the 3080 level was completed in oxidized tactites and hornfels. Minor amounts of unoxidized chalcopyrite was noted. Mining was mostly in leach grade material with about equal amounts of ore and waste.

The 3035 level advanced from the Northwest to the Southeast in altered monzonite, tactites, marble, and hornfels of predominately leach grade. Some of the tactites and hornfels contained veins of chalcopyrite partially oxidized to "copper pitch" and malachite.

SLOPE STABILITY

Oxide Pit

The slide zone in the southeast corner of Oxide Pit has remained relatively stable during the first quarter. Only minor amounts of creep and rock fall have been observed.

El Tiro Pit

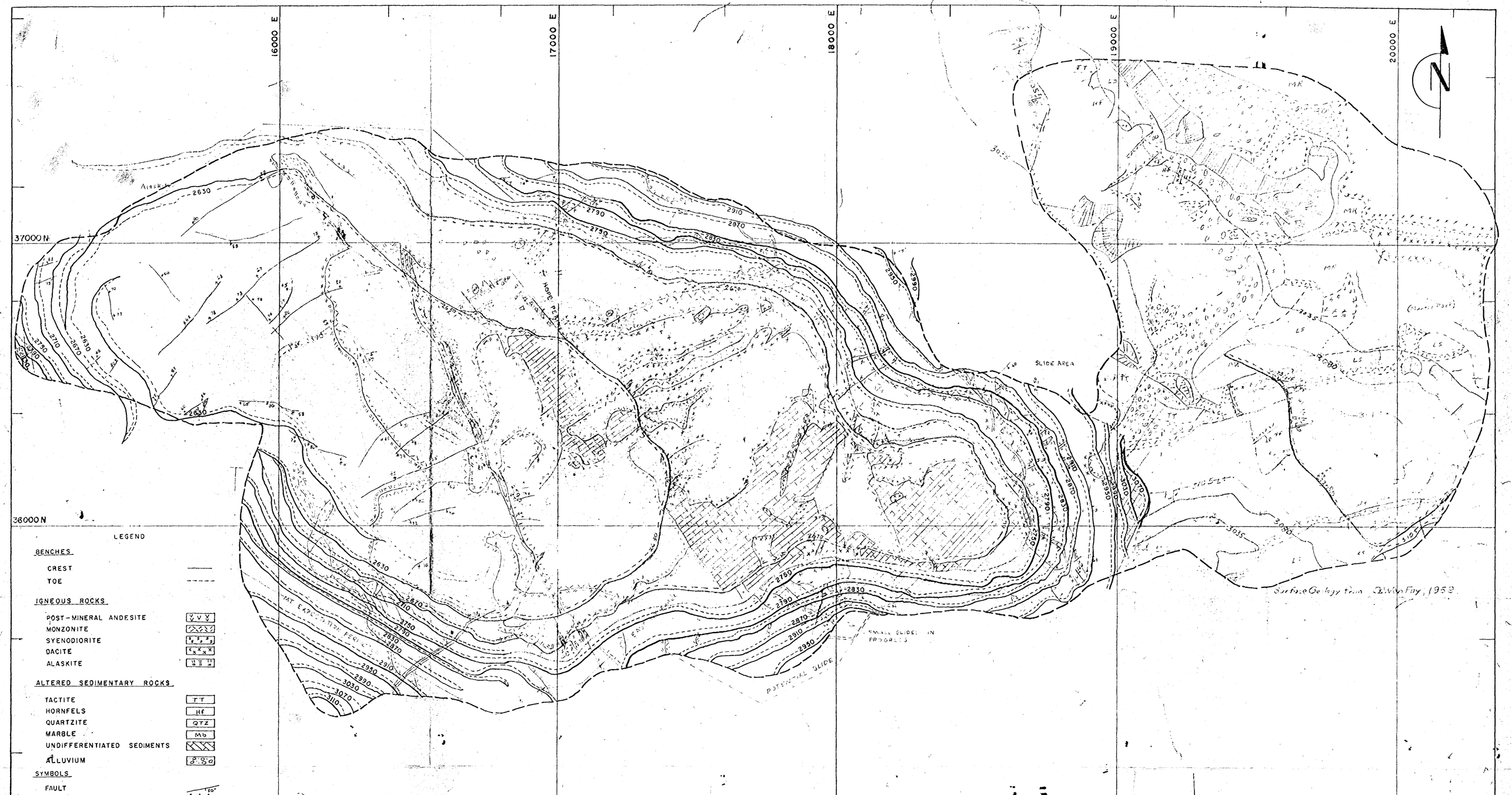
The slide zone on the south wall of El Tiro Pit continued to move during the quarter at about the same rate as previously recorded. The slump of the crest relative to a stable reference point varied from 0.18 to 0.31 feet during the quarter.

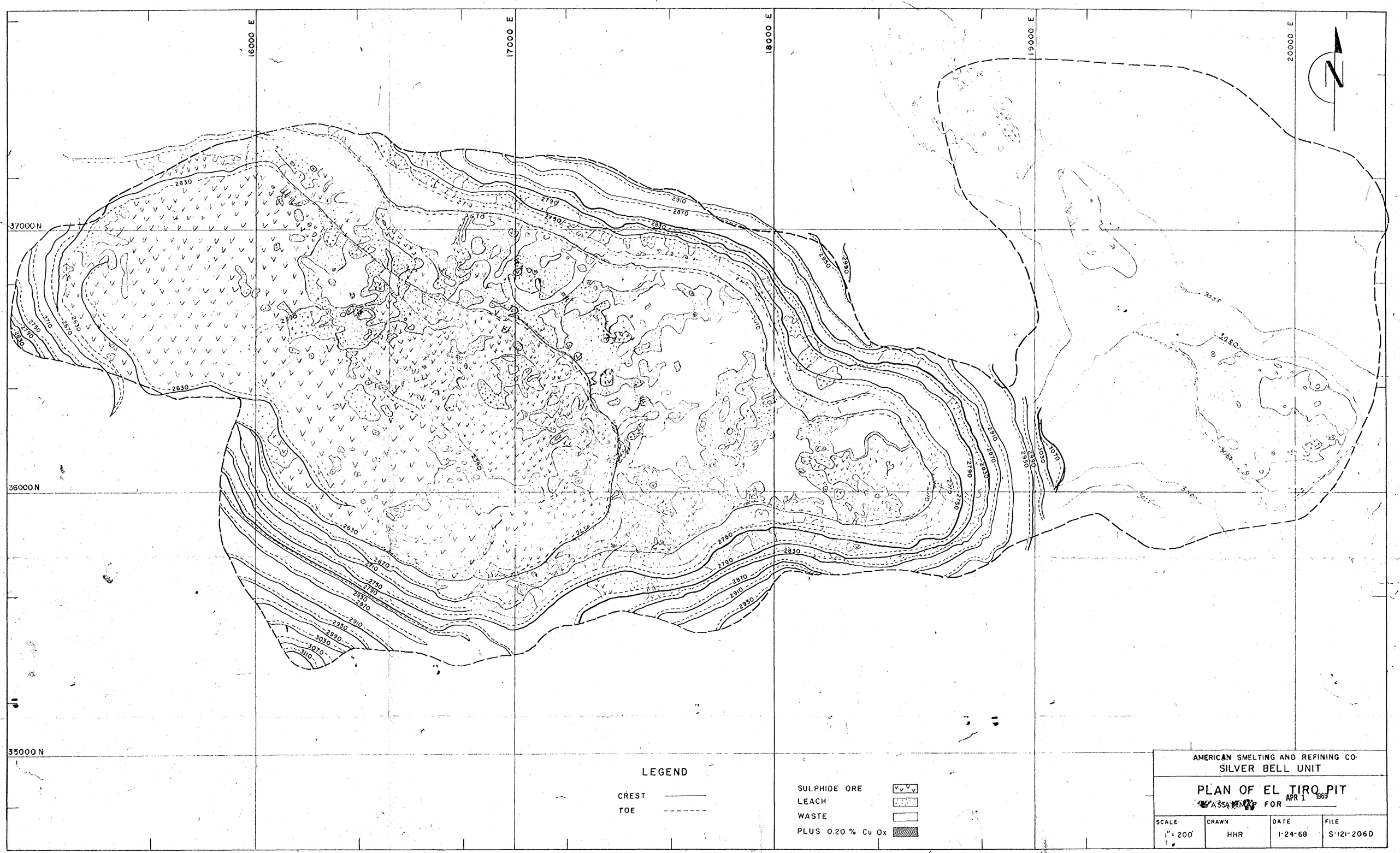
There is some danger of small rockfalls reaching the working level (2630) in the pit when operations are carried on below this zone as the upper levels have become rounded and offer no resistance to sliding rock.

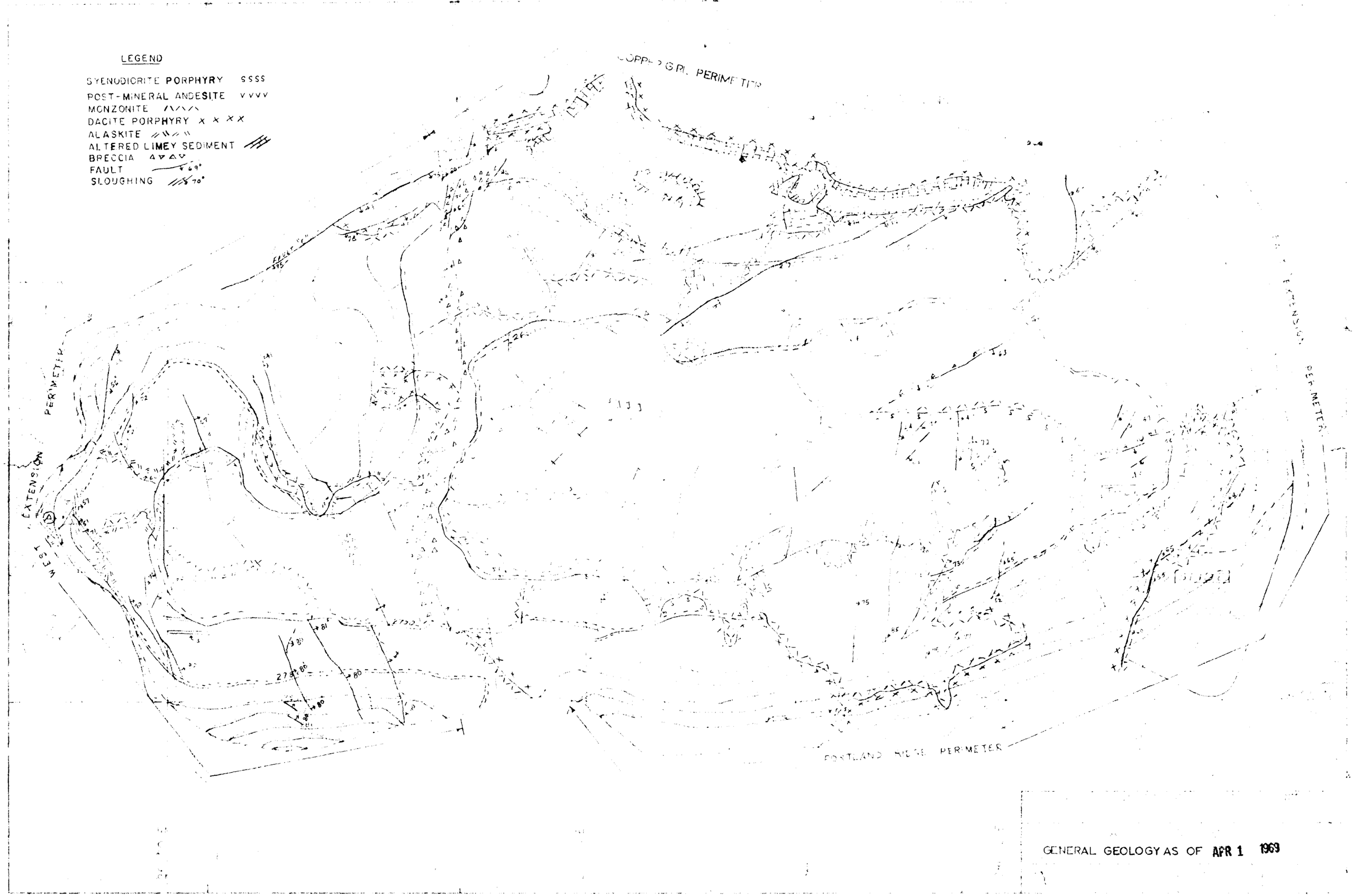
Paul Bauer

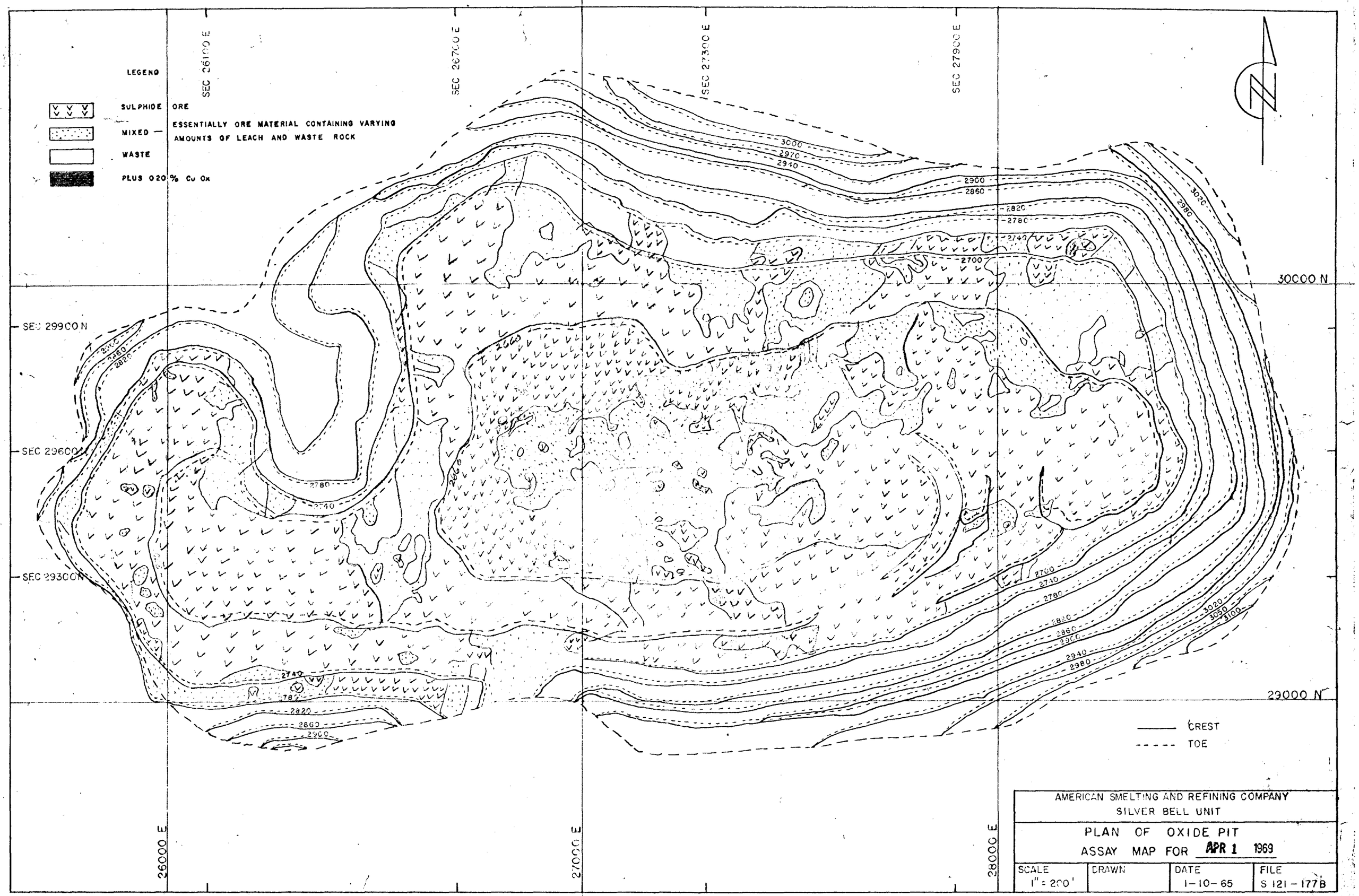
Paul Bauer
Geologist

PB:jca


16000 E
17000 E
18000 E
19000 E
20000 E
37000 N
36000 N
35000 N
N
Alaskite
Home Pet
SLIDE AREA
SMALL SLIDES IN FRIABLES
POTENTIAL SLIDE
Surface Geology from D.W. Fay, 1959
LEGEND
BENCHES
CREST
TOE
IGNEOUS ROCKS
POST-MINERAL ANDESITE
MONZONITE
SYENODIORITE
DACITE
ALASKITE
ALTERED SEDIMENTARY ROCKS
TACTITE
HORNFELS
QUARTZITE
MARBLE
UNDIFFERENTIATED SEDIMENTS
ALLUVIUM
SYMBOLS
FAULT
BRECCIA
AMERICAN SMELTING AND REFINING CO.
SILVER BELL UNIT
PLAN OF EL TIRO PIT
GEOLOGY FOR APR 1 1969
SCALE 1" = 200'
DRAWN HHR
DATE 1-24-68
FILE S-121-206D


16000 E
17000 E
18000 E
19000 E
20000 E
37000 N
36000 N
35000 N
LEGEND
CREST
TOE
SULPHIDE ORE
LEACH
WASTE
PLUS 0.20 % Cu Ox
AMERICAN SMELTING AND REFINING CO.
SILVER BELL UNIT
PLAN OF EL TIRO PIT
ASSAY MAP FOR APR 1 1969
SCALE
1" = 200'
DRAWN
HHR
DATE
1-24-68
FILE
S-121-206D


LEGEND
SYENODIORITE PORPHYRY SSSS
POST-MINERAL ANDESITE VVVV
MONZONITE
DACITE PORPHYRY X X X X
ALASKITE
ALTERED LIMEY SEDIMENT
BRECCIA
FAULT
SLOUGHING
PERIMETER
EXTENSION
WEST
PERIMETER
EXTENSION
PORTLAND HILL PERIMETER
GENERAL GEOLOGY AS OF APR 1 1969


LEGEND
SULPHIDE ORE
MIXED — ESSENTIALLY ORE MATERIAL CONTAINING VARYING AMOUNTS OF LEACH AND WASTE ROCK
WASTE
PLUS 0.20 % Cu Ox
SEC 26100 E
SEC 26700 E
SEC 27300 E
SEC 27900 E
SEC 29900 N
SEC 29600 N
SEC 29300 N
30000 N
29000 N
26000 E
27000 E
28000 E
CREST
TOE
AMERICAN SMELTING AND REFINING COMPANY
SILVER BELL UNIT
PLAN OF OXIDE PIT
ASSAY MAP FOR APR 1 1969
SCALE 1" = 200'
DRAWN
DATE 1-10-65
FILE S 121-177B

Mr. J. H. Courtright

J. H. C.

MAR 25 1969

AMERICAN SMELTING AND REFINING COMPANY
SILVER BELL UNIT
Silver Bell, Arizona

March 17, 1969

MEMORANDUM TO: Mr. D. R. JAMESON, Superintendent

Subject: MONTHLY REPORT - SILVER BELL UNIT DRILLING PROGRAM
PORTLAND RIDGE, FEBRUARY 1969

During February, 1969, two skid-mounted diamond drills were operated two shifts per day, six days per week, on the south side of Portland Ridge. Two vertical holes and one angle hole were completed and two vertical holes were in progress at the end of the month. Of the 1,311.2 feet drilled in February, 356.1 feet, or 27%, was drilled in ore.

The footage drilled and the average direct drilling costs for February, 1969, are:

Total Footage:	1,311.2 feet
[1]Average Advance per Shift:	19.0 feet
[2]Average Direct Cost per Foot:	$9.52

[1]Does not include moving time but does include all other delays.

[2]Increase in cost per foot due to a high ratio of moving to drilling time during the month and also an increase in moving and delay charges.

The attached table ~~summarizes the~~ drilling results.

The accompanying map and east-west cross section show the location of holes drilled in February.

The current round of diamond drilling on Portland Ridge appears to have developed nearly 2 million tons of ore to date. This may permit mining of an additional 4.5 million tons of ore which otherwise might not have been mined due to unfavorable stripping conditions. An important factor in evaluating this developed ore is that all of the vertical drill holes containing economic mineralization occur adjacent to at least one other such hole, indicating good continuity in the ore zone. The accompanying map shows that in the area around 28,500N, 28,000E the ore zone widens south of the ridge line. The holes drilled in the east side of this zone (F-163,

F-168, F-171) have mineralization averaging one percent sulfide copper while other holes to the west have contained lower grade ore. With the completion of F-174 it now appears that a sharp cut off of ore to the south has been reached. However, contouring of chalcocite thicknesses suggests that further drilling is required on both the east and west ends of the ridge.

Geologic controls on the distribution of ore include the following. The best ore intercepts have occurred in monzonite rather than in the fine grained porphyry which is being called syenodiorite (?). Most of the veins and large faults have an east-west trend. The ore zones existing in this area are also elongated in the east west dimension. Finally, the sharp cut-offs encountered in ore thicknesses to the south appear to be due to the damming effect of east-west trending thick quartz veins.

The footages drilled in February are summarized below:

F-171

This vertical hole was at the base of chalcocite ore at the beginning of the month. Only one additional interval of ore was found in February; however, when this was added to that penetrated in January the total thickness of 106.3 feet averaged 0.95/0.02. The hole was completed to 425.9 feet in moderately enriched, leach grade monzonite.

F-172

This angle hole was drilled due east from F-171 at an angle of 60° to the horizontal. Leached syenodiorite containing strong jarosite and alunite occurred to 134.1 where sulfides began. Monzonite occurred from 235.9 to the bottom of the hole at 445.5. Chalcocite ore was encountered from 180.2 to 276.7. Low grade chalcocite values continued to the bottom of the hole. Pyrite content was about average at 2 to 3 percent by volume. Only traces of chalcopyrite were noted.

F-173

Oxidized syenodiorite (?) containing weak live limonite was cored from 11.0 to 72.0. An interval of syenoriorite (?) cut by monzonite existed to the top of the sulfide zone at 96.0. The remainder of the hole, including a 198.6 foot ore interval averaging 0.63/0.01, was in monzonite. Clay and sericite alteration was strong in the capping and enriched zone but weaker in the primary zone indicating that much of the alteration is supergene. Primary mineralization was less than 0.10 percent copper.

F-174

The core from this hole was poorly mineralized and only moderately altered. Alternating intervals of syenodiorite (?) and coarse grained monzonite existed from the collar to a silicified breccia at 173.5. The breccia continued to 185.0. Below this was a fine grained silicified rock tentatively logged as a volcanic. No changes in mineralization but a decrease in alteration was noted below the breccia. As in many weakly altered fringing areas, sulfides were noted within a few feet of the surface although weak oxidation persisted to 120 feet. Pyrite content was about 1 percent while only traces of chalcopyrite were found.

F-175

This hole was at 47.0 feet at the end of the month. The footage was in moderately altered and leached monzonite. (This hole encountered an economic chalcocite thickness in March).

R. C. Edmiston

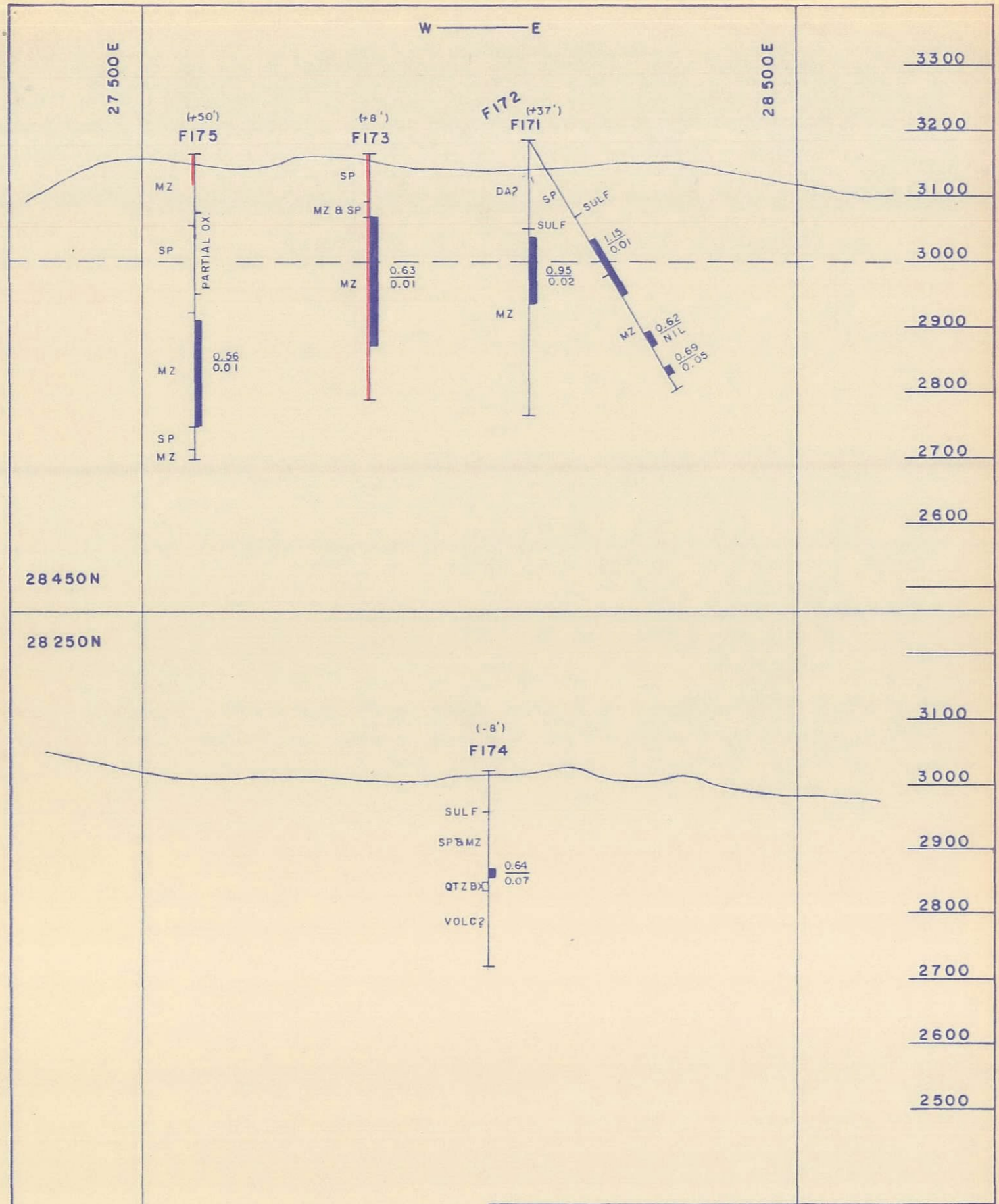
R. C. Edmiston
Resident Geologist

RCE:jca

DIAMOND DRILLING PROGRESS REPORT

Hole No.	Approx. Elevation	Approx. Coordinates North	Approx. Coordinates East	+0.40% Copper Lenses Depth to Top	Thickness	Avg. % Cu Total	Avg. % Cu N.S.	Feet Drill. During Mo.	Depth at End Month	Final Depth
F-171	3186.72	28,487.41	28,092.10	241.6	9.2	0.47	0.01	184.3	425.9	425.9
*F-172	3186.72	28,487.41	28,092.10	180.2	96.5	1.15	0.01	445.5	445.5	445.5
				296.7	9.4	0.43	Nil.			
				343.9	19.4	0.62	Nil.			
				404.0	13.0	0.69	0.05			
F-173	3165.16	28,458.02	27,848.32	96.0	198.6	0.63	0.01	376.4	376.4	376.4
F-174	3016.42	28,241.76	28,030.81	155.9	10.0	0.64	0.07	258.0	258.0	-
F-175	3164.82	28,500.01	27,581.14	No plus 0.40% intervals				47.0	47.0	
							TOTAL	1,311.2		

* F-172 drilled due east from F-171 at an angle of 60°.



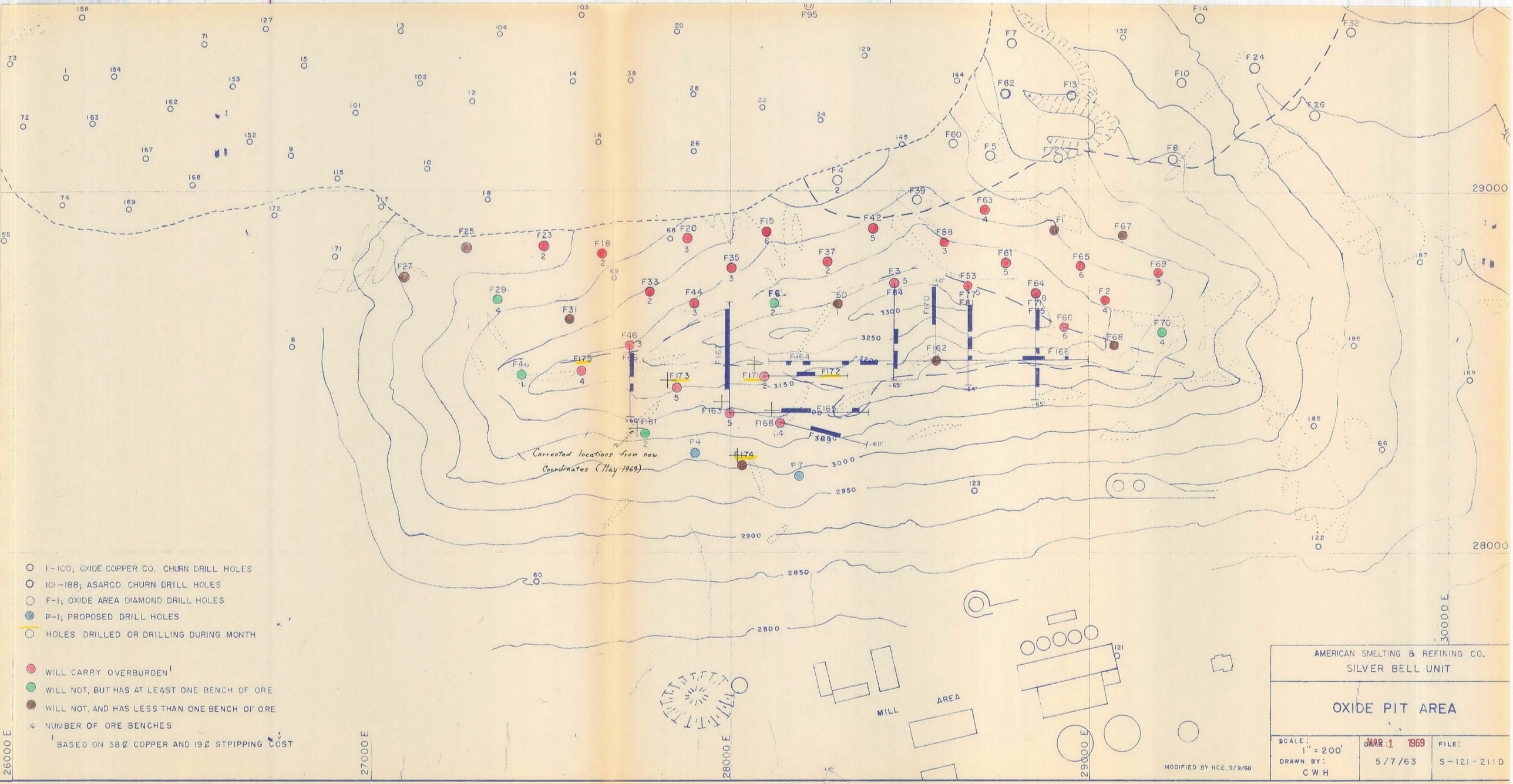
▮ + 0.4% Total Copper
Advance for month

Note: Rock Types Generalized
Cu Assay is Total Cu/Non Sul. Cu

AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT

PORTLAND RIDGE
DRILL HOLE PROJECTIONS

SCALE	DRAWN	DATE	FILE
1" = 200'	RCE	MAR 1 1969	S 121 A


AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT
OXIDE PIT AREA
SCALE: 1" = 200'
DRAWN BY: C W H
MAR 1 1969
5/7/63
FILE: S-121-211D
MODIFIED BY RCE, 9/9/68
MILL AREA
Corrected locations from new Coordinates (May 1969)
1-100; OXIDE COPPER CO. CHURN DRILL HOLES
101-188; ASARCO CHURN DRILL HOLES
F-1; OXIDE AREA DIAMOND DRILL HOLES
P-1; PROPOSED DRILL HOLES
HOLES DRILLED OR DRILLING DURING MONTH
WILL CARRY OVERBURDEN[1]
WILL NOT, BUT HAS AT LEAST ONE BENCH OF ORE
WILL NOT, AND HAS LESS THAN ONE BENCH OF ORE
4 NUMBER OF ORE BENCHES
[1] BASED ON 38¢ COPPER AND 19¢ STRIPPING COST
26000 E
27000 E
28000 E
29000 E
30000 E
29000
28000
3300
3250
3200
3150
3000
2950
2900
2850
2800

Mr. J. H. Courtright

J. H. C.

MAR 5 1969

W.E.S.

MAR 6 1969

MR. WES

READ AND RETURN

PREPARE ANSWERS ___ HANDLE ___

FILE ___ INITIALS ___

AMERICAN SMELTING AND REFINING COMPANY
SILVER BELL UNIT
Silver Bell, Arizona

February 18, 1969

MEMORANDUM TO: Mr. D. R. Jameson, Superintendent

Subject: MONTHLY REPORT - SILVER BELL UNIT
DRILLING PROGRAM, PORTLAND RIDGE
January, 1969

During January, 1969, two skid-mounted diamond drills were operated two shifts per day, six days per week, on the south side of Portland Ridge. Angle holes F-166, F-169 and F-170, and vertical hole F-168 were completed while vertical hole F-171 was in progress at the end of the month. Of the 1,401.6 feet drilled in January, 527.1 feet, or 38%, was drilled in ore.

The footage drilled and the average direct drilling costs for January, 1969, are:

Drill	Footage Drilled	*Advance Per Shift	Average Direct Cost Per Foot
Diamond, Skid, Angle	1,026.5	18.0	$ 8.85
Diamond, Skid, Vertical	375.1	34.1	8.64
TOTAL	1,401.6	Combined Average	$ 8.79

* Does not include moving time but does include all other delays.

The attached table summarizes the drilling results. The accompanying map and cross-sections show that about 1.5 million tons of ore has been developed by the current drilling. No definite boundaries have been found for the mineralization and several more holes are planned. Information gained from F-170, shown on Section 28,600E may be particularly useful in developing ore reserves and interpreting the geology of Portland Ridge. This hole, and the other holes drilled in January, is described below.

F-166

This hole was deepened from 637.0 feet to 747.0 feet in January after penetrating an ore interval from 609.4 to 637.0. However, although chalcocite was present to the bottom of the hole, no further ore was found. The advance was in moderately altered monzonite.

F-168

This hole was also in progress at the beginning of the month and was completed from 367.0 to 500.5 feet. The hole was in ore, which continued to a depth of 407.4 feet giving an overall thickness of 176.9 feet averaging 0.91/0.04. The advance was entirely in monzonite. Primary mineralization averaged less than 0.10% copper.

F-169

This hole was drilled S75°E from the site of F-168, at angle of 60°, as it was impossible to move the drill in this direction to drill a vertical hole. Monzonite was cored from the collar to 374.6 feet, syenoriorite porphry occupied the remaining interval to the bottom of the hole at 490.8 feet.

Strongly leached and altered capping extends from the collar to 96.4 feet. A partially oxidized zone containing some chalcocite and chalcopyrite occupies the interval from 96.4 feet to the top of the sulfide ore zone at 175.7 feet. This latter corresponds to a vertical distance of 150 feet below the surface. This contrasts with the top of the ore zone found in the vertical hole at this site, F-168, which occurred at a depth of 230.5 feet.

The ore thickness of 169.8 feet penetrated in F-169 was made up of alternating intervals of ore and leach averaging 0.46/.01. Primary mineralization in the bottom of the hole averaged 0.06% copper.

F-170

This hole was drilled due north from the site of F-162 at angle of 50° from the horizontal, as shown on the accompanying section. F-170 penetrated the same units found in F-162, and in the same order. The rock units consist in both cases of syenoriorite (?) and monzonite separated by a strong zone of brecciation, silicification and quartz veining. In both cases only weak enrichment was found in the syenoriorite (?) above the structure while ore values occurred in the monzonite below. It is possible that this silicified zone acted as a barrier to copper bearing solutions moving south from Oxide Pit, causing a zone of strong enrichment on one side of the veining while shielding the other from these same solutions.

In outcrop, on the south side of the ridge, can be seen one large and several smaller quartz veins, all strike approximately east-west. Most of the large faults in this area also strike east-west, parallel to the ridge line. It is possible that the southern limit of minable ore will be determined by this zone of quartz veining and silicification.

F-171

This vertical hole was at 241.6 feet and in progress at the end of January. Although the leached zone contained very strong crystalline jarosite with only minor live limonite a higher than average grade ore zone was encountered at 144.5 feet. This zone assayed 1.12/0.02 for a distance of 97.1 feet.

The hole was collared in a strongly altered fine grained rock logged as Dacite (?). This gave way to monzonite of a depth of 135.3 feet, which was also the base of oxidation. Monzonite persisted to the bottom of the hole in February at 425.9 feet. However, only one additional ore interval of 9.7 feet was found.

R.C. Edmiston

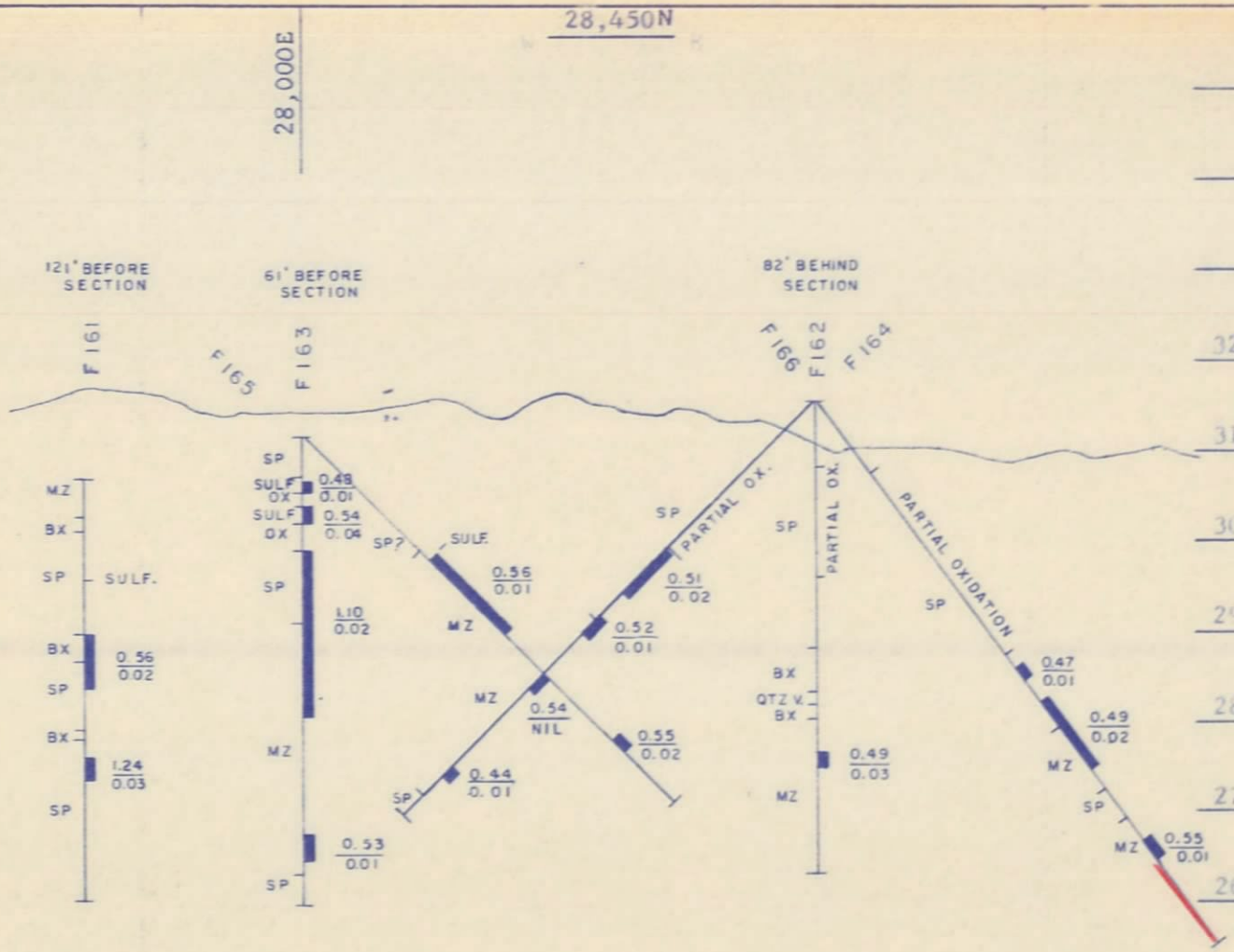
R. C. Edmiston
Resident Geologist

RCE:jca

DIAMOND DRILLING PROGRESS REPORT

Hole No.	Approx. Elevation	Approx. Coordinates North	Approx. Coordinates East	+0.40% Copper Lenses Depth to Top	Thickness	Avg. % Cu Total	Avg. % Cu N.S.	Feet Drill. During Mo.	Depth at End Month	Final Depth
[1] F-166	3153.14	28,532.15	28,571.02	No +0.40% intervals				110.0	747.0	747.0
F-168	3110.55	28,358.43	28,134.76	367.0	40.4	0.46	0.01	133.5	500.5	500.5
[2] F-169	3110.55	28,358.43	28,134.76	114.8 175.7	10.2 169.8	0.42 0.46	0.03 0.01	490.8	490.8	490.8
[3] F-170	3153.14	28,537.15	28,571.02	201.0	209.7	0.71	0.04	425.7	425.7	425.7
F-171	3186.72	28,487.41	28,092.10	144.5	97.1	1.12	0.02	241.6	241.6	-
						TOTAL		1,401.6		

1. F-166 drilled due east from F-162 at an angle of -55°
2. F-169 drilled S75°E from F-168 at an angle of -60°
3. F-170 drilled due north from F-162 at an angle of -60°

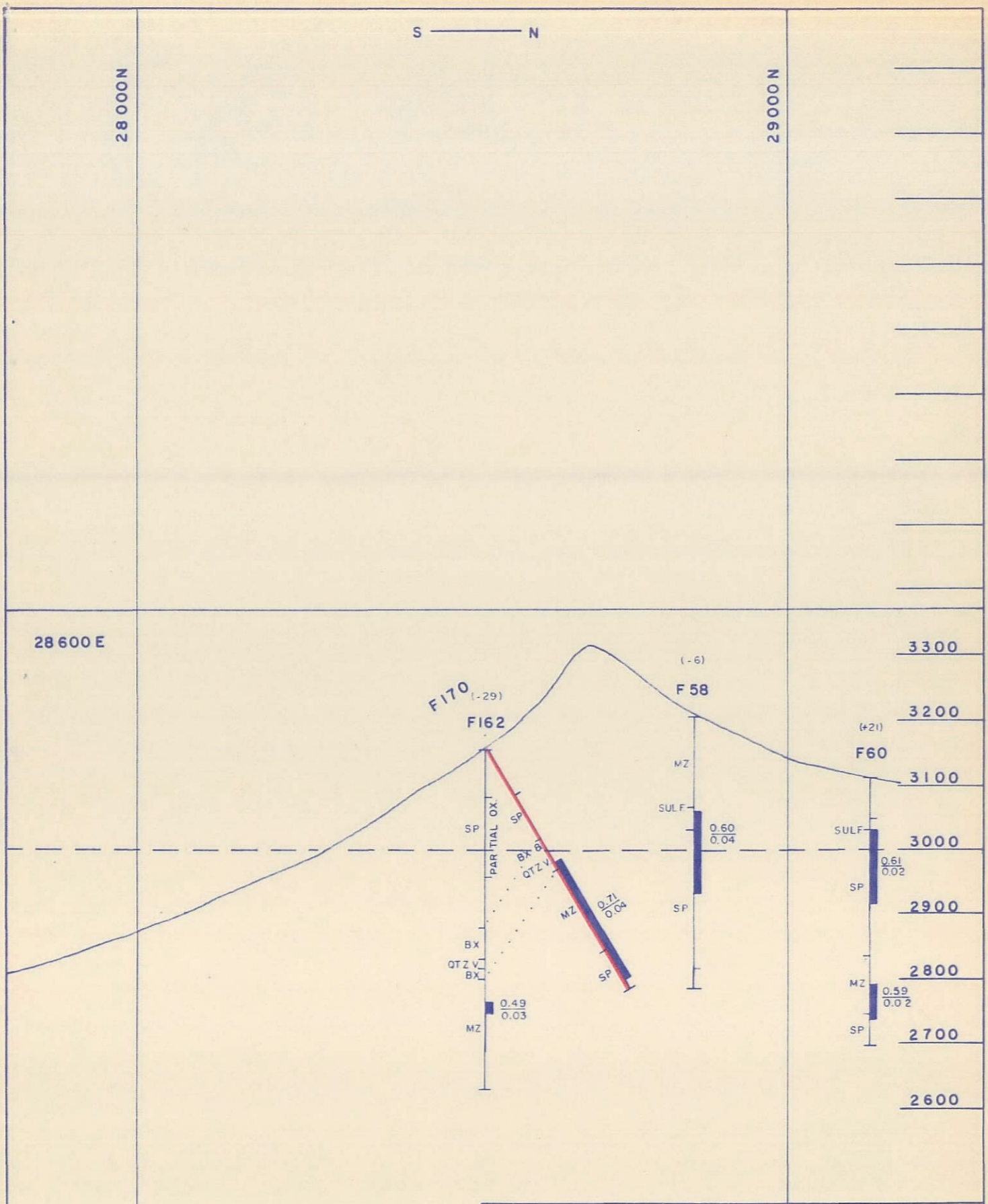


▮ + 0.4% Total Copper

▮ Advance for month

Note: Rock Types Generalized
Cu Assay is Total Cu/Non Sul. Cu

AMERICAN SMELTING & REFINING CO. SILVER BELL UNIT			
PORTLAND RIDGE DRILL HOLE PROJECTIONS			
SCALE 1" = 200'	DRAWN RCE	DATE FEB 1 1969	FILE S 121 A



+ 0.4% Total Copper

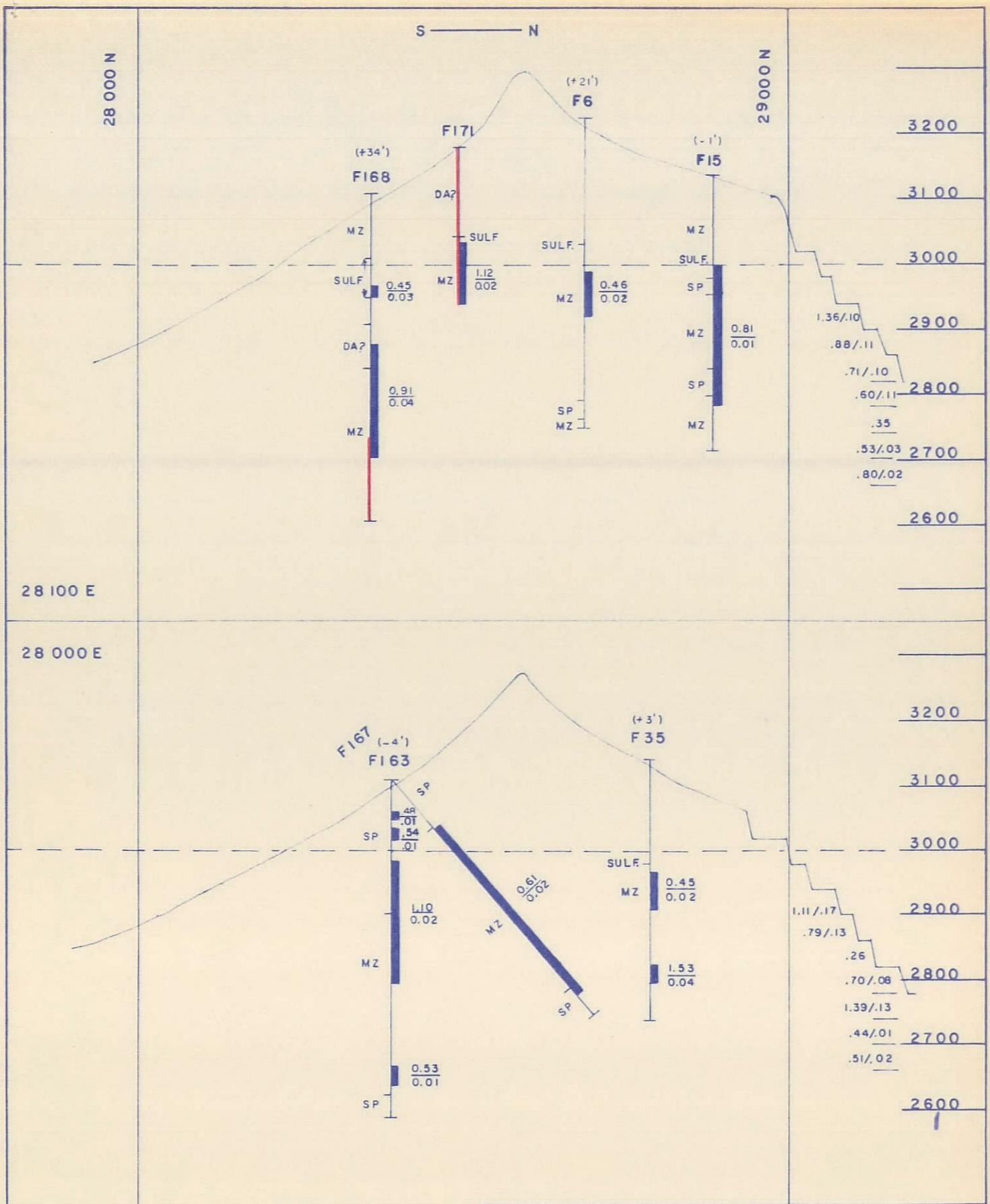
Advance for month

Note: Rock Types Generalized
Cu Assay is Total Cu/Non Sul. Cu

AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT

PORTLAND RIDGE
DRILL HOLE PROJECTIONS

SCALE	DRAWN	DATE	FILE
1" = 200'	RCE	FEB 1 1969	S 121 A



+ 0.4% Total Copper

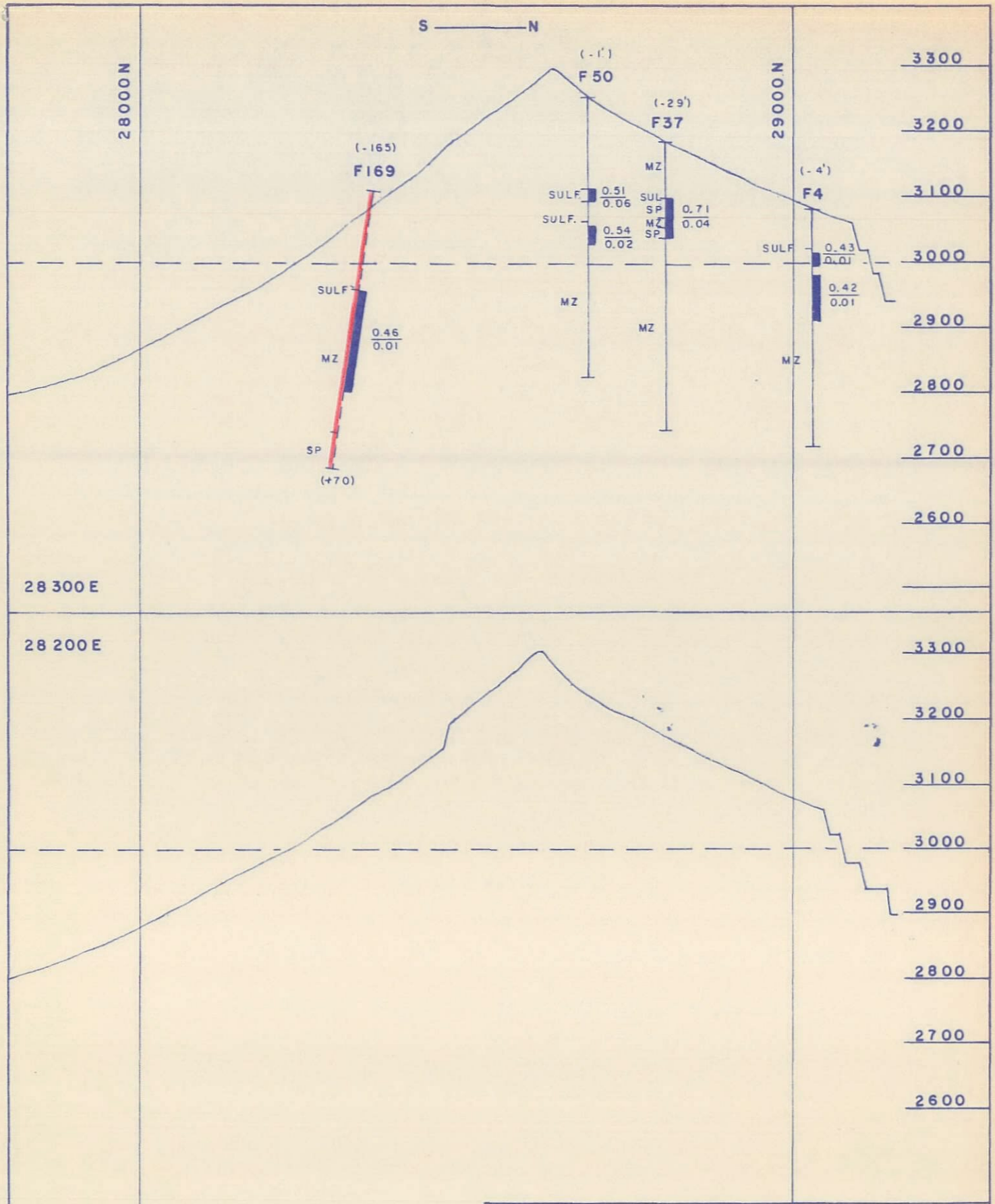
Advance for month

Note: Rock Types Generalized
Cu Assay is Total Cu/Non Sul. Cu

AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT

PORTLAND RIDGE
DRILL HOLE PROJECTIONS

SCALE	DRAWN	DATE	FILE
1" = 200'	RCE	FEB 1 1969	S 121 A



+ 0.4% Total Copper

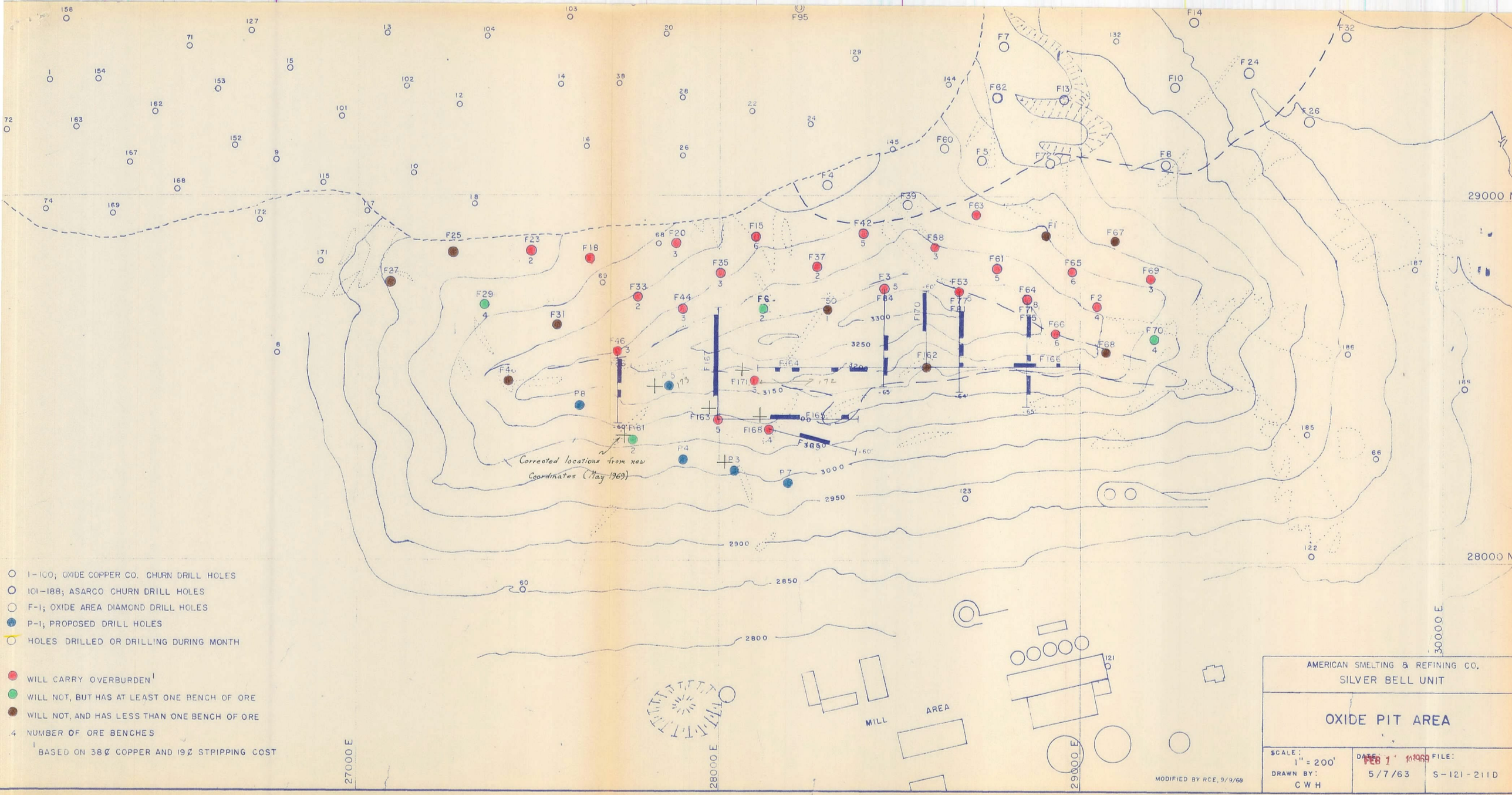
Advance for month

Note: Rock Types Generalized
Cu Assay is Total Cu/Non Sul. Cu

AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT

PORTLAND RIDGE
DRILL HOLE PROJECTIONS

SCALE	DRAWN	DATE	FILE
1" = 200'	RCE	FEB 1 1969	S 121 A



- 1-100; OXIDE COPPER CO. CHURN DRILL HOLES
- 101-188; ASARCO CHURN DRILL HOLES
- F-1; OXIDE AREA DIAMOND DRILL HOLES
- P-1; PROPOSED DRILL HOLES
- HOLES DRILLED OR DRILLING DURING MONTH

- WILL CARRY OVERBURDEN[1]
- WILL NOT, BUT HAS AT LEAST ONE BENCH OF ORE
- WILL NOT, AND HAS LESS THAN ONE BENCH OF ORE
- .4 NUMBER OF ORE BENCHES

[1] BASED ON 38¢ COPPER AND 19¢ STRIPPING COST

Mr. J. H. Courtright

MR. WES
READ AND RETURN ✓
PREPARE ANSWERS ___ HANDLE ___
FILE ___ INITIALS ___

AMERICAN SMELTING AND REFINING COMPANY
SILVER BELL UNIT
Silver Bell, Arizona

January 16, 1969

W.E.S.
FEB 5 1969

J.H.C.
JAN 29 1969

MEMORANDUM TO: Mr. D. R. Jameson, Superintendent

Subject: MONTHLY REPORT - SILVER BELL UNIT DRILLING PROGRAM, PORTLAND RIDGE - DECEMBER 1968

During December, 1968, two skid mounted diamond drills were operated two shifts per day, six days per week on the south side of Portland Ridge. Angle holes F-165 and F-167 were completed while angle hole F-166 and vertical hole F-168 were in progress at the end of the month. Of the 1,523.2 feet drilled in December, 638.1 feet or 42%, was drilled in ore.

The footage drilled and the average direct drilling costs for December, 1968, are:

Drill	Footage Drilled	*Advance per Shift	Average Direct Cost per Foot
Diamond - Skid - Angle	1,156.2	17.2	$ 7.35
Diamond - Skid - Vertical	367.0	36.7	10.41
TOTAL	1,523.2		
Combined Average			$ 8.09

* Does not include moving time but does include all other delays.

The attached table summarizes the drilling results.

The accompanying vertical cross-sections show the location of the ore penetrated in December as well as that drilled previously. The north-south sections have been revised to include only those holes located within fifty feet of the plane of the section. Also shown are average assays for the ore exposed in the south wall of Oxide Pit. These figures were arrived at by averaging all the assays for the final row of blast holes for a distance of fifty feet on either side of the section.

Both north-south sections show that the ore thickens immediately south of the ridge line while the grade increases. More than 500,000 tons of above average grade ore are indicated by the drilling which has been completed to date.

The east-west section shows that while F-162 was a waste hole, angle holes drilled on due east and west bearings found significant, but not economic, ore zones. The ore found in F-166 at a depth of 250 feet below the surface warrants the eventual drilling of another vertical hole east of F-162.

The footage drilled in December are described below.

F-165

This angle hole was completed from 531.3 to a final depth of 575.2 feet in December. The advance was in rock altered beyond recognition and containing leach grade chalcocite. Two zones of strong enrichment were logged in this hole beginning at 196.5 feet and 475.4 feet and separated by 72.4 feet of waste averaging only 0.06% Total copper.

F-166

This hole was drilled due east from F-162 at an angle of -55° to a depth of 637.0 feet and was still in progress at the end of the month. The most significant feature of this hole is a large interval of partial oxidation followed by several ore zones, the deepest of which is approximately 450 feet below the surface. (The hole was deepened from 637.0 to 747.0 feet in January, but no additional ore was penetrated.)

The rock units encountered were monzonite and a fine grained rock, also logged in adjacent holes, which could be either a fine grained intrusive such as the syenodiorite or the ignimbrite which is definitely recognized 500 feet south of the hole. The syenodiorite (?) was cored from the collar to a fault contact with the monzonite at 450.8 feet. Monzonite occupied the remainder of the hole except for one additional intercept of syenodiorite from about 435 to 573 feet. Alteration was strong throughout with an estimated pyrite content, by volume, of 1% to 4%. Unenriched primary mineralization was not reached but would probably average 0.10% or less.

F-167

This hole was drilled due north from the site of F-163 at an angle of 50° to the horizontal. A sharp, rather than transitional, sulfide contact was found at 98.7 feet. (Most ~~of the holes~~ currently being drilled have encountered large partially oxidized zones before entering clean sulfides.) The base of oxidation nearly coincided with a contact between syenodiorite (?) and monzonite. Syenodiorite (?) was cored from the collar to 94.7 feet and from 420.5 feet to the bottom of the hole at 475.3 feet. The interval between was occupied by monzonite and contained nearly all of the 342.7 feet of ore averaging 0.61/0.02. The ore was unusually uniform with only the first two intervals containing more than one percent copper while only one interval assayed less than 0.30%.

Strong clay and moderate to strong sericite was noted. Sulfides were mostly fine grained and evenly disseminated rather than being concentrated in veinlets or on fractures.

F-168

This vertical hole was drilled to a depth of 367.0 feet in December and completed to a final depth of 500.5 feet in January. The hole was in monzonite except for two intervals of dacite porphyry (?), the largest extending from 194 to 274 feet. The leached capping contains all varieties of limonite in abundance including live limonite, jarosite, hematite and botryoidal crusts. Partially oxidized sulfides containing one 18 foot ore interval were found from 74.3 to 230.5 feet where clean ore began. Including the ore penetrated in January, a total thickness of 176.9 feet averaging 0.91/0.04 was found. The top of this ore zone is 100 feet lower than the top of adjacent ore intercepts. This irregularity could be due either to post-chalcocite faulting or deep oxidation with an accompanying re-precipitation of the chalcocite. The primary mineralization appears to be less than 0.10% as in other holes in this area.

R C Edmiston

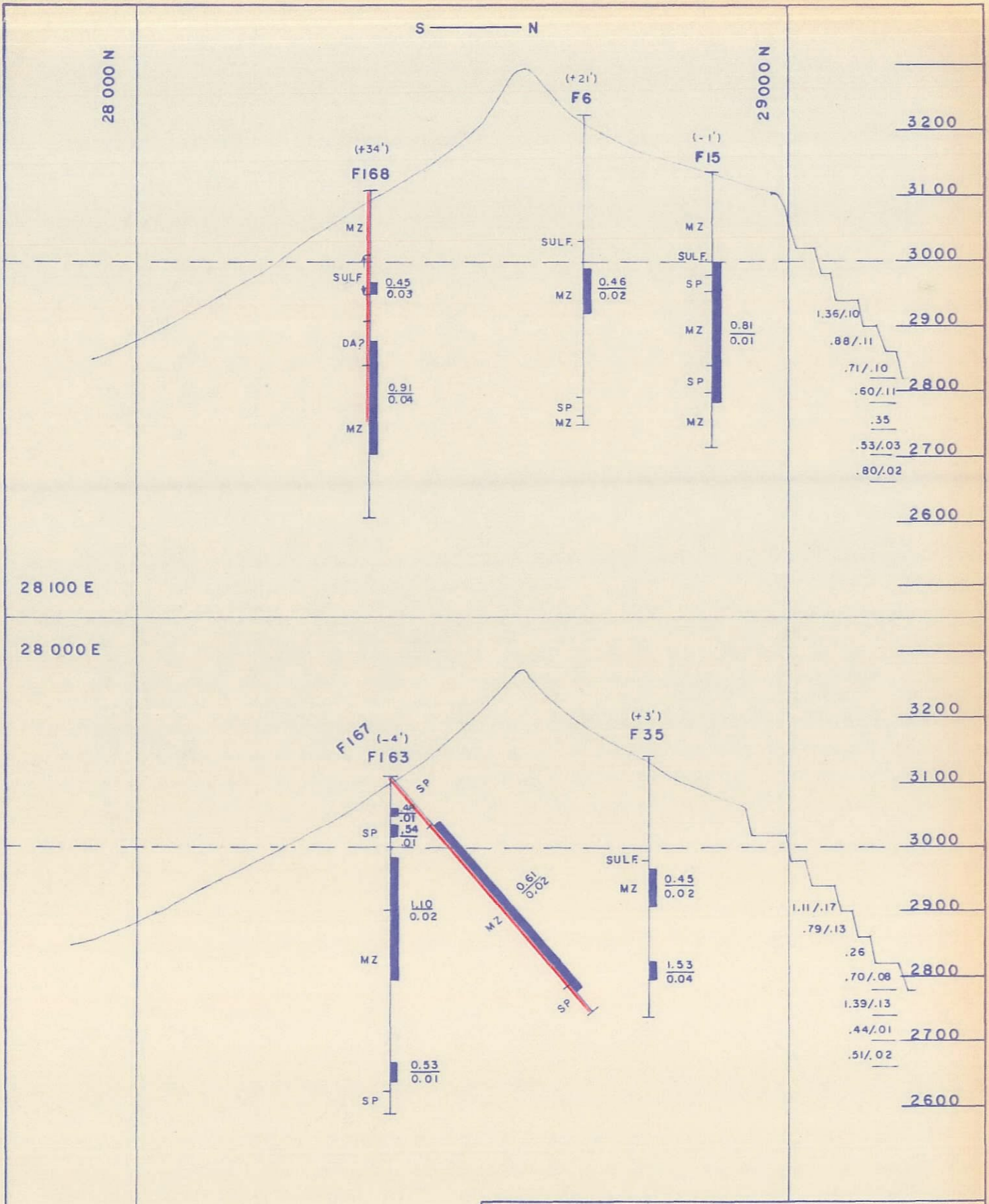
R. C. Edmiston
Resident Geologist

RCE:jca

DIAMOND DRILLING PROGRESS REPORT

Hole No.	Elevation	Coordinates North	Coordinates East	+0.40% Copper Lenses Depth to Top	Thickness	Avg. % Cu Total	Avg. % Cu N.S.	Ft. Drill. During Mo.	Depth End Mo.	Final Depth
[1] F-165	3113.26	28,388.59	27,996.32	No plus 0.40% intervals				43.9	575.2	575.2
[2] F-166	3153.14	28,532.15	28,571.02	324.9	8.9	0.50	0.02	637.0	637.0	637.0
				371.5	14.8	0.47	0.01			
				418.0	89.6	0.49	0.02			
				609.4	27.6	0.55	0.01			
[3] F-167	3113.26	28,388.59	27,996.32	98.7	342.7	0.61	0.02	475.3	475.3	475.3
F-168	3110.55	28,358.43	28,134.76	149.2	18.0	0.45	0.03	367.0	367.0	-
				230.5	136.5	1.04	0.05			
							TOTAL	1,523.2		

1 F-165 drilled due east from site of F-163 at an angle of -48°
2 F-166 " " " " " F-162 " " " " -55°
3 F-167 " " north " " " F-163 " " " " -50°



+ 0.4% Total Copper

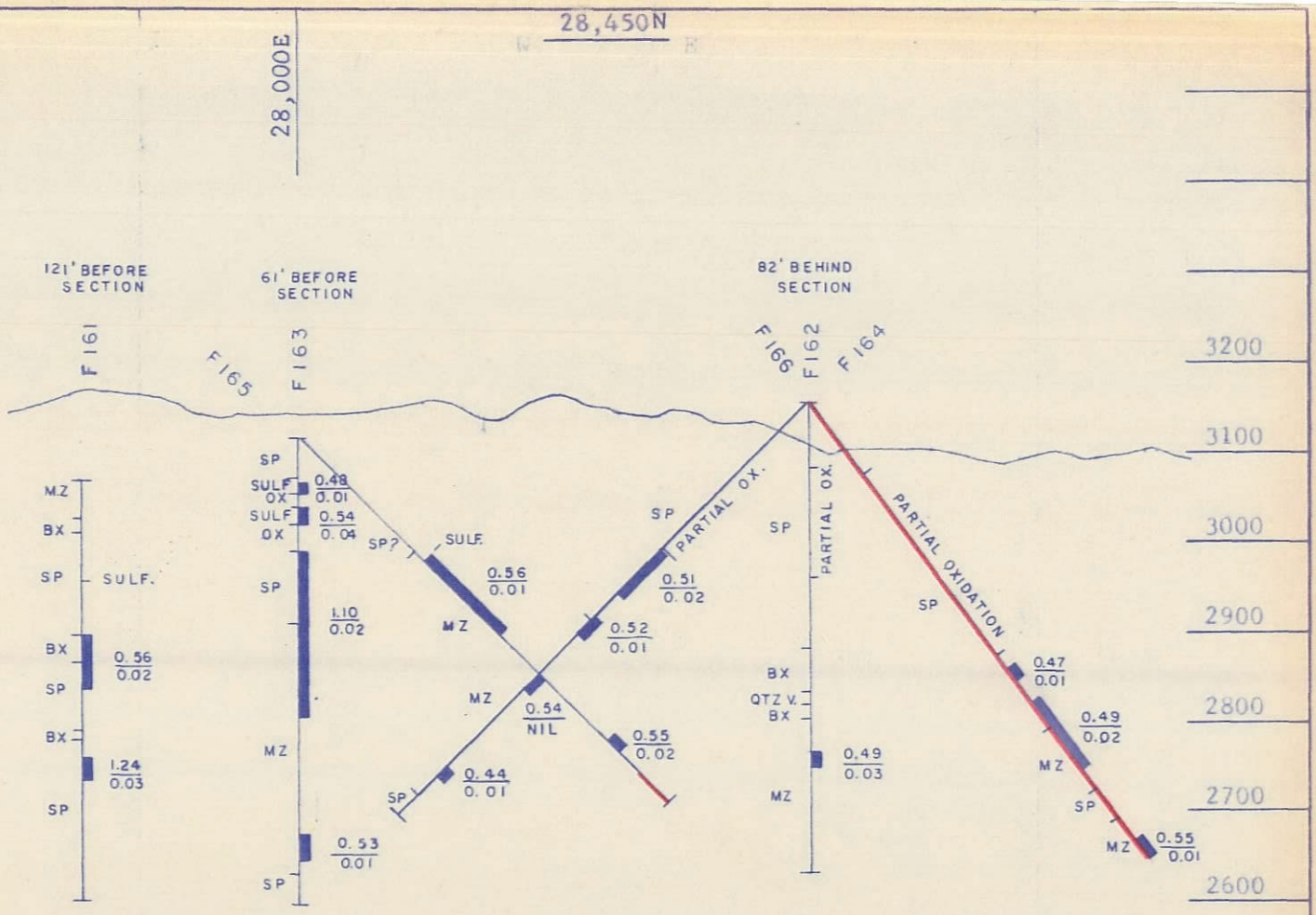
Advance for month

Note: Rock Types Generalized
Cu Assay is Total Cu/Non Sul. Cu

AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT

PORTLAND RIDGE
DRILL HOLE PROJECTIONS

SCALE	DRAWN	DATE	FILE
1" = 200'	RCE	JAN 1 1969	S 121 A



+ 0.4% Total Copper

Advance for month

Note: Rock Types Generalized
Cu Assay is Total Cu/Non Sul. Cu

AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT

PORTLAND RIDGE
DRILL HOLE PROJECTIONS

SCALE	DRAWN	DATE	FILE
1" = 200'	RCE	JAN 1 1969	S 121 A

OXIDE PIT PERIMETER

EAST WASTE DUMP

EAST EXTENSION NO. 2

MILL AREA

30000 N

29000 N

28000 N

26000 E

27000 E

28000 E

29000 E

30000 E

MOD.—ST. LEACHED OUTCROPS.

AREA OF OVERALL STRONGEST MINERALIZATION AND ALTERATION.

1-100; OXIDE COPPER CO. CHURN DRILL HOLES

101-188; ASARCO CHURN DRILL HOLES

F-1; OXIDE AREA DIAMOND DRILL HOLES

P-1; PROPOSED DRILL HOLES

HOLES DRILLED OR DRILLING DURING MONTH

WILL CARRY OVERBURDEN[1]

WILL NOT, BUT HAS AT LEAST ONE BENCH OF ORE

WILL NOT, AND HAS LESS THAN ONE BENCH OF ORE

.4 NUMBER OF ORE BENCHES

[1] BASED ON 38¢ COPPER AND 19¢ STRIPPING COST

MODIFIED BY RCE, 9/9/68

AMERICAN SMELTING & REFINING CO.

SILVER BELL UNIT

OXIDE PIT AREA

SCALE:	DATE:	FILE:
1" = 200'	JAN 1 1969	S-121-211D
DRAWN BY: CWH	5/7/63	

AMERICAN SMELTING AND REFINING COMPANY
SILVER BELL UNIT
Silver Bell, Arizona

January 16, 1969

MEMORANDUM TO: Mr. D. R. Jameson, Superintendent

Subject: QUARTERLY GEOLOGIC REPORT

ODIXE PIT

Mining during the fourth quarter advanced the 2660 level west and north in ore and leach grade syenodiorite and monzonite. Rock type and mineralization were similar to the same location on the 2700 level. Further expansion north between the western perimeter and 27,400E should encounter ore grade syenodiorite and monzonite.

EL TIRO PIT

During the past quarter mining was carried out on the 2680 and 2630 levels and on Page Hill and Union Ridge.

2670 Level

Mining on the east extension of 2670 level encountered slightly larger amounts of hornfels, tactites, and monzonite than in the same location on the 2710 level. Ore and leach was restricted to the tactites and hornfels with the monzonite and dacite being waste.

2630 Level

Mining on the 2630 level encountered hornfels and tactites in the El Tiro Fault Zone and monzonite to the southeast. Rock type is generally the same as in the same location on the 2670 level. Expansion southeast to coordinates 35,806N, 17,400E. should encounter ore grade monzonite. To the east and northeast greater amounts of leach and waste should be present in dacite and monzonite.

UNION RIDGE AND PAGE HILL

Mining in oxidized sediments continued on the 3080 level of Union Ridge and the 3105 level of Page Hill.

Page Hill

Mining on the 3105 level was in strongly faulted and sheared hornfels and tactites. Minor amounts of unoxidized sulfides were present. The ratio of sulfide copper to oxide copper was about 1.0 on the east increasing slightly to the west.

Union Ridge

Mining on the 3080 level was in faulted hornfels and tactites roofed by altered monzonite. The tactites are hematite stained and contain small amounts of malachite and chrysocolla. The monzonite is strongly altered and contains trace amounts of malachite, chrysocolla, and galena. Unoxidized chalcopyrite ore was encountered in the north end of the ridge.

(RCE For)
L. J. Jansen
Geologist

SLOPE STABILITY

Oxide Pit

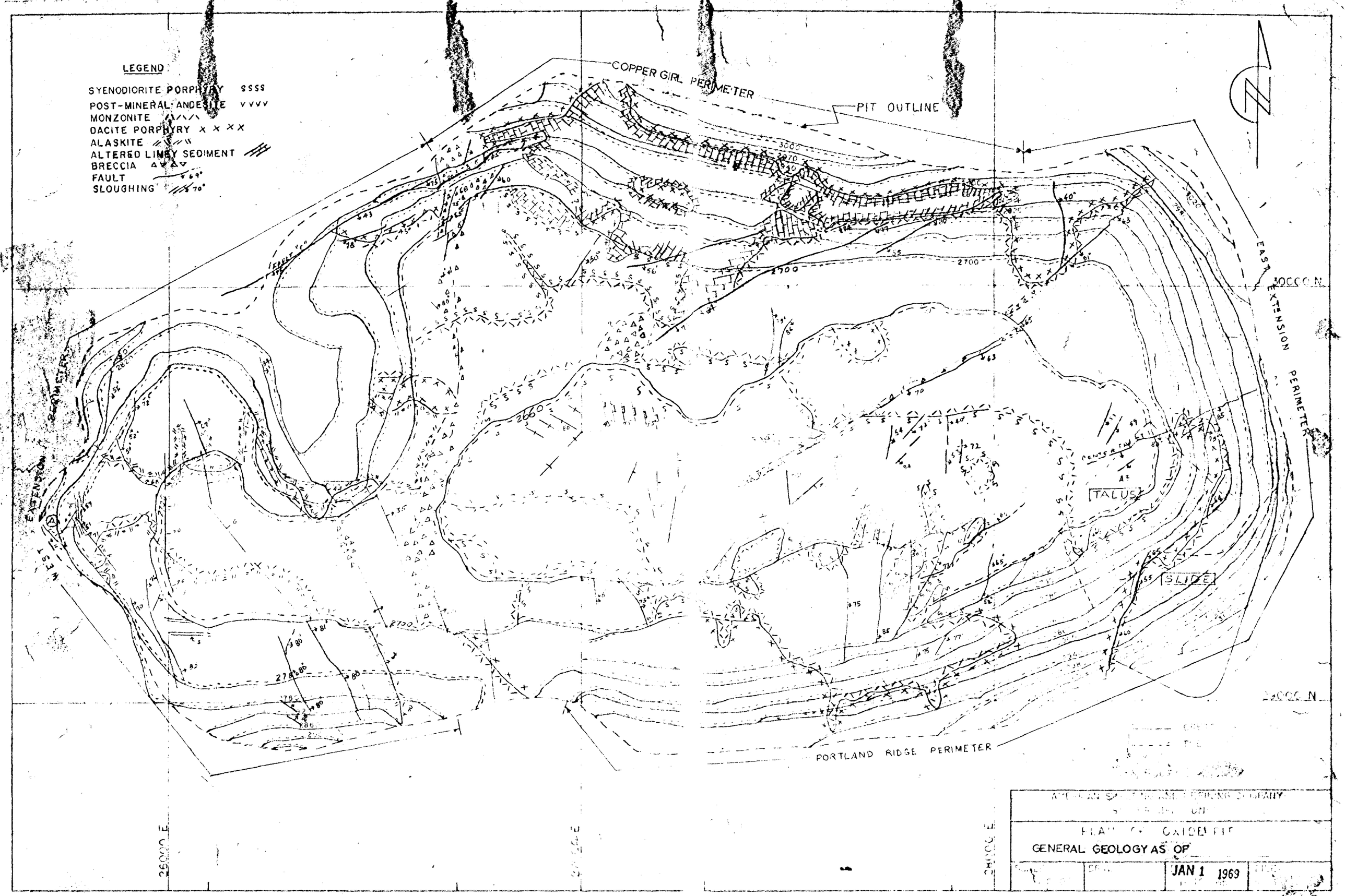
The slide zone in the southeast corner of Oxide Pit continued to creep during the past quarter, however, no new slides have taken place. The zone is presently stable, but continuing creep could lead to further large scale sliding.

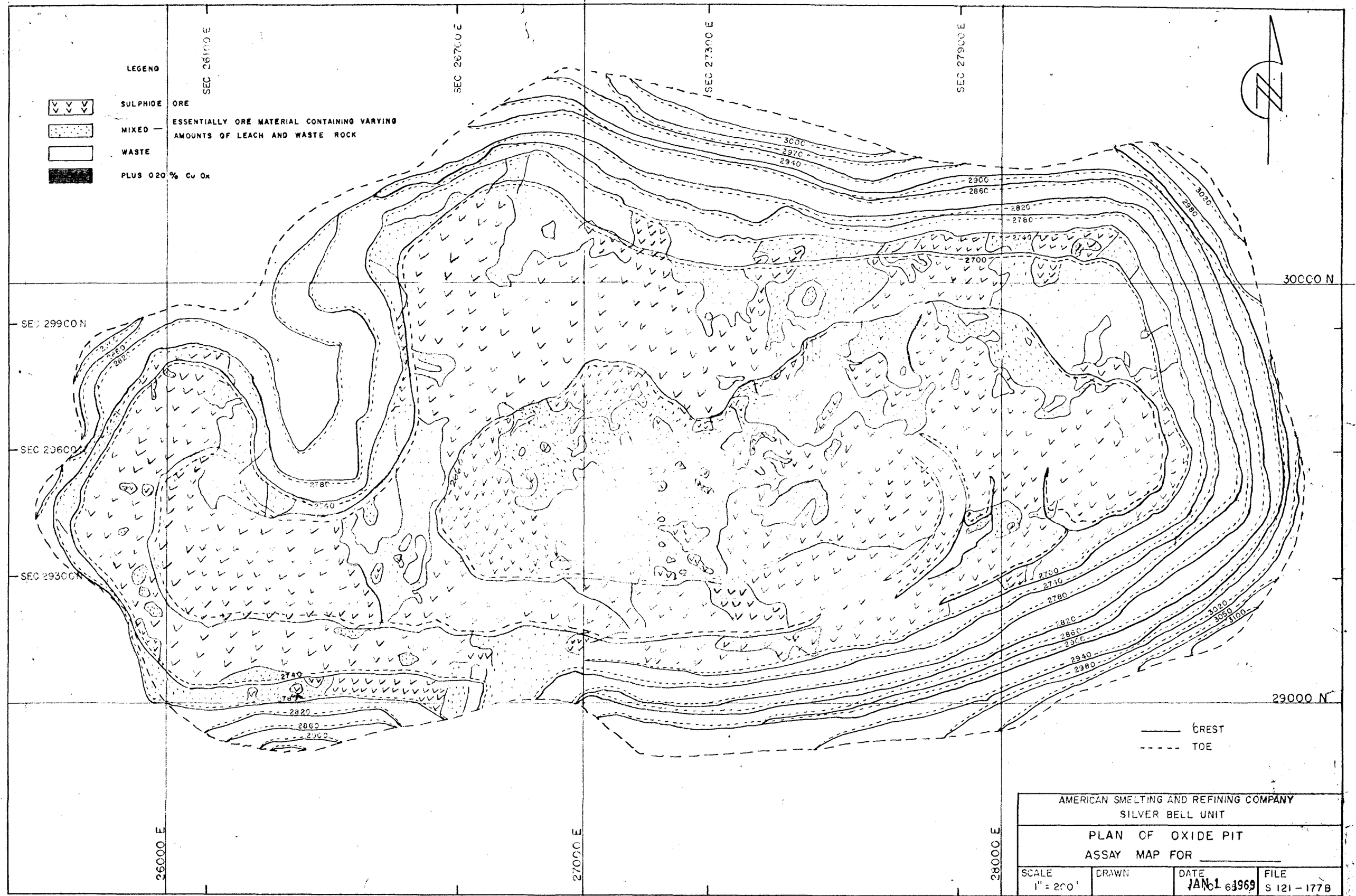
El Tiro Pit

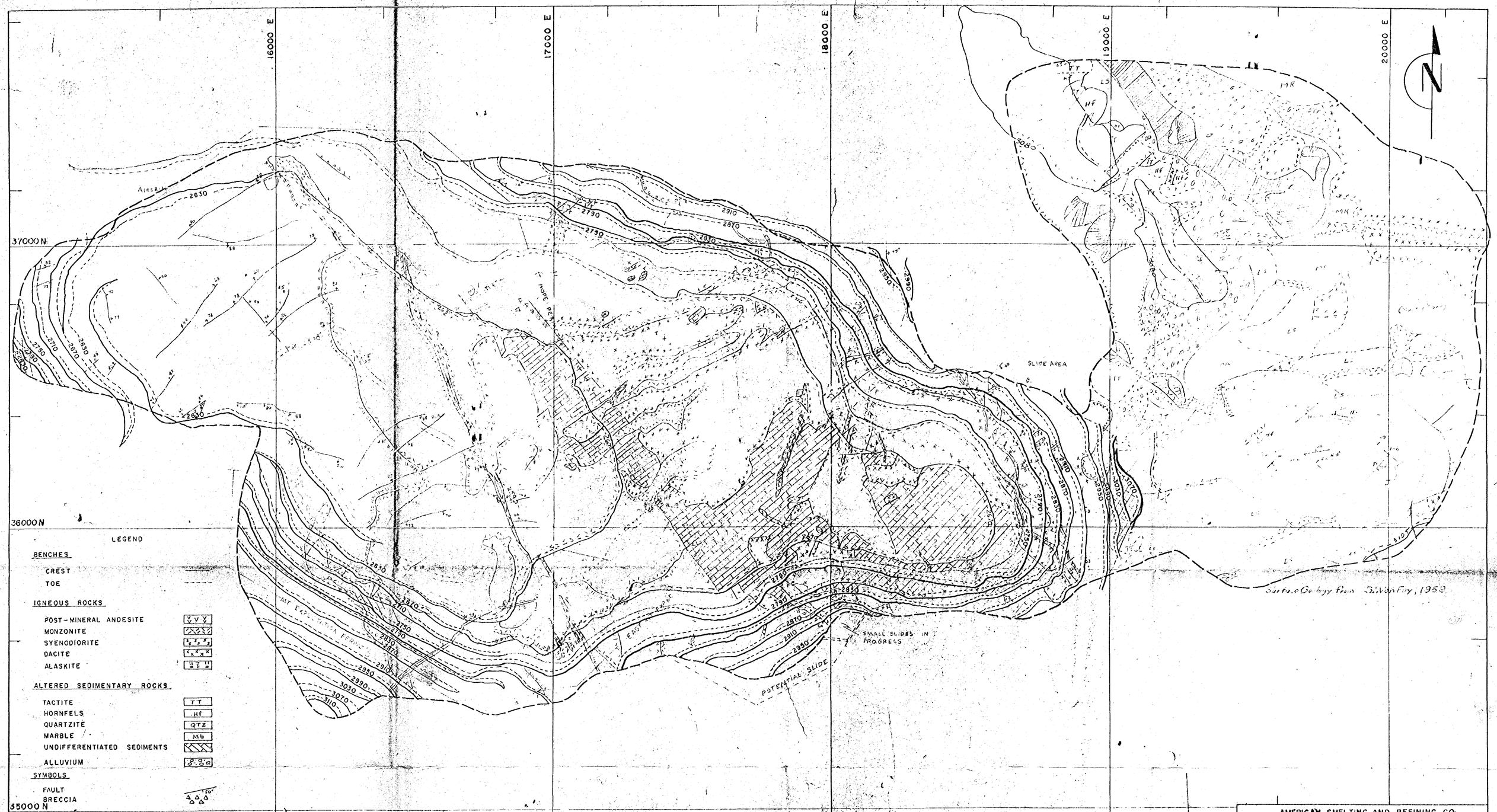
The potential slide on the south perimeter of El Tiro Pit (shown on the Geologic Map of El Tiro Pit) continues to move at this time. Twelve survey pins were installed on this zone in April, 1968. Measurements were taken in April and June, 1968 and on January 3, 1969. Between June, 1968 and January, 1969, the crests of the upper two levels dropped 0.61 to 1.16 feet relative to a "stable" point behind the slump. Similarly, aggregate movement outwards, towards the pit, from a "Stable" point to the crest averaged about one foot. At this rate of movement, about 2 feet per year, the slide will become a serious problem within two or three years. If the slide is accelerating and continues to accelerate a general failure of some sort will probably occur in less than three years. More periodic measurements will be necessary to determine the rate of acceleration of the rock mass.

R. C. Edmiston
R. C. Edmiston
Resident Geologist

RCE:jca


LEGEND
SYENODIORITE PORPHYRY SSSS
POST-MINERAL ANDESITE VVVV
MONZONITE
DACITE PORPHYRY X X X X
ALASKITE
ALTERED LIMEY SEDIMENT
BRECCIA
FAULT
SLOUGHING
COPPER GIRL PERIMETER
PIT OUTLINE
EAST EXTENSION PERIMETER
WEST EXTENSION
PORTLAND RIDGE PERIMETER
TALUS
SLIDE
FAULT "C"
2700
2660
2780
25000 E
30000 N
AMERICAN SMELTING AND REFINING COMPANY
PLAN OF OXIDE PIT
GENERAL GEOLOGY AS OF
JAN 1 1969

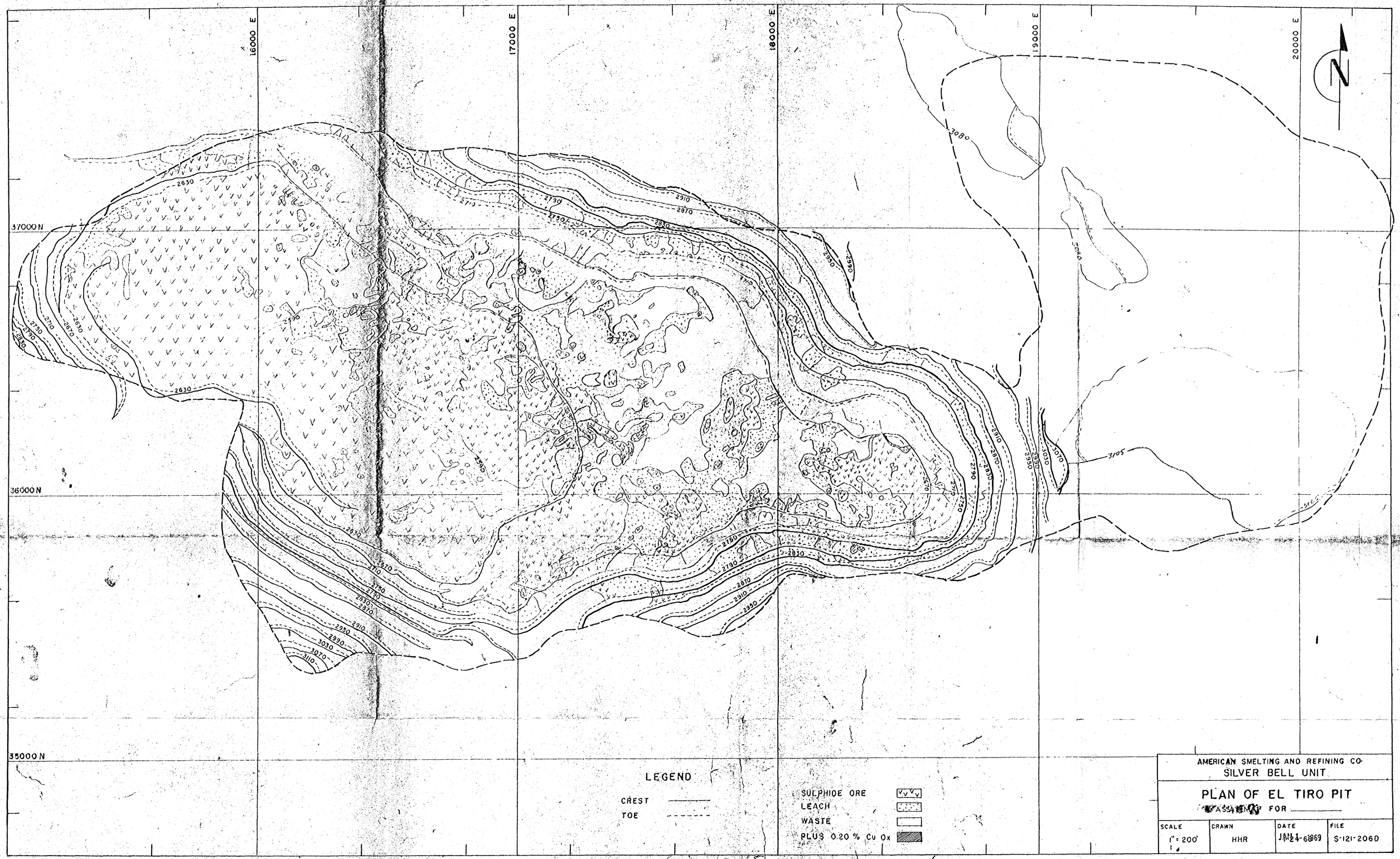

LEGEND
SULPHIDE ORE
MIXED — ESSENTIALLY ORE MATERIAL CONTAINING VARYING AMOUNTS OF LEACH AND WASTE ROCK
WASTE
PLUS 0.20 % Cu Ox
SEC 26100 E
SEC 26700 E
SEC 27300 E
SEC 27900 E
30000 N
29000 N
SEC 29900 N
SEC 29600 N
SEC 29300 N
26000 E
27000 E
28000 E
3000
2970
2940
2900
2860
2820
2780
2740
2700
3020
2980
3050
3100
CREST
TOE
AMERICAN SMELTING AND REFINING COMPANY
SILVER BELL UNIT
PLAN OF OXIDE PIT
ASSAY MAP FOR
SCALE 1" = 200'
DRAWN
DATE JAN 1 6 1969
FILE S 121 - 177B



AMERICAN SMELTING AND REFINING CO.
SILVER BELL UNIT

PLAN OF EL TIRO PIT
GEOLOGY FOR

SCALE	DRAWN	DATE	FILE
1" = 200'	HHR	JAN 1 1969 1-24-68	S-121-2060


16000 E
17000 E
18000 E
19000 E
20000 E
37000 N
36000 N
35000 N
N
LEGEND
CREST
TOE
SULPHIDE ORE
LEACH
WASTE
PLUS 0.20 % Cu Ox
AMERICAN SMELTING AND REFINING CO.
SILVER BELL UNIT
PLAN OF EL TIRO PIT
FOR
SCALE
1" = 200'
CRAWN
HHR
DATE
JAN 24 1969
FILE
S-121-206D

Mr. J. H. Courtright

AMERICAN SMELTING AND REFINING COMPANY
SILVER BELL UNIT
Silver Bell, Arizona

J.H.C.
JAN 4 1969

December 16, 1968

MEMORANDUM TO: Mr. D. R. Jameson, Superintendent

Subject: MONTHLY REPORT - SILVER BELL UNIT DRILLING PROGRAM, PORTLAND RIDGE - NOVEMBER, 1968

During November, 1968, two skid mounted drills operated two shifts per day, six days per week on the south side of Portland Ridge. Vertical holes F-162 and F-163 and angle hole F-164 were completed. Angle hole F-165 was nearly completed and angle hole F-166 was started.

The footage drilled and the average direct drilling costs for November, 1968, are:

Drill	Footage Drilled	Advance Per Shift	Average Direct Cost Per Foot
Diamond - Skid - Vertical	613.3	23.6	$ 7.01
Diamond - Skid - Angle	1,178.1	21.8	8.08
TOTAL	1,791.4		
	Combined average		$ 7.71

The attached table summarizes the drilling results.

The attached vertical section shows that an economic thickness and grade of ore has been penetrated under the west end of Portland Ridge. In addition, preliminary results on a hole drilled in December at an angle of 50° to the north from the site of F-163 indicates that the ore zone penetrated south of the ridge line is continuous with the ore found between the ridge and Oxide Pit. Several additional holes will be necessary to outline the dimensions of this ore body and these are shown on the accompanying map. Drilling on the east end of the ridge has revealed a thick, sub-ore grade, partially oxidized chalcocite zone.

Descriptions of the footage drilled in November appear below.

F-162

This hole was drilled from 330.7 feet to a final depth of 525.9 in November. The only ore found in the hole assayed 0.49/0.03 (Total/Non-Sulfide) from 399.8 to 407.7 feet. However, leach grade chalcocite mineralization extended to 454.0 feet for an overall enriched thickness of 251.3 feet.

The advance was in strongly altered monzonite with some intervals being recrystallized or altered beyond recognition.

F-163

This hole was advanced from 103.4 to a final depth of 521.5 feet in November. Beginning at 125.7 feet a 183.0 foot ore thickness assaying 1.10/0.02 Cu was penetrated. This is the greatest thickness of plus 0.80% copper drilled to date south of the Oxide Pit perimeter. The sulfides occured mostly as discrete dissiminated grains rather than as veinlets or concentrations along fractures. A fine grained porphyritic rock, logged as syenodiorite porphyry (?), extends from the surface down to a monzonite contact at 205.1 feet. The monzonite continues to 478.9 feet where a series of alternating monzonite and syenodiorite (?) intervals begins and continues to the bottom of the hole. (Some of the intervals logged as syenodiorite on Portland Ridge may actually be pre-mineral volcanics probably Mt. Lord Ignimbrite, which is known to exist in the mill area. However, both units are fine grained and difficult to distinguish when strongly altered or recrystallized.).

F-164

This hole was drilled due west from the site of F-162 at an angle of 45°. A mixed zone of sulfides and limonite existed from the collar to 231.9 feet down the hole. Chalcocite ore was penetrated from 231.9 to 299.0 and 338.4 to 363.3, the interval 299.0 to 338.4 having been leached. The interval from 363.3 to 431.0 averaged only 0.07% copper but this was followed by a low grade enriched zone averaging 0.31% for the remaining 215.8 feet to the bottom of the hole. Syenodiorite (Ignimbrite ?) was cored from the collar to 348.3 feet where monzonite was encountered. Syenodiorite (?) was again found at 620.0 and persisted to the bottom of the hole. Clay alteration was strong overall and was accompanied by weak to moderate visible sericite.

F-165

This hole was drilled east from the site of F-163 at an angle of 45°. Strongly leached capping with no remnant sulfides exists from the collar to a distance of 173.3 feet. Minor sulfides are found from 173.3 to 196.5 where a 118.7 foot ore intercept begins. This zone is followed by waste to 475.4 feet where another low grade enriched zone begins which averages 0.30% total copper for 99.8 feet to the bottom of the hole. The latter zone contains one ore interval of 18.5 feet.

Silicification and alteration in this hole has so obscured the texture that most of the core could not be identified with certainty. However, it appeared that the finer grained porphyritic rock found at the collar persisted to 189.0 where monzonite (?) was encountered. Below 385.0 very strong silicification or recrystallization and alteration rendered the rock unidentifiable.

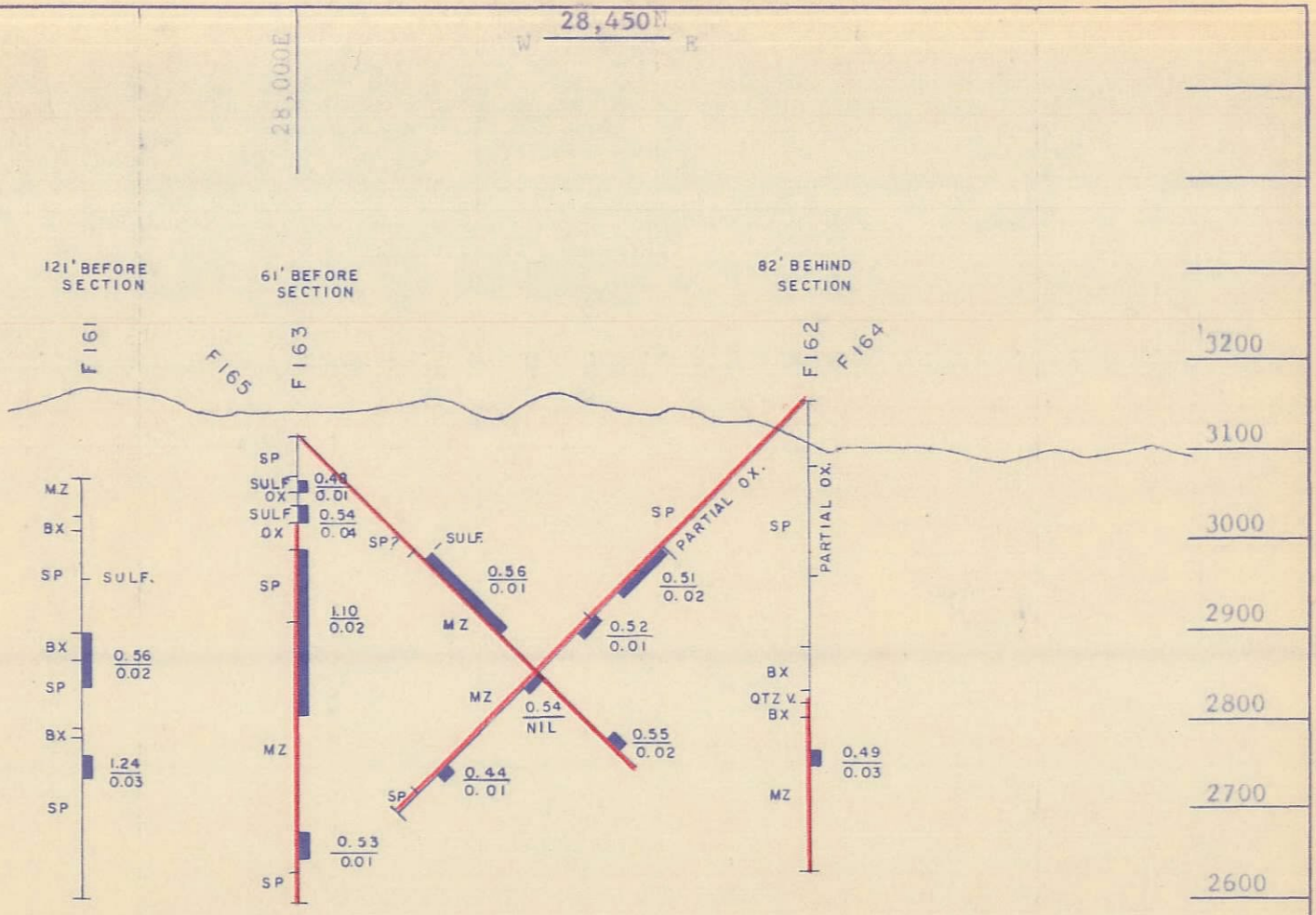
R. C. Edmiston

R. C. Edmiston
Resident Geologist

RCE:jca

DIAMOND DRILLING PROGRESS REPORT - November, 1968

Hole No.	Elevation	North	East	+0.40% Copper Lenses Depth to Top	Thickness	Avg. % Cu Total	Avg. % Cu N.S.	Feet Drilled During Month	Depth To End Month	Final Depth
F-162	3153.14	28,532.15	28,571.02	389.8	17.9	0.49	0.03	195.2	525.9	525.9
F-163	3113.26	28,388.59	27,996.32	125.7	183.0	1.10	0.02	418.1	521.5	521.5
				441.8	27.7	0.53	0.01			
F-164	-47° angle hole, drilled due west from site of F-162			231.9	67.1	0.51	0.02	646.8	646.8	646.8
				338.4	24.9	0.52	0.01			
				431.0	12.0	0.70	Nil			
				573.0	10.9	0.44	0.01			
				620.0	7.2	0.95	0.01			
F-165	45° angle hole, drilled due East from site of F-163			196.5	118.3	0.56	0.01	531.3	531.3	-
				483.9	18.5	0.55	0.02			
						TOTAL		1,791.4		



▮ + 0.4% Total Copper

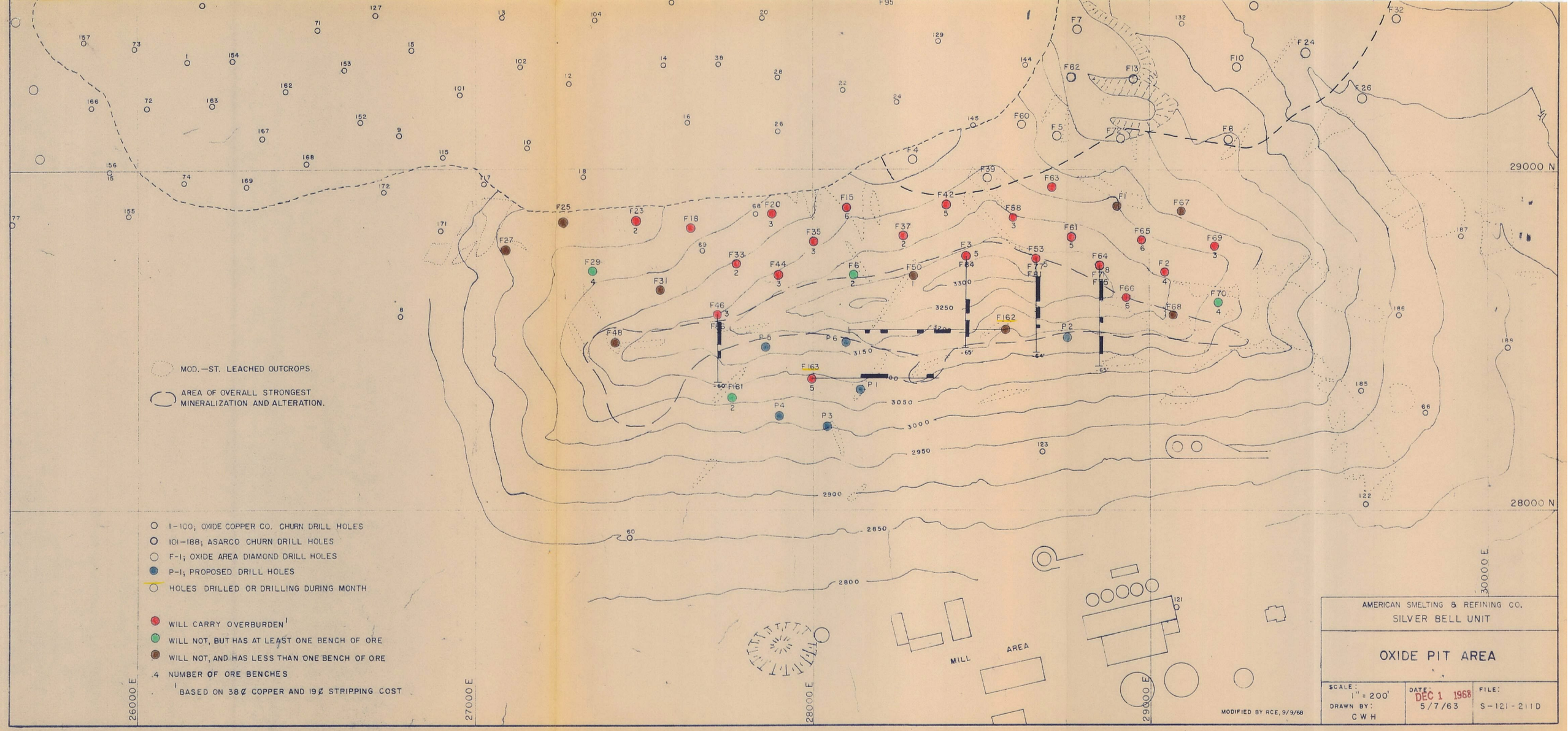
| Advance for month

Note: Rock Types Generalized
Cu Assay is Total Cu/Non Sul. Cu

AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT

PORTLAND RIDGE
DRILL HOLE PROJECTIONS

SCALE	DRAWN	DATE	FILE
1" = 200'	RCE	DEC 1 1968	S 121 A


MOD.—ST. LEACHED OUTCROPS.
AREA OF OVERALL STRONGEST MINERALIZATION AND ALTERATION.
1-100; OXIDE COPPER CO. CHURN DRILL HOLES
101-188; ASARCO CHURN DRILL HOLES
F-1; OXIDE AREA DIAMOND DRILL HOLES
P-1; PROPOSED DRILL HOLES
HOLES DRILLED OR DRILLING DURING MONTH
WILL CARRY OVERBURDEN[1]
WILL NOT, BUT HAS AT LEAST ONE BENCH OF ORE
WILL NOT, AND HAS LESS THAN ONE BENCH OF ORE
.4 NUMBER OF ORE BENCHES
[1] BASED ON 38¢ COPPER AND 19¢ STRIPPING COST
29000 N
28000 N
26000 E
27000 E
28000 E
29000 E
30000 E
3300
3250
3150
3050
3000
2950
2900
2850
2800
MILL
AREA
MODIFIED BY RCE, 9/9/68
AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT
OXIDE PIT AREA
SCALE: 1" = 200'
DRAWN BY: CWH
DATE: DEC 1 1968 5/7/63
FILE: S-121-211D

Mr. Courtright

S-1.1

AMERICAN SMELTING AND REFINING COMPANY
SILVER BELL UNIT
Silver Bell, Arizona

J. H. C.

August 26, 1968

AUG 28 1968

MEMORANDUM TO: Mr. D. R. Jameson, Superintendent

Subject: MONTHLY REPORT - SILVER BELL UNIT DRILLING PROGRAM EL TIRO PIT, NORTHWEST SILVER BELL, NORTH BUTTE, AND OXIDE PIT AREAS, JULY, 1968

During the month of July, 1968, two truck mounted diamond drills were operated one or two shifts per day, six days per week. (The reduction in shifts was due to vacations.) At the beginning of the month one drill was completing D-308 in El Tiro pit while the other was drilling magnetic anomallies in the Northwest Silver Bell area. The drill in El Tiro Pit was moved to North Butte, where F-158 and F-159 were drilled, and then to Oxide Pit where the first of two proposed 1,500 foot holes was collared on the 2660 level. The other drill remained in the Northwest Silver Bell area throughout the month.

The footage drilled and the average direct drilling cost for the month of July, 1968 are:

Total footage: 2,063.5 feet.
Average advance per shift: 22.7 feet.
Average direct cost per foot: $7.22.

The attached table summarizes the drilling results.

EL TIRO AREA

The last of four holes proposed to test for sedimentary ore at depth in the North El Tiro Hill Area, D-308, was completed in July. In summary, several short intervals of low grade (less than 0.60%) ore have been penetrated by three holes, D-198E, D-216E and D-308. Holes D-198E and D-216E are churn drill holes which were deepened. These contain enough shallow mineralization to carry the overburden, but not enough mineralization was uncovered by deepening the holes to warrant any additional deep drilling in this area at the present time. Hole D-308 penetrated several ore horizons, separated by larger intervals of waste, which do not appear to carry the overburden. A summary of the footage drilled in July is given below.

D-308 - This hole was drilled to a depth of 651.5 feet in June. Hornfels were encountered to 670.2, except for an andesite dike from 654.9 to 659.3. Monzonite was then penetrated to a depth of 695.0 where there was a fault contact with alaskite. A post-mineral andesite dike, dipping 55° to 62°, was encountered from 751.2 to 772.5 where monzonite was again found. A complex sequence of short intervals of monzonite, post-mineral andesite and hornfels persisted to the bottom of the hole at 947.9 feet. No ore was encountered from 651.5 feet to the bottom.

NORTHWEST SILVER BELL AREA

Drilling on three magnetic anomallies, outlined on the attached map of this area, commenced in June with D-309. Two holes, D-309 and D-310 have been completed and are described below. Two ore intervals were penetrated by D-310 and although these do not carry the overburden they are extremely interesting because most of the mineralization was in the form of primary hornite rather than chalcopyrite and also because this is the first sedimentary ore penetrated in this area. (Bornite contains 63.3% copper, by weight; chalcopyrite contains 34.5% copper).

D-309 - This hole was described to a depth of 73.8 feet last month. The hole continued in alaskite which was cut by numerous aplite dikes to a depth of 100.4 feet. The alaskite persisted to the bottom of the hole at 510.0 and was cut by several more thin aplite dikes.

Disseminated magnetite was found throughout the hole in amounts visually estimated at 1/2% to 1%. (The core frequently attracted a light, strong magnet held 1/4 inch away.) The ratio of magnetite to pyrite was about 1:1 with magnetite sometimes exceeding pyrite in abundance. The plagioclose was altered to a green clay mineral while the orthoclase was generally unaltered. The abundance of magnetite and chlorite and the intensity of plagioclase alteration increased with depth. Traces of moly were noted as well as a trace of galena at about 390 feet. The highest copper assay reported was 0.09%.

D-310 - Strongly broken dacite occurred from the collar to a depth of 45.4 feet where a 5.9 foot xenolith (?) of garnet-diopside hornfels was found. The dacite then continued to 131.5 feet where a 5.3 foot intercept of massive epidote occurred. Silicified and chloritized dacite then occurred and continued to a depth of 228.8 feet where another remnant of hornfels, 11.2 feet thick, was followed by a silicified monzonite dike, 3 feet thick. Hornfels were then found from 243.0 feet to 580.2 feet except for post-mineral andesite dikes in the intervals 271.2-273.9 and 294.3 - 301.2 and a dense, unfractured quartzite from 341.0 to 359.0.

Two ore intercepts occurred. At 402.3 feet there began a 35.7 foot intercept assaying 0.89/0.01 (Total copper/Non-Sulfide copper). Mineralization was primarily hornite with some chalcopyrite in a gangue of wollastonite and calcite. At a depth of 518.9 feet a 10.7 foot intercept assaying 6.02/.01 occurred, followed by 4.4 feet assaying 0.68/0.01. Again the mineralization was mostly primary bornite, this time in a gangue of dolomite in which the bornite occurred as discrete grains. The hole was stopped in dacite at a depth of 590.4 feet.

NORTH BUTTE AREA

Two holes were drilled on North Butte in July at the request of Mr. J. H. Courtright. Although the outcrops in this area exhibit strong alteration no successful drilling had been carried out. A previously drilled churn drill hole entered a post-mineral dike and a diamond drill hole, F-149, spotted on very strong igneous capping encountered sediments near the surface.

Both hole F-158 and F-159 encountered moderate to strong non-sulfide minerals at the surface but failed to penetrate any sulfide values greater than 0.15%.

No further holes are recommended in this area at this time.

F-158 - This hole was drilled to a depth of 297.8 feet entirely in monzonite. Abundant jarosite and turquoise (9.6% CuO by weight) were noted near the surface. The first 25.6 feet averaged 0.22% in non-sulfides. Sulfide boxworks were lined with jarosite crystals. Pyrite and weak chalcocite were first noted at 43 feet; however, oxidation along fractures persisted to 206.7 feet. Moderate to strong alteration persisted the length of the hole. A very high pyrite to chalcopyrite ratio was noted (5 or 10 to 1).

F-159 - This hole was very similar to F-158. After 20.0 feet of rockbit, monzonite was cored to a depth of 352.7 feet. Jarosite and green copper staining were noted at the surface with the first interval assaying 0.42/0.29 from 20.0 to 29.6. The 0.42% copper is probably entirely in the form of non-sulfides with the indication of sulfides being due to difficulties in assaying certain copper oxides. Sulfides were noted at 79.4 feet; however, oxidation persisted to depth along fractures. Alteration was moderate to strong overall.

OXIDE PIT

The first of two proposed deep holes to check for a possible increase in primary mineralization with depth was started from the bottom of Oxide Pit in July.

F-160 - This hole was collared from a ramp on the 2660 level and rockbitted to 12.0 feet. Syenodiorite porphyry was cored from 12.0 to 65.2 feet and from 69.6 to 85.6 feet with monzonite occupying the intervals 65.2 to 69.6 and 85.6 - 90.7 feet. Moderate to strong clay alteration and silification were noted. The interval from 12.0 to 29.3 had an average assay of 0.40/0.31. The strong non-sulfides probably are due to recent, post-mine, oxidation, as this level was covered by about three feet of water for several weeks. Weak secondary orthoclase was also noted.

(Mr. R. H. Luning had charge of the drilling from July 22 to August 5 and originated parts of the above descriptions).

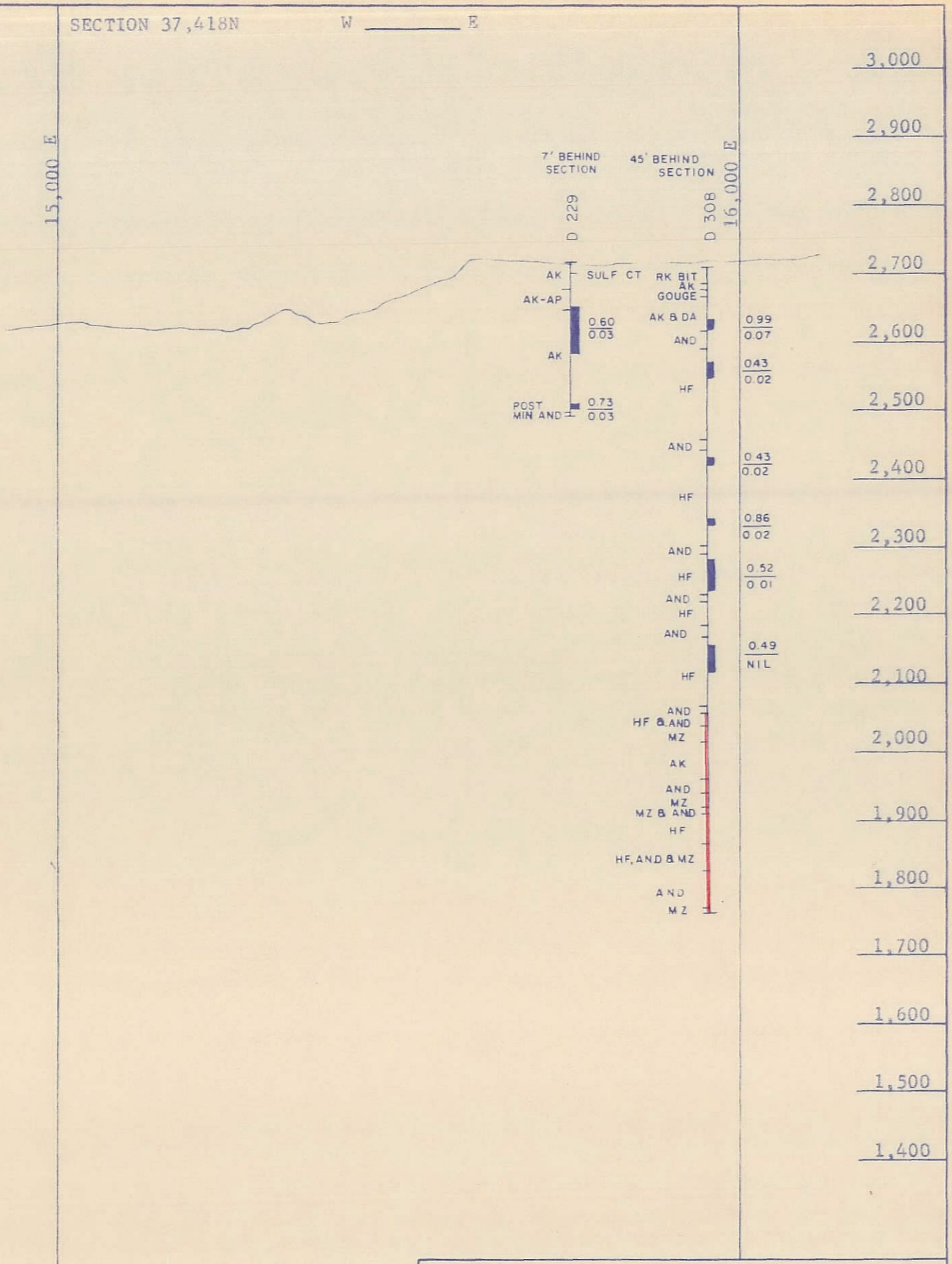
R.C. Edmiston

R. C. Edmiston
Resident Geologist

RCE:jca

DIAMOND DRILLING PROGRESS REPORT - JULY, 1968

Hole No.	Approx. Elevation	Approx. Coordinates North	Approx. Coordinates East	+0.40% Copper Lenses Depth to Top	Thickness	Avg. % Cu Total	Avg. % Cu N.S.	Ft. Drill. During Mo.	Depth End Mo.	Final Depth
D-308	2,712.51	37,463.49	15,951.56	No plus 0.40% this interval				296.4	947.9	947.9
D-309	2,694.46	39,701.14	14,456.14	" "	"	"	"	436.2	510.0	510.0
D-310	2,694.99	39,481.92	14,901.12	402.3	35.7	0.89	0.01	590.4	590.4	590.4
				518.9	15.1	4.46	0.01			
F-158	2,912.06	30,668.42	22,859.99	No plus 0.40% Cu this interval				297.8	297.8	297.8
F-159	2,897.14	30,873.75	23,026.09	" "	"	"	"	352.7	352.7	352.7
F-160	2,664.30	29,646.85	27,731.34	" "	"	"	"	90.0	90.0	-
						Total		2,063.5		



+ 0.4% Total Copper

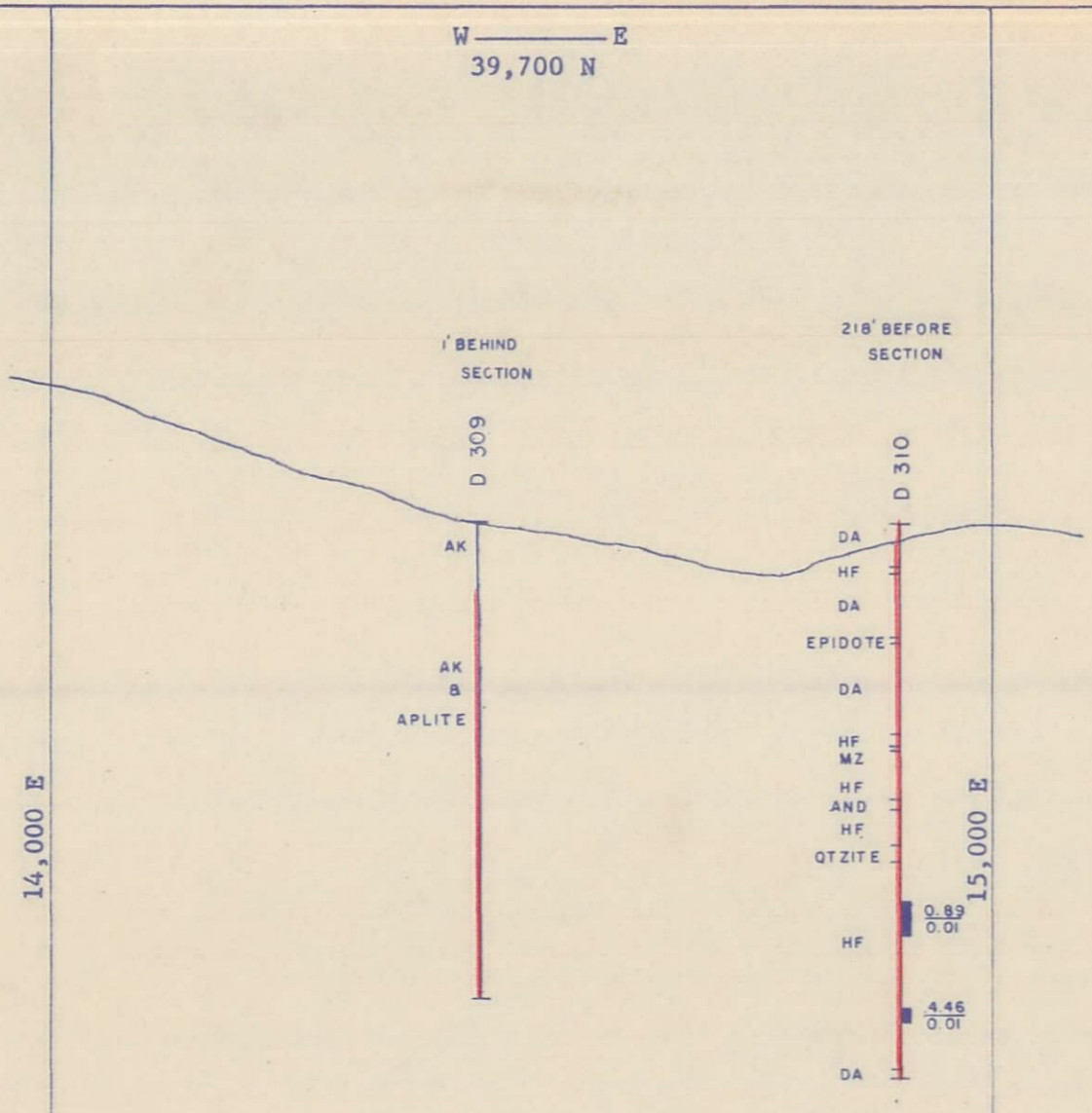
Advance for month

Note: Rock Types Generalized
Cu Assay is Total Cu/Non Sul. Cu

AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT

DAISY SHAFT - NORTH EL TIRO HILL AREA
DRILL HOLE PROJECTIONS

SCALE	DRAWN	DATE	FILE
1" = 200'		AUG 1 1960	S 121 A



+ 0.4% Total Copper

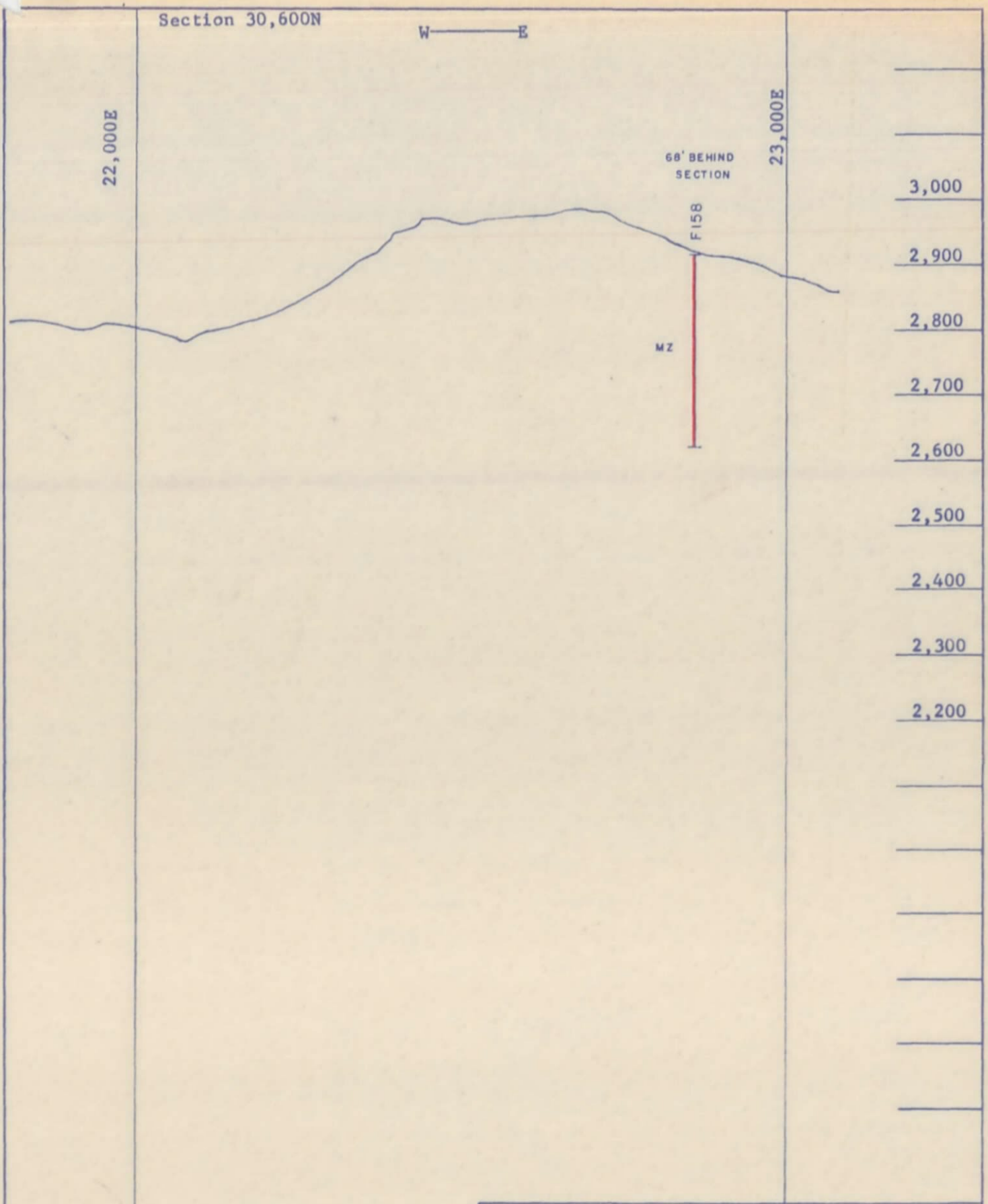
Advance for month

Note: Rock Types Generalized
Cu Assay is Total Cu/Non Sul. Cu

AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT

NORTH WEST SILVER BELL AREA
PROJECTED DRILL HOLE

SCALE	DRAWN	DATE	FILE
1" = 200'	RCE	AUG 1 1968	S 121 A



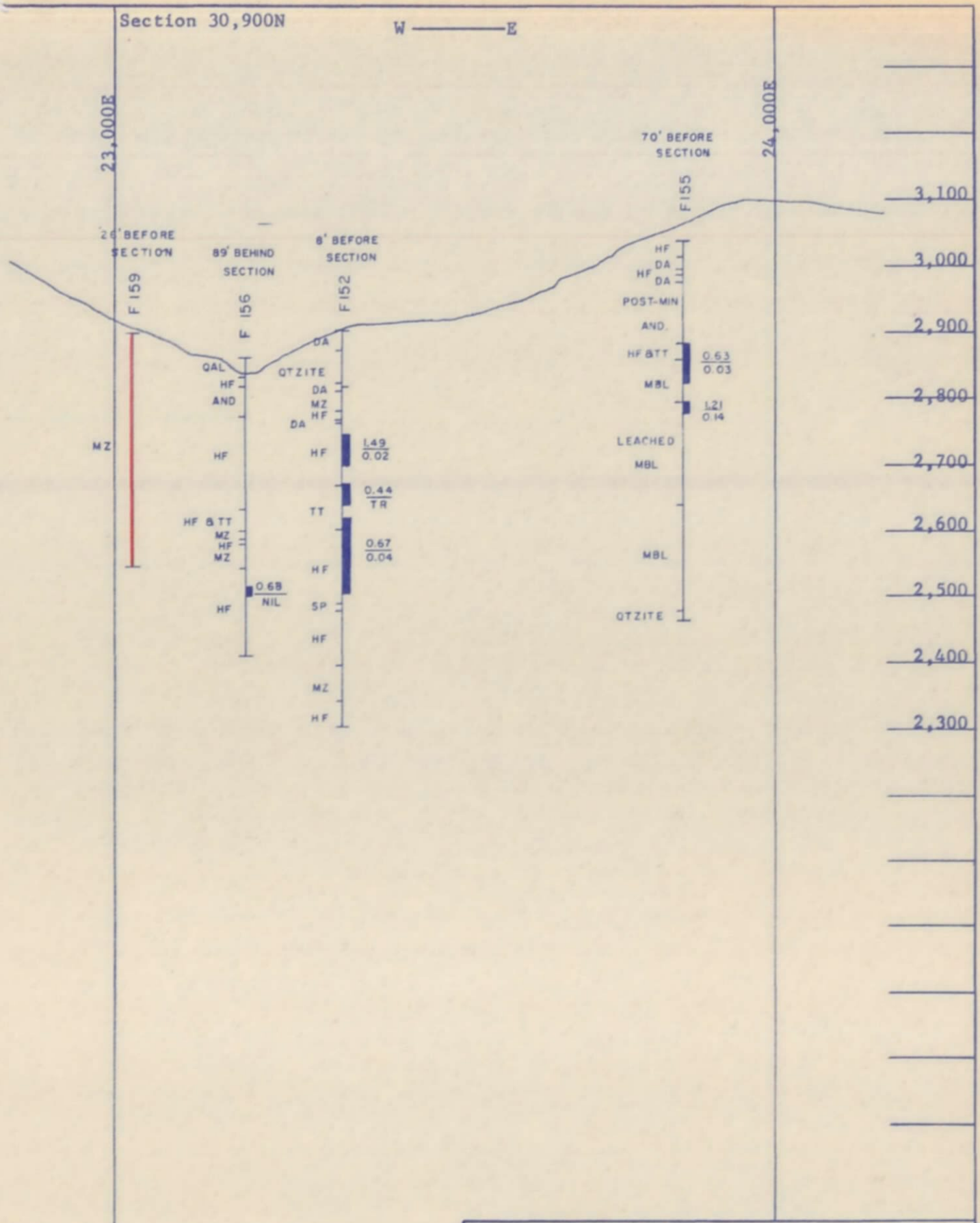
■ + 0.4% Total Copper
| Advance for month

Note: Rock Types Generalized
Cu Assay is Total Cu/Non Sul. Cu

AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT

NORTH BUTTE
DRILL HOLE PROJECTIONS

SCALE	DRAWN	DATE	FILE
1" = 200'	RCE	AUG 1 1968	S 121 A



▮ + 0.4% Total Copper

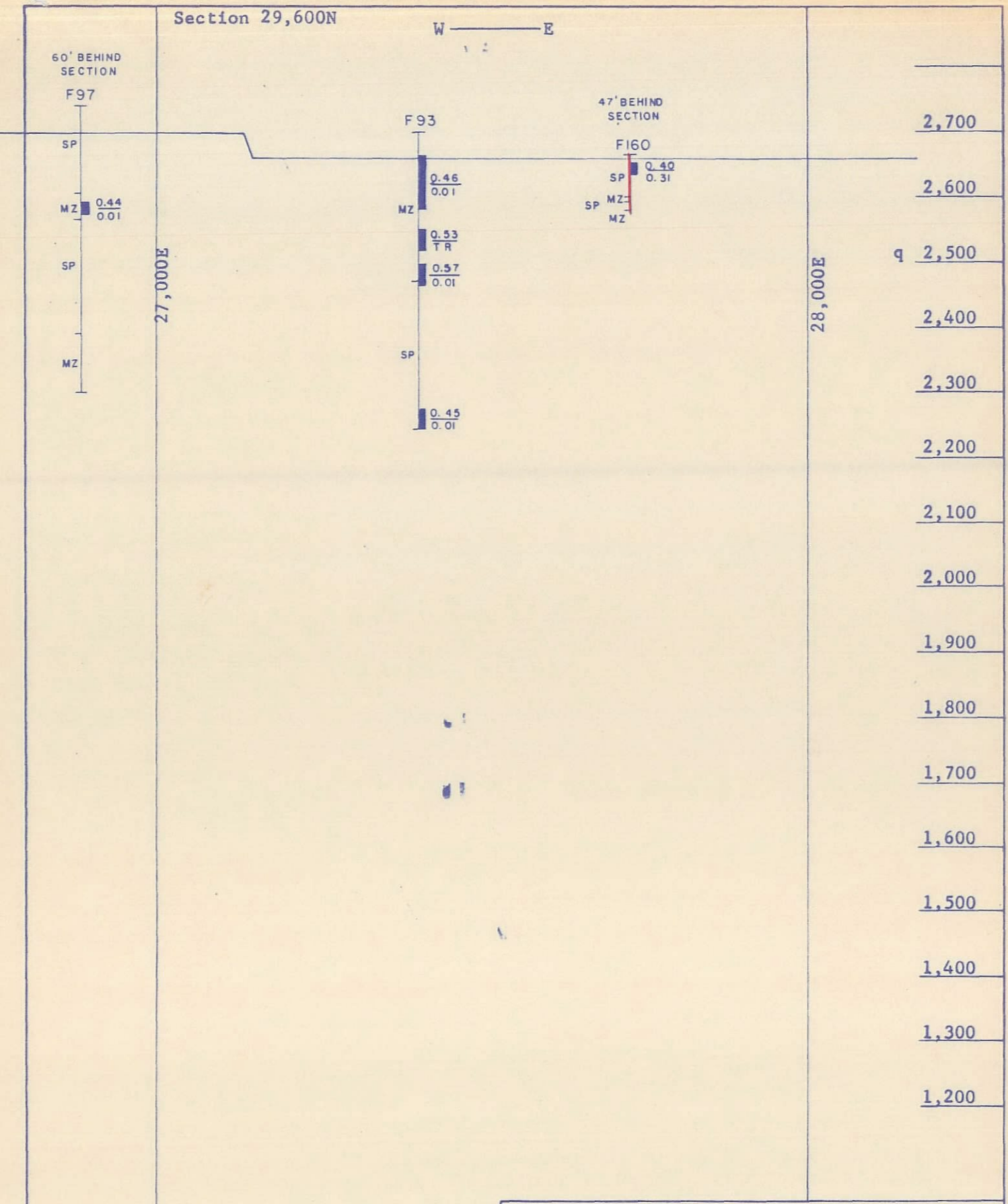
| Advance for month

Note: Rock Types Generalized
Cu Assay is Total Cu/Non Sul. Cu

AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT

DANUBE AREA
DRILL HOLE PROJECTIONS

SCALE	DRAWN	DATE	FILE
1" = 200'	RCE	AUG 1 1968	S 121 A



+ 0.4% Total Copper

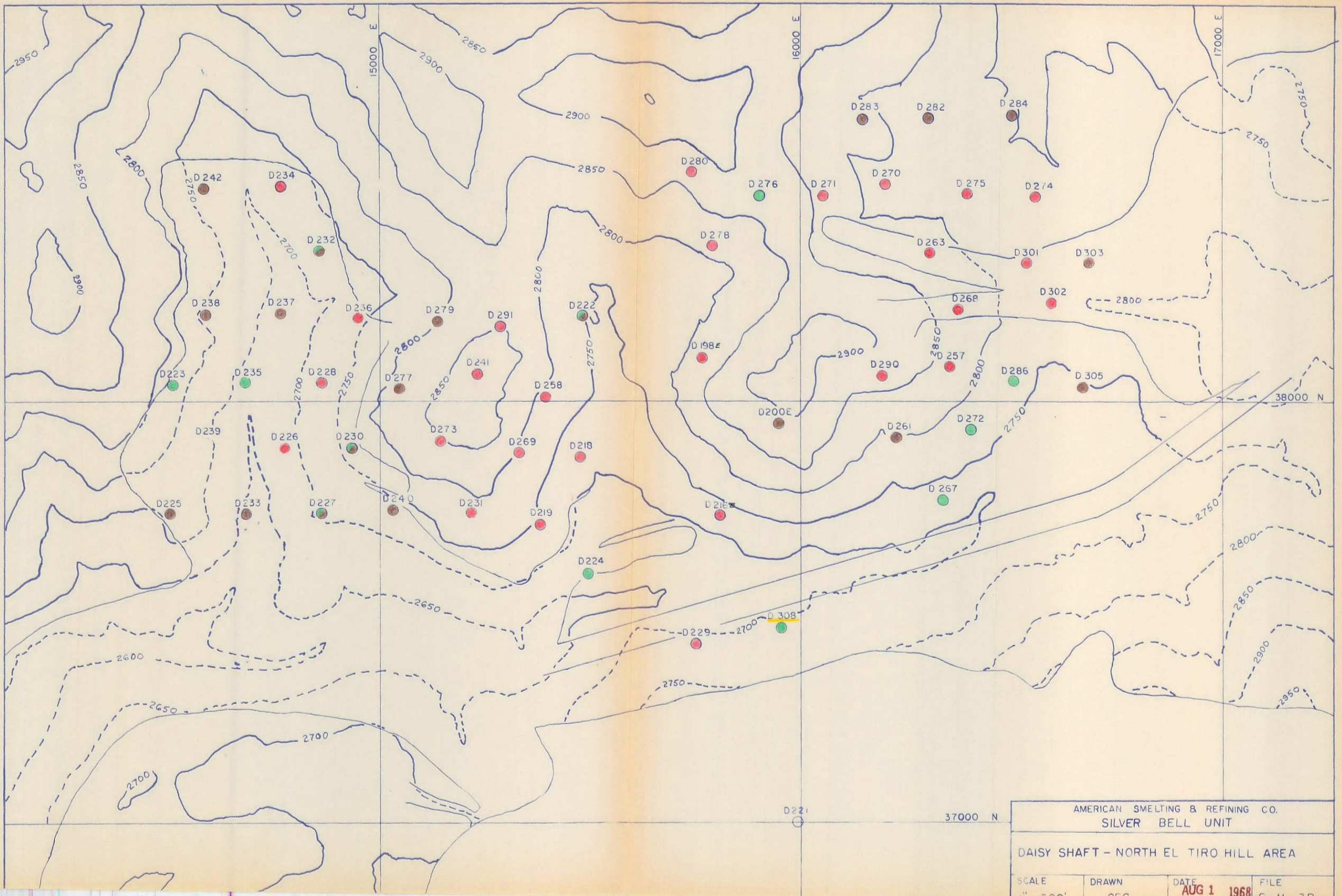
Advance for month

Note: Rock Types Generalized
Cu Assay is Total Cu/Non Sul. Cu

AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT

OXIDE PIT
DRILL HOLE PROJECTIONS

SCALE	DRAWN	DATE	FILE
1" = 200'	RCE	AUG 1 1968	S 121 A



AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT

DAISY SHAFT - NORTH EL TIRO HILL AREA

SCALE	DRAWN	DATE	FILE
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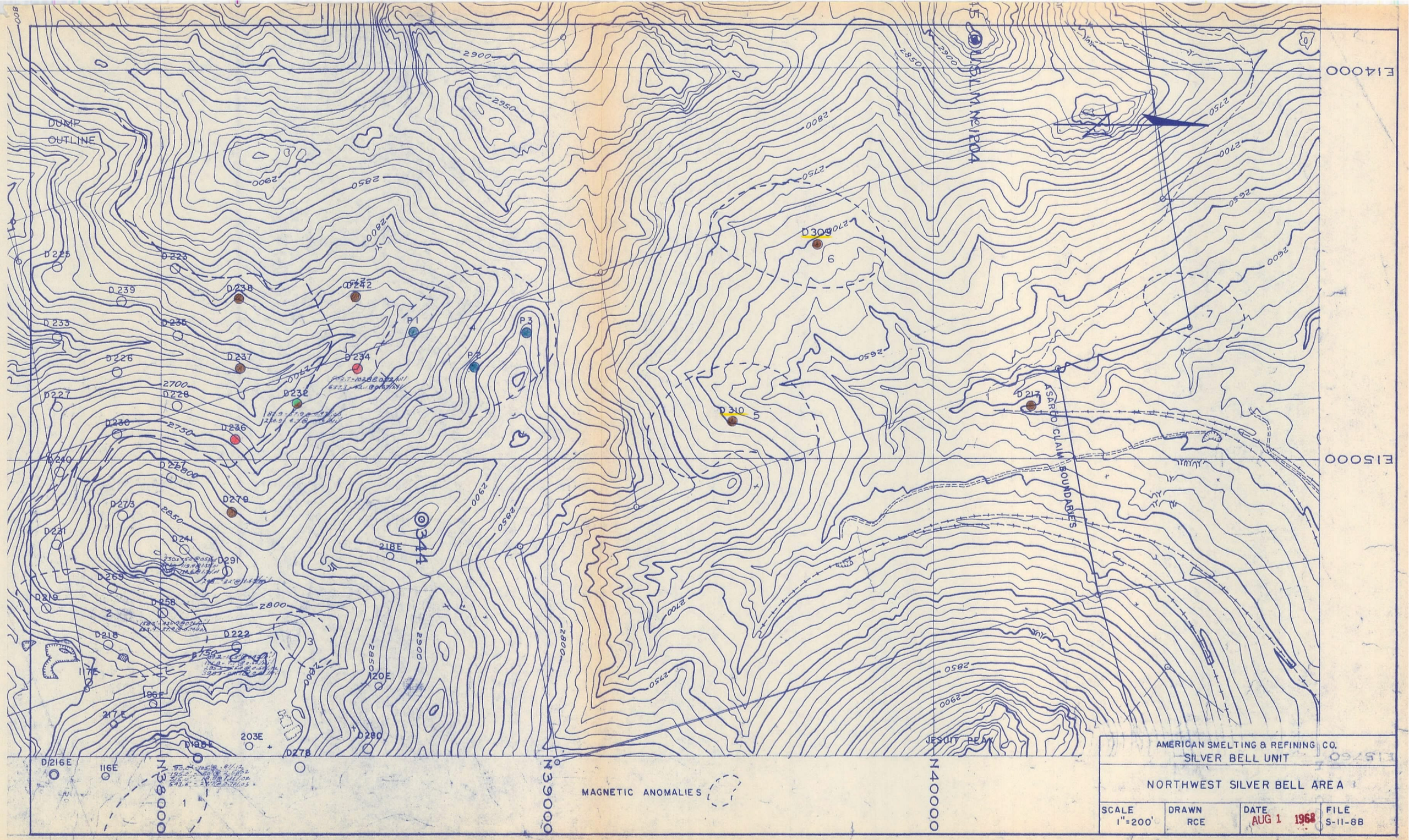
DUMP OUTLINE
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D223
D239
D238
D242
D233
D235
D226
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D234
D227
D228
D232
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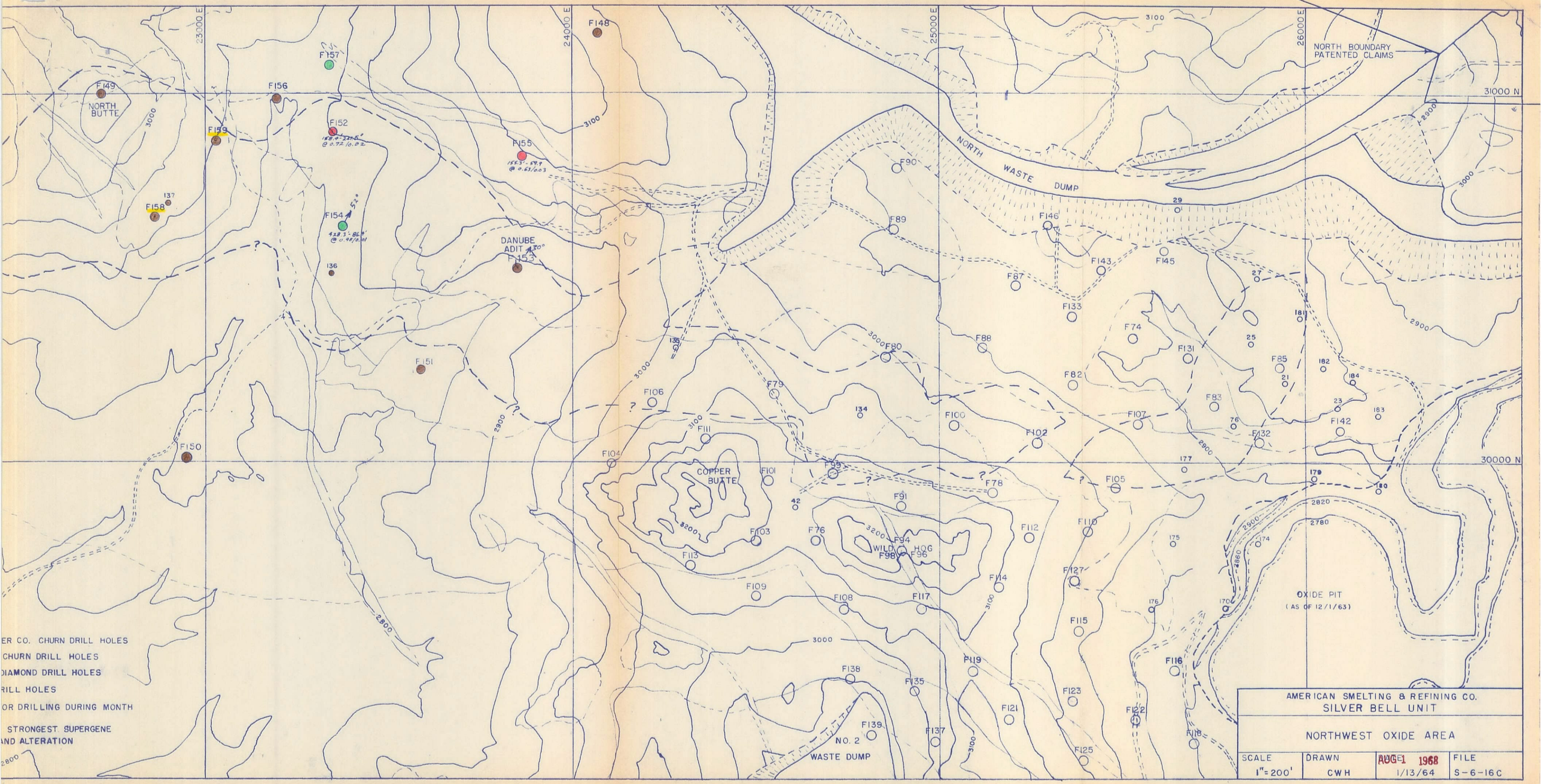
D240
D255
D279
D273
D241
D291
D221
D269
D219
D258
D222
D218
D216E
116E
D198E
203E
D278
D280
196E
217E
120E
218E
D309
6
D310
5
D217
ASARCO CLAIM BOUNDARIES
JESUIT PEAK
MAGNETIC ANOMALIES
N38000
N39000
N40000
E14000
E15000
E15760
2900
2950
2850
2800
2750
2700
2650
2600
AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT
NORTHWEST SILVER BELL AREA
SCALE 1"=200'
DRAWN RCE
DATE AUG 1 1968
FILE S-11-88


23000 E
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NORTH BOUNDARY PATENTED CLAIMS
NORTH WASTE DUMP
NORTH BUTTE
DANUBE ADIT
COPPER BUTTE
WILD HOG
OXIDE PIT
(AS OF 12/1/63)
NO. 2 WASTE DUMP
F148
F149
F156
F157
F152
F155
F158
F154
F153
F151
F150
F90
F89
F146
F143
F145
F87
F133
F88
F80
F74
F131
F85
F82
F83
F107
F132
F142
F106
F79
F100
F102
F111
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F101
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F108
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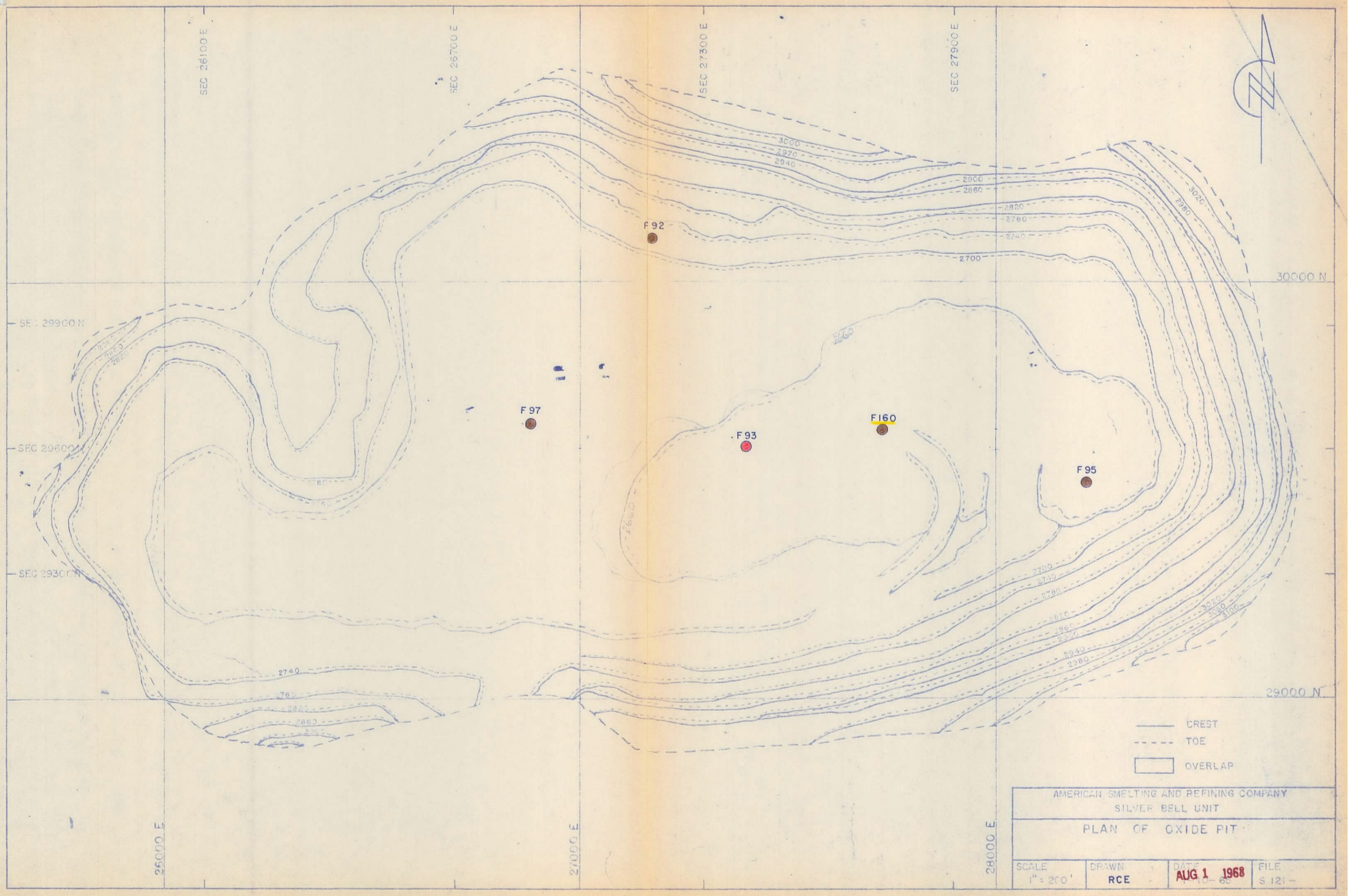
AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT
NORTHWEST OXIDE AREA
SCALE 1"=200'
DRAWN CWH
AUG 1 1968
1/13/64
FILE S-6-16C
ER CO. CHURN DRILL HOLES
CHURN DRILL HOLES
IAMOND DRILL HOLES
RILL HOLES
OR DRILLING DURING MONTH
STRONGEST SUPERGENE
AND ALTERATION


SEC 26100 E
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AMERICAN SMELTING AND REFINING COMPANY
SILVER BELL UNIT
PLAN OF OXIDE PIT
SCALE
1" = 200'
DRAWN
RCE
DATE
AUG 1 1968
FILE
S 121 -

Mr. Courtright

S 1.1

AMERICAN SMELTING AND REFINING COMPANY
SILVER BELL UNIT
Silver Bell, Arizona

June 1968

J.H.C.
JUL 11 1968

MEMORANDUM TO: Mr. D. R. Jameson, Superintendent

Subject: MONTHLY REPORT - SILVER BELL UNIT DRILLING PROGRAM
NORTH EL TIRO HILL AND DANUBE AREAS, MAY, 1968

During the month of May, 1968, two drills were operated at Silver Bell, working two shifts per day, six days per week. A truck mounted diamond drill was used to deepen churn drill hole 216-E on North El Tiro Hill and then was moved to Danube Hill, west of Oxide pit, to drill a vertical hole. An angle hole skid mounted diamond drill completed one hole and began another on Danube Hill.

The footage for each drill and the average direct drilling costs for May 1968 are:

Drill	Footage Drilled	Average Advance per Shift	Average Direct Cost per Foot
Diamond - Truck	1,021.5	23.2'	$ 7.68
Diamond - Skid, Angle	937.9	22.9'	8.00
TOTAL	1,959.4	Combined Average	$ 7.84

The attached table summarizes the drilling results.

NORTH EL TIRO HILL AREA

Four churn drill holes in the vicinity of North El Tiro Hill have been selected for deepening to check for possible deep seated chalcopyrite ore in the sediments. The first of these, D198E, was completed in April and described in last month's report. The second, D216E, was completed in May and a summary of the geology is given below. The results of the first two holes are not encouraging although some ore has been found. These holes do confirm that the sediments plunge westerly under the alaskite. Also, it is significant to note that the greatest thicknesses of ore drilled to date have occurred in the sediments immediately below the alaskite.

D216E

This hole started in alaskite at a depth of 455.9 feet. The alaskite contained xenoliths of mineralized hornfels beginning at 490 feet and continuing to the hornfels contact at 499.4 feet. A syenodiorite (?) dike cut the hornfels from 543.3 to 558.6. This dike was followed by 59.2 feet of ore in hornfels and tactites averaging 0.47% total copper and 0.01% non-sulfide copper. The ore interval was more sheared than surrounding rock and contained moderate to strong serpentine and 2 to 4 percent pyrite; no magnetite was observed.

DIAMOND DRILLING PROGRESS REPORT - MAY, 1968

Hole No.	Elevation	Coordinates North	Coordinates East	+0.40% Copper Lenses Depth to Top	Thickness	Aver. % Copper Total	Aver. % Copper N. S.	Ft. Drill. During Mo.	Depth End Mo.	Final Depth
F-153*	2897.26	30,528.85	23,849.04	230.3	9.9	0.46	0.02	286.4	507.4	507.4
				273.7	18.8	0.75	0.03			
				401.8	9.5	0.54	Nil			
F-154**	2880.75	30,638.04	23,372.93	316.6	12.5	0.47	0.01	651.5	651.5	
				390.2	20.9	0.71	0.11			
				428.3	86.4	0.48	0.01			
F-155	3039.07	30,830.19	23,860.61	155.3	59.9	0.63	0.03	573.5	573.5	573.5
				246.1	15.6	1.21	0.14			
				261.9	57.0	0.52	0.33			
D216E	2722.42	37,735.38	15,807.10	588.6	59.2	0.47	0.01	448.0	903.9	903.9
							TOTAL	1,959.4		

* Angle hole - 30° plunge; N30°E
** Angle hole - 52° plunge; N30°E

Below the ore intercept there was a fine grained, dark green diopside (?) hornfels which graded into a limy tactite at about 680 feet. Thin dikes of monzonite were encountered at 744 feet and a large mass of monzonite was entered at 757.2 feet. The monzonite persisted to the bottom of the hole at 903.9 feet, except for a post-mineral andesite dike from 802.0 - 803.2. The monzonite was fine grained along the hornfels contact and contained about 10% phenocrysts in a granular matrix so that it could more accurately be called a latite porphyry.

Two adjacent deep holes in the area, D198E and D219, have bottomed in monzonite giving a picture of a wedge of sediments trapped between alaskite and monzonite.

DANUBE AREA

With the completion of two angle holes and a vertical hole in the Danube Area, in the current round of drilling, it is evident that there is enough low grade, but shallow, mineralization in the sediments to warrent the drilling of several more holes. No additional angle holes are planned and the Angle Hole Skid Drill has been exchanged for a truck mounted drill which is being used to drill additional vertical holes adjacent to F-152, the hole containing the largest intercept of ore found in this area to date. A description of the holes drilled in May is given below.

F-153

This hole was collared at an angle of 30° from the horizontal in a direction of N30°E, and drilled to a depth of 221.0 feet during April. Sediments were encountered at a depth of 147.2 feet and were partially oxidized to a depth of 230.3 feet. An ore intercept of 0.44% sulfide in a highly fractured hornfels occurred from 230.3 - 240.2. A post-mineral andesite porphyry dike existed from 247.8 to 273.8. This rock was notably unfractured and single pieces of core ranged up to 4.9 feet in length. Below the dike a second ore intercept occurred from 273.7 to 292.5 feet. The rock was a mixture of hornfels, tactite and marble in which the mineralization occurred as hands of massive magnetite, pyrite and chalcopyrite. Below this there was a coarse grained white to pink marble with few sulfides to a depth of 391.4 feet, where a wollastonite-garnet hornfels began. The hornfels contained one 9.5 foot intercept of ore and gave way to a mixture of hornfels and marbles which persisted to the bottom of the hole at 507.4 feet.

Composite samples of igneous rock and hornfels were assayed for molybdenum for comparison with the values obtained from a surface geochemical sampling program conducted by Barry N. Watson in 1964. The geochemical sampling indicated about 60 ppm in this area, whereas the core assay indicated 10 ppm for the igneous and 20 ppm for the hornfels.

F-154

This hole was intended to penetrate the hornfels at a 45°angle in the vicinity of F-152. However, when acid etching tests were carried out it was found that the hole was collared at a 52° angle, rather than 45°, and that hole steepened to about 57° near the bottom. Dacite, cut by numerous post-mineral andesite and monzonite dikes was cored to a depth of 259.5 feet where the hornfels began. The hornfels were strongly broken and gougey to a depth of 408.6, probably indicating a broad fault zone. An ore zone assaying 0.71/0.11* existed from 390.2 to 411.1. The non-sulfides were mainly native copper and copper pitch.

The largest ore intercept was from 428.3 feet to 522.5 feet, which assayed 0.48/0.01. The ore was mainly in a soft, tan to light green, limey hornfels where the chalcopyrite was finely disseminated. Below the ore, the hornfels remained limey to a depth of 596.4 feet where there was an increase in the abundance of silicate minerals. Within the silicate (diopside ?) hornfels concentrations of pyrite and magnetite were found, but these were not in association with chalcopyrite. The hole was bottomed at 678.8 feet.

F-155

Hole F-155 was collared in hornfels. The hornfels were cut by dacite in the intervals 25.3 to 42.0 and 50.0 to 62.6. A post-mineral andisite dike was encountered from 62.6 feet to 155.3 feet. This was followed by 59.9 feet of ore in hornfels, tactites and impure marble. The chalcopyrite was either finely disseminated or in bands with magnetite and serpentine. The serpentine content of the ore zone varied from 10% to 40%. Much of the ore was in impure marble which averaged 50-60% calcite, 5-10% silicates and 10-15% serpentine.

At a depth of 246.1 feet strong oxidation was encountered in a vuggy, porous marble. The first 18.6 feet of this leached marble yielded an assay of 1.21/0.14*. This was followed by 57.0 feet of marble which assayed 0.52/0.33. Within this zone chalcopyrite existed in various degrees of oxidation to copper pitch and malachite. Some unusual mineral occurrences, for Silver Bell, were also noted in this zone. Native copper was found in some of the open calcite veins and vugs where it occurred as stringers filling the spaces between calcite crystals. A vein of galena, fluorite and wulfenite was found at about 315 feet.

Leaching and oxidation effects continued to a depth of 375.7 feet. A syenodiorite (?) dike cut the marble from 356.5 feet to 360.5 feet. The marble contained fewer impurities from the base of the oxidized zone to 561.4 feet, where the diamond drill bit was burnt into a fine grained white quartzite. One 12.1 foot recovery of the quartzite was made bringing the bottom of the hole to a final depth of 573.5 feet.

* Total copper/non-sulfide copper.

Robert C. Edmiston

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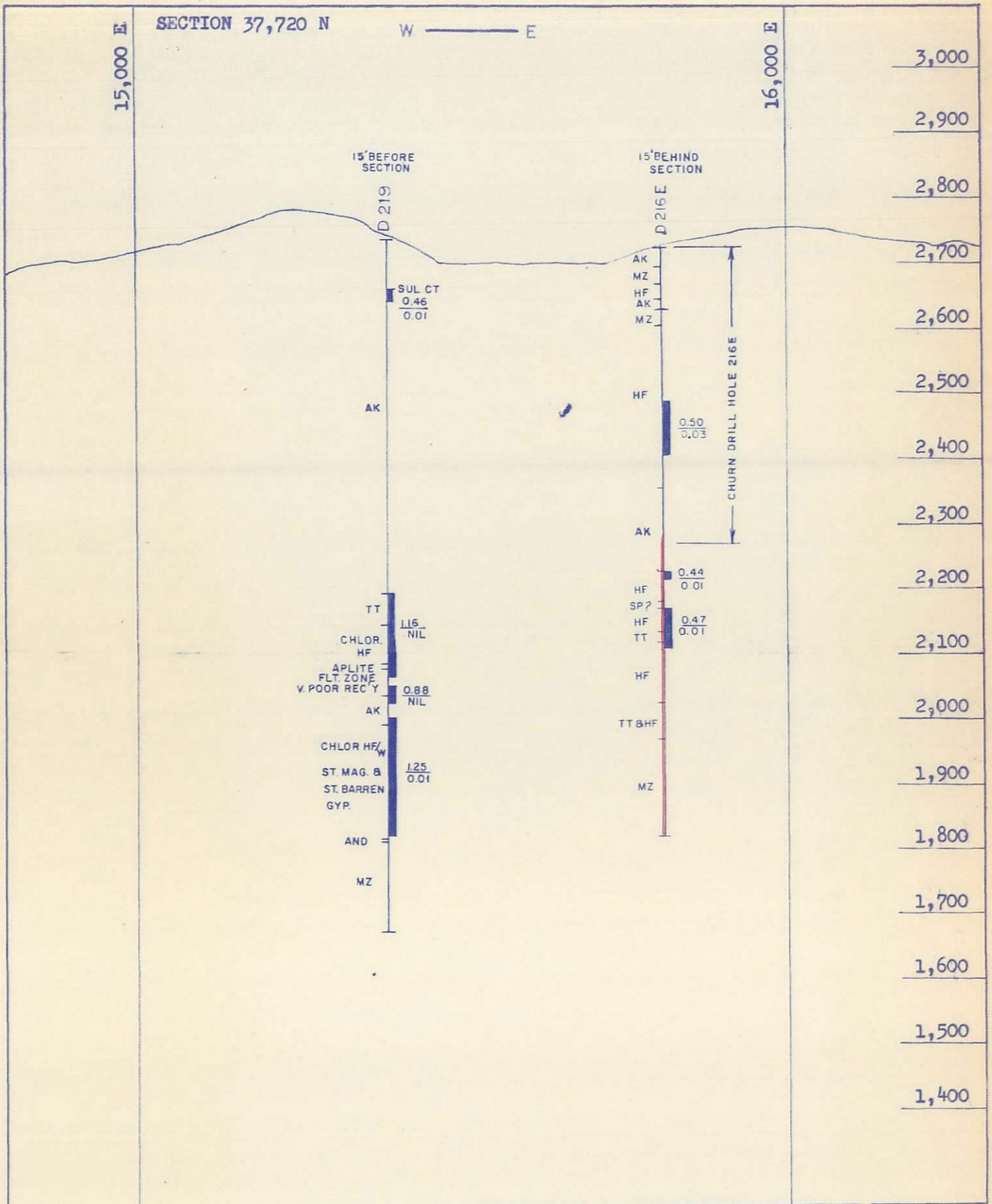
Resident Geologist

RCE:jca



+0.4% Total Copper

Advance for month

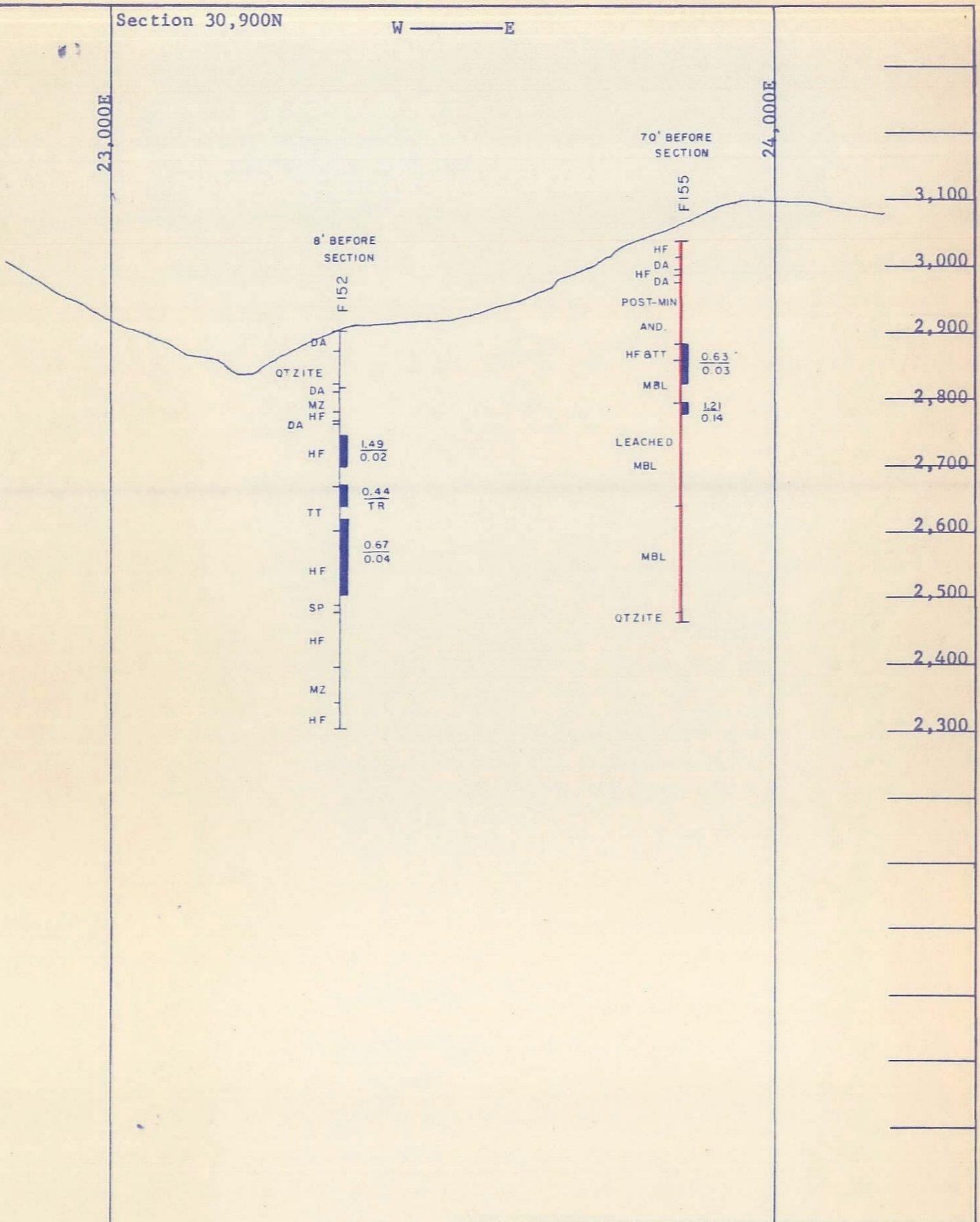
Note: Rock Types Generalized

Cu Assay is Total Cu/Non Sul. Cu

AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT

DAISY SHAFT - NORTH EL TIRO HILL AREA
DRILL HOLE PROJECTIONS

SCALE	DRAWN	DATE	FILE
1" = 200'	JAB	MAY 1968	S 121 A



+ 0.4% Total Copper

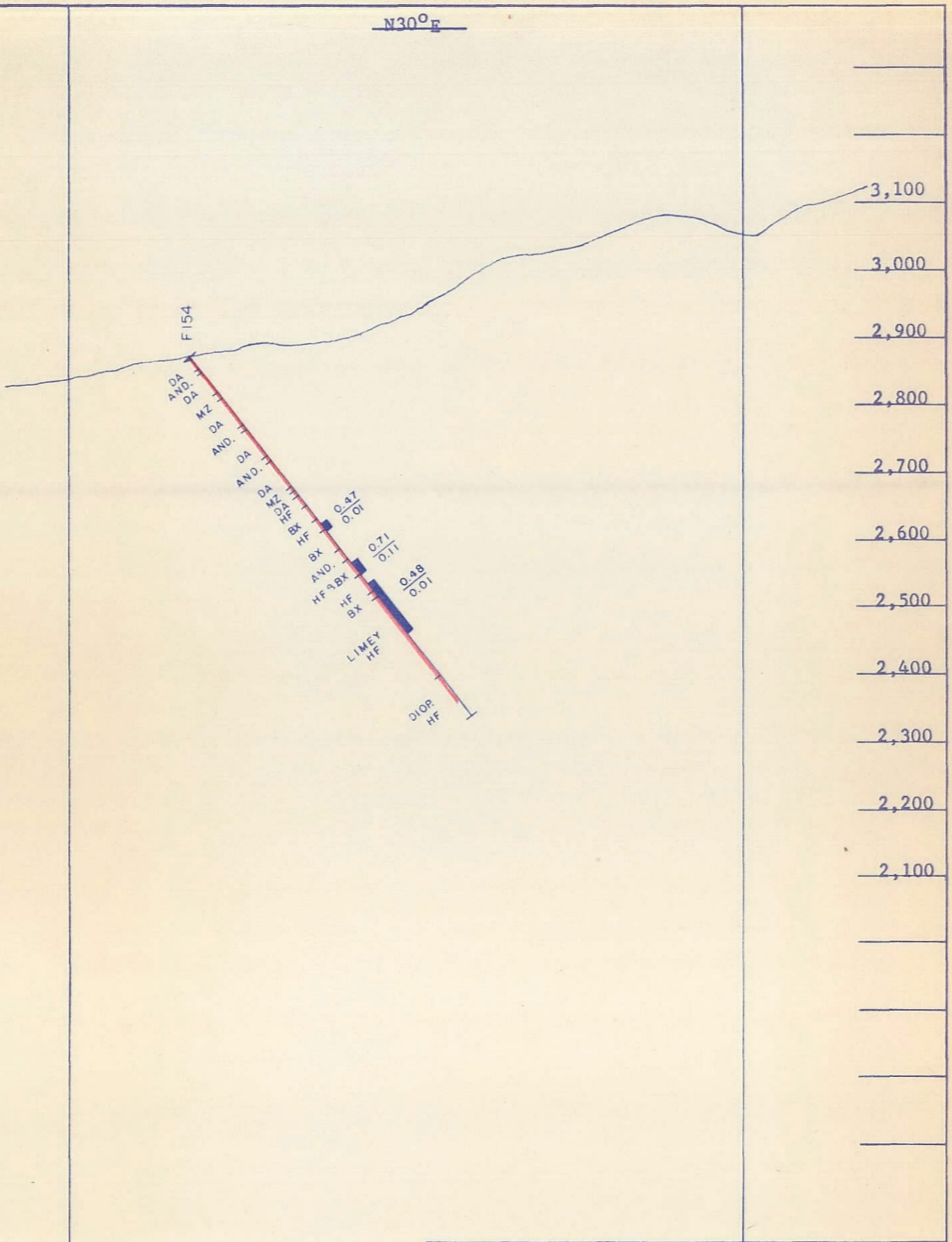
Advance for month

Note: Rock Types Generalized
Cu Assay is Total Cu/Non Sul Cu

AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT

DANUBE AREA
DRILL HOLE PROJECTIONS

SCALE	DRAWN	DATE	FILE
1" = 200'	RCE		S 121 A



+ 0.4% Total Copper

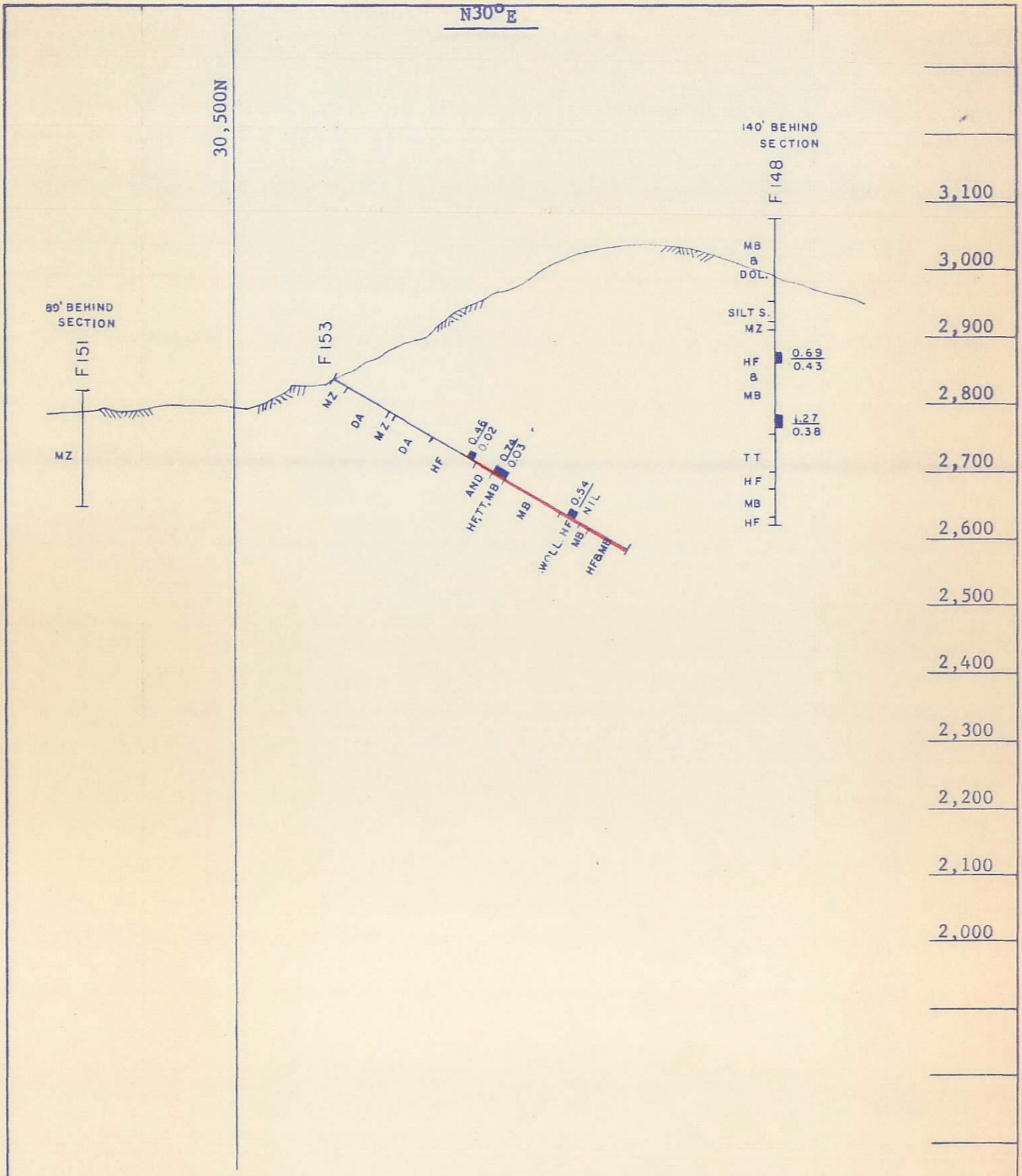
| Advance for month

Note: Rock Types Generalized
Cu Assay is Total Cu/Non Sul. Cu

AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT

DANUBE AREA
DRILL HOLE PROJECTIONS

SCALE	DRAWN	DATE	FILE
1" = 200'	RCE	MAY 1968	S 121 A



+ 0.4% Total Copper

Advance for month

Note: Rock Types Generalized
Cu Assay is Total Cu/Non Sul. Cu

AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT

DANUBE HILL
DRILL HOLE PROJECTIONS

SCALE	DRAWN	DATE	FILE
1" = 200'	RCE	MAY 1968	S 121 A

EXPLANATION FOR PLAN MAPS

D-2??

○ Holes drilled during month

P-??

● Proposed holes. Those holes colored are those of the original grid pattern that will probably be drilled.

D-Series Recent drilling program started with hole number D-218.

E-Series Churn drill holes drilled starting around 1956.

COPPER CONTENT

D-231

● 125'-115.0' @ 1.17/0/05 Hole contains sufficient thickness of +0.4% material to carry overburden.

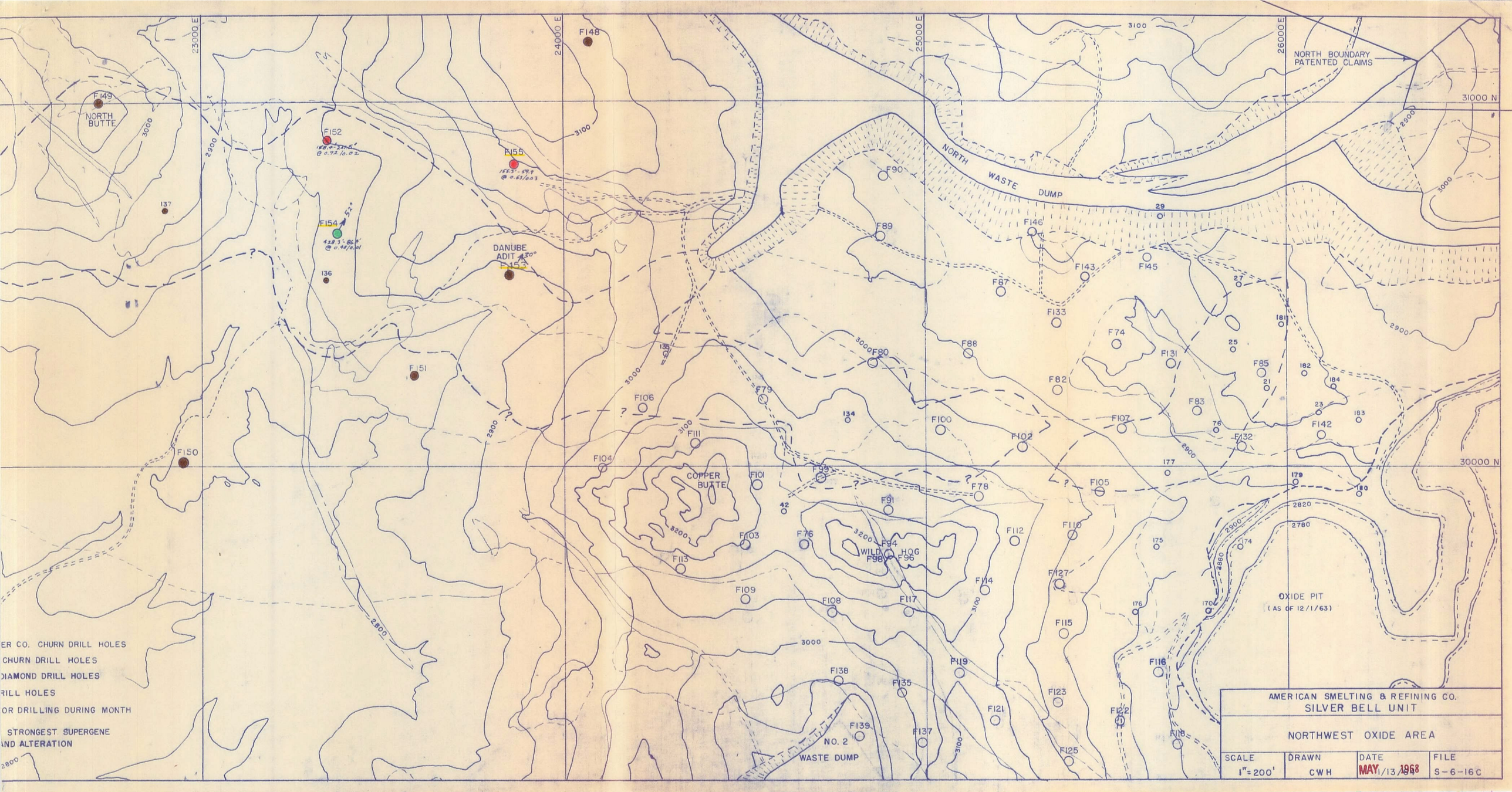
To be read - Starting at 125' there is 115.0' of material which assays 1.17% total copper and 0.05% non-sulfide copper.

D-2??

● Marginal hole. Insufficient thickness and/or grade of material to carry stripping.

D-2??

● None to thin +0.4% copper intervals.


23000 E
24000 E
25000 E
26000 E
31000 N
30000 N
NORTH BOUNDARY PATENTED CLAIMS
NORTH WASTE DUMP
NORTH BUTTE
DANUBE ADIT
COPPER BUTTE
WILD HOG
NO. 2 WASTE DUMP
OXIDE PIT
(AS OF 12/1/63)
F148
F149
F150
F151
F152
F153
F154
F155
F74
F76
F78
F79
F80
F82
F83
F85
F87
F88
F89
F90
F91
F94
F96
F98
F99
F100
F101
F102
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F106
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F121
F122
F123
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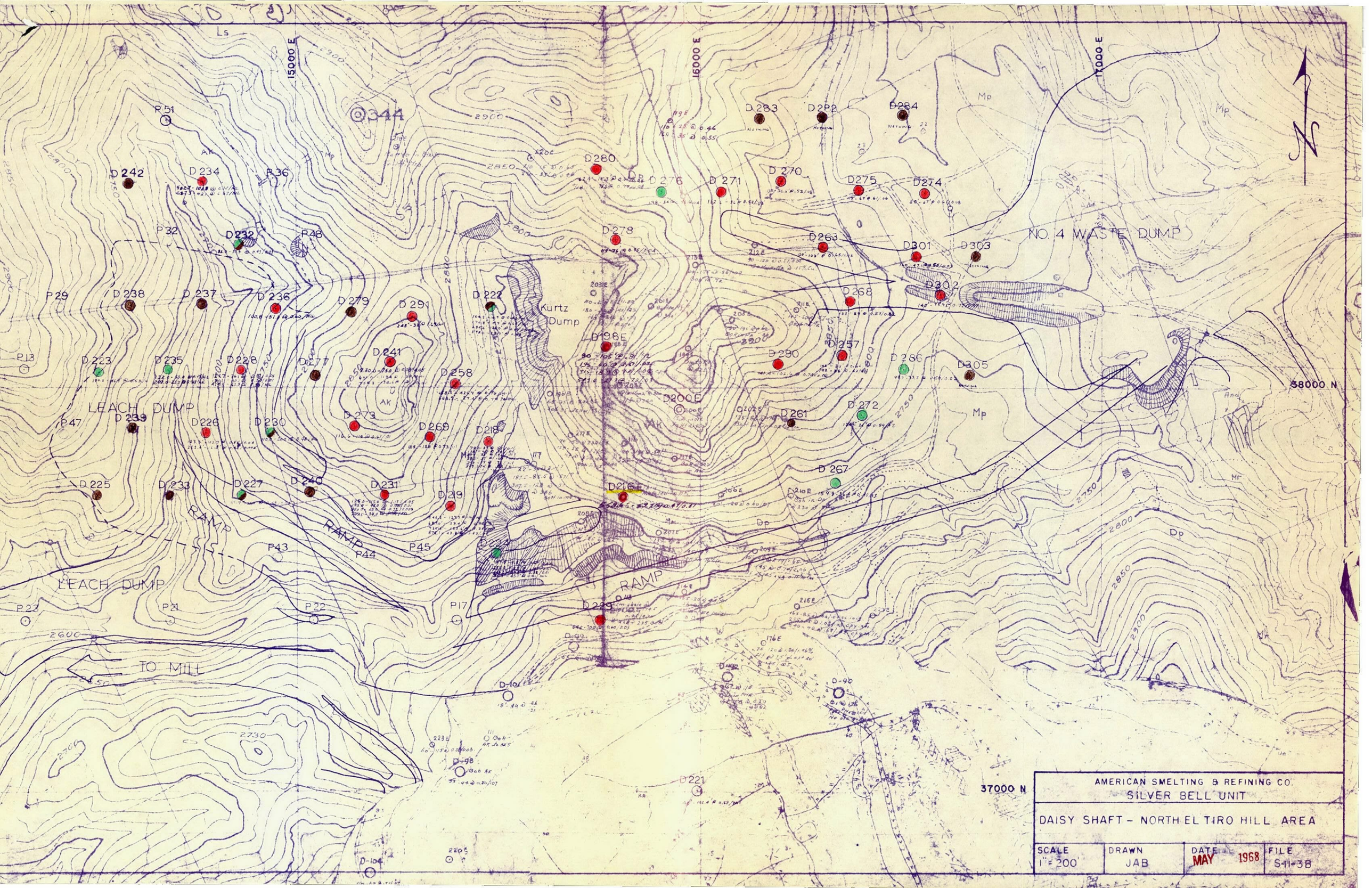
F132
F133
F135
F137
F138
F139
F142
F143
F145
F146
ER CO. CHURN DRILL HOLES
CHURN DRILL HOLES
DIAMOND DRILL HOLES
RILL HOLES
OR DRILLING DURING MONTH
STRONGEST SUPERGENE
AND ALTERATION
AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT
NORTHWEST OXIDE AREA
SCALE 1"=200'
DRAWN CWH
DATE MAY 1/13/1968
FILE S-6-16C


15000 E
16000 E
17000 E
38000 N
37000 N
NO. 4 WASTE DUMP
LEACH DUMP
LEACH DUMP
Kurtz Dump
RAMP
RAMP
RAMP
TO MILL
D 242
D 234
P 51
P 36
P 32
D 232
P 48
P 29
D 238
D 237
D 236
D 279
D 291
D 222
D 223
D 235
D 228
D 277
D 241
D 258
P 13
P 47
D 239
D 226
D 230
D 273
D 269
D 218
D 225
D 233
D 227
D 240
D 231
D 29
D 216E
D 229
P 43
P 44
P 45
P 21
P 22
P 17
P 23
D 280
D 276
D 271
D 270
D 275
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D 283
D 292
D 284
D 278
D 263
D 301
D 303
D 302
D 268
D 257
D 290
D 286
D 305
D 272
D 261
D 267
D 221
D-101
D-96
D-98
D-104
2900
2850
2800
2750
2730
2600
Mp
Dp
AMERICAN SMELTING & REFINING CO.
SILVER BELL UNIT
DAISY SHAFT - NORTH EL TIRO HILL AREA
SCALE 1" = 200'
DRAWN JAB
DATE MAY 1968
FILE S-11-38