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James Doyle Sell Mining Collection

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LOGGING NOTES
1) ore minerals - gives % Cu in each mineral; volume % where no assay available (tr = < 0.1 vol %); left blank where no ore minerals were seen
2) gangue minerals - gives volume % present; only alteration minerals were logged
3) sulfide veins - gives number present and range of dips

GEOLOGIC LOG

PROJECT ASARCO - 3R (Sunnyside) Patagonia Mtns, Ariz (Sta Cruz Cty)

PROJECT ASARCO - 3R
Collar elev.
Coord N.
Inclination vert
Logged by FTG
Date start 8/12/72

HOLE NO. TR-10
Final depth 410.5
Coord E.
Page 1 of 10
Date finish 12/1/72

DEPTH from	DEPTH to	int'vl	% CORE RECOV.	ASSAY Cu	ASSAY Pb Mo	ASSAY Mo	ASSAY	ASSAY OZ Ag	ORE MINERALS chalcocite	ORE MINERALS enargite	ORE MINERALS chalcopyrite	ORE MINERALS	ORE MINERALS molybdenite	ORE MINERALS sphalerite	ORE MINERALS	ORE MINERALS chrysocolla	GANGUE MINERALS pyrite - diss	GANGUE MINERALS pyrite - vein	GANGUE MINERALS limonite	GANGUE MINERALS hematite	GANGUE MINERALS jarosite	GANGUE MINERALS clay	GANGUE MINERALS sericite	GANGUE MINERALS quartz - diss	GANGUE MINERALS quartz - vein	GANGUE MINERALS alunite	STRUCTURE sulfide veins	STRUCTURE faults	ROCK TYPE and REMARKS
																													Rockbit
NC 0	10	10	—																										
	20		80	.49					.10	.39						tr	6		4				70						10: INTRUSIVE BRECCIA: massive, no vugs; frags subang - ang to 6" dia in med - f.gr gritty matrix, clasts 70% silica tuff, minor qtz
	30		80	.05															10		2	10	10			5			
	40		80	.02															10		2	10	5			5			mz por, rhy por, sharp contact w matrix. Frags = 40-75% of
	50		90	.06					tr	.06						tr	1		7		2	10	10			8			breccia. Alteration is pervasive f.gr ser; alunite in clots to 1/4"
	60		100	.28						.28							2		1			10	50			3			and discont veins, veins incr w depth (?) Dissem py - enar is
	70			.10						.10							4		1			5	30			5			post - bx and is mostly in matrix. Enar is med - c.gr in masses to
	80			.12						.12							3		1			5	40			5			1/4" and in 1/16 - 1/4" discont alun veins, rarely as rims around
	90			.05						.05							3					5	30			3			frags. Dissem enar assoc w incr ser. Chalcocite as coatings on
90	100			.03						.03							3					5	30			3			py and enar (?). Silica tuff occas has 5-10% f.gr py of pre-bx age.
	110		varies	.05						.05							3					5	35			2			Completely leached intervals at 18-48', 63-65, 123 127, 135-147.
	120		95-	.46				.10	.30	.16						tr	2					10	65			3			Rare 1-3" goug, intervals indicate post-bx faulting.
	130		100%	.65	SD'			.14	.65	tr							1		3	6		15	60			2			
	140			1.10	@			.14	1.10	tr							2		2	6		10	60			2			
	150			.27	0.63			.15	.27	tr							1		1	8		20	25			4			
	160			.65				.14	.65								1					10	60			1			
	170			.04					.04								1					5	60			1			
	180			.08					.08	tr							2					5	60			1			170 - 192: abundance of qtz monz por frags increases.
	190			.04					.02	.02							3					5	60			5	2:55		
190	200			.09		11				.09							3					10	40			4			192: QUARTZ MONZONITE PORPHYRY: contact grad 192-205, qmp has 10-30%
	210			.04						.04							3					5	40			7			1/16-1/4" anhed - eched feld. phenos; por texture often vague due to st alt.
	220			.06						.06							4					5	40			7			Rock is wkly bx w 1/16" stockwork-like alunite veins. Alteration
	230			.03						.03							3	tr				5	50			6	1:45		pervasive, f.gr. Gray kaolinite (?) veins cut white alunite (?) veins.
	240			.08						.08							4	tr				5	50			6	2:45		Py is dissem and coarser than in intrusive bx. Enar is c.gr,
	250			.18						.18							4	tr				5	50			5	3:10 80		dissem in angular enar-py-alun filled vugs to 1" dia, in enar-alun
	260			.10						.10							4					5	50			8	1:70		and enar-py veins. Estim 70% enar is dissem
	270			.11						.11							4	tr				5	50			8	1:75		
	280			.05						.05							3	tr					40			5			270: INTRUSIVE BRECCIA: contact grad; mixed ang frags silica tuff (70%) and
	290			.03						.03							3	tr					45			7			qtz mz por (30%), all < 6" dia, form 70-95% of rock with 5-30% grit - clay (?) - ser matrix; frag outlines and rock text often
290	300			.01						.01							3						45			5			vague. Alt is pervasive ser w ang peds + short veins of alunite.
	310			.06						.06							2					10	40			3		7 @ 302	Poss silicif (?) of qmp. Enar as 1/4 - 1/2" clots in matrix, no veins. Py f.gr
	320			.37				.13		.37							2						40			3			uniform dissem to 347', then dissem, in irreg clots and 1/4 - 3/4"
	330			.53				.15		.53							2						40			3			veins wk fault 302-309
	340			.22				.20		.22							2						40			3			
	350			.10						.10							4						40			2			
	360			.31						.31							3	1					40			4			
	370			.01						.01							2	3		1			30			4	3:20		
	380			.07						.07							5						45			3			370-465: change to qtz mz por - rich intrusive breccia, grad over 20',
	390			.24						.24							4						45			2	1:70		characteriz by sharp frag outlines, incr in % matrix, incr in #
390	400			.12		21				.12							3						40			4			rock types. Frags are ang, 1/4 - 4" dia, 70% qmp, 30% silica tuff +
	410			.02						.02							2			tr			40			1			por volc, form 40-60% of rock, 5% of frags contain up to 80%
	420			.03						.03							3						50			1			v.f.gr py of pre-bx age. Alt is pervasive. Py is f.gr where dissem,
	430			.01						.01							2						40			1			c.gr in vein-like aggregates. Enar is dissem. Minor shear (?) fracts.

mn 2555 dam

GEOLOGIC LOG

PROJECT ASARCO - 3R
Patagonia Mtns., Ariz

PROJECT ASARCO - 3R
Collar elev. ____
Coord N. ____
Inclination vert
Logged by FTG
Date start 8/17/72

HOLE NO. TR-10
Final depth 410.5'
Coord E. ____
Page 2 of 10
Date finish 12/1/72

DEPTH from	DEPTH to	int'vl	% CORE RECOV.	ASSAY Cu (ppm)	ASSAY Mo (ppm)	ASSAY Ag (oz)	ORE MINERALS chalcocite	energite	molybdenite	sphalerite	GANGUE MINERALS pyrite-diss	pyrite-vein	hematite	clay	sericite	quartz-diss	quartz-vein	alunite	STRUCTURE sulfide veins	faults	shears	ROCK TYPE and REMARKS
430	440	10		.01				.01			2				30	10?		1			3: 80	
	450			.01				.01			3				40	5		1			3: 80	
	460			tr				tr			3				40	5		2				
	470			.01				.01			3				40			1			10: 80	465 – 618: intrusive breccia contains 60-95% silica tuff frags, also
	480			.01				.01			2				30			1			50 80	spher rhy, qmp, por vole. Alt. of matrix is wht, wispy - angular patches
	490			.01							2				30			1				qtz - ser. Py is dissem and rare veins to ½". Enar all dissem.
490	500			.12			.08	.04			2	tr			30			1				Locally strong shearing. This section contains zones of st bx, but not
	510							tr			2	2			45			1	2: 60°			mixed, silica tuff -- may be large blocks – see 465-488, 562-587,
	520							tr			3				50							594-618.
	530							tr			2				40			1				
	540							tr			3				40			4				
	550							tr			3				35			1				
	560							tr		tr	2				40			1				557: ⅛" sphalerite vein
	570			.01				.01		tr	2				40			1				562 - 587: silica tuff breccia(?): st shatter; patches med-gr sericite
	580							tr			1		tr		40							
	590							tr			3		tr		30			1				587 - 594: intrusive breccia: Typical multilithic bx, sharply defined frags
590	600			tr	13			tr			3		1		40							594 - 618: silica tuff breccia(?): vague bx text., hem assoc w st py.
	610							tr			2		2		30							
	620							tr			3		1		35							618 - 710: typical multilithic intrusive breccia w no vugs, subang -
	630							tr			2		1		30			3				round frags to 5" dia forming 60-90% of rock. Frags of qmp and
	640							tr			2		1		30			2				mass. v. f.gr py more abundant than above. Contacts top and bottom sharp
	650			.17				.17			2		tr		30	10		1				Suls irreg. dissem in matrix and frags. Veins + barren joints rare
	660			.80		.13	.40	.40			12	1		10	35	10	5		2: 10-25°	2'-65'		650-660: strong dissem to mass. pyrite, minor faulting, 2 veins
	670			.02				tr			2		tr		30	5		3				at ½", chalcocite as coat on py; rocks on top + bottom wkly silicif
	680			.06			.05	.01			3		1		35	5		5				
	690			.02				02			4		1		30	5		3				
690	700			.01				.01			3		2		40			1				
	710							tr			3		2		40							
	720							tr			3		1		55	5						710: QUARTZ MONZONITE PORPHYRY BRECCIA: gray, mass, w 30-40%
	730							tr			3		1		55	5						white anhed alt. feld. pheno. Rock is weakly brecciated, frags all angular
	740							tr			3	tr	2		45				1: 30°			and show ⅛ - 3" separation, all healed w dk gy siliceous material and
	750							tr			3		1		35							minor angular pods ser(?). Alt is pervasive, often nearly destroying
	760										3	tr	1		45				1: 60°			por. text. Pyrite is uniform dissem and in rare ⅛" veins
	770										3		1		50							738-748: intrusive breccia; sharp irreg contacts; intrusive character emphasis
	780										3	tr	1		50		2		1: 40°			by absence of qmp frags, even though qmp forms upper-lower contacts
	790										2		1		45					34'-784		756-764: intrusive breccia. py veins at contact cutting both rocks
790	800			.02	6						3				50							784-818. wk fault zone; mostly broken w minor gouge
	810										3				45							
	820										2				50							
	830							tr			2				40	2		3				820: qtz. monz. por. cut by minor gritty zones in irreg. pattern, possible
	840										2				40					2'-849		xenoliths
	850										2				40							
	860										3				30							853-858: intrusive breccia

mn 2555 dm

GEOLOGIC LOG

PROJECT ASARCO - 3R
Patagonia Mtns, Ariz

PROJECT ASARCO - 3R | HOLE NO. TR-10
Collar elev. | Final depth 4105
Coord N. | Coord E.
Inclination vert | Page 3 of 10
Logged by FTG
Date start 8/17/72 | Date finish 12/1/72

DEPTH from	DEPTH to	int'vl	% CORE RECOV.		ASSAY Cu		ASSAY Mo (ppm)				ORE: energite			ORE: molybdenite				MINERALS	GANGUE MINERALS: pyrite - diss	pyrite - vein		hematite		clay	sericite	quartz - diss	quartz - vein		alunite								STRUCTURE: sulfide veins	STRUCTURE: faults		ROCK TYPE and REMARKS
860	870																		3						40														9' @ 863		863 - 872: broken zone
	880																		3	1			tr		35													1: 80°			870: Py veins 1/8 - 1/4" w minor enar, hem
	890										tr								3	1			tr		35													1: 60			
890	900				.01						tr								2	1			1		40													2: 45, 80			902-908: intrusive breccia: top contact sharp at 30°, bottom contact grad
	910																		2	1			tr		40																908: QUARTZ MONZONITE PORPHYRY: contact is grad.; 30% eched, ser-alt.
	920																		2						45																feldspar (plag?) pheno, 5% lt brn pseudom @ bio-hbld. Py is f-med
	930																		3						45																gr, diss, assoc w lt brn pseudom.
	940																		3						45																937: QUARTZ MONZONITE PORPHYRY BRECCIA: massive, wkly bx qtz mz por
	950																		2						40														1'-950		with siliceous (?) filling of matrix; grad to minor zones of st bx
	960																		2				Tr		45																and minor zones of unbx qmp. Alt predom sericite, silicif is
	970																		2				tr		45	2															minor. Py diss and rare 1/8 - 1/4" veins (no alt selvage). Enar mostly
	980																		2						45					1									1'-980		dissem
	990																		2						45																
990	1000				.03		8												2						45					6										
	1010										tr								2				1		45	2				2										
	1020										tr								2						45														3'-1012		
	1030				.05						.05								3				2		40	5														
	1040										tr								3	tr			3		35															
	1050										tr								3	1			tr		40	5												1: 20			
	1060										tr								2				1		35													3: 20 45			
	1070										tr								2				1		30	20														1062: INTRUSIVE BRECCIA: sharp contact, 40-60%, 1/4-3", subrnd-
	1080										tr								2				1		35	10				2										ang. frags in dk. gray f-g gritty-clayey matrix. Rock types
	1090										tr								2				1		35	5														mixed but obscure, incl. qmp, por volc, silica tuff w abund
1090	1100				.19						.19								2				tr		35	10														v. f gr py. Larger frags often brkn, but not separated. Alteration
	1110																		2						45														2'-1106		is st silicif at upper contact, pervasive v. f gr ser (?). Py is
	1120																		2						40														2'-1112		f-med gr, dissem in matrix (less abund. in frags).
	1130																		2				tr		40																
	1140																		2				tr		40																1133 - 1143: wk brecciated gray-brn por. volc (?), grad w intrusive bx
	1150																		2				1		40																
	1160										tr								2				2		40																1150 - 1164: same as 1133 - 1143
	1170																		2				tr		40																
	1180																		2						30																
	1190																		2						30																
1190	1200				.02		14												2						35																
	1210																		2						35																
	1220																		2						35														2'-1217		
	1230																		3						40																1222: QUARTZ MONZONITE PORPHYRY BRECCIA: dense lt gy, por text
	1240																		3						40	10				1											obscured by st alt, frags have vague shapes, grad borders. Alt is
	1250										tr								3				tr		40	10				1								1: 70			pervasive w sericite in qmp and st silicif in matrix and (?) qmp.
	1260																		3	1					35	10				2								1: 80.			Py is uniform dissem, med gr. Kaolinite (?) in clear, soft 1/8" veins
	1270																		2						35	10				1											Alunite (?) is dull white
	128.																		3						35	10															
	1290																		3						35	10															

mn 2555 dam

GEOLOGIC LOG

PROJECT ASARCO - 3R
Patagonia Mtns. Ariz

PROJECT ASARCO - 3R
Collar elev. ____
Coord N. ____
Inclination vert
Logged by FTG
Date start 8/17/72

HOLE NO. TR-10
Final depth 4105
Coord E. ____
Page 4 of 10
Date finish 12/1/72

DEPTH from	DEPTH to	int'vl	% CORE RECOV.	ASSAY Cu (ppm)	ASSAY Mo (ppm)	ORE MINERALS enargite	ORE MINERALS molybdenite	GANGUE MINERALS pyrite-diss	pyrite-vein	hematite	clay	sericite	quartz-diss	quartz-vein	alunite(?)	STRUCTURE sulfide veins	STRUCTURE faults	ROCK TYPE and REMARKS
1290	1300	10						3				35	10		1			
	1310							2	1			30	20		1	1:70°		1300: breccia texture vague where silicif is pervasive. Minor
	1320					tr		2	1			30	20		1	1:70		py veins 1/16-1/8" w tr enar
	1330					tr		2				30	20		2			
	1340					tr	tr	2		tr		40	15		1			
	1350							3				40	10		1			
	1360							3	tr			40	15		1			
	1370					.1		3	1			40	15		1	2:80		
	1380							3				40	10		1	3:80-90		1377: rhyolite (?) inclusion (?) per text absent, irreg 1/8-1/4" ser pods
	1390			.18	22	.18		2	2			40	10		1			
1390	1392	2						3				40	10		1			
NX → 1392	1400	8						3				40	10		1			
	1410	10						4				40	5		1			
	1420							4				40			2			
	1430			.07		.07		4	tr			40		tr	1	1:50		1420: sulfide veins more abund; py veins irreg shape, may fill brkn
	1440			.03		.03		4	tr			40		1	1	6:50-80		areas in qmp, enar mostly in veins. Veins contain minor qtz.
	1450			.37		.37		4	tr			40			1			no alt. selvage. Zones w abund diss py also contain 1/4-1"
	1460			.02		.02	tr	4	1			40		tr	1	3:70		masses of med-f gr py
	1470			.11		.11		5	1			40			1			
	1480			.13		.13		4	tr	1		40		1	1	2:50		
	1490			.12		.12		4	1	2		40		1	1	2:70		
1490	1500			.01		.01		4	tr			50			1			
	1510					tr		3	2			50		1	1	2:45-90		
	1520					tr		6				50			1			
	1530					.1		4				50			1			
	1540							2		1		30			1			1531: INTRUSIVE BRECCIA: 1/2-3" ang-subrnd frags of qmp, arkose, latite,
	1550							2		1		30			2			silica tuff, rhy. por, form 75 % of rock in med-dk gy
	1560							2		1		30			1			compact, gritty matrix. Upper contact is grad 1-2' w bx cutting
	1570							2				30			1			qmpbx. Alt. is unclear, pervasive f gr sericite (?). Py is med-
	1580							4				30			1			f gr, dissem in matrix and as rare rims on frags, rare
	1590							2				30			1			siliceous frags have up to 80 % f gr py
1590	1600			.03	34			2				30			1			
	1610							2				30			1			
	1620					tr		3				30			1			
	1630							2				30						
	1640							3		1		30						
	1650					tr		3		1		30						
	1660							3				30						
	1670							3		1		30						
	1680							3		1		30			1			
	1690					tr		3		1		30						
1690	1700			.25		.25		3				30			1			
	1710							3				30			1			

mn 2555 dm

GEOLOGIC LOG

PROJECT ASARCO - 3R
Patagonia Mtns, Ariz

PROJECT ASARCO - 3R
Collar elev.
Coord N.
Inclination vert
Logged by FTG
Date start 8/12/72

HOLE NO. TR-10
Final depth 4105
Coord E.
Page 5 of 10
Date finish 18/1/72

DEPTH from	DEPTH to	int'vl	% CORE RECOV.	ASSAY Cu	ASSAY Mo (ppm)	ORE MINERALS: enargite	ORE MINERALS: molybdenite	ORE MINERALS: sphalerite	GANGUE MINERALS: pyrite diss	GANGUE MINERALS: pyrite vein	GANGUE MINERALS: hematite	GANGUE MINERALS: clay	GANGUE MINERALS: sericite	GANGUE MINERALS: quartz - diss	GANGUE MINERALS: quartz - vein	GANGUE MINERALS: alunite (?)	STRUCTURE: sulfide veins	ROCK TYPE and REMARKS
1710	1720								3				20			1		
	1730								3				20			1		1727 SILICA TUFF: dense, massy, lt gy, contact is ∿ 40°; rock is soft
	1740								3				20			?		enough to be scratched, but rings under the hammer. Texture
	1750								3				20					variable, mostly f. gr gy matrix (70-90%) w lt gy - wht wispy
	1760								3				20					masses of sericite (alun.?) up to 1" dia and 1/16-1/2" discont ser?
	1770					tr			2	1	tr		25					veins in wk stockwork pattern. Rare 3-6" zones of wk
	1780								3				25					porphyritic (?) texture. Alteration unclear - assumed to be f gr
	1790					tr			2				20					ser in gray matrix, wispy pods, and f-med gr in stkwk;
1790	1800			.01	36	.01			3				20					however wispy pods + f g ser may be primary constituent of
	1810					tr			2				20					tuff; 60-70% of rock is f gr qtz, also assumed to be
	1820					tr			2		1		20					primary. Nature of rock is obviously uncertain. Py is med-f gr,
	1830					tr			3				20					dissem and in rare 1/8" veins.
	1840								3	tr	tr		20					
	1850					tr			3		tr		20					
	1860					tr			3		tr		20					1850-1921: silica tuff is pervasively brecciated and healed w compact
	1870					tr			3		tr		20					siliceous (?) rock flour; frags are 1/2-1", angular. No vugs
	1880					tr			3				20					1851-1966: intrusive breccia w abund qmp frags
	1890					tr			2	1	tr		20				1:10°	
1890	1900			.03		.03			2	1	tr		20				1:20°	
	1910								3		tr		20					
	1920								3		tr		20					
	1930								2				25					1921: INTRUSIVE BRECCIA: 1/4-6" subrnd-angular frags of silica tuff
	1940								3				25					qmp, minor other; forms 60-70% of rock in gritty, med-f gr
	1950					tr			3		tr		25					matrix. Alteration is pervasive sericite (?). Py is med-gr, uniform
	1960								3		tr		25					diss both matrix and frags, rare 1/8" veins
	1970								3		tr		25					
	1980								3		tr		25					
	1990					tr			3		tr		20				1:20°	
1990	2000			.01	70	.01			2		tr		20					
	2010					tr			3				20					2000: frags of silica tuff to 10' dia more abundant w depth
	2020								2				20					
	2030					.1			4				20					2025: 1' section w 90% ser, 10% py
	2040					.1		tr	5				20					
	2050					tr			2	1			20				1:45	
	2060					tr			2				20				1:40	
	2070								3				20					
	2080					tr			3	tr			20				1:75	
	2090					.2			3	tr			15				1:75	
2090	2100			.04		tr			3				15					
	2110								3				20					
	2120					tr			3				20					
	2130					tr			3				20					
	2140			1.20		1.20			4	2			15				2:75, 90	2130-2170: frags mostly silica tuff; py diss and in 1/2" irreg veins, enar in veins

mn 2555 dm

GEOLOGIC LOG

PROJECT ASARCO - 3R
Patagonia Mtns, Ariz

PROJECT ASARCO - 3R
Collar elev.
Coord N.
Inclination vert
Logged by FTG
Date start 8/17/72

HOLE NO. TR-10
Final depth 410.5
Coord E.
Page 6 of 10
Date finish 12/1/72

DEPTH from	DEPTH to	int'vl	% CORE RECOV.	ASSAY Cu	ASSAY Mo (ppm)	ORE MINERALS: enargite	molybdenite	sphalerite	GANGUE MINERALS: pyrite-disc	pyrite-vein	hematite	clay	sericite	quartz-disc	quartz-vein	alunite (?)	STRUCTURE: solide veins	faults	shears	ROCK TYPE and REMARKS
2140	2150	10				.1			3				15							
	2160					.1			3	1			15				3.0 60°			
	2170					tr		1.0	3	1			20			3	1:30°	3 @ 2167		2166 1" py-sl vein @ 30°, sl is brn, occurs in 1/8 - 1/2" massive bands
	2180								3		tr		30							2173 - 2294: 1/8 - 3" frags of silica tuff (90%), qmp (10%) form
	2190								2		tr		25							60 - 70% of rock, occur in gritty matrix, minor post-bx faulting
2190	2200			.01	16				4		tr		20							2173 - 2187: fy uniform dissem and in rare 6" vein-like masses
	2210								3		tr		15							Character of intrusive breccia becomes vague w depth as %
	2220								2		1		20			1				of qmp frags and % matrix both decrease.
	2230								2		tr		20							
	2240								2		tr		20							
	2250								2		tr		20							
	2260								2	1	tr		20				2:45			
	2270					tr			2		tr		20			1				
	2280								2		Tr		20			1				
	2290								2		tr		15			2			4 @ 2282	2282 - 2286: wk shearing @ 85°
2290	2300			.01		.01			3		tr		15			1				2294: SILICA TUFF: gra, dense, massive, wkly brecciated but well healed
	2310					tr			2		tr		10							w. white, ang 1/8 - 1/4" wisp, aggregates and thin veni of ser(?) -
	2320			.02		tr			2	5			15				2:70			alun (?), tr 1/16" quartz eyes; minor subrnd white 1/8" pods
	2330			.01					8	1		5	15							sugg vague por text fr mostly dissem
	2340			.07		.07			45			5	20							2315 - 2345: irreg zones of massive (+25 vol%) c gr pyrite, occurs
	2350			.04		.04			18				45			5			18°	as circular 1/4 - 1/2" pods and in irreg masses. Clear, f gr
	2360					.1			5				30			5			2345	mineral (clay?) is only obvious assoc non-sul mineral.
	2370					.1			5		tr		30			3				2345 - 2363: near-vertical, open shears?
	2380								2				20			1				
	2390								2		tr		20			4				
2390	2400			.12	59	.12			2	1	1		20				1:70			
	2410					.1			4				30			2				
	2420					.1			4		tr		20							
	2430					tr			3	1			20				2:40-70			
	2440								2	2			25				2.75			
	2450								2	2			20				2:70			
	2460								4				25							2450 with increasing depth the circular 1/8 - 1/4" white pods become
	2470								4				25			1				ellip - circ, irreg - shaped + distrib pods w g, rims (which acquire
	2480								3				25			1				greenish cast w depth - ser?) and white (ser alun ?) cores;
	2490								3	1			25				1.75			py preferentially dissem in pods; pods may be a primary
2470	2500			.01			tr		3				20							characteristic of silica tuff, wk brecciation ends gradually
	2510								2	1			25				1:70			
	2520								2	1			25				1:70			Dissem py gen med gr, cubes
	2530					tr		tr	3		tr		20							
	2540							tr	3				20							
	2550								3				20							
	2560								3				20							
	2570								4				25							

mn 2555 dam

GEOLOGIC LOG

PROJECT ASARCO - 3B
Patagonia Mtns Ariz

PROJECT ASARCO - 3B
Collar elev.
Coord N.
Inclination vert
Logged by FTG
Date start 8/17/72

HOLE NO. TR-10
Final depth 4105
Coord E.
Page 7 of 10
Date finish 12/1/72

DEPTH from	DEPTH to	int'vl	% CORE RECOV.	ASSAY Cu	ORE MINERALS: sphalerite	molybdenite	GANGUE MINERALS: pyrite-dis	pyrite-vein	hematite	clay	sericite	quartz-dis	quartz-vein	alunite	serpentine	STRUCTURE: sulfide veins	fault	ROCK TYPE and REMARKS
2580	2580		95-100		tr	tr	3				25							
	2590				tr		3				25							
2590	2600			.02	.02		3	tr			20							
	2610				tr		3	1			30					2:45-80°		
	2620				tr		3				30							
	2630				tr		3				30					1:50		
	2640				tr	tr	3	1			35							
	2650				tr		3				40						1'-2648'	
	2660				tr		3				40							
	2670		90		tr	tr	3	1			50					1:85	12'-	2668: 12' fault zone has 1"-1' frags dk gy silica tuff in wht
	2680		90		tr	tr	3				65						2668	intensely sericitized gouge
	2690				tr	tr	3	1			45							
2690	2700			.02	.02		4	tr			40					2:50		
	2710				tr		4				35							
	2720				tr		6				30					1:30		
	2730				tr		6				30						5-2725'	
	2740				tr		6				30							
	2750				tr		4				30							
	2760				tr		3	tr			20					1:80		
	2770						3				20							
	2780						3				25							2772-2789: vague por text in silica tuff w 10% wht subh phen
	2790						3				40							2788: INTRUSIVE BRECCIA: grad contact, lt gy, massive, 1/8-6" subrnd
2790	2800			.02			3				40							frags silica tuff, qmp, por volc; forms 80% of rock w
	2810						2	1			40					1:70		20% med-f gr gritty matrix, % qmp (?) or qtz-feld por (?)
	2820						2	1			40					1:70		incr w depth Py dissem and in 1/8-1" veins often wkly crushed
	2830				tr		2	3			40					6:45-70		Alt is pervasive v. f gr ser? Py veins cut both matrix and frags
	2840						2				45							
	2850						2				45							
	2860						3				40							
	2870						2				40							
	2880						2				40							
	2890						2	1			40					1:45		
2890	2900			.02			2	1			40					2:50		2890: XENOLITHIC QUARTZ FELDSPAR PORPHYRY: lt gy, massive; similar
	2910						3	tr			45							to intrusive breccia except that matrix is qtz feld por, contact
	2920						4	tr			45							is grad; estimate 60% silica tuff inclusions. Por has 30-50%
	2930						3				40							1/8" anhed feldspar (?) phen and 1-5% 1/16" quartz eyes. Py veins
	2940						3	1			40					2:60		cut frags and qfp, mostly < 1/8" thick
	2950						2	1			45					3:70		2920-2950 rock may be intrusive bx
	2960						2	tr			50							
	2970		85				2	1			50					2:50		
	2980		90				1	2			50					2:70		2970: 1/16" py veins incr w depth, barren joints all attitudes incl vertical
	2990						2	2			55				1	3:20-V		
2990	3000			.04			2	1			50					2 50		2990 abundance of xenoliths sharply reduced to 5-20%

mn 2555 dm

GEOLOGIC LOG

PROJECT ASARCO - 3R
Patagonia Mtns, Ariz

PROJECT ASARCO - 3R
Collar elev.
Coord N.
Inclination vert
Logged by FTG
Date start 3/17/72

HOLE NO. TR-10
Final depth 4105
Coord E.
Page 8 of 10
Date finish 12/1/72

DEPTH from	DEPTH to	int'vl	% CORE RECOV.	ASSAY Cu	ASSAY Mo (PPM)	ORE minerals: malachite	chalcopyrite	molybdenite	GANGUE MINERALS: pyrite-diss	pyrite vein	hematite	clay	sericite	quartz-diss	quartz-vein	alunite	serpentine	STRUCTURE sulfide veins	ROCK TYPE and REMARKS
3000	3000								3	1			50				2	2:70	3000: Serpentine is dk grn - blk, is disem in 1/16" specks and coats joints where rock is shattered. Apparently assoc w wk pervasive silicif (?). Perhaps silicif is primary feature - a good place between silica tuff and qfp (?)
	3020								3	1			50					6:50-70	
	3030								3	1			50				2		
	3040								2	1	tr(?)		45	5			2	1:80	
	3050								2	1			30	10			2		
	3060								2	1			35	10				3:60-80	
	3070								2	1			35	10			5	1:70	
	3080								2	1			35	10			5	5:10-70	
	3090								2	1			35	10	tr		5	3:20-70	
3090	3100			.04					2	1			40	5				2:70	
	3110								2	1			30	10				3:40-70	
	3120								2	3.			30	10			3	2:40-70	
	3130								3	1			35	10			1	1:80	3120-3140: silicif (?) of qfp resembles silica tuff
	3140								2	1			30	10			1		
	3150								2	1			30	10			2	5:20-70	
	3160								2	1			30	15				6:40-70	3150(?): QUARTZ FELDSPAR PORPHYRY: contact is approx due to gradual decr in xenoliths and strong silicif. Por text is vague, qtz and feld phenos often destroyed. Silicif weakens w depth and sericit becomes dominant, spotty c gr ser on some veins. Short pre and post-min breccias. Serp disem and in veins. Py in 1/32" discontin smears to 1/8" veins. Traces cpy in veins. Molybd as grains to 1/8" dia assoc w bleb joints, often w kaolinite (?)
	3170								2	3			30	15			2	6:50-70	
	3180								2	4			30	15			10	10:40-80	
	3190								2	1			30	15			4	6:60-80	
3190	3200			.06	90		tr	.06	3	1			40	10			2	3:55	
	3210			.07	42			.07	2	1			45	5				7:50-80	
	3220			.06	33			.06	2	1			45					3:75	
	3230			.01	38				2	1			45	1				2:70	
	3240			.01	37				2	1			45	2				4:30-70	
	3250			.03	55				3			3	45	1					
	3260			.03	114			tr	3	tr		1	45	2					3250: pyrite in py veins to 1/2" and in qtz-py veins 1/16"-1/2"; veins crisscross strike + dip and often offset each other - suggests very wk stockwork. Vein gangue is qtz-clay, veins rarely are wkly vuggy. Cpy assoc only w qtz-py veins. Numerous barren joints
	3270			.01	114			tr	3	1		2	45	1				3:30-80	
	3280			.04	62			tr	2	1		1	45	2				2:40-70	
	3290			.04	185			tr	2	1		1	45	2				3:20-80	
BX → 3290	3300			.04	27		.04	tr	3	tr		1	45	2					
	3310			.04	15		.04	tr	2	1		1	45	4				3:70	
	3320			.13	16		.13		2	1		1	45	4				3:40-70	
	3330			.21	24		.21		2	tr		1	45	4				5:40-70	
	3340			.18	26		.18		2	1		2	45	4				1:45	
	3350			.03	13				3	2		2	45	4				1:50	
	3360			.01	19				2	3		2	45	5				3:40-V	
	3370			.10	17		.10		2	2		1	45	5				3:70	
	3380			.05	14				2	2		1	45	5			2	7:30-80	
	3390			.08	17		.08		2	2		2	45	5				6:30-V	
3390	3400			.05	14		.05		2	2		1	45	6				4:40-70	
	3410			.05	25			tr	3	2		1	45	6				8:30-70	
	3420			.06	22				2	3		2	45	6				12:30-80	
	3430			.10	17		.10		2	2		2	45	6				6:40-70	

mn 2555 dm

GEOLOGIC LOG

PROJECT ASARCO - 3R
Patagonia Mtns., Ariz

PROJECT ASARCO - 3R
Collar elev.
Coord N.
Inclination vert
Logged by FTG
Date start 8/17/72

HOLE NO. TR-10
Final depth 4105
Coord E.
Page 9 of 10
Date finish 12/1/72

DEPTH from	DEPTH to	int'vl	% CORE RECOV.	ASSAY Cu	Mo	MoS_2	Au	Ag	ORE MINERALS: chalcopyrite	molybdenite	GANGUE MINERALS: pyrite-disc	pyrite-vein	clay	sericite	quartz-disc	quartz-vein	serpentine	STRUCTURE: sulfide veins	ROCK TYPE and REMARKS
3430	3440	10		.07	31				.07	tr	2	3	1	45		6		4:40-70	
	3450			.18	37				.18		2	1	1	45		6		4:40-70	
	3460			.18	67				.18		2	2		45		6	1	7:45-30	
	3470			.19	38				.19		2	1		45		6		3:40-70	3469: qtz feld por is alternating 1-5' sections of st sericitic
	3480			.13	197				.13		2	1		45		6	tr	5:40-70	w good por text which are grad. w grayish silic.f (?) sections
	3490			.14	18				.14		2	2		45		6	tr	7:45-90	Estim 5% qtz eyes Estim 2-5x more partly mineralz and
3490	3500			.09	39				.09		2	3		45		6	tr	9:45-80	barren joints than # recorded sulfide veins
	3510			.08	64						2	2		45		5	tr	8:40-80	
	3520			.13	29				.13		2	2		40		5	tr	5:45-70	
	3530			.07	35				.07		2	2		45		6	tr	8:45-70	
	3540			.04	62						3	2		40		6	tr	6:10-80	
	3550			.46	64				.46		2	2		40		6		4:40-70	
	3560			.27	34				.27		2	2		45		5	tr	4:40-60	
	3570			.08	34						2	2		45		5		5:10-70	
	3580			.09	42				.09		2	2		45		5		8:50-80	
	3590			.14	10						3	2	tr	40		5		4:50-70	
3590	3600			.06	36						3	1		45		5		7:60-90	
	3610			.09	17				.09		2	1		45		5		3:70	3600: chalcopyrite is increasing w depth. Vein cpy is med gr
	3620			.07	11				.07		2	2	tr	45		5		8:10-80	and only in qtz-py veins w minor py. Dissem cpy is fine-
	3630			.03	37				.03		2	2	tr	45		5		7:50-70	grained and generally visible only with +10x hand lens in
	3640			.11	15				.11		3	2		40		6		5:50-70	indirect light (cloudy day) on a freshly broken surface, estim
	3650			.13	9				.13		2	2	tr	40		6		4:50-70	cpy is 80% dissem, 20% on veins. Mass py veins mostly
	3660			.18	43				.18		2	2	1	40		6		6:20-80	barren and are often cut by smaller qtz-py-cpy veins
	3670			.16	17				.16		2	2	2	40		6		4:40-80	
	3680			.21	10				.21		2	2	1	40		6		5:30-70	
	3690			.16	15				.16		2	2	tr	40		6		6:10-70	
3690	3700			.20	58				.20		2	2	tr	40		6		6:60	
	3710			.19	14				.19		2	2	2	40		6		7:30-70	
	3720			.28	24				.28		2	2	1	40		6		5:40-70	
	3730			.26	120				.26		2	2	1	40		6		8:50-70	
	3740			.29	43				tr .29		2	3	2	40		6		13:40-70	
	3750			.27	83				.27		2	2	1	40		6		7:20-70	
	3760			.24	31				.24		3	2	1	40		6		8:60-80	
	3770			.26	44				.26		3	1	1	45		2		3:50	
	3780			.22	28	Fill, A			.22		2	2	1	45		5		6:40-80	
	3790			.32	28	composites			.32		2	2	1	45		5		9:40-90	
3790	3800			.27	44				.27		3	2	1	45		5		12:40-80	
	3810			.35	40				.35		2	2		45		6		6:40-70	
	3820			.41	56				.41		2	2		45		5	1	6:50-70	
	3830			.32	59	.010	.008	.10	.32		2	2		45		5		7:40-80	
	3840			.41	36				.41		2	3	1	50		3		7:45-70	3830 good por text w 30-40% white feld and 5% qtz eye
	3850			.42	58				.42		2	3	2	50		6		8:40-70	phenocrysts becoming gradually more visible w depth
	3860			.40	60				.40		2	3	1	50		6		6:40-70	

mn 2555 dam

GEOLOGIC LOG

PROJECT ASARCO - 3R
Patagonia Mtns, Ariz

PROJECT ASARCO - 3R
Collar elev. ____
Coord N. ____
Inclination vert
Logged by F.T.G
Date start 8/17/72

HOLE NO. TR-10
Final depth 4105
Coord E. ____
Page 10 of 10
Date finish 12/11/72

DEPTH from	DEPTH to	int'vl	% CORE RECOV.	ASSAY Cu	ASSAY Mo	ASSAY MoS2	ASSAY Au oz	ASSAY Ag oz	ORE MINERALS enargite	chalcopyrite	bornite (?)	molybdenite	GANGUE MINERALS pyrite-diss	pyrite-vein	clay	sericite	quartz-diss	quartz-vein	STRUCTURE sulfide veins	faults	ROCK TYPE and REMARKS
3860	3870	10		.58	30				tr	.58		tr	2	4	1	50		7	10:20-V		
	3880			.57	110	.027	.006	.10		.57			2	4	1	50		7	12:20-V		
	3890			.35	35					.35			2	3	1	50		5	9:40-70		
3890	3900			.51	115					.51			2	2	2	50		5	6:40-70		
	3910			.53	267					.53			2	3	1	50		4	11:50-80		3900: chalcopyrite continues to increase as fgr dissem and med gr
	3920			.76	524					.76			2	3	1	50		5	9:30-70		aggres to 1/8" in step-dip qtz-py veins, cpy mostly absent
	3930			.34	59	.049	.007	.15		.34			2	3	1	45		5	11:20-70		from flat and all py (only) veins Kaolinite (?) forms masses to
	3940			.35	97					.35			2	3	1	45		5	10:15-80		1/8" in qtz veins Qtz veins become wkly vuggy w depth. Mo/p
	3950			.53	360				tr	.53			2	4	2	45		8	9:40-70		in 1/16-1/8" qtz-py veins and in wkly bx, veins like zones to 2"
	3960			.32	94					.32			2	3	1	45		6	9:20-80		wide Py (only) veins 1/32-1/2" wide
	3970			.37	20					.37			2	2	1	45		4	6:20-80		Alteration continues as pervasive fgr ser. Minor zones of
	3980			.63	433	.038	.005	.16		.63			2	3	1	45		7	9:30-80		silicif may be incl of silica tuff
	3990			.58	91					.58			2	3	1	45		5	8:50-80		
3990	4000			.55	205				tr	.55			2	3	1	45		5	11:20-80		
	4010			.46	24				tr	.46			2	3	1	45		5	10:20-80		
	4020			.41	94					.41			2	2	1	45		3	5:30-70	12'@4016	4016: crushed zone w minor gouge
	4030			.37	42	.023	.004	.13		.37			2	2	1	45		3	8:30-70		
	4040			.50	32					.50	tr		2	3	1	45		5	9:20-70		
	4050			.65	388				tr	.65			2	3	1	45		6	7:20-V		
	4060			.44	72					.44			2	1		45		3	6:20-70		4050: occas bleached selvages along py veins
	4070			.62	167					.62	tr		2	2	1	45		4	6:20-70		
	4080			.40	48	.026	.005	.31		.40			2	2	1	45		4	7:20-70		
	4090			.81	79				tr	.81			2	2	1	50		4	4:20-70		
4090	4100			.82	278					.82	tr		2	2	2	45		6	5:20-70		
	4105	5		.59	97					.59			2	2	1	50		6	4:50-70		

NOTES

1) Drilling contractor - Jay Mfg Co

2) Drill hole survey - Pearsons Survey Co

	bearing	inclination
1000'	–	–
2000'	–	89° 45'
3000'	–	–
3350'	S77W	87° 15'
3700'	N67W	88° 00'

3) Assaying - American Analytical
a) sample #: SU14 - A10 - 20
b) the last number is the depth at bottom of 10' sample

mn 2555 dam

~~JHe~~/WLK

ASARCO

Southwestern Exploration Division

August 27, 1976

FILE MEMORANDUM

3R Project - 0040
Monthly Report - Aug. 1976

Hole TR-14 advanced 822 ft. from 0-822 ft. in strongly altered quartz monzonite porphyry and assorted Mesozoic clastic and volcanic rocks. The core contained uniformly disseminated fine-grained pyrite averaging 5 vol. percent. Expenses for the month were $24,000, leaving an estimated balance of $140,000.

F. T. Graybeal

F. T. Graybeal

FTG:lb

ASARCO

Southwestern Exploration Division

September 28, 1976

FILE MEMORANDUM

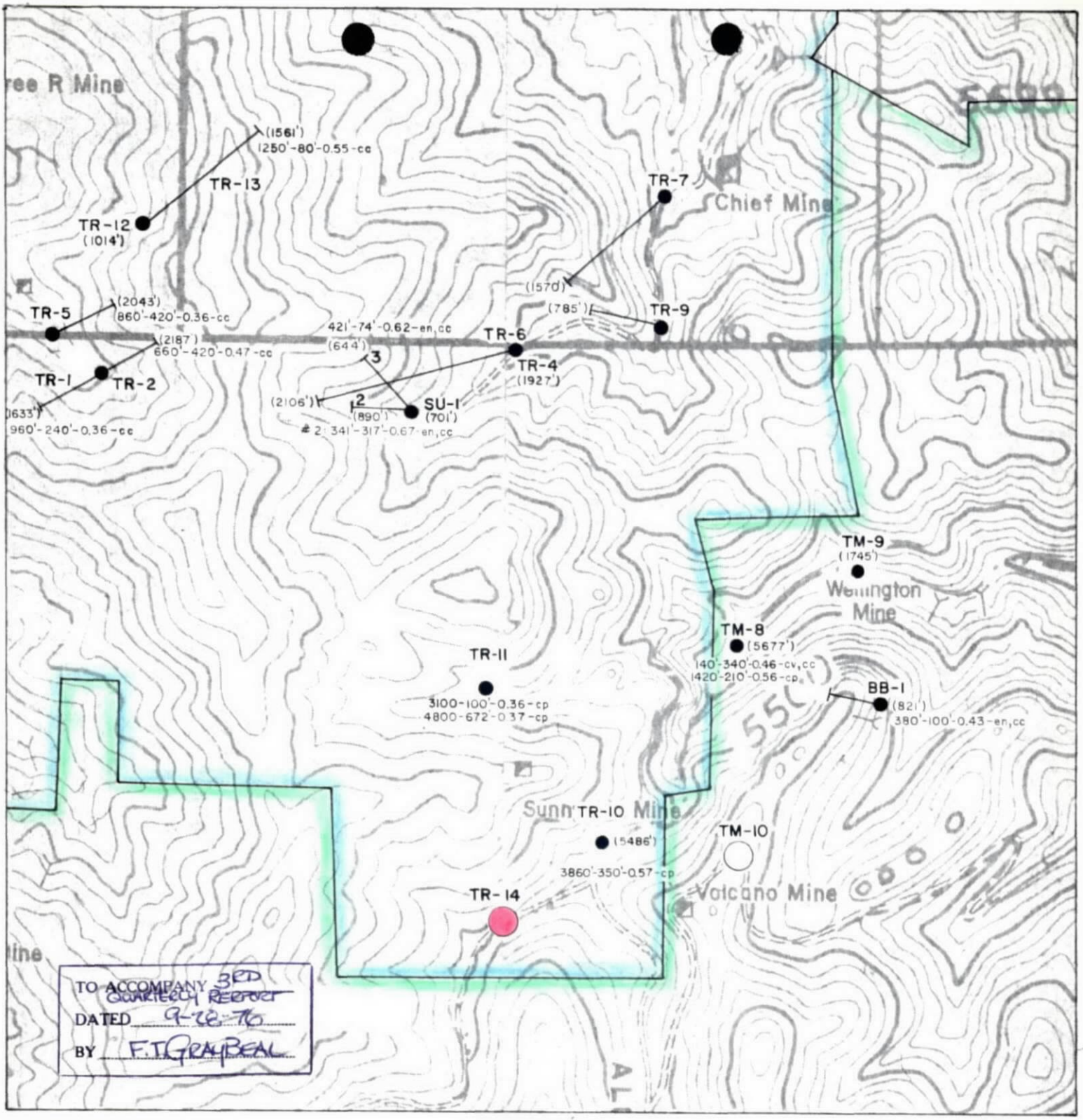
3R Project - 0040
Monthly Report - Sept. 1976

Hole TR-14 advanced 2545 ft. from 822-3367 ft. in strongly altered quartz monzonite porphyry. Traces of chalcopyrite are present below 2000 ft. Expenses for the month were $67,000 leaving an estimated balance of $73,000.

F. T. Graybeal

F. T. Graybeal

FTG:lb
Att.



SCALE: 1" = 1000'

EXPLANATION

(821') BB-1 — drill hole showing depth

P — Current drill hole (P-Proposed)

Kerr-McGee—Thunder Mtn

Anaconda-3R

ASSAY DATA KEY

depth-length-%Cu-mineral

3860'-350'-0.59-cp

GEOLOGIC LEGEND

cp – chalcopyrite
cv – covellite
cc – chalcocite
en – enargite

DRILL MAP

3R – THUNDER MTN. PROJECT

PATAGONIA MTNS.

Santa Cruz County, Arizona

F.T.G

Sept. 1973

MVK 2638

ASARCO

JHC → file

Southwestern Exploration Division

March 10, 1976

Mr. T. C. Osborne
Director of Exploration
New York Office

Three R Project - 0040
Santa Cruz County, Arizona

Dear Sir:

A recently completed study of chalcocite enrichment in the Three R mine area (see attached report) indicates that the copper was not derived by progressive vertical enrichment from the overlying leached outcrops, but by lateral movement from enargite-bearing outcrops along the high ridge 1500 ft. east of the mine. Drill intersections of chalcocite, up to 420 ft. of 0.47% Cu, in the mine area are highly variable and discontinuous and are interpreted as peripheral zones of a more continuous chalcocite blanket which underlies the ridge. Two drill holes are recommended to test for chalcocite enrichment as shown on the maps and sections in the attached report. W. L. Kurtz and J. H. Courtright have reviewed the data in the field, and I have also attached a memo on the subject by Mr. Courtright. I estimate the cost to do 2500 ft. of drilling in two holes at $40,000.

The Three R agreement with Anaconda was recently revised so that Asarco's aggregate expenditure at the end of the fourth year, ending June 22, 1976, will total not less than $325,000. Our current expenditures, estimated to March 1, 1976, will total approximately $306,000 leaving an estimated balance of $48,000 remaining in the Three R authorization. These remaining funds were originally requested to start an additional deep hole to test the hypogene mineralization approximately one mile south near TR-10. I now propose these funds be used to test the chalcocite potential in the Three R mine area. If you approve we would start drilling in March, while arranging to have all costs invoiced in the second quarter of 1976. A request for funds to test the hypogene mineralization will be deferred until later in the year.

Very truly yours,

F. T. Graybeal

F. T. Graybeal

FTG:lb
Atts.

cc: WLKurtz - w/o atts.
TCOsborne (MIT) - w/o atts.

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

June 27, 1960

FILE MEMORANDUM

THREE R COPPER MINE
Patagonia, Arizona

McFarland-Hullinger Diamond Drill Hole No. 2
Bearing E SE, dip 45°
600 level

Estimated value - .05% to .5% Cu. Secondary chalcocite as films. No primary chalcocite noted.

0' - 119'	Coarse textured alaskite alternating with dense, fine grained sediment (arkosic qtzite?).. A few quartz eyes in places, suggesting a felsite porphyry. Strong sericite-clay alteration throughout. Several small leached areas showing slaggy reddish brown limonite. A few mineralized seams - 30° to 45° to core axis.
119' - 139'	Altered alaskite. Leached zone, with a few remnants of disseminated sulphides (pyrite with cc films). Several 1" thick sections of slaggy limonite - minor breccia textures. Mineralized seams at about 45°.
139' - 187'	Altered alaskite. Sparse, but pervasive disseminated pyrite with minor cc films.
187' - 199' BOTTOM	Dense, fine-grained, strongly altered arkosic quartzite (?). Disseminated pyrite more abundant than in alaskite - sparse cc as films.

Diamond Drill Hole No. 3
Bearing S SE, dip 0°

0' - 91'	Strongly altered alaskite with a few short (6") sections of fine grained altered arkose(?). Partially leached throughout - 4" slaggy limonite at 31' and at 48' - seams of dark brown limonite at all angles . Some disseminated pyrite.

(Cont'd.)

File Memo
Three R Copper Mine

June 27, 1960

Diamond Drill Hole No. 3 (Cont'd.)
Bearing S SE, dip 0°

91' - 197'	Altered alaskite with a few sedimentary inclusions. Disseminated pyrite with sparse films of chalcocite. 1" blobs of massive pyrite with thin chalcocite coatings at 110', 112', 113', 115' and 170'.
197' - 314' BOTTOM	Altered alaskite, sedimantary inclusions(?) make up + 20% of core. Numerous, small leached areas. 2" slaggy limonite at 265'. 18" slaggy limonite at 303'. Disseminated pyrite with thin chalcocite films throughout.

Logged by J. H. COURTRIGHT

JHC/z

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

May 17, 1960

FILE MEMORANDUM

THREE R COPPER MINE
Patagonia, Arizona

McFarland-Hullinger Diamond Drill Hole No. 1
Bearing SE, dip 0°.
600 level

Current depth 197'. Ex Core. Recov: ± 95%

Entire hole in moderate to strongly altered Alaskite with disseminated pyrite and minor amounts of both secondary and primary chalcocite. Estimated average grade: .50 to 1.0% Cu. Most mineralized seams are from 45° to 60° to core axis.

0' - 28'	Disseminated py, cc. 6" leached zone at 8'.
28' - 32'	Oxidized. Dark red and brown slaggy limonite derived from more or less massive sulphides (mainly pyrite). Original sulphide about 30% of rock. Some breccia texture.
32' - 59'	Slightly oxidized. Scattered seams and specks of limonite. 6" massive limonite at 58'.
59' -197'	1" massive sulphides (mainly pyrite) at 134' and 6" massive sulphides at 180'.

Original signed by
J. H. Courtright

Logged by J. H. COURTRIGHT

JHC/ds

ASSAY CERTIFICATE

McFARLAND & HULLINGER
SAHUARITA MILL OPERATIONS

660 level

D.D. HOLE # 1 - 3R MINE

Date MAY 23, 1960

DECRIPTION	AU. OZS. PER TON	AG. OZS. PER TON	CU PER CENT	ZN PER CENT	PB PER CENT	FE PER CENT		
0 - 10			.20					
10 - 20			.07					
20 - 28			.10					
28 - 32			.20					
32 - 40			.47					
40 - 50			.22					
50 - 60			.12					
60 - 70			.10					
70 - 80			.07					
80 - 90			.10					
90 - 100			.10					
100 - 110			.07					
110 - 120			.07					
120 - 130			.10					
130 - 140			.10					
140 - 150			.12					
150 - 160			.20					
160 - 170			.12					
170 - 180			.10					
180 - 190			.07					
190 - 200			.20					

Assayer.

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

November 16, 1959

Mr. C. P. Pollock, Exploration Manager
American Smelting and Refining Company
120 Broadway
New York 5, New York

THREE R MINE
Santa Cruz County, Arizona

Dear Sir:

The Three R property contains a well-mineralized breccia pipe which has not been explored in the sulphide zone. The surface outcrops show practically no copper, but limonite after copper sulphides indicates an original copper content ranging within 1 and 4 % over an area about 100 by 700 feet. These showings invite exploration with a chance of developing a small sulphide ore body subject to underground mining. It is recommended (1) that the property be optioned, (2) that the area be surveyed and mapped in detail, and (3) that a minimum preliminary program of 4000' of core drilling be done. This will all cost about $60,000.

You may recall that in 1951 we drilled a breccia pipe called the BX which is one of a group of pipes found in the Patagonia Mountains near the Company's Flux mine. This drilling was known as the Sunnyside Project. It was instigated by my report of June 12, 1951 to Mr. L. K. Wilson (copy to Mr. Goodwin with his copy of Mr. Landwehr's transmittal letter to Mr. Pope June 14, 1951). As background for the following comments please refer to that report and also to my "Review" dated May 8, 1952 of the results of this drilling program. I can find no record here that the New York office ever received a copy of this latter memorandum, so a Thermofax copy is attached.

The Three R property has been considered by the Company a number of times over the past 45 years. However, this attention always has been directed only toward the veins of the old mine proper.

At the time we did this work on the BX pipe the Three R property, which covered part of the mineralized area and included one particularly favorable breccia pipe, was not available to us. It was under option to Consolidated Coppermines Corp. who was drilling the property and actively competing with us for ground in the district. At that time we sketchily mapped part of the Three R ground, and this is shown on the geologic map accompanying my report of June 12, 1951; but, due to the activity of Coppermines personnel, we were unable at that time to map or study carefully any of the mineralized zones in the Three R ground.

Eventually, Coppermines dropped its option without having drilled in the southern part of the property where the interesting breccia pipe is situated. Subsequently, a small amount of ore was produced from the old

mine by other lessees, but this work was stopped in 1956. The property, which consists of 21 patented claims, is now open and the owners have asked Sherwood Owens, a local promoter, to dispose of it for them.

The breccia pipe we are presently concerned with, which will be termed the Three R pipe, is better-mineralized than the nearby BX pipe which we drilled in 1952. This opinion is based on a re-examination of the area by Mr. Courtright, Mr. Blucher and me earlier this year. This study was more carefully done than my brief inspection in 1951. Therefore, opinions herein supersede those in my attached "Review" of 1952.

A 300-foot shaft at the west end of the Three R pipe has no sulphides on its dump, and the base of oxidation should be somewhere below 400 feet, as was the case in the BX pipe. So, no possibilities for open pit mining exist. Despite the depth of leaching, only a negligible amount of secondary chalcocite is to be expected. This is based on conditions found at the BX pipe and elsewhere in the district. Old reports on the Three R mine proper describe the occurrence of chalcocite ore in the main vein for a vertical range of 500 feet. We believe this was mostly primary chalcocite, and anticipate that the sulphide zone in the Three R pipe will be made up largely of primary chalcocite or enargite with some chalcopyrite. Consequently, if commercial mineralization exists, it could extend to depth and not be restricted to a thin supergene zone.

As stated in the opening paragraph the leached outcrops of the Three R pipe indicate an original copper content of 1 to 4%. In dealing with leached outcrops over fairly strong mineralization such as this, there is a greater degree of uncertainty than is the case with lower grade mineralization. An underground ore body here consisting of one or two million tons averaging only 2% Cu would probably be unprofitable or marginal at best; but there is a fair chance that it could average high enough to be in the profitable range. This is speculative business, then; but the surface showings are sufficiently good to warrant a preliminary exploration program involving something like 4000' of core drilling, assuming a satisfactory deal could be made.

Prior to any drilling, however, a program of geological surface and underground mapping would have to be undertaken. This is needed primarily to portray accurately the geometrical relations between the mine workings and the very rugged surface topography in the vicinity of the favorable outcrops so that drillholes can be positioned properly. Although it is always possible that this detailed work could bring to light unfavorable features not now recognized, the geological mapping probably would not affect the decision of whether or not to drill.

I have had a casual talk with Mr. Owens and it seems that a deal could be worked out along the following lines:

(1) $5000 down. Ostensibly, this is to take care of delinquent taxes. Actually, back taxes are estimated by us to be less than half this amount, and the $5000 might be negotiated downward.

(2) $5000 at end of first year.

(3) Minimum advance royalty. Amount unspecified, but presumably it would be about $10,000 at the end of the second and ensuing years.

(4) Sliding scale royalty. Unspecified rate.

(5) Purchase price. In past deals this has ranged around $300 to $350 thousand. We might be able to improve this.

If we were to make a deal and undertake a minimum preliminary drilling program, the costs just short of the first year would be approximately as follows:

Property payments	$ 5,000
Mapping, Legal Fees, and General Exploration Expense	5,000
Drilling (4000') and Roadbuilding	50,000
Total	$60,000

Normally, on a property like this we would probably do the detailed mapping, carry negotiations to a firmer point, and then report formally to you about the exploration possibilities. Our previous experience in the surrounding areas is sufficient that we now can make a preliminary evaluation of exploration possibilities. Therefore, before proceeding any further with negotiations or field study, I would like to have your opinion of the proposition.

Yours very truly,

Original Signed By
K. Richard

KENYON RICHARD

Enclosure
KR/ds
Office copy routed to:
TASnedden
ACHall
JHCourtright

ASARCO

Exp[illegible]on Department

October 16, 1975

File Memo

THREE R MINE AREA
SANTA CRUZ COUNTY, ARIZONA

During his work in the Patagonia Mountains, Mr. Graybeal has made an intensive study of the old Three R Mine area lying in the northwest portion of a plus 4 mile long zone of alteration-mineralization. Based on Anaconda's and earlier drill data plus outcrop mapping he has concluded that most of the chalcocite in the Three R area was derived from the ground to the east, occupied by a ridge at about 6000 feet elevation, and that the outcrops of this ridge contain significant limonite after chalcocite and/or enargite which may be underlain by a weak to moderate enrichment comprising a .5 to .6% Cu blanket on the order of 100 million tons in size.

On October 10th Messrs. Kurtz, Graybeal and I made a brief tour through the Three R area and along the ridge to the east. The former area exhibits generally weak mineralization derived mainly from pyrite while the latter shows disseminated cavities in a pervasively altered rock (alaskite) containing hematite obviously derived from sulphides ---- chalcocite and/or enargite. The frequency of the limonite bearing cavities is quite variable and veins or veinlets are scarce to absent (outcrops are very sparse except on the ridge crest). The general aspect is that of weak to moderate pre-existing copper mineralization; however, I would agree that the prospect merits a modest amount of exploratory work, say three diamond drill holes of around 1000 feet each.

J.H. Courtright

J.H. Courtright

JHC:vh

JNC

AMERICAN SMELTING AND REFINING COMPANY
TUCSON ARIZONA

April 29, 1975

J. H. C.
MAY 2 1975

TO: W. L. Kurtz

FROM: F. T. Graybeal

3R Project -- 0040
Monthly Report -- Apr. 1975

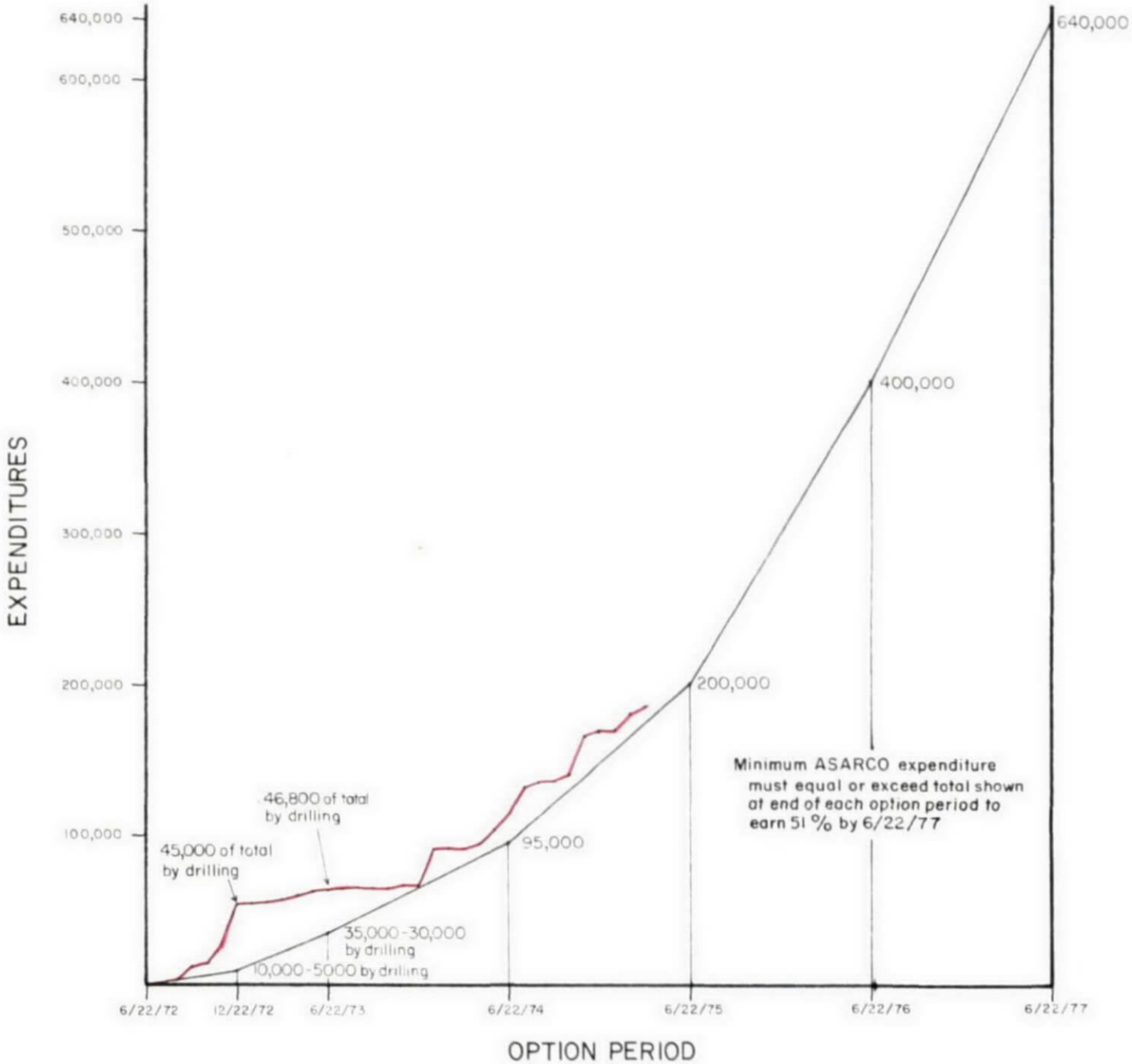
Hole TR-11 advanced 313 ft. from 2335-2648 ft. The rock continued in quartz monzonite porphyry with a single 10 ft. dike of quartz feldspar porphyry, the first dike of this rock seen in the hole. Alteration in the quartz monzonite varies weak to strong disseminated sericite, which is cut by later quartz-sericite-pyrite veins. The abundance of pyrite in these veins contrasts with the lack of pyrite in similar veins of possible thermal collapse origin in TM-8 and TR-10. I will speculate that these veins may reflect the presence of an underlying mineralized zone, perhaps related to the quartz feldspar porphyry. Occasional chalcopyrite veins up to 1/4 inch thick reflect the continued decrease in the pyrite:chalcopyrite ratio with increasing depth. The rods are currently stuck in the hole.

Expenses for the month were $5,000, leaving an estimated balance of $165,500. A graph showing cumulative expenditures through Mar. 1975 is attached.

F. T. Graybeal

F. T. Graybeal

FTG:lb
Att.



Cumulative ASARCO Expenditures
Through March, 1975.

TO ACCOMPANY Monthly Drilling Report
DATED April 28, 1975
BY E. T. Graybeal

EXPENDITURE RATE
3R PROJECT
Patagonia Mtns.
Santa Cruz County, Arizona

MVK 2670

J.H.C.

AMERICAN SMELTING AND REFINING COMPANY
TUCSON ARIZONA

March 26, 1975

J. H. C.
APR 2 1975

TO: W. L. Kurtz

FROM: F. T. Graybeal

3R Project -- 0040
Monthly Report -- Mar. 1975

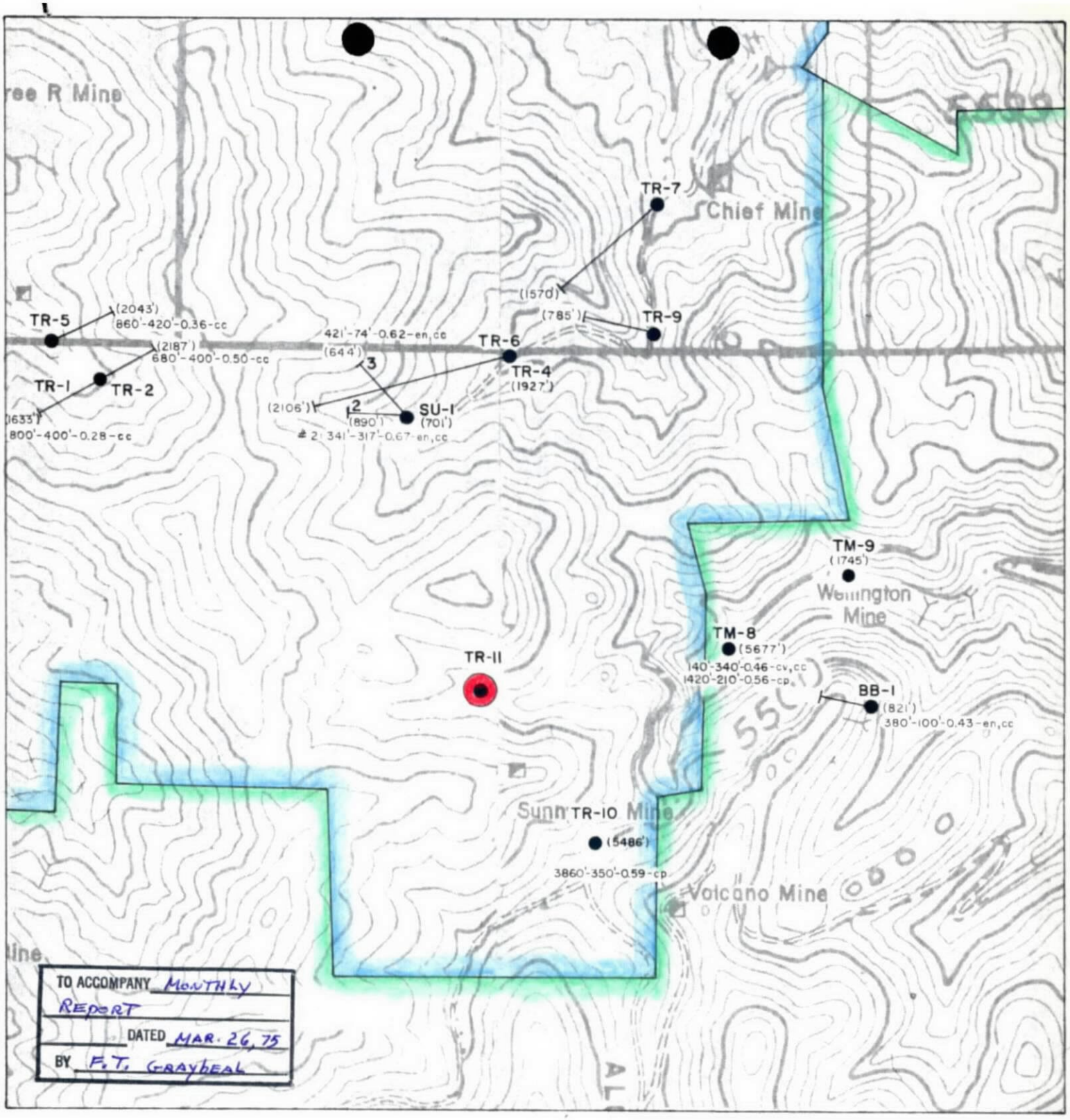
Hole TR-11 was advanced 745 ft. from 1590-2335 ft. Phyllic alteration in the quartz monzonite porphyry was locally rather weak and was accompanied by a decrease in the pyrite:chalcopyrite ratio, a disappearance of tourmaline and (nearby) molybdenite, and a possible coarsening of the grain size of chalcopyrite.

Expenditures for the month were $5,500, leaving an estimated balance of $170,500.

F. T. Graybeal

F. T. Graybeal lb

FTG:lb
Att.



SCALE: 1" = 1000'

EXPLANATION

(821') BB-1 drill hole showing depth

Current drill hole

Kerr-McGee—Thunder Mtn

Anaconda-3R

ASSAY DATA KEY

depth-length-%Cu-mineral

3860'-350'-0.59-cp

GEOLOGIC LEGEND

cp – chalcopyrite
cv – covellite
cc – chalcocite
en – enargite

DRILL MAP

3R – THUNDER MTN. PROJECT

PATAGONIA MTNS.

Santa Cruz County, Arizona

F.T.G. Sept. 1973

MVK 2638

JHC

AMERICAN SMELTING AND REFINING COMPANY
TUCSON ARIZONA

March 13, 1975

J. H. C.

MAR 19 1975

Mr. T. C. Osborne
Assistant Director of Exploration
New York Office

Supplemental Exploration
Authorization Request
3R Project
Santa Cruz County, Arizona

Dear Sir:

As we discussed during your visit to Tucson in December 1974, we have received sufficient encouragement in our drilling on the adjoining 3R and Thunder Mountain Projects to justify continued exploration.

Our first diamond drill hole, TR-10, on the 3R Project area intersected:

110 feet to 160 feet; 50 feet @ 0.63% copper
3860 feet to 4210 feet; 350 feet @ 0.57% copper, 0.033% MoS_2, 0.004 oz. gold, 0.10 oz. silver

Diamond drill hole TM-8 on the Thunder Mountain Project area intersected:

140 feet to 210 feet; 70 feet @ 0.58% copper
210 feet to 370 feet; 160 feet @ 0.25% copper
370 feet to 480 feet; 110 feet @ 0.68% copper
1420 feet to 1630 feet; 210 feet @ 0.56% copper
4300 feet to 5500 feet; 1200 feet @ 0.25% copper, 0.017% MoS_2, 0.10 oz. silver

The 1745-foot diamond drill hole, TM-9, on the Thunder Mountain Project area intersected copper mineralization averaging less than 0.20% above a thousand feet.

Drill holes TM-8 and TR-10 confirm the existence of a vertically zoned porphyry copper system and demonstrate that higher primary copper values are associated with a potassic zone of alteration into which the phyllic zone has collapsed. The exploration chances for finding significant ore grade copper mineralization are considered good.

Drill hole TR-11 is currently drilling at 2,000 feet to test for the deep copper zone. At this time I request funds to complete this hole and to drill an additional hole (specific location to be determined upon completion of hole TR-11) on the 3R Project area. Estimated expenditures to complete this work are:

Complete TR-11	$ 51,000
Land Payments	4,000
Drill new hole	100,000
Drill road	10,000
Geochemistry petrographic and related studies	10,000
Total	$175,000

If you approve, please request a Supplemental Exploration Authorization for this amount. Forms 302-EA and 302-EB are attached.

Respectfully submitted,

W. L. Kurtz

W. L. Kurtz

WLK:lb
Attachs: Map; Forms

cc: JHCourtright - w/o attachs.
RBCrist - w/o attachs.
FTGraybeal - w/o attachs.
WGKellogg - w/forms only

J.H.C.

AMERICAN SMELTING AND REFINING COMPANY
TUCSON ARIZONA

J. H. C.
FEB 6 1975

January 30, 1975

TO: W. L. Kurtz

FROM: F. T. Graybeal

3R Project - 0040
Monthly Report -- Jan. 1975

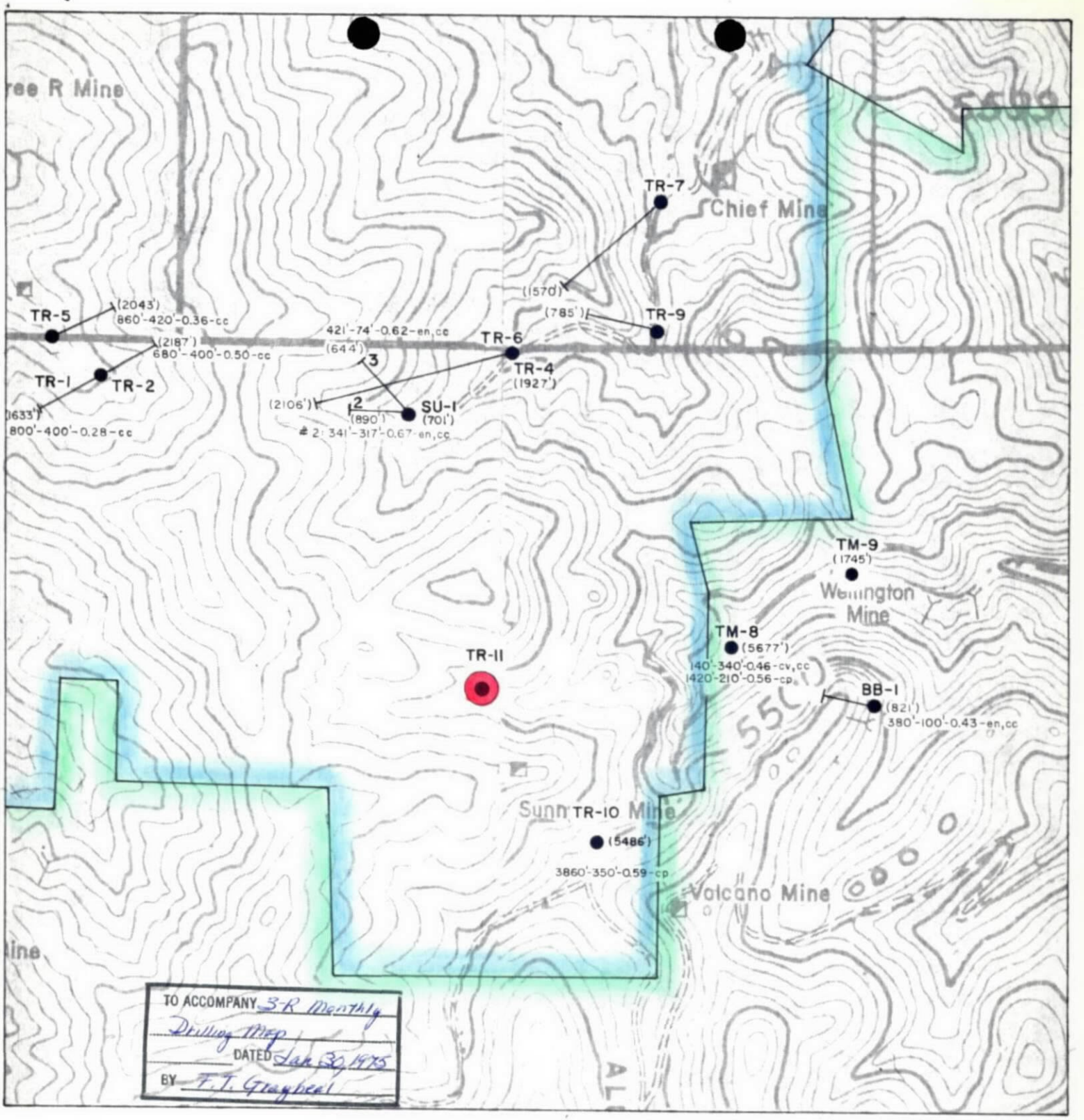
The original TR-11 was abandoned at Joy cost and a new hole was collared 25 ft. SW of the original hole. The new TR-11 was advanced 682 ft. from 0-682 ft. Strongly altered and pyritized alaskite and quartz monzonite porphyry were encountered throughout. Minor fluid inclusion studies were continued.

Expenditures for the month were $600, leaving an estimated balance of $11,500. The expenditure rate graph for the fourth quarter is attached.

F. T. Graybeal

F. T. Graybeal

FTG:lb
Attachs.



SCALE: 1" = 1000'

EXPLANATION

(821') BB-1 — drill hole showing depth

Current drill hole

Kerr-McGee — Thunder Mtn

Anaconda - 3R

ASSAY DATA KEY

depth - length - % Cu - mineral

3860' - 350' - 0.59 - cp

GEOLOGIC LEGEND

cp - chalcopyrite
cv - covellite
cc - chalcocite
en - enargite

DRILL MAP

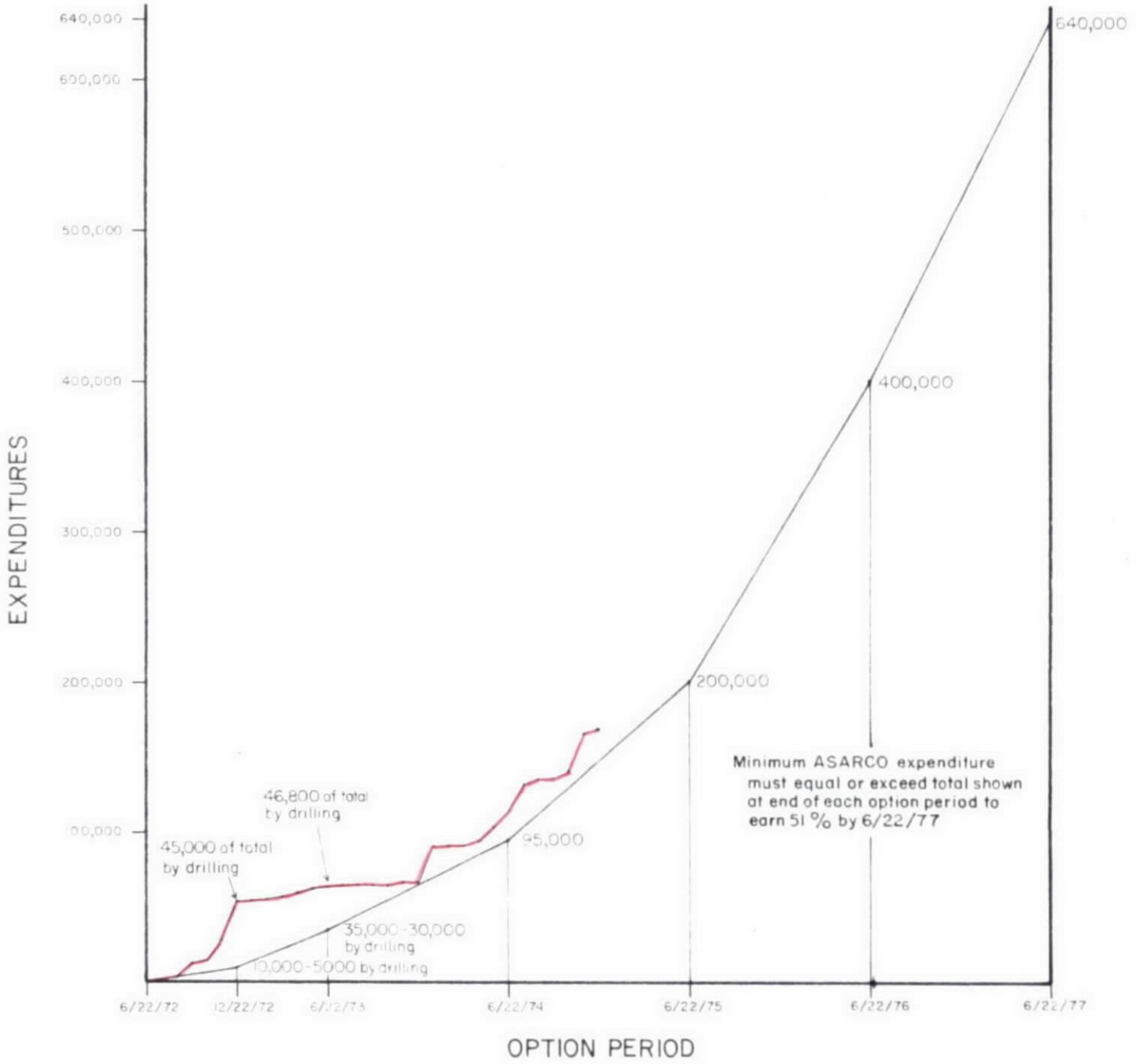
3R - THUNDER MTN. PROJECT

PATAGONIA MTNS.

Santa Cruz County, Arizona

F.T.G. Sept. 1973

MVK 2638



Cumulative ASARCO Expenditures Through December, 1974.

TO ACCOMPANY Report
DATED Jan. 30, 1975
BY F.T. Graybeal

EXPENDITURE RATE
3R PROJECT
Patagonia Mtns.
Santa Cruz County, Arizona

MVK 2670

JHC

AMERICAN SMELTING AND REFINING COMPANY
TUCSON ARIZONA

December 23, 1974

TO: W. L. Kurtz

FROM: F. T. Graybeal

3R Project -- 0040
Monthly Report -- Dec. 1974

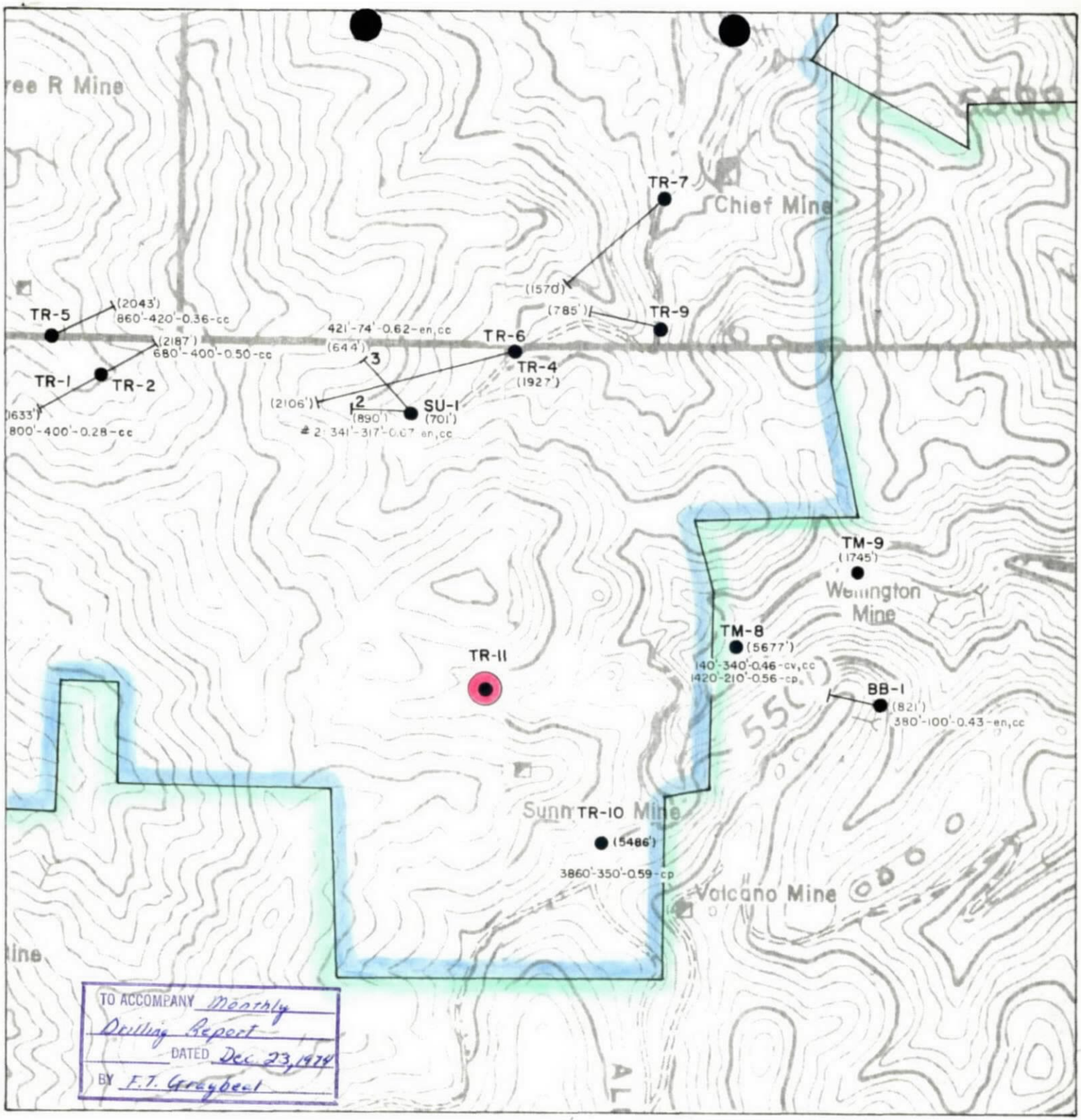
Hole TR-11 was a total disaster this month. The NC rods remained stuck and an attempt to drill NX through an 80-ft. interval of open NC hole below the stuck rods was successful to 1326 ft. At that point the NC core barrel came loose and fell partly into the open hole, lodging at an angle to the hole. Subsequent reentries with NX were deflected by the core barrel. Attempts to cement the barrel and drill it out were unsuccessful because the barrel apparently turns when the NX rods are twisted through it for new reentries, causing the rods to deflect in a new direction. Discussions of the fiasco with you, N. P. Whaley, myself, and Jack Lloyd of Joy on Dec. 20 resulted in an agreement to abandon this hole and collar a new hole at Joy's expense.

There were no invoiced expenses this month for which Asarco is responsible. Minor geological studies were continued. Expenses for the month were $400.00, leaving an estimated balance of $12,100.00.

F. T. Graybeal

F. T. Graybeal

FTG:lb
Attach.



SCALE: 1" = 1000'

EXPLANATION

(821') BB-1 — drill hole showing depth

Current drill hole

Kerr-McGee—Thunder Mtn

Anaconda-3R

ASSAY DATA KEY

depth-length-%Cu-mineral

3860'-350'-0.59-cp

GEOLOGIC LEGEND

cp – chalcopyrite
cv – covellite
cc – chalcocite
en – enargite

DRILL MAP

3R – THUNDER MTN. PROJECT

PATAGONIA MTNS.

Santa Cruz County, Arizona

F.T.G. Sept. 1973

MVK 2638

J.H.C.

AMERICAN SMELTING AND REFINING COMPANY
TUCSON ARIZONA

J. H. C.
OCT 30 1974

October 28, 1974

TO: W. L. Kurtz

FROM: F. T. Graybeal

Three R Project - 0040
Monthly Report - Oct. 1974

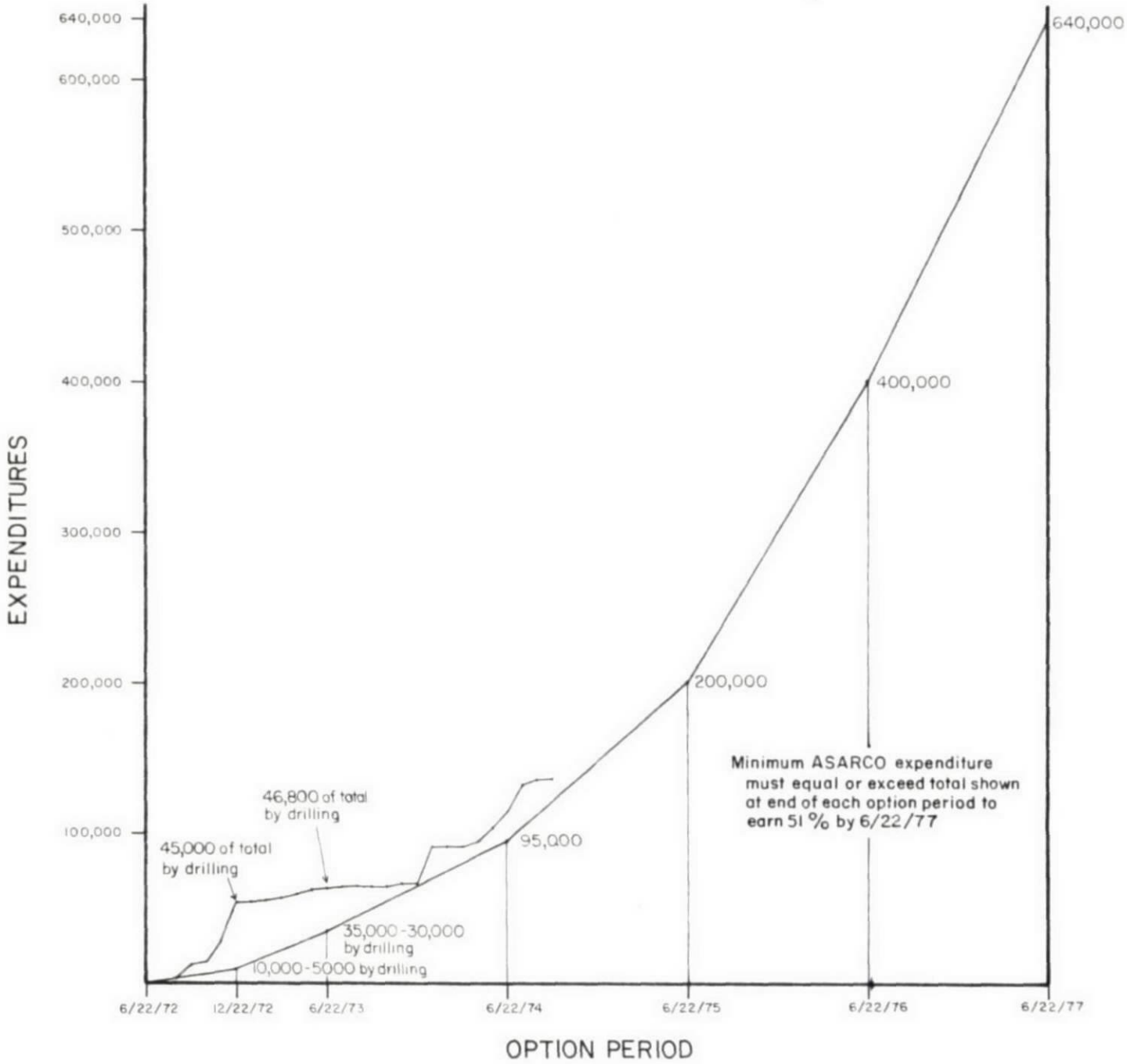
Hole TR-11 was advanced 236 ft. from 0-236 ft. Both alaskite and quartz monzonite porphyry were encountered, carrying up to 5 vol. percent disseminated pyrite mixed with short leached intervals. Supergene chalcocite occurs below 110 ft. Alteration is strong in the quartz monzonite porphyry and is so intense in the alaskite such that no original igneous textures remain.

Expenditures for the month were $10,000.00, leaving an estimated balance of $25,600.00. The expenditure rate graph for the third quarter of 1974 is attached.

F. T. Graybeal

F. T. Graybeal

FTG:lb
Attachs.



Cumulative ASARCO Expenditures
Through SEPT. 30, 1974.

EXPENDITURE RATE

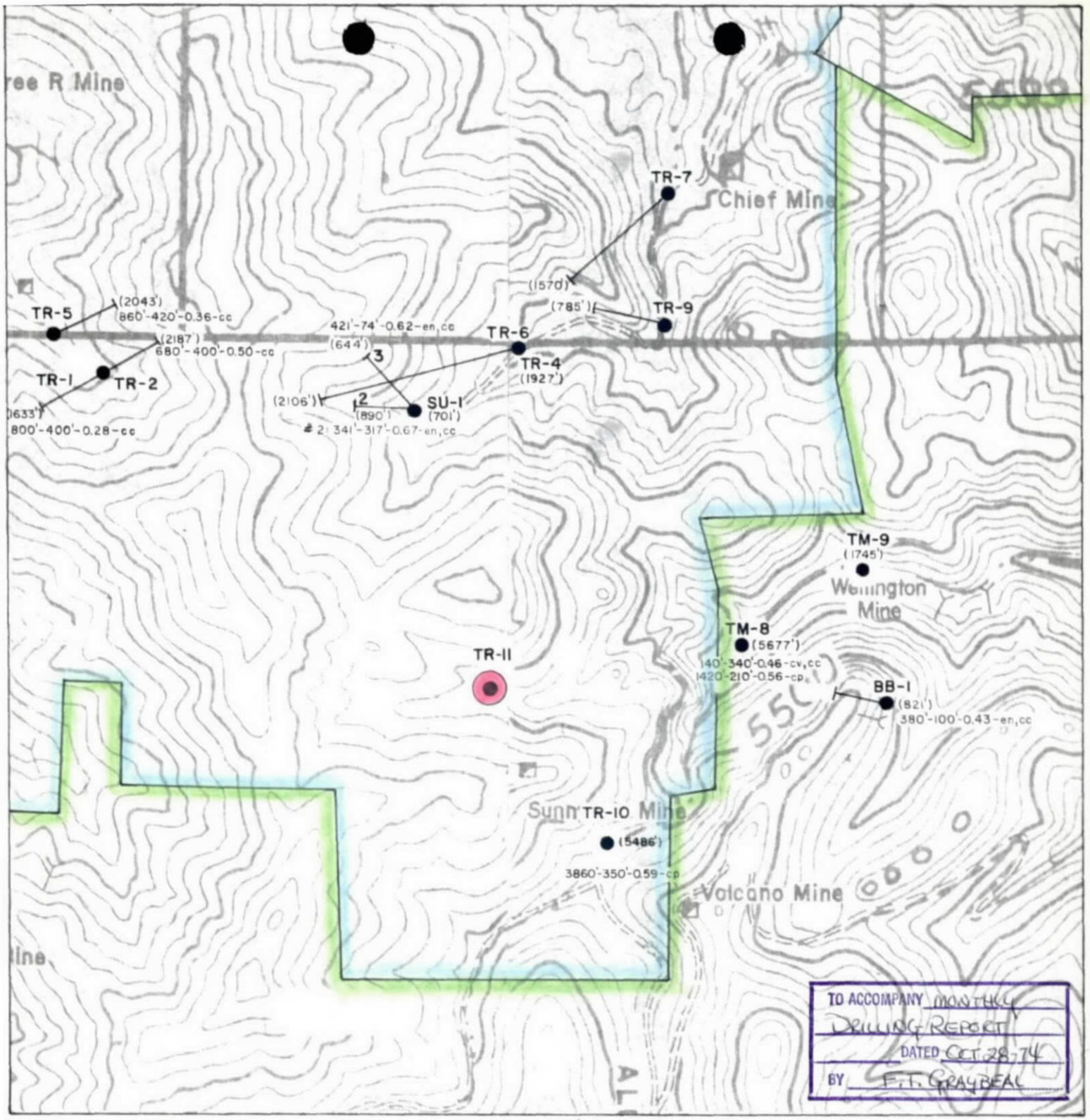
3R PROJECT

Patagonia Mtns.

Santa Cruz County, Arizona

TO ACCOMPANY MONTHLY DRILLING REPORT
DATED OCT 28-74
BY F.T. GRAYBEAL

MVK 2670



SCALE: 1" = 1000'

EXPLANATION

(821') BB-1 — drill hole showing depth

Current drill hole

Kerr-McGee—Thunder Mtn

Anaconda-3R

ASSAY DATA KEY

depth-length-%Cu-mineral

3860'-350'-0.59-cp

GEOLOGIC LEGEND

cp – chalcopyrite
cv – covellite
cc – chalcocite
en – enargite

DRILL MAP

3R – THUNDER MTN. PROJECT

PATAGONIA MTNS.

Santa Cruz County, Arizona

F.T.G. Sept. 1973

MVK 2638

J.H.C.

AMERICAN SMELTING AND REFINING COMPANY
TUCSON ARIZONA

J H C.

AUG 29 1974

August 29, 1974

TO: W. L. Kurtz

FROM: F. T. Graybeal

Three R Project -- 0040
Monthly Report -- Aug. 1974

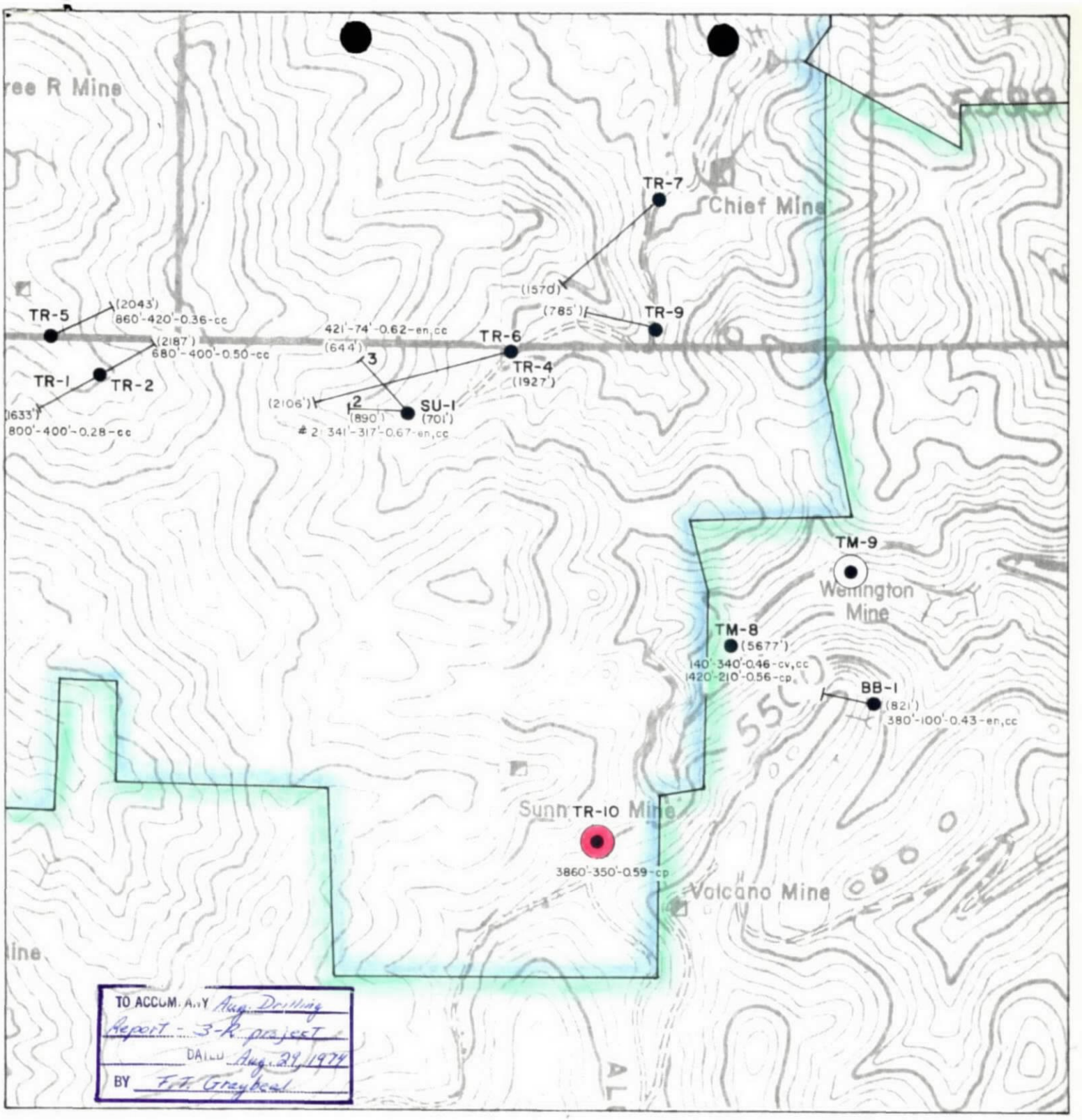
Hole TR-10 was advanced 107 ft. from 5379-5486 ft. and bottomed at 5486 ft. The core continued in mixed phyllic and potassic alteration and the core was everywhere strongly altered. A weakly brecciated zone with scattered 1 in. pods of chalcopyrite was cut from 5402-5464 ft; however, the highest assay in this zone was a mere 0.42% Cu.

A summary report is mostly complete and only awaits the completion of composite assaying. Expenditures for the month were $6,100, leaving an estimated balance of $44,500.

F. T. Graybeal

F. T. Graybeal

FTG:lb
Attachs.



SCALE: 1" = 1000'

EXPLANATION

(821') BB-1 — drill hole showing depth

Current drill hole

Kerr-McGee—Thunder Mtn

Anaconda-3R

ASSAY DATA KEY

depth-length-%Cu-mineral

3860'-350'-0.59-cp

GEOLOGIC LEGEND

cp – chalcopyrite
cv – covellite
cc – chalcocite
en – enargite

DRILL MAP

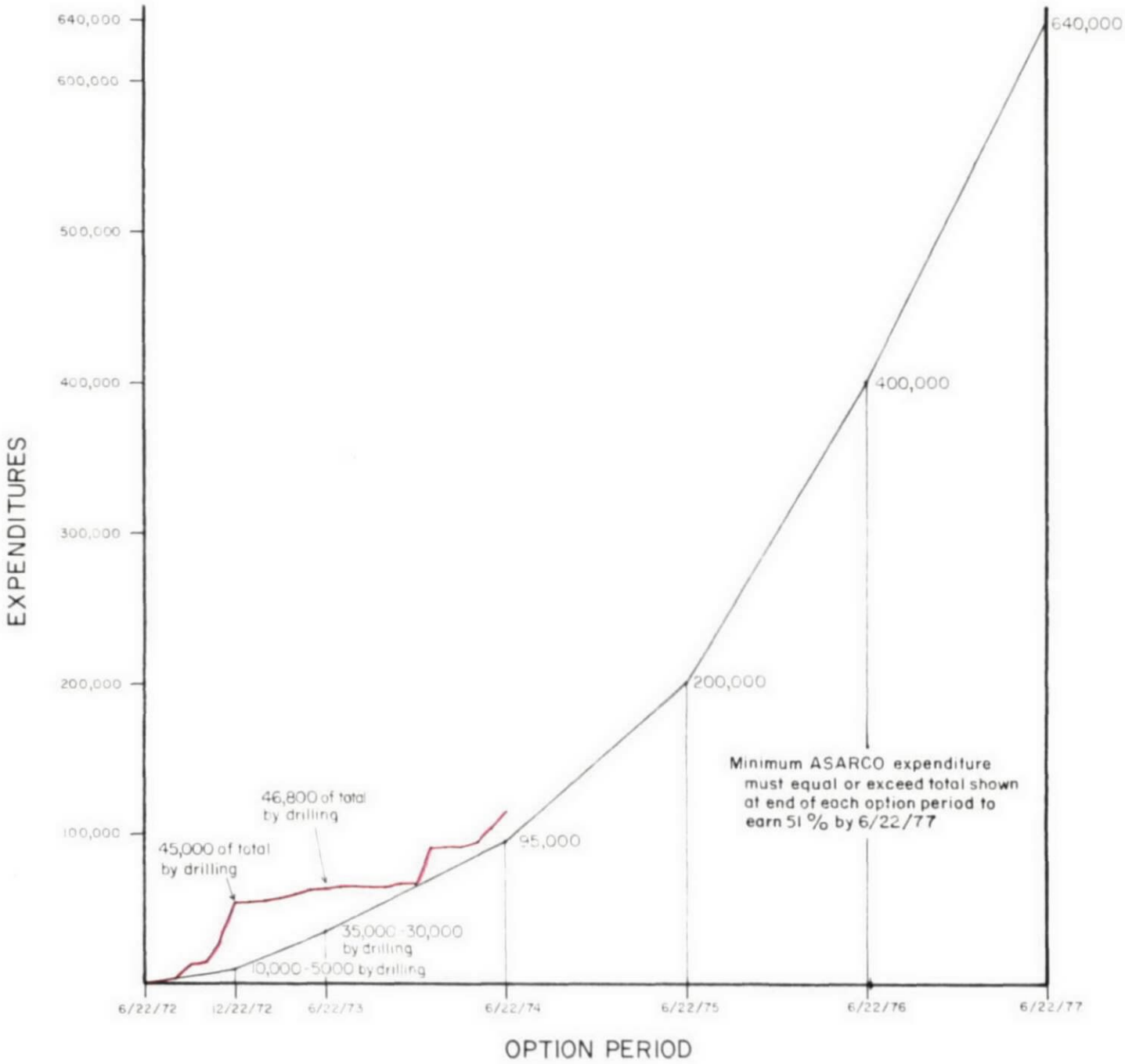
3R – THUNDER MTN. PROJECT

PATAGONIA MTNS.

Santa Cruz County, Arizona

F.T.G. Sept. 1973

MVK 2638



Cumulative ASARCO Expenditures
Through June.

TO ACCOMPANY Monthly Drilling Report
DATED Aug. 29, 1974
BY F. T. Greybeal

EXPENDITURE RATE

3R PROJECT

Patagonia Mtns.

Santa Cruz County, Arizona

MVK 2670

J.H.C.

AMERICAN SMELTING AND REFINING COMPANY
TUCSON ARIZONA

J. H. C.
AUG 6 1974

July 31, 1974

Memorandum to: W. L. Kurtz

From: F. T. Graybeal

Three R Project -- 0040
Monthly Report -- July 1974

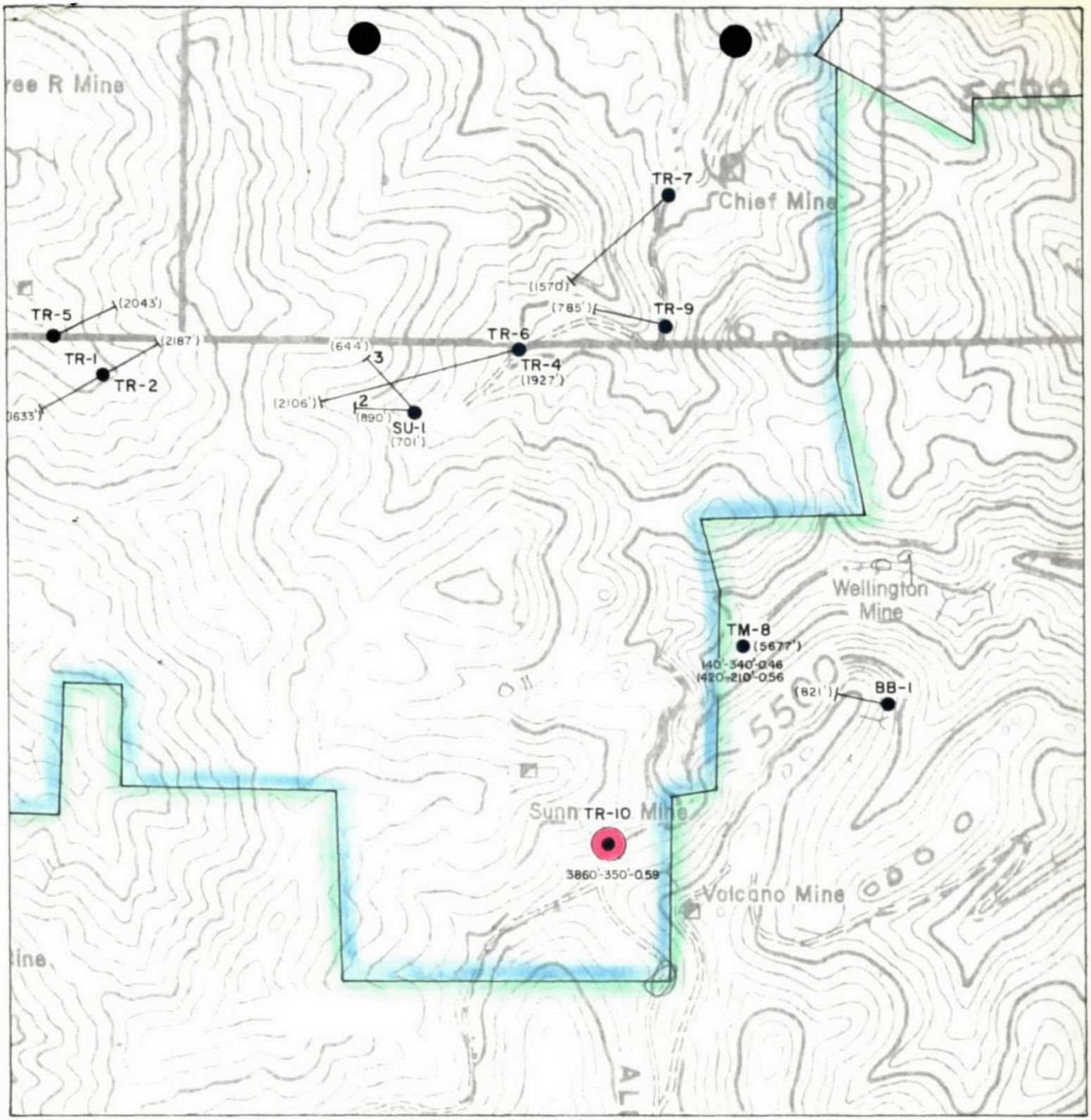
Hole TR-10 was advanced 335 ft. from 5044-5379 ft. Potassic alteration minerals continue to form up to 25% of the core and are often cut by diffuse quartz-sericite veins. The overall alteration remains strong. The pyrite content is estimated to average about 3 volume percent and the copper content is estimated to be around 0.25% Cu. No assays are available for the hole below 4830 ft.

Core recovery has been erratic during the past month due to broken rock and this has slowed progress. However, I expect the hole will be terminated during the next month. Expenditures for the month were $12,400, leaving an estimated balance of $50,500.

F. T. Graybeal

F. T. Graybeal

FTG:lb
Attach.



SCALE: 1" = 1000'

EXPLANATION

(821') BB-1 drill hole showing depth

Current drill hole

Kerr-McGee—Thunder Mtn

Anaconda-3R

ASSAY DATA KEY

depth - length - % Cu

3860' - 350' - 0.59

TO ACCOMPANY 3-R Drilling Report

DATED July 31, 1974

BY F.T. Graybeal

DRILL MAP

3R - THUNDER MTN. PROJECT

PATAGONIA MTNS.

Santa Cruz County, Arizona

F.T.G. Sept. 1973

MVK 2638

J.H.C.

AMERICAN SMELTING AND REFINING COMPANY
TUCSON ARIZONA

June 28, 1974

J. H. C.
AUG 9 1974

Memorandum to: W. L. Kurtz

From: F. T. Graybeal

Three R Project -- 0040
Monthly Report - June 1974

Hole TR-10 was advanced 558 ft. from 4486-5044 ft. Increasing amounts of potassic alteration minerals, including both biotite and orthoclase, were noted throughout and the alteration remains strong. The host rock is igneous, probably the quartz feldspar porphyry. The copper content appears visually to average about 0.30% Cu.

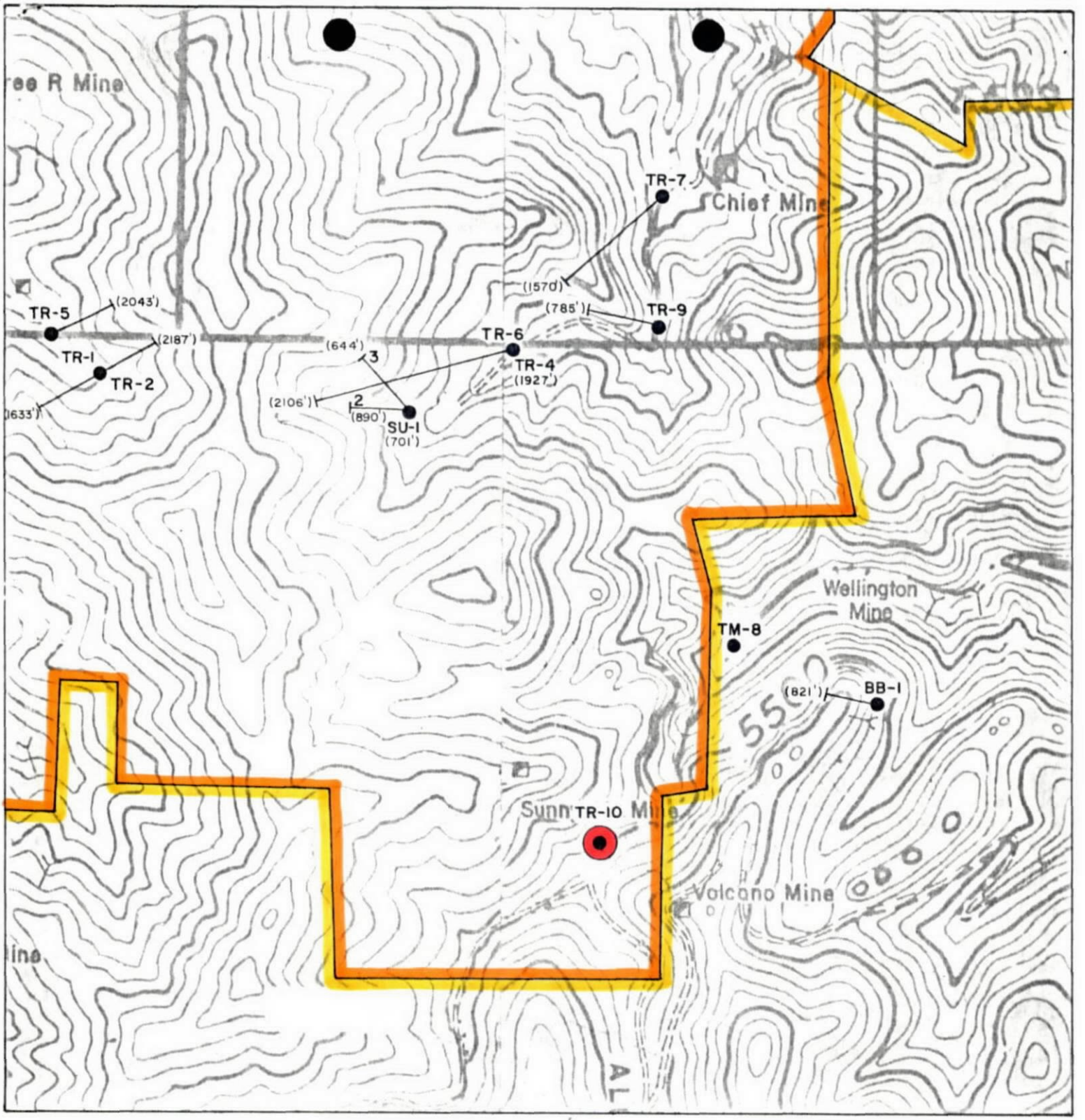
The interval from 4210-4830 ft. (from the bottom of the higher grade zone to the present end of splitting) varies from 0.01-0.69% Cu and averages 0.27% Cu.

It now appears probable that the road to a new site northwest of TR-10 will not be completed in time, due to fire danger. However, drilling in TR-10 since April will be sufficient for 1974 assessment.

F. T. Graybeal

F. T. Graybeal

FTG:lb
Attach.



SCALE: 1" = 1000'

EXPLANATION

(821') BB-1 drill hole showing depth

Current drill hole

Kerr-McGee—Thunder Mtn

Anaconda-3R

TO ACCOMPANY MONTHLY REPORT FOR JUNE
DATED 6-28-74
BY F.T. GRAYBEAL

DRILL MAP

3R - THUNDER MTN. PROJECT

PATAGONIA MTNS.

Santa Cruz County, Arizona

F.T.G. Sept. 1973

MVK 263A

J.N.C.

AMERICAN SMELTING AND REFINING COMPANY
TUCSON ARIZONA

May 31, 1974

J. H. C.

MAY 31 1974

Memorandum to: W. L. Kurtz

From: F. T. Graybeal

Three R Project -- 0040
Monthly Report -- May 1974

Hole TR-10 was advanced 381 ft. from 4105-4486 ft. Very strong quartz-sericite alteration with disseminated and vein chalcopyrite-pyrite-molybdenite mineralization was encountered throughout. The total sulfide content of the interval 4100-4400 ft. is estimated to average about 7%. Weak brecciation is indicated by small quartz-filled vugs which are irregularly distributed from 4100-4400 ft. The rock became increasingly broken from 4300-4400 ft. and the hole entered a fault zone at 4438 ft. The grade of the chalcopyrite mineralization increased from 4100-4180 ft. and then decreased to the 0.20-0.40% Cu range below that. Significant assays are as follows (0.50% Cu cutoff):

Interval	Length	% Cu	% MoS_2	oz. Au	oz. Ag
4100-4210	110 ft.	0.67	0.032	0.002	0.07
3860-4210	350 ft.	0.59	0.033	0.005	0.15

At May 1974 metal prices, an equivalent value of 0.74% Cu is calculated for the interval 3860-4210 ft.

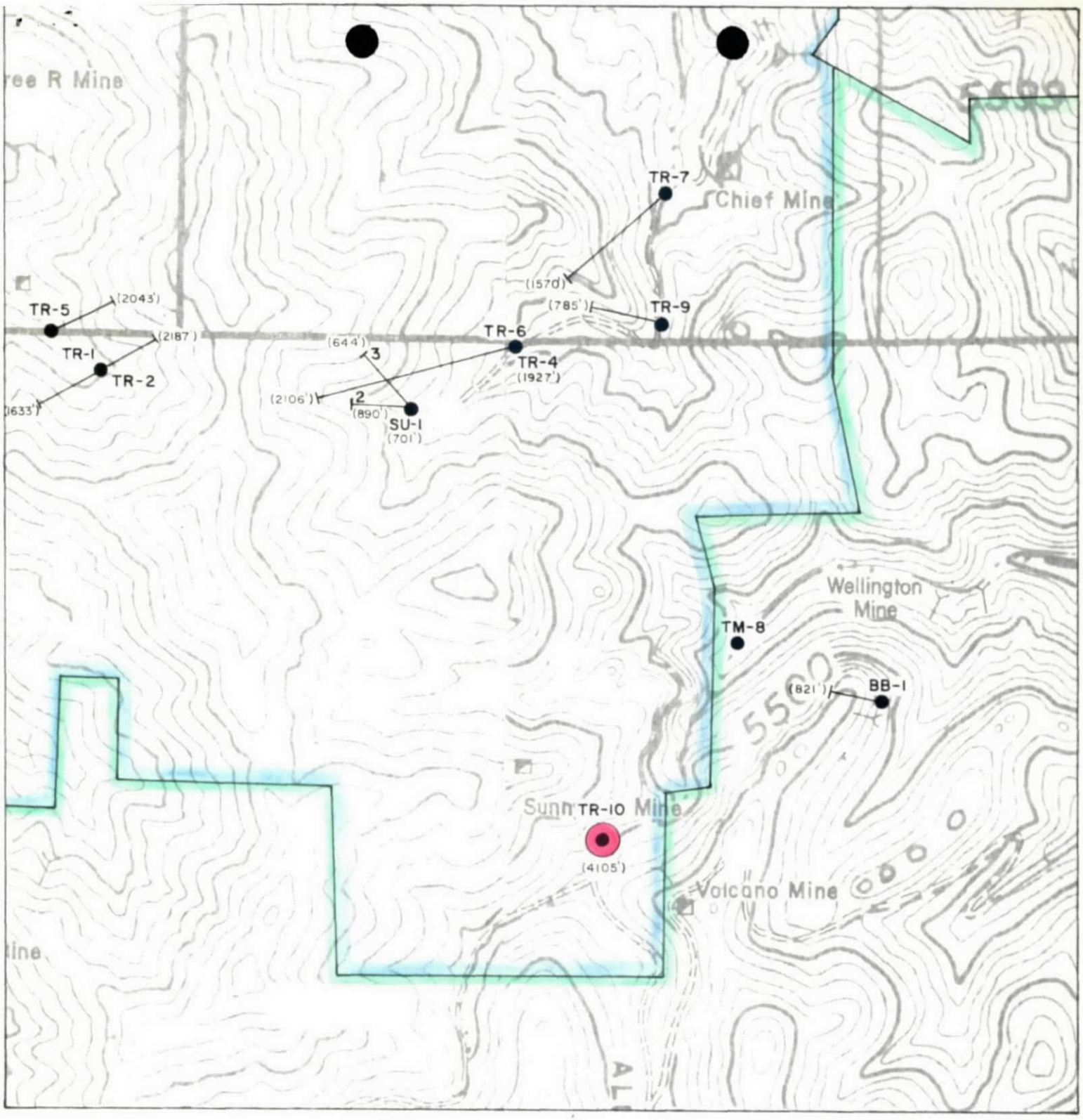
Assays from 4210-4360 averaged 0.37% Cu. Values for Au, Ag, and MoS_2 are not yet available, but are not expected to be significantly higher than in the interval 3860-4210.

Espenditures for the month were $10,600, leaving an estimated balance of $77,500.

F. T. Graybeal

F. T. Graybeal

FTG:lb
Attach.



EXPLANATION

(821') BB-1 — drill hole showing depth

Current drill hole

Kerr-McGee—Thunder Mtn

Anaconda-3R

TO ACCOMPANY REPORT
DATED MAY 31, 1974
BY F.T. GRAYBEAL

SCALE: 1" = 1000'

DRILLING PROGRESS FOR THE MONTH OF MAY 1974

DRILL MAP

3R - THUNDER MTN. PROJECT

PATAGONIA MTNS.

Santa Cruz County, Arizona

F.T.G.

Sept. 1973

MVK 2638

JHC.

AMERICAN SMELTING AND REFINING COMPANY
TUCSON ARIZONA

May 1, 1974

J. H. C.
MAY 2 1974

Memorandum to: W. L. Kurtz

From: F. T. Graybeal

Three R Project -- 0040
Monthly Report -- Apr. 1974

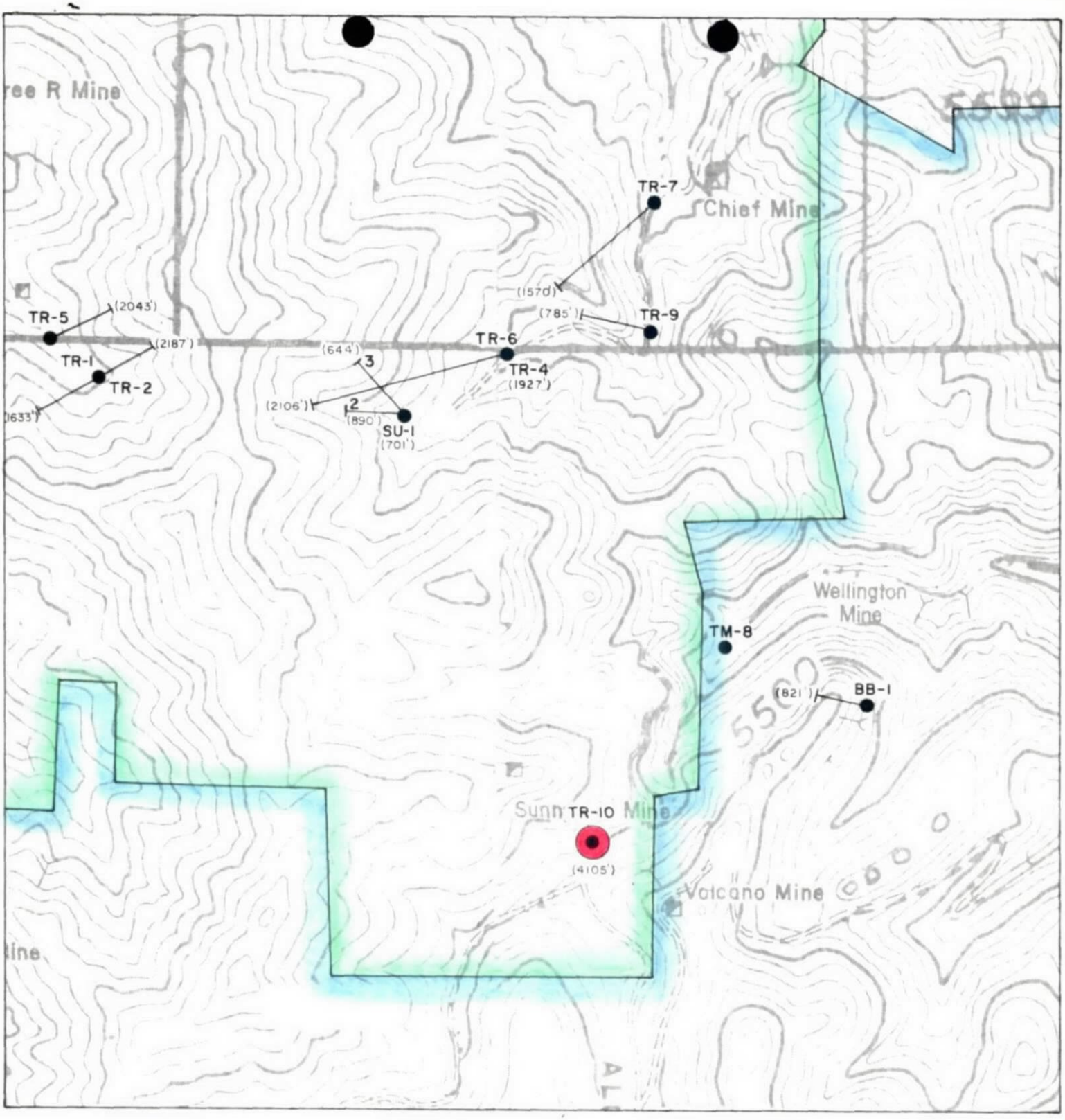
Hole TR-10 was reentered on April 16, 1974 and cased. The hole was then reamed from 3500-4105 and the Parsons survey tool, previously lost at the bottom of the hole, was successfully retrieved. The moment of truth is upon us.

Expenditures for the month were $5,000, leaving an estimated balance of $85,700. An expenditure rate chart is attached.

F. T. Graybeal

F. T. Graybeal

FTG:lb
Attachs.



EXPLANATION

(821')— BB-1 drill hole showing depth

Current drill map

Kerr-McGee—Thunder Mtn

Anaconda-3R

TO ACCOMPANY Memo
DATED May 1, 1974
BY F.T. Graybeal

SCALE: 1" = 1000'

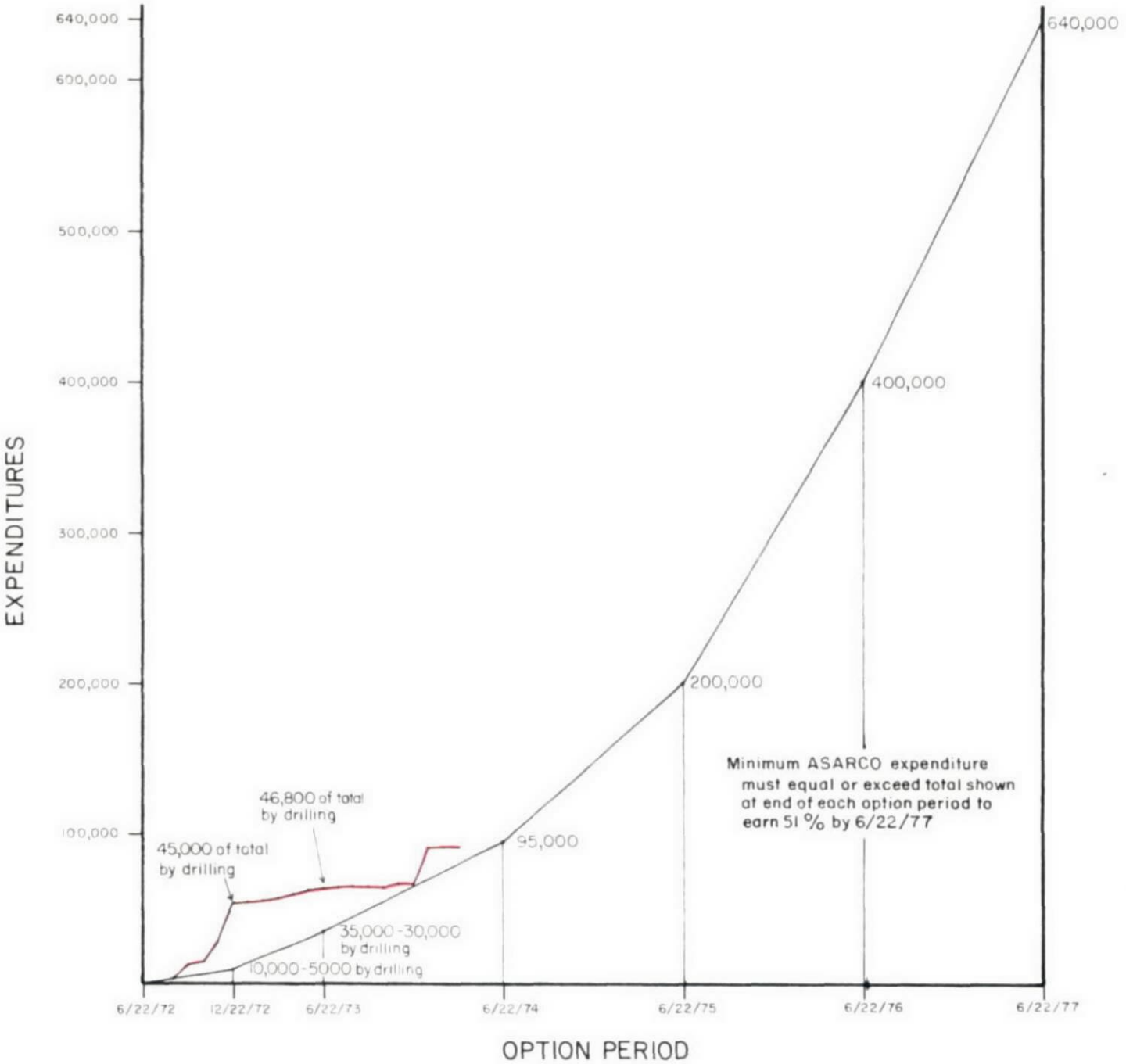
DRILL MAP

3R - THUNDER MTN. PROJECT

PATAGONIA MTNS.

Santa Cruz County, Arizona

F.T.G. Sept. 1973



Cumulative ASARCO Expenditures
Through March, 1974.

TO ACCOMPANY Memo...
DATED May 1, 1974.....
BY F.T. Graybeal.....

EXPENDITURE RATE

3R PROJECT

Patagonia Mtns.

Santa Cruz County, Arizona

MVK 2670

JHC

AMERICAN SMELTING AND REFINING COMPANY
TUCSON ARIZONA

March 27, 1974

Memorandum to: W. L. Kurtz

From: F. T. Graybeal

Three R Project -- 0040
Monthly Report -- March 1974

Several days were spent concerning alteration petrography. TR-10 was skeletonized and core rejects were moved to storage at Mission. Expenditures this month were $200.00, leaving an estimated balance of $90,700.

F. T. Graybeal

F. T. Graybeal

FTG:lb

AMERICAN SMELTING AND REFINING COMPANY
TUCSON ARIZONA

I. H. C.
MAR 15 1974

February 1, 1974

Memorandum to: W. L. Kurtz

From: F. T. Graybeal

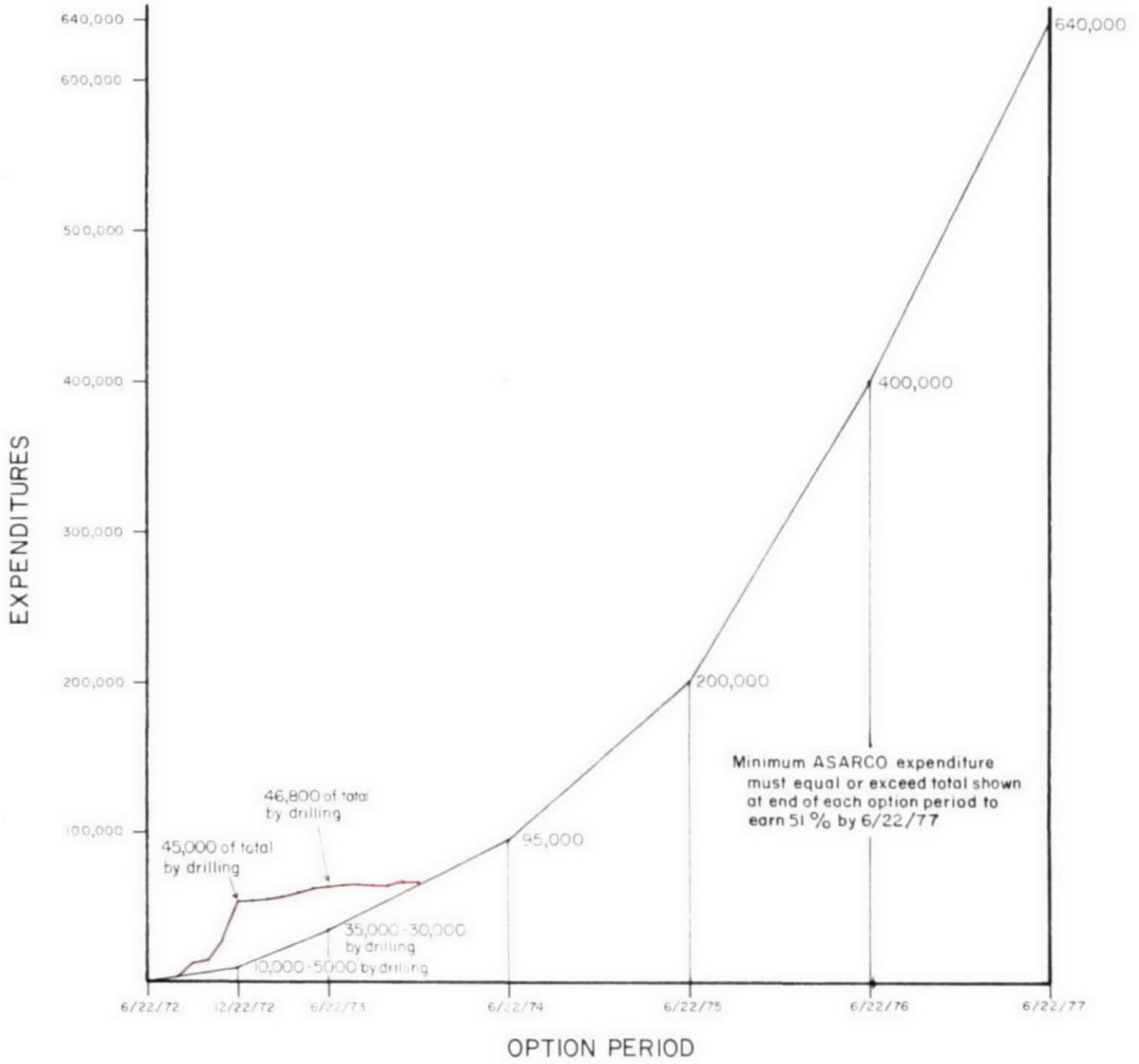
Three R Project -- 0040
Monthly Report - Jan. 1974

The drill road to TR-10 was improved in preparation for reentry of this hole. Fluid inclusion studies of all Anaconda core and selected surface rocks will be done when time permits and motivation exceeds the square of eye strain.

F. T. Graybeal

F. T. Graybeal

FTG:lb
Attach.



Cumulative ASARCO Expenditures
Through Dec. 1973

EXPENDITURE RATE

3R PROJECT

Patagonia Mtns.

Santa Cruz County, Arizona

TO ACCOMPANY Monthly Report
DATED Feb. 1, 1974
BY F.T. Graybeal

MVK 2670

AMERICAN SMELTING AND REFINING COMPANY
TUCSON ARIZONA

J. H. C.
NOV 12 1973

November 8, 1973

Mr. T. C. Osborne
Asst. Director of Exploration
New York Office

Supplemental Exploration
Authorization Request
3R (Anaconda) Project
Santa Cruz County, Arizona

Dear Sir:

The ASARCO drilling on the 3R Project and adjacent Thunder Mountain Project demonstrates that we are exploring a large porphyry copper system. Drill hole TR-10 was bottomed at 4105' and contained the following significant assays:

Interval	Length	% Cu	% MoS_2	oz. Au	oz. Ag
3860-4105	245'	0.52	0.029*	0.006*	0.16*
4030-4105	75'	0.60			

*based on 50' composites.

The mineralization is increasing with depth and I concur with Mr. Graybeal that this hole should be deepened to 5,000 feet, and a new hole drilled 2,000 feet north of TR-10.

Land committments to December 1974, including the $16,000 renewal fee Anaconda negotiated for extending options, are $25,392.

I estimate the cost to complete this phase of exploration as follows:

Deepen TR-10	$ 21,000
Drill new hole	60,000
Land committments	25,392
Site preparation	5,000
Legal, contingencies	3,608
	$115,000

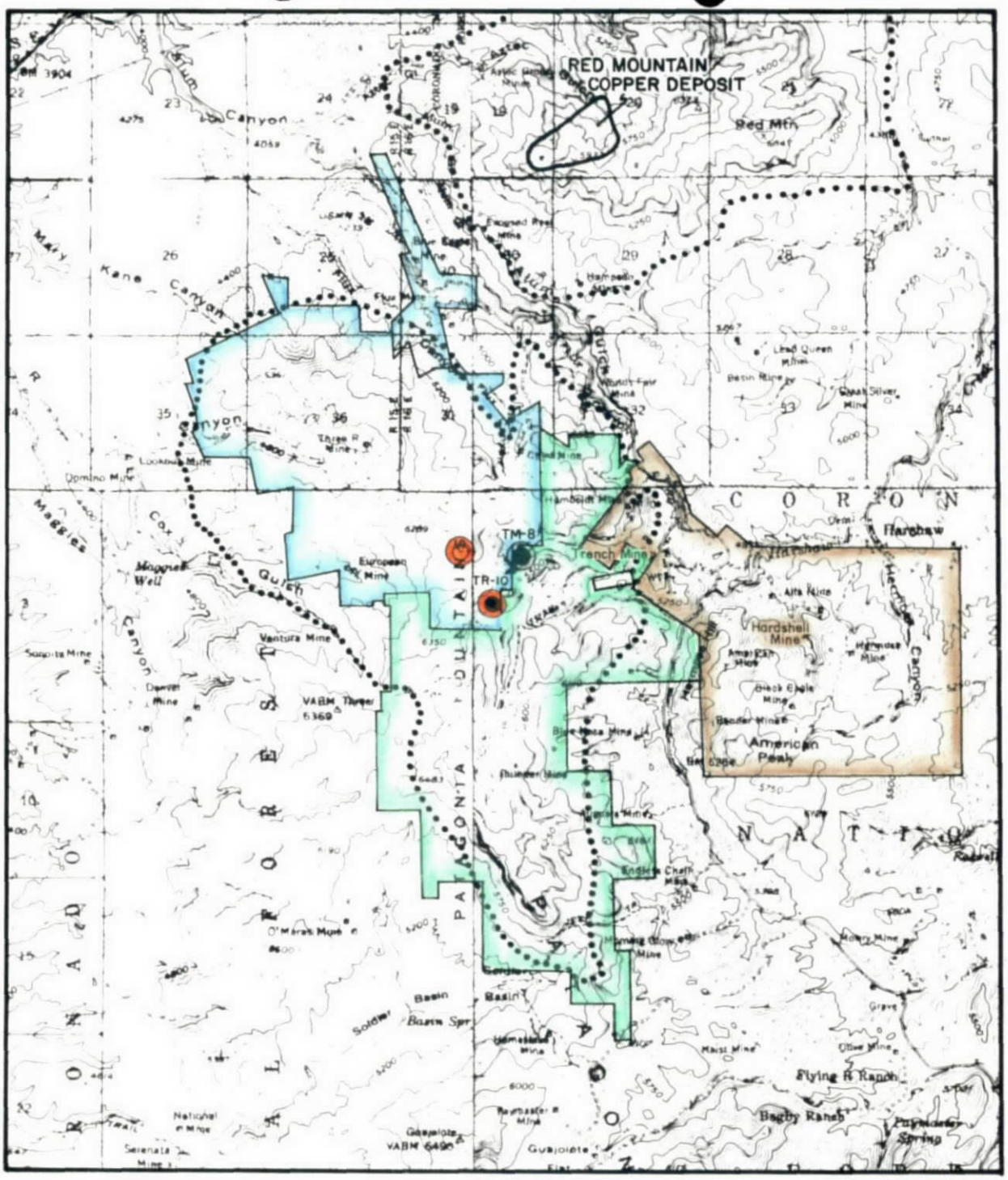
If you approve, please request a Supplemental Exploration Authorization for this amount. Forms 302-EA and 302-EB are enclosed.

Respectfully submitted,

W. L. Kurtz

WLK:lb
Encs: Forms & Map

cc: JHCourtright - w/encs.
RBCrist - w/o encs.
FTGraybeal - w/o encs.
JDSell - w/o encs.
ADCoumides - w/Forms only



LEGEND

- 3R Project
- Thunder Mtn Project
- ASARCO
- TR-10 3860-4105 0.52 Cu to be deepened
- TM-8 1420-1650 0.54 Cu in progress at 3000'
- Proposed Drill Hole
- Areas of Pervasive Hydrothermal Alteration

TO ACCOMPANY 3R-Supp. Exp. Auth. Request
DATED Nov. 8, 1973
BY W.L. Kurtz

3R-THUNDER MOUNTAIN PROJECTS

SANTA CRUZ COUNTY, ARIZONA

1" = 1 mile

Revised-Nov. 1973-W.L.K.

MVK 2630

PRINTED IN USA 9/69

FORM 302-EB

New York No. .....

APPLICATION FOR SUPPLEMENTAL EXPLORATION AUTHORIZATION

November 8, 1973

Originating Office SWED - Tucson

Application is hereby made for supplemental Authorization to cover cost, in excess of original estimate, of work authorized by New York.

No. 0040-00 - 3R (Anaconda) Project, Santa Cruz Co., Arizona

Present total Estimated Cost (Form 302-EA attached)	$. 160,000
Amount previously authorized (date 9/6/72)	$. 45,000
Balance for which Authorization is now requested	$. 115,000

ADDITIONAL WORK CONTEMPLATED:

Deepen drill hole TR-10 from 4105 feet to 5000 feet.

Diamond drill a new 4-5,000 foot hole.

EXPLANATION OF INCREASED COST:

TR-10 bottomed in 0.6% copper and should be deepened to test thickness and grade of mineralization. Drill holes TR-10 and TM-8 demonstrate that a large porphyry copper system exists and justify another exploratory drill hole to further test this large zone.

Reviewed by ..... Acct. Mgr. or Chief Acct.

Approved by ..... Vice President

Recommended by ..... Supervisor

Approved by ..... Comptroller

Account Chargeable to .....
To be designated by Comptroller

Approved by Advisory Committee

.....19.....

Approved by Board of Directors

.....19.....

.....
Secretary

FORM 302-EA

Printed in U.S.A.

ESTIMATE, MINERAL EXPLORATION

PROSPECT 3R (Anaconda) Project

LOCATION Santa Cruz Co., Arizona

OFFICE SWED - Tucson

BY W. L. Kurtz

No.	Type of Work	Salaries/Wages Days	Salaries/Wages Amount	Material	Fees, Rent, Services	Traveling	Taxes	Other	Total Estimate Cost
501	Outright Purchase								
502	Option Payments				30,500				30,500
503	Bonus Payments								
504	Minimum Royalties-								
	Deductible from								
	Future Production								
505	Minimum Royalties-Not								
	Deductible from								
	Future Production								
506	Rental Payments								
507	Staking Claims								
511	Surface Excavating								
512	Underground "								
521	Surface Drilling				102,500				102,500
522	Underground "								
530	Geologic		1,500			1,000			2,500
540	Sampling, Assaying, Lab.				4,000				4,000
550	Geophysics								
560	Geochem		1,400		5,000	1,100			7,500
570	Engineering								
580	Construction (temp.)				5,000				5,000
590	Construction (perm.)								
610	Administration, Field		6,000			2,000			8,000
	Offices and Camps								
620	Administration, General								
641	Autos and Vehicles								
642	Aircraft and Boats								
650	Partner's Share								
	ASARCO'S SHARE		8,900		147,000	4,100			160,000
661	Commission or Fees								
663	Exchange								
	TOTAL		8,900		147,000	4,100			160,000

JHK

AMERICAN SMELTING AND REFINING COMPANY
CENTRAL RESEARCH LABORATORIES
SOUTH PLAINFIELD, N. J., 07080

RECEIVED
JUL 6 1973
S. W. U. S. EXPL. DIV.

W. L. K.

July 3, 1973 JUL 1973
Re: 3175

File — 3R

Mr. F. T. Graybeal
Southwestern Exploration Division
Tucson, Arizona

Mineral Identification - Exploration Samples

Three samples were received with your covering letter of June 18, 1973. The following are the identifications we have been able to make on the phases described in your letter.

Green Rock SU-243 (MR-452-A)

Fine-grained green crust material was hand picked from the rock sample.

Microscopic - possible phases are:

chenevixite	$Cu_2Fe_2(AsO_4)_2(OH)_4 \cdot H_2O$ (?)
erinite	$Cu_5(AsO_4)_2(OH)_4$
olivenite	$Cu_2(AsO_4)(OH)$

X-ray Diffraction - strong pattern of a copper arsenate, possibly one of the following:

chenevixite
erinite
clinoclasite

Electron Microprobe - area selected was analyzed for Cu, Fe, As, and O_2. The following analysis was obtained:

Cu 23.8%, Fe 17,8%, As 22.8%, O total & H_2O 35.6% (by difference).

On the basis of the data it is concluded that the copper arsenate phase is chenevixite.

Drill Core DDH-TR5-1630 (MR-452-B)

Fine grained, soft areas hand picked from polished surface.

X-ray Diffraction - Strong kaolinite
Possible mica

Drill Core TR-6:997 (MR-452-C)

Tan or light brown rounded to tabular aggregates hand picked.

X-ray Diffraction - Strong mica possibly
muscovite or sericite:
possible kaolinite

If there are any questions, please do not hesitate to contact me.

Edward Martinez

EM:rg
cc: JJCollins
RBHaagensen
VKudryk
WLKurtz

cpy. ~~JHCourtright~~
TC Osborn
M Hecox
Zed Jones Kerr McGee

THE ANACONDA COMPANY

PRIMARY METALS DIVISION
P.O. BOX 11309, TUCSON, ARIZONA 85706

ANACONDA
from mine to consumer

RECEIVED
MAR 19 1973
S. W. U. S. EXPL. DIV.

W. L. K.
MAR 21 1973

March 15, 1973

Mr. W. L. Kurtz,
Manager of Exploration
American Smelting & Refining Co.
P.O. Box 5747
Tucson, Arizona
85703

J. H. C.
MAR 22 1973

Re: Alunite
3R Area
Santa Cruz Co., Arizona

Dear Mr. Kurtz:

Art Barber has asked me to reply to your letter to him of February 15th with regard to the advisability of obtaining potassium prospecting permits for the Sunnyside - 3R Area.

The process developed in Mexico which is used by Earth Sciences makes products the sum market value of which is, in southern Arizona, less than the cost of production. Assuming ground alunite at $3.00/ton, ammonia at $70.00/ton, sulfur at $5.00/ton, natural gas at $ .50/mft^3, steam at $1.50/ton, electricity at $ .05/kwh, and labor at $5.00/hour, the manufacturing cost would be in the neighborhood of $60.00 per ton of combined products. This does not include taxes, overhead, marketing or capital burden. Taking alumina at $100/ton, ammonium sulfate at $18/ton and potassium sulfate at $20/ton, a ton of combined product would sell for $48.00. The market price of all products would have to increase markedly before this approach would make money.

In view of the expected surplus of sulfuric acid in this area, the possibility of an increase in the price of ammonium sulfate is remote.

The investment of a significant amount of money in potassium permits would not seem to be justified.

Sincerely yours,

J. K. Grunig

JKG:jk

J. H. C.
JAN 30 1973

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

January 24, 1973

Three R Project

Memorandum to: W. L. Kurtz

From: F. T. Graybeal

Geology of TR-10
Patagonia Mountains
Santa Cruz County, Arizona

SUMMARY

Diamond drill hole TR-10 is located on the southeast side of the Anaconda claim group near the border with Kerr-McGee as shown on the accompahying drilling progress map. The hole bottomed at 4105 feet in strong chalcopyrite mineralization. The interval from 4030-4105 feet contains 75 feet averaging 0.60% Cu and the grade is still increasing at 4105 feet. The host rock is a quartz feldspar porphyry exhibiting strong phyllic alteration.

Vertical zoning of both silicate and sulfide minerals is well developed. Petrographic work indicates that alteration zoning is similar to typical porphyry copper models and it seems probable that a potassic alteration zone with associated high grade copper mineralization will be encountered a short distance below the bottom of the hole. Accordingly, I recommend that TR-10 be deepened an additional 1000 feet.

INTRODUCTION

The results of diamond drill hole TR-10 are given on the accompanying geologic log. A summary log (Fig. 1) was also prepared to graphically illustrate the geological variations. Geologic logging was supplemented by a detailed examination of 30 thin sections which locations are shown on Figure 1. Most of the following discussion may be clarified by reference to Figure 1. Core recovery mostly exceeded 95 percent.

GEOLOGY

Four major rock types were encountered. The quartz monzonite porphyry is probably the oldest rock. It is strongly altered and recognized by the presence of subhedral to euhedral pseudomorphs of sericite after plagioclase. It is usually brecciated and rehealed adjacent to the intrusive breccia. The silica tuff is a gray, siliceous rock of unknown type. It is not in contact with the quartz monzonite porphyry, but is probably part of the younger(?) Chief formation. The intrusive breccia contains abundant fragments of quartz monzonite porphyry and silica tuff in a gritty matrix. Its intrusive character

appears well established at 738-748 feet where it cuts a wide section of, but contains no fragments of, a quartz monzonite porphyry. The quartz feldspar porphyry is characterized by quartz eyes up to 4 mm. diameter, and may be equivalent in age to the intrusive breccia. The contact between these two rocks is gradational and is located where the matrix changes from gritty to igneous material.

The distribution of copper (Fig. 1) is somewhat irregular to about 2400 feet reflecting the erratic distribution of medium-grained enargite. The interval from about 2400-3200 feet is uniformly very low in copper and reflects the almost complete absence of copper sulfide minerals. The interval from 3200-4105 feet shows a regular and progressive use in copper content reflecting the increase of fine-grained chalcopyrite. As indicated on Figure 1 no chalcopyrite was seen above 3200 feet. Chalcopyrite occurs as fine-grained disseminations and in quartz-pyrite veins exclusively within the quartz feldspar porphyry. The presence of the disseminated chalcopyrite (perhaps 60-80% of the total) went unnoticed during initial logging due to its very fine grain size and its similarity to disseminated pyrite in strong direct light.

Figure 1 shows a slow and irregular rise in the molybdenum content of the core with depth. Molybdenite was only observed in abundance in association with chalcopyrite.

Vertical zonation was also recognized in some of the alteration minerals as shown on Figure 1. Alunite occurs primarily near the surface in clinozoisite-kaolinite veins and is often associated with small amounts of zunyite. Its disappearance with depth is much more rapid than was suspected from the logging. This was due primarily to the occurrence of fine-grained clinozoisite-kaolinite veins which resembled many alunite veins seen on the surface. The distribution shown on Figure 1 is that seen in thin section.

Clinozoisite, the iron-free member of the epidote group, was recognized only in thin section and occurs mostly in veins with kaolinite and with or without alunite. Some epidote was noted at depth.

The distribution of kaolinite was recognized only through petrographic work. It occurs with clinozoisite in veins near the surface, in irregular aggregates at moderate depth, and as a minor constituent of quartz veins near the bottom of the hole. Its abundance decreases with depth.

Serpentine occurs as small disseminated aggregates and as a filling of weakly shattered zones. Its occurrence is mostly restricted to a 200-foot interval immediately above the top of the chalcopyrite zone.

Pyrite is disseminated throughout the entire hole in amounts varying from 1-45 volume percent. A slight increase with depth is noted as follows:

Interval	Volume % Pyrite	Variation (Vol. %)
0-1000	2.8	1-13
1000-2000	2.8	2-6
2000-3000	4.0	2-45
3000-4000	3.9	3-6

This increase is not immediately evident during logging. The grain size of pyrite also increases with depth. The relative abundance of pyrite veins (Fig. 1) is more variable. Although small veins are irregularly present throughout the hole, they begin to appear consistently at about 2400 feet and increase in abundance to the bottom of the hole.

Quartz veins (Fig. 1) are almost entirely restricted to the chalcopyrite zone. Pervasive silicification is erratically distributed throughout the hole.

Sericite is pervasively distributed throughout the hole in all rock types. Variations in its abundance are partly related to differences in rock type.

ASSAY RESULTS

Significant primary copper mineralization was encountered at the bottom of the hole. The individual assays are given on the geologic log and are averaged on Table 1.

TABLE 1: Significant assay results in TR-10

approx. cutoff(1)	interval	length	% Cu
0.40%	3810-4105	295 ft.	0.48
0.50%	3860-4105	245 ft.	0.52
0.50%	4030-4105	75 ft.	0.60

(1) cutoff is point where assays of cutoff or higher become abundant. Intervals 3810-4105 and 3860-4105 include some 0.30-0.40% Cu assays.

It is sufficient to note that the mineralization is increasing in grade with depth and that the hole bottomed in probable ore grade material.

The average of six 50 foot composite samples from 3810-4100 was 0.029% MoS_2, 0.006 oz. Au, and 0.16 oz. Ag. Copper assays of 50 foot composite samples checked very closely with averages calculated from individual 10 foot samples.

A short section of chalcocite mineralization near the surface averaged as follows:

interval	length	% Cu	oz Ag
110-160	50 ft.	0.63	0.13

DISCUSSION

Vertical zoning of alteration and sulfide minerals is well developed in TR-10. The sharp transition from enargite near the surface to chalcopyrite at depth confirms earlier hypotheses that the Sunnyside area is an important porphyry copper prospect. An evaluation of the geologic log shows that several easily recognized megascopic features are present which show significant variation with depth and are assumed to be related to distance above the chalcopyrite zone. These features, in order of their appearance, are as follows:

1) pyrite veins become consistently present 800 feet above the chalcopyrite zone (1460 feet above +0.50% Cu)

2) enargite disappears 450 feet above the chalcopyrite zone (1110 feet above +0.50% Cu)

3) quartz feldspar porphyry appears 300 feet above the chalcopyrite zone (960 feet above +0.50% Cu)

4) serpentine appears 200 feet above the chalcopyrite zone (860 feet above +0.50% Cu)

5) quartz veins are coincident with the first appearance of chalcopyrite (660 feet above +0.50% Cu)

Any or all of the above features may be useful as ore guides in subsequent drill holes. The presence of quartz veins may not be useful in locating the chalcopyrite zone, however they do appear to indicate the presence of very fine-grained chalcopyrite. In addition, the first appearance of both chalcopyrite and abundant molybdenite was roughly 660 feet above material containing +0.50% Cu. Thus, the initial occurrence of quartz veins, chalcopyrite, and abundant molybdenite may serve as useful guide to higher grade zones of chalcopyrite mineralization.

Geochemical data are incomplete at the present time. Figure 1 shows that the Mo content is mostly less than 20 ppm to 1500 feet and then varies irregularly from 11-70 ppm to 3200 feet. Zinc data are incomplete, but strong variations are indicated in the few analyses available. Splitting of all the remaining core has been started and 100 foot composites of the entire hole will be assembled to provide a more complete picture of trace element distribution.

Vertical zoning of alteration minerals was best observed in thin section and was not clearly evident from core logging. An advanced argillic assemblage (alunite-kaolinite-zunyite) is present to about 700 feet and appears to be crosscutting and destroying an older(?) propylitic (clinozoisite) assemblage. Below 700 feet an argillic assemblage (kaolinite with variable sericite) is present. The amount of kaolinite gradually decreases with depth to less than 4% below 2500 feet. This decrease is accompanied by a decrease in the variability of sericite to a rather consistent 35-50% below 2800 feet. The variability of sericite in the upper part of the hole is partly a function of varying rock type. However, the vertical changes in kaolinite and sericite and the increase in pyrite and quartz veining with depth suggest that the hole bottomed in a phyllic assemblage (quartz-sericite-pyrite). Phyllic alteration in the quartz feldspar porphyry has been locally strong enough to destroy the quartz eyes.

Minor amounts of topaz occur throughout the hole and traces of axinite were seen below 4000 feet. Considerable variation in the abundance and type of fluid inclusions was noted during petrographic work, and an evaluation of these features will be made when time permits.

The alteration pattern in TR-10 indicates that with increasing depth the hole will penetrate a zone of potassic alteration. In the classic porphyry copper model, the primary copper content is highest at the phyllic-potassic interface and within the upper portion of the potassic zone. The presence of strong phyllic alteration with abundant pyrite veins at the bottom of the hole and the coincident progressive rise in the copper content strongly indicate that the bottom of the hole is near a zone of potassic alteration and accompanying high grade copper mineralization. I recommend that TR-10 be deepened a minimum of 1000 feet.

COMMENTARY

Lowell and Guilbert (1970, Econ. Geol., p. 373-408) proposed a model of lateral and vertical zoning in a typical porphyry copper deposit based on a reconstruction of the San Manuel-Kalamazoo deposits. These deposits provide a good horizontal section within and outside the ore zone and a good vertical section within the ore zone. However, most of the rocks which were vertically above the ore zone at the time of deposition are now eroded. The enclosed shell geometry suggested by Lowell and Guilbert certainly applies to the potassic zone and probably to the phyllic zone, but they have no evidence that part of the phyllic with perhaps an expanded argillic cap may not have extended for several thousand feet above the ore zone perhaps to the surface. All other zoning studies of porphyry copper deposits are of lateral variations, and, where vertical, are within the ore zone.

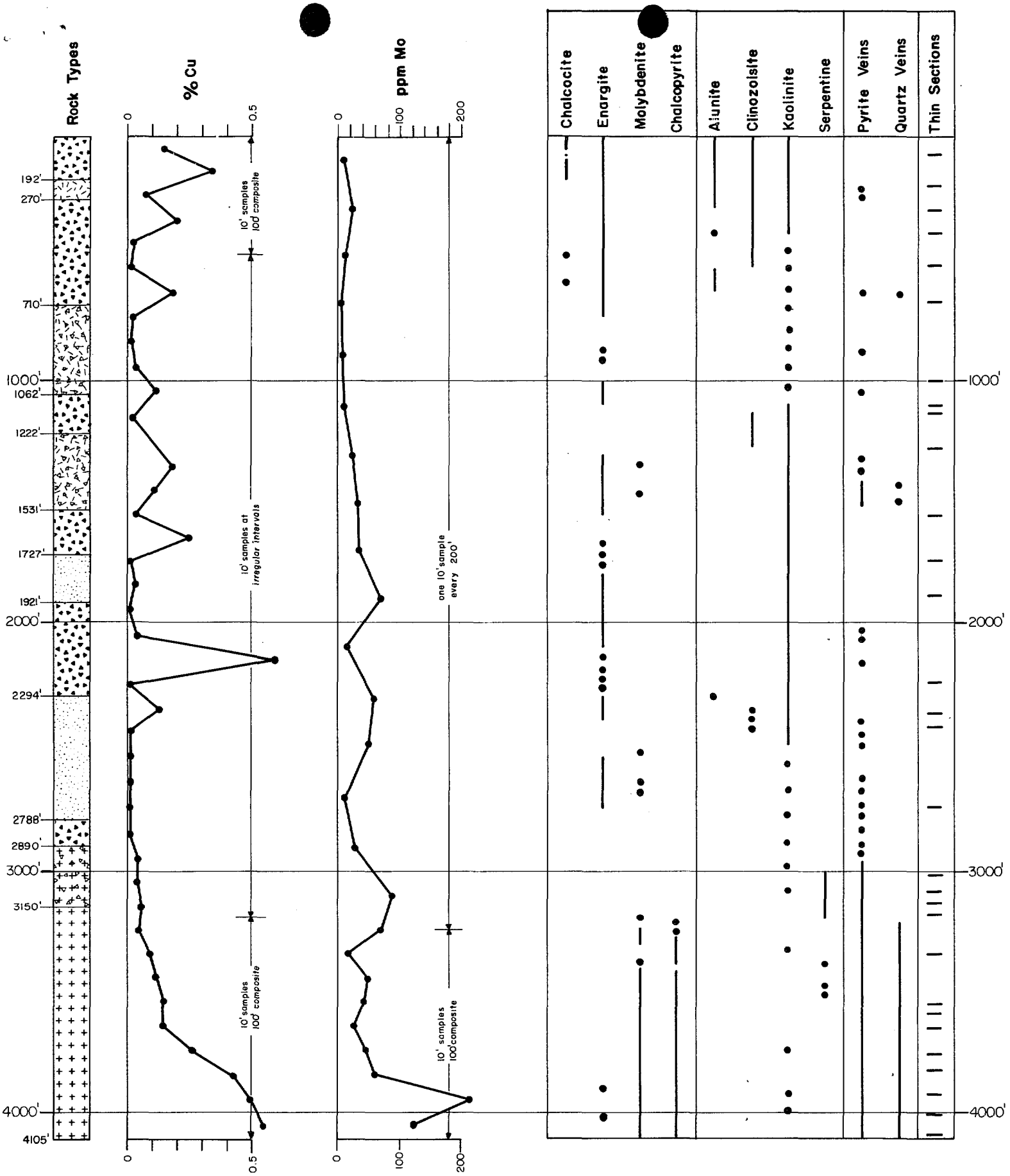
Vertical zoning above porphyry copper deposits is not well documented. Vertical zoning in rocks above the ore zone is of much greater exploration significance than vertical zoning within the orebody. (In other words,

it is harder to find the ore deposit than it is to find high grade zones within the ore deposit.) This lack of documentation is due to the fact that only one deposit with an extensive column of overlying alteration has been found -- Red Mountain. Acquisition of the Red Mountain data or access to core would be particularly informative. Further study of their drill logs within the chalcocite blanket, and further study of the TR-10 core is planned.

F. T. Graybeal

F. T. Graybeal

FTG:lb
Attachs. & Enc.



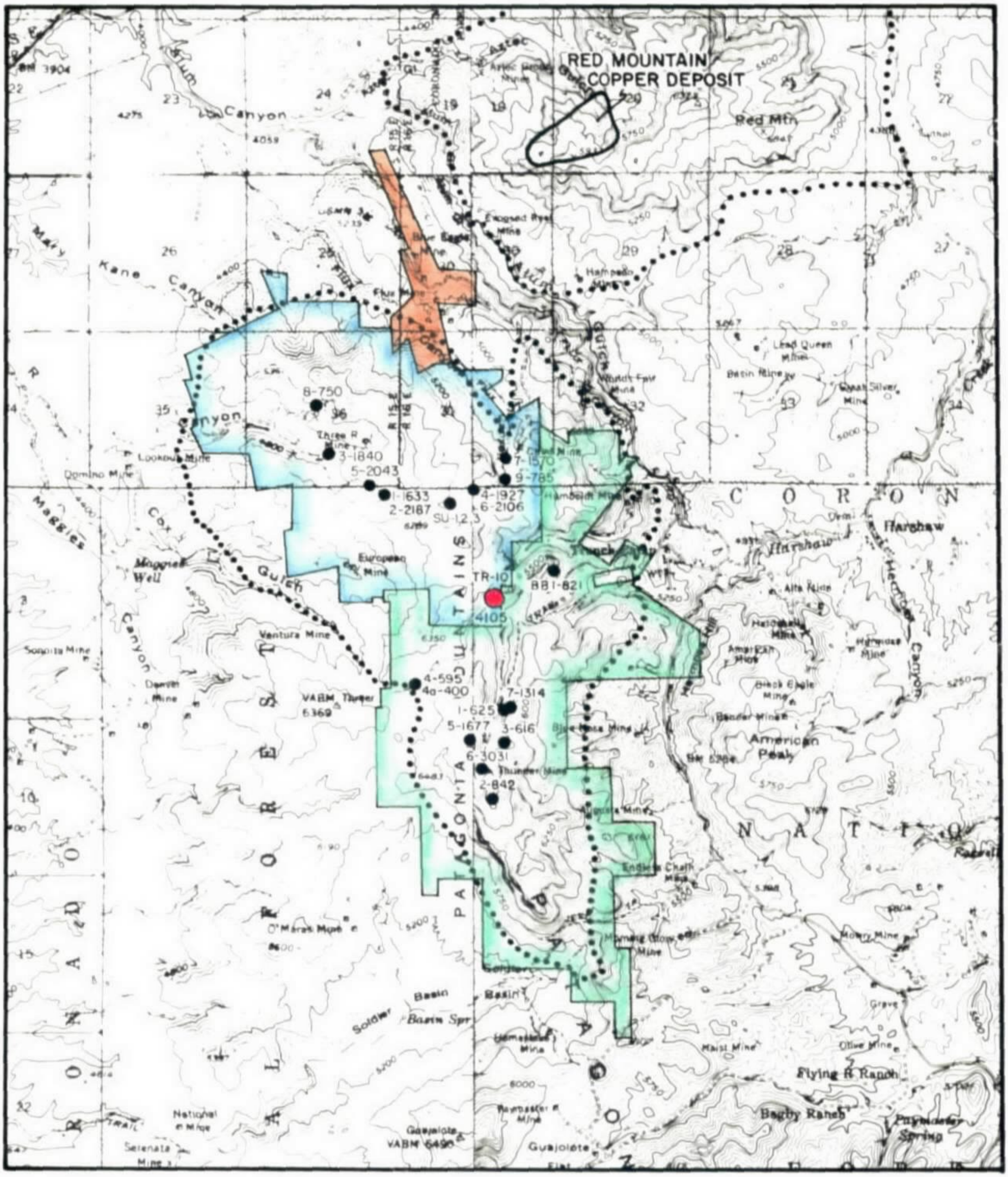
GEOLOGIC EXPLANATION

- Quartz Feldspar Porphyry
- Intrusive Breccia
- Silica Tuff
- Quartz Monzonite Porphyry

FIGURE 1

GRAPHIC LOG OF TR-10 PATAGONIA MOUNTAINS SANTA CRUZ CO., ARIZ.

1" EQUALS 500'



LEGEND

- Anaconda
- ASARCO
- Kerr-McGee

8-750 ● previous drill hole showing depth (Anaconda prefix-TR) (Kerr-McGee prefix-TM)

TR-10 ● ASARCO drill hole

areas of pervasive hydrothermal alteration

TO ACCOMPANY *Report*
DATED *Jan. 24, 1973*
BY *[illegible]*

DRILLING PROGRESS MAP

for the month of ______________

3R PROJECT

SANTA CRUZ COUNTY, ARIZONA

1" = 1 mile

MVK 2574

J. H. C.

DEC 1 - 1972

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

November 28, 1972

TO: W. L. Kurtz

FROM: F. T. Graybeal

3R Project (MA 0040)
Monthly Report - November 1972

Drilling

Drill hole TR-10 was advanced from 2962-4004 ft. (1042 ft.) in what appears to be a xenolith-rich monzonite porphyry. The nature of this rock is unclear as it appears to be gradational with numerous intervals of silica tuff and to contain a highly variable abundance of xenoliths. The alteration assemblage is argillic-phyllic and is uniformly strong throughout.

The bottom of the enargite zone was penetrated at 2760 ft. From 2760 to 3190 no copper minerals could be identified with certainty. At 3190 traces of chalcopyrite and molybdenite were encountered and appear to be slowly increasing in abundance to the bottom of the hole. Roughly coincident with the appearance of chalcopyrite and molybdenite is a transition from predominantly disseminated to predominantly vein-controlled sulfide mineralization. The veins are 1/16-1" thick and contain either pyrite or quartz-pyrite, the latter with or without chalcopyrite and molybdenite. Although no copper assay is expected to exceed 0.2% Cu, the overall appearance of the core is quite favorable.

Field Work

Logging of all but one hole in the TR series is complete. Core from TR-9 has not yet been located by Anaconda. Mapping of the Sunnyside adit was completed.

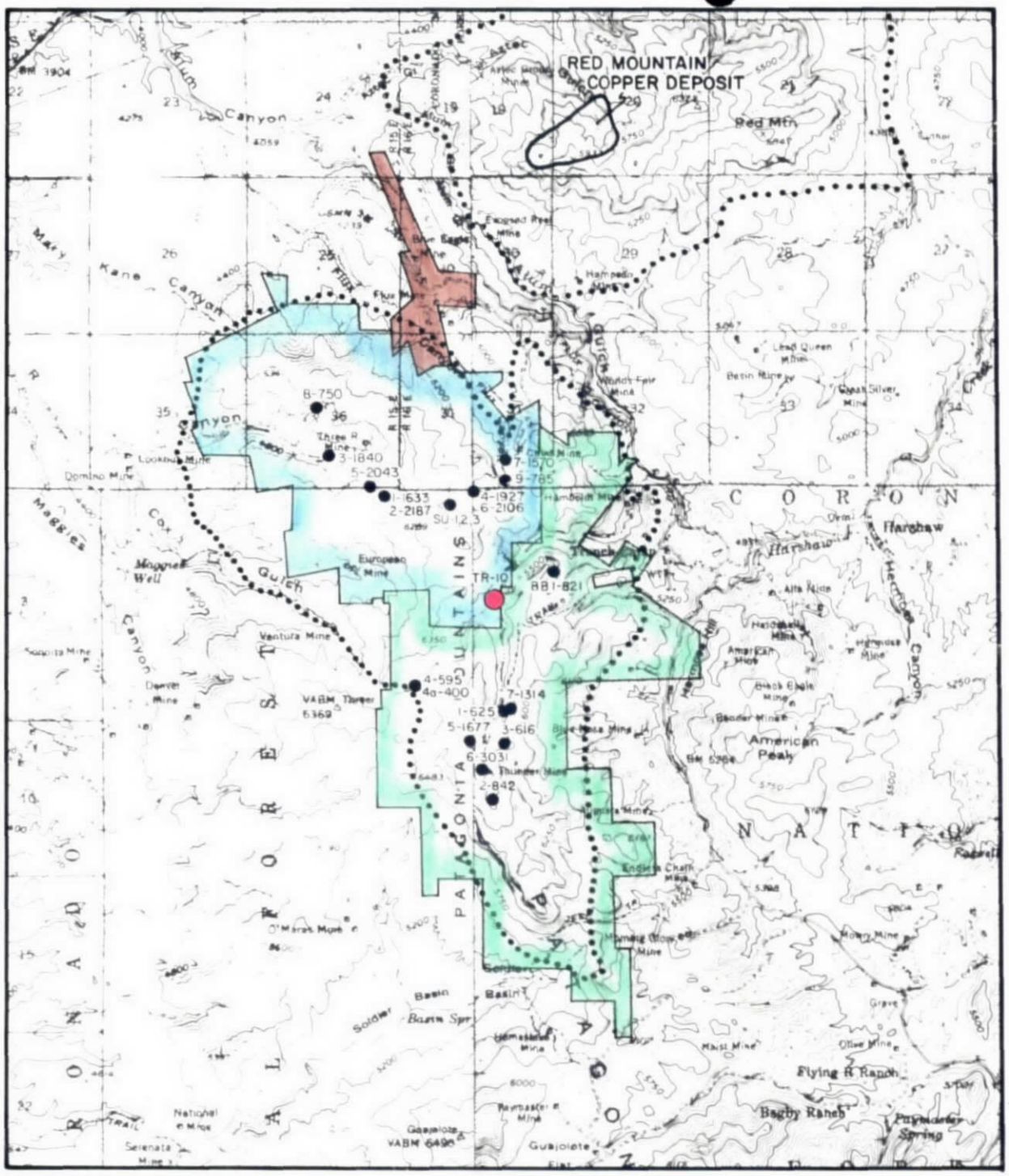
Expenditures

Total drilling expenditures during the month were $15,450 (estimated and invoiced), leaving an estimated balance of $2,350.

F. T. Graybeal

F. T. Graybeal

FTG:lad
Attach: Progress Map



LEGEND

- Anaconda
- ASARCO
- Kerr-McGee

8-750 ● previous drill hole showing depth
(Anaconda prefix - TR)
(Kerr-McGee prefix - TM)

TR-10 ● ASARCO drill hole

areas of pervasive hydrothermal alteration

DRILLING PROGRESS MAP

for the month of November, 1972

3R PROJECT

SANTA CRUZ COUNTY, ARIZONA

1" = 1 mile

MVK 2574

OFFICE OF THE SECRETARY

RECEIVED
SEP 14 1972
EXPLORATION DEPT.

New York, N.Y., September 12, 1972

J. H. C.
SEP 14 1972

Mr. J. J. Collins

The following is an extract from the minutes of the Advisory Committee meeting held on September 6, 1972:

Anaconda
3-R prop.

Mining Authorization #0040-00
Patagonia Mountains
Arizonza

It was reported by Company Geologists that Anaconda has approximately 2,000 acres of property west of Asarco's Trench Mine. It was reported further that Anaconda has spent $320,000 in partial exploration of this area and now offers the Company the opportunity to earn a 51% interest in this property by spending $640,000 in five (5) years. The agreement with Anaconda concerning this property would only require an expenditure of $35,000 in the first year and this agreement further provides that Asarco could terminate it at any time.

Company Geologists request authorization to execute an agreement with Anaconda and authorization for an expenditure of $45,000 during the first year, mainly to deepen Anaconda's 1972 assessment work drill hole by diamond drilling to at least the 3,000-foot depth to test for primary copper mineralization.

There was granted authorization to execute the Asarco-Anaconda Joint Venture Agreement and to spend $45,000 for drilling at the Patagonia Mountains property, Arizona, a possible copper prospect.

J. F. Hornbostel, Jr.

JFH:pg
Encl.
FGHamrick
HQStringham - 2 w/encl.
JHCourtright
WLKurtz w/encl.
RBChrist w/encl.

JHC

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

August 11, 1972

J. H. C.

AUG 30 1972

Mr. J. J. Collins
Director of Exploration
New York Office

Mining Authorization Request
Anaconda 3R Property
Santa Cruz County, Arizona

Dear Sir:

Kerr-McGee's announcement, Sept. 23, 1970, of deep primary ore grade copper beneath Red Mountain proved a vertically zoned copper deposit and refocused our attention on the 3R-Sunnyside area because of similar surface features (large area of pervasively altered and pyritized rocks; occurrences of the copper bearing mineral enargite; and the presence of a molybdenum-in-rock anomaly).

The large altered area (3R-Sunnyside-Thunder Mtn.) has been controlled by Anaconda and Kerr-McGee for a number of years but, to date, has not been adequately tested. We began a re-evaluation of this area (which includes the old Asarco Sunnyside Project) early this year. On April 6, 1972, I forwarded you a copy of Mr. Graybeal's report "Metal Zoning in the Patagonia Mountains". This literature compilation pointed to the Sunnyside area as being a center of mineralization. Since that time we have acquired drill information and geochemical data from Anaconda and Kerr-McGee and have augmented this with field mapping and additional geochemical sampling. I enclose two reports by Mr. Graybeal: "Evaluation of Kerr-McGee's Thunder Mtn. Property" dated May 2, 1972, and "Evaluation of the Sunnyside Area" dated August 11, 1972. Mr. Graybeal recommends participating in exploration of both properties.

The data developed to date confirms our original premise that the Sunnyside area offers excellent exploration potential for the discovery of a deep, vertically zoned, primary copper deposit similar to Red Mountain. The initial drill test is recommended on Anaconda ground in the vicinity of the Sunnyside Mine (Plates 1, 2 & 3 Sunnyside Report). This drill location is within the moly anomaly; within the enargite zone; within the strong alteration zone; and a mile north of drill hole TM-6 which passed into fresh intrusive at 2,000 feet; and will test for a vertically zoned copper deposit, will provide information for geological evaluation of the altered zone, and, though drilled on Anaconda ground, will also effectively provide a test of the northern part of the Kerr-McGee ground.

We have negotiated a most equitable agreement with Anaconda that calls for Asarco to spend $640,000 over a 5-year period for a 51% interest according to the following schedule:

Period	Expenditures
6 months	$ 10,000.00
12 months	25,000.00
24 months	60,000.00
36 months	105,000.00
48 months	200,000.00
60 months	240,000.00
Total	$640,000.00

After Asarco earns its 51%, either party may be diluted (2% for each $100,000 expenditures) to a minimum of 15% at which point the non-participating party's interest is converted into the right to receive 4.5% NSR after recovery of capital.

An agreement with Kerr-McGee has not been finalized. Terms discussed by Kerr-McGee would require a firm committment by Asarco to spend $150,000 over a three-year period. Then Asarco would have to spend an additional $750,000 over the next three years, with the right to terminate at any time, to earn its 50% interest.

At our request Anaconda is performing their 1972 assessment work by collaring a NC diamond drill hole at the Sunnyside location. It is our plan to deepen their hole to at least 3,000 feet. I estimate the costs to complete this hole, to cover geological and geochemical work, and 1 year's land payments as follows:

Diamond drilling	$40,000.00
Geological, geochemical	10,000.00
Land payments	5,000.00
	$55,000.00
Less Anaconda assessment work	(10,000.00)
Amount requested	$45,000.00

This sum is $10,000 more than our first year's work requirements, but believed justified to complete the initial test.

If you agree, please request a Mining Authorization in the amount of $45,000. Immediate approval would allow the drilling started by Anaconda to continue without interruption. (A request for exploration funds to test the Kerr-McGee ground will await the results of the Sunnyside drill hole.)

As you are aware from your April Tucson trip, exploration of the Sunnyside zone has Mr. Courtright's approval.

Respectfully submitted,

W. L. Kurtz

WLK:lad
Encs.

cc: JHCourtright - w/encs.
RBCrist - w/encs.
FTGraybeal - w/o encs.
ADCoumides - w/Forms 302-M & 302-MA

PRINTED IN USA. 9/69

FORM 302-M

N[illegible] York No. .....

AUTHORIZATION FOR MINERAL EXPLORATION

August 11, 1972. Originating Office ..Tucson.-SWED.....

DESCRIPTION:

LOCATION OF PROSPECT/PROJECT: Anaconda 3R Property, 5 miles south of Patagonia, Arizona, and 1-1/2 miles west of Asarco's Trench Mine.

PARTNERS: Anaconda

Partner's Per Cent ....49.....

COMPANY: [X] ASARCO

[ ] Subsidiary. Specify .....

WORK CONTEMPLATED:

Deepen Anaconda's 1972 assessment work drill hole (to be collared during week of August 14, 1972) by diamond drilling to at least the 3,000-foot depth to test for +0.7% primary copper mineralization.

Total estimated cost (FORM 302-MA ATTACHED) $.45,000.00.....

Reviewed by .....
Acct. Mgr. or Chief Acct.

Approved by .....
Vice President

Recommended by .....
Supervisor

Approved by .....
Comptroller

Account Chargeable to .....
To be designated by Comptroller

Approved by Advisory Committee

.....19 ...

Approved by Board of Directors

.....19 .....

.....
Secretary

FORM 302-MA

Printed in U.S.A.

PROSPECT Anaconda 3R Property

COST ESTIMATE, MINERAL EXPLORATION

OFFICE Tucson - SWED

LOCATION Santa Cruz Co., Arizona

BY W. L. Kurtz

No.	Type of Work	Salaries/Wages Days	Salaries/Wages Amount	Material	Fees, Rent, Services	Traveling	Taxes	Other	Total Estimate Cost
501	Outright Purchase								
502	Option Payments				5,000				5,000
503	Bonus Payments								
504	Minimum Royalties-								
	Deductible from								
	Future Production								
505	Minimum Royalties-Not								
	Deductible from								
	Future Production								
506	Rental Payments								
507	Staking Claims								
511	Surface Excavating								
512	Underground "								
521	Surface Drilling				28,000				28,000
522	Underground "								
530	Geologic		1,500			1,000			2,500
540	Sampling, Assaying, Lab.				2,000				2,000
550	Geophysics								
560	Geochem		1,400		5,000	1,100			7,500
570	Engineering								
580	Construction (temp.)								
590	Construction (perm.)								
610	Administration, Field								
	Offices and Camps								
620	Administration, General								
641	Autos and Vehicles								
642	Aircraft and Boats								
650	Partner's Share								
	ASARCO'S SHARE		2,900		40,000	2,100			45,000
661	Commission or Fees								
663	Exchange								
			2,900		40,000	2,100			45,000

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

August 11, 1972

TO: W. L. Kurtz

FROM: F. T. Graybeal

Evaluation of the Sunnyside Area
Patagonia Mountains
Santa Cruz County, Arizona

SUMMARY AND RECOMMENDATIONS

The Sunnyside area is cut by a NS-elongate monzonite porphyry which is pervasively altered and pyritized and which is spatially associated with several areas of enargite-chalcocite and copper oxide. The monzonite porphyry and copper mineralization lie within the limits of a +10 ppm Mo anomaly in rock. Recent drilling in this area demonstrated that strong hydrothermal alteration extends below 2000 ft. and that enargite grades into chalcopyrite with depth. These features are favorable indications for the presence of ore-grade copper mineralization at depth.

Based on results to date and an invitation from Anaconda to spot their 1972 assessment hole, a recommendation is made to test the area adjacent to the Sunnyside mine. This hole should be diamond drilled to 3000 ft. and continued if the rocks are well altered. The proposed site lies within the Mo anomaly and is near several copper occurrences. In addition to providing deep information in an area where no core is available, this hole will also serve to evaluate the northwest portion of the Kerr-McGee ground.

INTRODUCTION

The Patagonia Mtns. are located in southern Arizona as shown on Figure 1. The Sunnyside area lies near the center of a large zone of pervasive pyrite mineralization at the north end of the Patagonia Mtns. The area of primary interest lies mostly on ground held by Anaconda, but also extends southward onto ground held by Kerr-McGee as shown on Plate 1. Interest in this area has been revived by information which suggests the presence of a vertical zoning pattern similar to that found at Red Mtn.

The present evaluation has consisted primarily of geologic mapping at 1" = 500' and rock chip geochemical sampling. In addition, pertinent drill core from both Anaconda and Kerr-McGee has been examined by G. J. Stathis and myself. Information from earlier mapping in this area by J. H. Courtright and Kenyon Richard has been used to fill in gaps in the work completed to this date.

GEOLOGY

The distribution and nomenclature of the various rocks encountered are shown on Plate 2. The Chief formation includes quartz-eye tuff, conglomeratic tuff, and siliceous tuff. The latter two appear to extend blanket-like over all earlier formations. The vent for these rocks lies about 2000 ft. SE of the Chief mine. Exposures of the monzonite porphyry appear to be near the top of this intrusion as evidenced by the numerous inclusions and by erratic textural variations near the contacts.

Planar structures are very poorly developed in this area. North-to northwest-striking shears are locally present in the Flux series southwest of the Chief mine and a strong fault or shear zone appears to control mineralization in the Volcano and Sunnyside mines. The only breccia of pipe-like geometry is the BX pipe, the site of most drilling in this area. Other tectonic breccias are mostly confined to highly siliceous rocks and are probably related to minor fault movement. The northerly elongation of the monzonite porphyry and the presence of roughly parallel shears suggest that any zones of primary mineralization may also be elongate in this direction.

MINERALIZATION

The entire Sunnyside area is pervasively mineralized with disseminated, fine-grained pyrite which probably averages 1-2 volume percent. Pyritic mineralization locally reaches 10-20 percent along the monzonite contacts, and is generally less than 0.5 percent in siliceous units in the Chief formation. Drill core from the BX pipe and the Bucket breccia (BB-1, 2000' NE of Sunnyside mine) averaged 3-5% pyrite with perhaps 70 percent disseminated, and the remainder in 1/32 to 6 inch veins.

Several small areas of copper oxide mineralization are shown on Plate 3, and they all occur adjacent to the east side of the monzonite porphyry. The deposits at the Volcano and Sunnyside mines appear to have been exposed by small mining operations and did not originally outcrop.

The distribution of copper sulfide mineralization is not well known and is difficult to predict in outcrop. Drilling in the BX pipe by ASARCO in 1951 encountered enargite and chalcocite. Drilling by Anaconda in this same area cut enargite and chalcocite with increased amounts of chalcopyrite at depth under the BX pipe. Drilling by Kerr-McGee in the Bucket breccia cut enargite and chalcocite. Dump material and old core at the Sunnyside mine contain enargite. Finally, mapping of the strongly altered monzonite on the ridge northeast of the BX pipe indicated the presence of indigenous limonites similar to those within the BX pipe. These widespread occurrences of enargite and chalcocite lie within and east of the monzonite porphyry. The presence of chalcopyrite at depth under the BX pipe suggests that vertical mineral zoning patterns similar to those encountered at Red Mtn. are present in the Sunnyside area.

The distribution of hypogene alteration is obscured by the pervasive development of supergene clay. Erratic occurrences of silica, tourmaline, and alunite appear to be spatially related to the monzonite porphyry. Strong sericite alteration was noted in all drill core in this area and appears to be increasing in strength at the bottom of TR-6 (2000 ft. vertically below the surface).

GEOCHEMISTRY

A systematic program of rock chip sampling at 500 ft. spacing along lines 1000 ft. apart was undertaken in the Sunnyside area. Particular attention has been given to the distribution of molybdenum because of the presence of a molybdenum anomaly over the deep copper mineralization at Red Mtn. and the fact that the original discovery was made by drilling within this anomaly. The highly erratic distribution of molybdenum values in the Sunnyside area, which vary from less than 1 to 125 ppm in the more strongly mineralized areas, makes contouring nearly impossible. To reduce this variability to manageable proportions, the average of four samples at each corner of a rectangle (2 adjacent samples from 2 adjacent lines) was calculated and plotted. The resulting area of +10 ppm Mo is shown on Plate 3 to coincide closely with the monzonite porphyry and wall rocks along its east contact emphasizing the importance of drilling within or adjacent to this intrusion.

Although the threshold of 10 ppm Mo is low, this value marks a rather sharp break in sample populations when plotted on a histogram. In addition, sampling and geologic reconnaissance on Red Mtn. by G. J. Stathis has revealed that most of the recent drilling done there is defined by the 10 ppm contour. The Red Mtn. anomaly appears more uniform, although of lower magnitude, when compared to the Sunnyside anomaly.

DRILLING

The locations of all diamond drill holes on Anaconda and Kerr-McGee ground are shown on Plate 1. The distribution of those holes which contain roughly 0.10% Cu or more emphasizes the importance of the Sunnyside area for further exploration. To date, three holes in this area have been logged (TR-4, 6, and BB-1) and the results are summarized on Table 1 along with pertinent information from other holes. Of particular interest is the fact that both TR-4 and 6 bottomed in strong alteration at roughly 2000 ft. depth. In addition they both contained increased amounts of chalcopyrite at depth, although grades were mostly less than 0.10% Cu. Hole BB-1, although well mineralized, did not provide a sufficiently deep test to permit an evaluation of this portion of the Sunnyside area to be made. The nearest deep test south of the Sunnyside mine is TM-6 (3000') which is over one mile away. This hole bottomed in fresh quartz monzonite.

TABLE 1. Summary of drilling in the Sunnyside area.

Hole	Depth	Comments
TR-4	1927	Strongly altered monzonite porphyry to the end of hole; 5 ft. assays vary from 0.02 - 1.50% Cu; averages slightly less than 0.10% Cu.
TR-6	2106 at 45°	Strongly altered monzonite porphyry to end of hole; 5 ft. assays vary from 0.01 - 1.00% Cu; averages slightly less than 0.10% Cu; drilled under BX pipe.
SU-1,2,3	701, 890, 644	Drilled by ASARCO in 1951 in silicified and brecciated monzonite porphyry; possible reserve of 2.7 million tons at 0.48% Cu.
BB-1	821 at 60°	Moderate to strongly sericitized Chief formation; 10 ft. assays vary from 0.02 - 1.20% Cu; contains 612 ft. @ 0.25% Cu below leached capping.
Abandoned core on Sunnyside dump	500-750?	Reportedly drilled by Ventures, Ltd. in late 1940's to crosscut Sunnyside structure at depth, core contains enargite in strongly altered monzonite porphyry.

RECOMMENDATIONS

Anaconda has recently advised ASARCO of their intention to complete their 1972 assessment requirements by drilling and invited ASARCO to spot the drill location. Accordingly, one drill hole is recommended to test for the presence of primary mineralization at depth in the Sunnyside area. This hole is located just southwest of the Sunnyside mine within the +10 ppm Mo anomaly and adjacent to the monzonite porphyry. This hole will test for mineralization in the wall rocks of the porphyry where most mineralization in this area is found. In addition it will provide important information on the character of deep mineralization within the 2 mile gap between TR-4 and TM-6 where no deep information is available. Although the hole is to be collared on Anaconda ground, it will also provide an important test of the closely adjacent northwestern portion of the Kerr-McGee claims. This hole should be diamond drilled to at least 3000 ft. and continued if strong alteration is encountered at that depth.

A second area for which sufficient information exists to recommend drilling is along the east side of the BX pipe. Current information indicates that a gradual transition from enargite to chalcopyrite mineralization is occurring at depths of 1500-2000 coincident with pervasive and, in part, increasing strength of alteration. A drill hole in this area should be extended to 2000 ft. depth at minimum cost and diamond drilled to 3000 ft. or deeper if the rocks are still strongly altered.

Mapping to date indicates that other targets will be defined as work continues. The widest portion of the Mo anomaly north of the BX pipe is coincident with an area of strongly altered monzonite porphyry which contains limonite after enargite and minor chalcocite. This geology is similar to that encountered over the deep mineralization at Red Mtn. A second area of potential interest lies 3000-6000 ft. east of the Volcano mine on Kerr-McGee ground where a small monzonite porphyry plug cuts the Chief formation. Rocks in this area average between 5-10 ppm Mo which, although low, may be a reflection of rock type rather than reduced intensity of mineralization.

The areas in the vicinity of the BX pipe and east of the Volcano will almost certainly be recommended as necessary, not alternative tests for deep primary copper mineralization. Specific recommendations will be made upon completion of the current mapping and sampling program.

F. T. Graybeal

F. T. Graybeal

FTG:lad

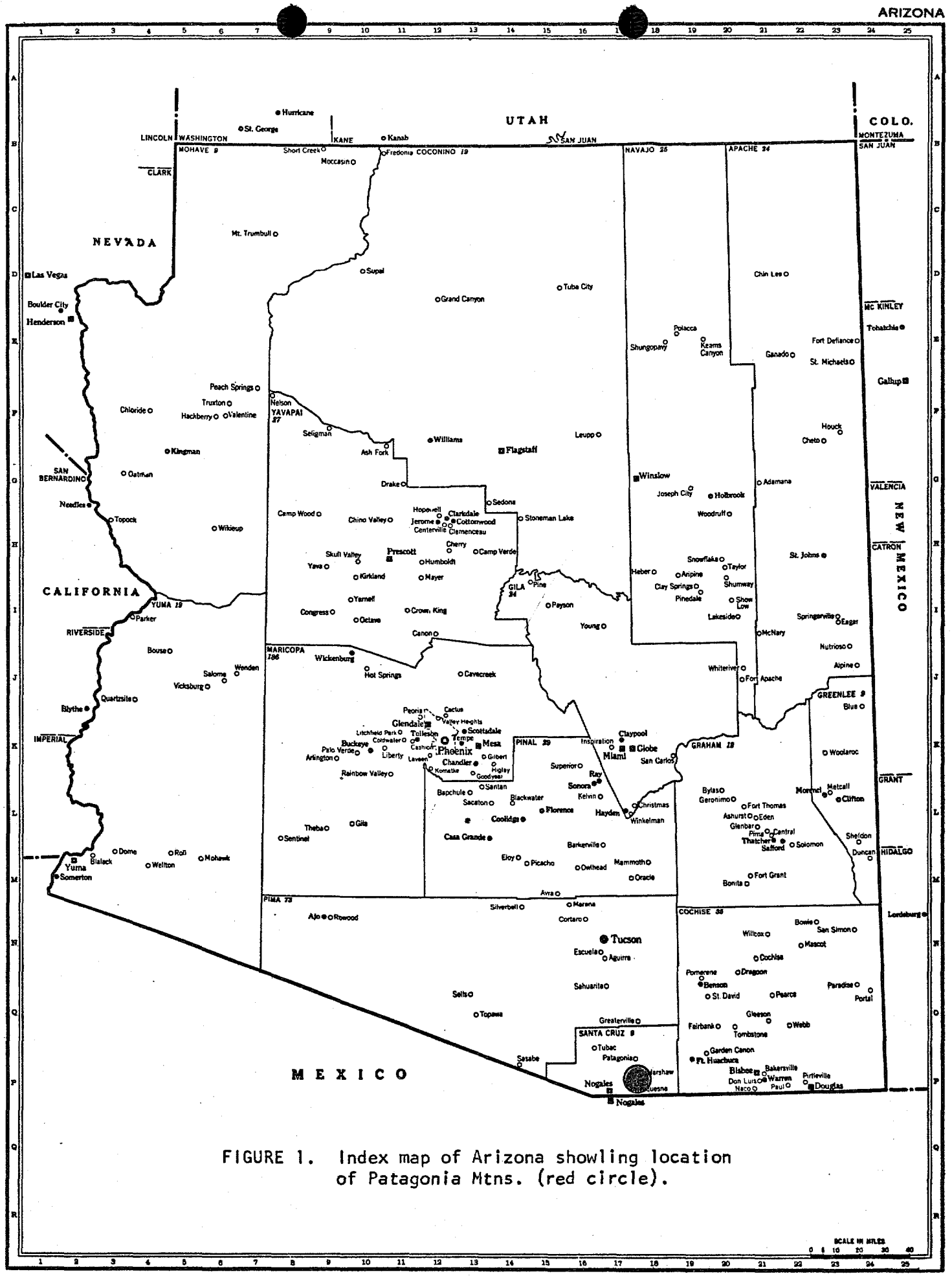
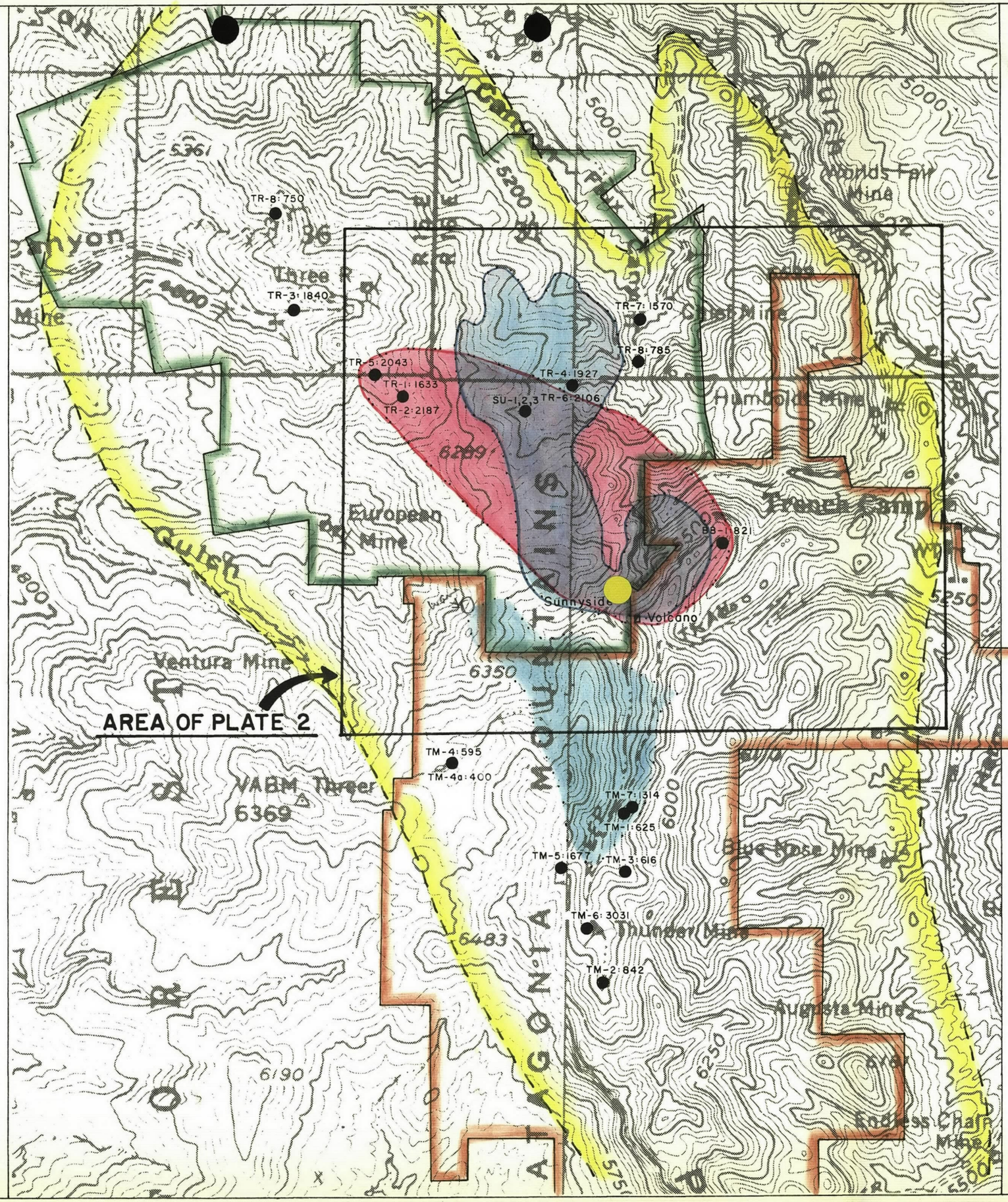


FIGURE 1. Index map of Arizona showling location of Patagonia Mtns. (red circle).

PLATE I



LEGEND

- Pervasive Pyritic Mineralization
- Approximate Area of +10 ppm Mo in Rock (includes data from Kerr-McGee and Anaconda)
- Area of Known Copper Oxide, and +0.10 % Cu Over Entire Length of Drill Holes
- TM-1: 625 — Drill Hole Showing Depth
- Proposed Drill Hole
- Anaconda Ground
- Kerr-McGee Ground

0 2000' 4000'

LOCATION MAP

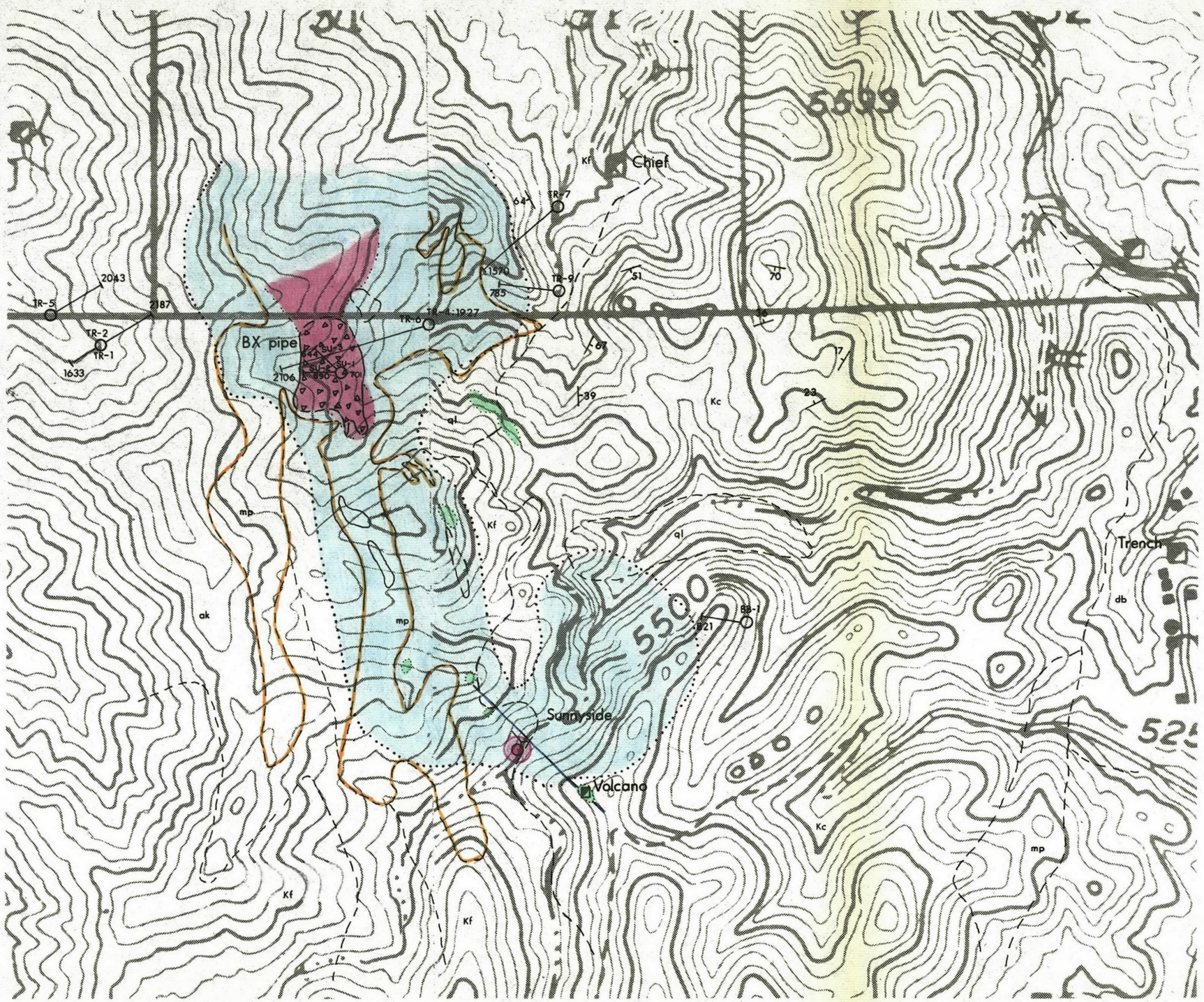
SUNNYSIDE AREA

Patagonia Mtns.

Santa Cruz Co., Arizona

F.T.G. Aug. 1972

MVK 2557



EXPLANATION

mp	MONZONITE PORPHYRY
ql	QUARTZ LATITE
Kc	CHIEF FORMATION
db	DIABASE
ak	ALASKITE
Kf	FLUX SEDIMENTS & VOLCANICS (may include some older rocks)

Copper oxide occurrences

Indigenous limonite after enargite

Breccia

Shear zone

+10ppm Mo in rock

TR-5 2043' Drill hole showing depth

Proposed drill hole

0 1000' 2000'

N

GEOLOGIC MAP
BX-SUNNYSIDE AREA
PATAGONIA MOUNTAINS
SANTA CRUZ Co., ARIZONA

F.T.G. Aug. 1972

AMERICAN SMELTING AND REFINING COMPANY
SOUTHWESTERN EXPLORATION DIVISION
P. O. BOX 5747, TUCSON, ARIZONA 85703

1150 NORTH 7TH AVENUE
TELEPHONE 602-792-3010

J. H. C.

JUN 20 1972

June 20, 1972

Mr. G. A. Barber, Exploration Manager
The Anaconda Company
151 S. Tucson Blvd., Suite 222
Tucson, Arizona 85716

3-R Property

Dear Mr. Barber:

I am delivering to you today a draft of the agreement between Anaconda and ASARCO on the 3-R Property. I believe this agreement includes all the revisions which you and I discussed last Thursday.

Because I should like to start field work immediately, and because it will probably take thirty days to obtain approval of the agreement by Company attorneys, I request that you make Anaconda's data available to us so that we will not have unnecessary duplication of work on the 3-R Property.

As you know, I plan to have Mr. Graybeal work on this project. Mr. Graybeal is scheduled to leave for Alaska on July 5th, and I would like him to accomplish as much work as possible before then.

Very truly yours,

W. L. Kurtz

W. L.Kurtz
Manager of Exploration

WLK:lad
Enc.

cc: JHCourtright
RBCrist
FTGraybeal

J. H. C.

JUN 2 1972

AMERICAN SMELTING AND REFINING COMPANY
SOUTHWESTERN EXPLORATION DIVISION
P. O. BOX 5747, TUCSON, ARIZONA 85703

1150 NORTH 7TH AVENUE
TELEPHONE 602-792-3010

June 2, 1972

Mr. G. A. Barber, Exploration Manager
The Anaconda Company
151 S. Tucson Blvd., Suite 222
Tucson, Arizona 85716

3-R Property

Dear Art:

I have reviewed your proposed revisions to our first draft of a proposal involving the 3-R Property, Santa Cruz County, Arizona, and am in general agreement except for your proposed revision of Article 4.

ARTICLE 1 - Option Period

Any property 100% acquired by either party during the period of the agreement will become subject to the terms of the agreement, provided the acquired property is within one mile of perimeter formed by claims included in Exhibit A and Exhibit B.

ASARCO can terminate the agreement by providing 90-days written notice.

ARTICLE 2 - Initial Acquisition of Title

Upon providing evidence of expending $640,000 within the term of the agreement, ASARCO will acquire 51% ownership of the properties covered by the agreement.

ARTICLE 3 - Protection of Property Interests

(Imperative to extend existing lease-option before signing agreement.)

ARTICLE 4 - Arrangement of Interests

Revise: Both parties will share expenses in proportion to their ownership percentages after ASARCO has expended $640,000 on the property. Should Anaconda elect not to participate in such expenditures, its equity will be reduced 8% per $100,000 expended by ASARCO to a minimum of 10%, at which point Anaconda will receive 10% of the net profits after ASARCO recaptures its capital investment.

ARTICLE 5 - Definitions

The term "expenditures" shall consist of actual expenditures made in or on behalf of the 3-R property and not include any related overhead charges.

Please contact me by phone to discuss any of the above.

Very truly yours,

W. L. Kurtz

W. L. Kurtz
Manager of Exploration

WLK:lad

cc: RBCrist
JHCourtright

J. H. C.

APR 6 1972

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

April 6, 1972

Mr. J. J. Collins
Director of Exploration
New York Office

3R-Sunnyside Area
Patagonia Mountains
Santa Cruz Co., Arizona

Dear Sir:

This transmits Mr. Graybeal's report "Metal Zoning in the Patagonia Mountains".

As you know, Asarco's interest in the mineral potential of the Patagonia Mountains spans a long period of time (Trench Mine, Flux Mine, Sunnyside Copper Project, Hardshell Silver Project) and was refocused by the discovery of deep primary ore grade copper beneath Red Mountain by Kerr-McGee. As you recall, Asarco elected not to participate in the deep exploration of Red Mountain with Kerr-McGee.

The vertical zoning demonstrated in the Kerr-McGee discovery strongly suggests that the large hydrothermally altered pyritic area centered around Sunnyside is a prime target for deep hypogene copper mineralization.

Mr. Graybeal has constructed mineral zoning maps of the Patagonia Mountains that strengthens this conclusion. Your attention is called to his maps:

1. Geologic Map and Index to Mineral Deposits
11. Distribution of Significant Metal Zones
12. Preliminary Property Status

Again, Mr. Graybeal is to be complimented on his excellent work and interpretations that greatly enhance the Sunnyside area as a prime exploration target. Subsequent field work will undoubtedly change the geologic map, but not the concept advanced by Mr. Graybeal.

A draft of a joint-venture agreement has been sent to Anaconda for their consideration. Kerr-McGee's local office favors a joint venture with Asarco and has requested approval of their management.

Very truly yours,

W. L. Kurtz

WLK:lad
Enc.

J. H. C.
APR 4 1972

April 4, 1972

Mr. Art Barber
Exploration Manager
The Anaconda Company
151 South Tucson Boulevard
Tucson, Arizona 85716

file

Dear Art:

Enclosed is a suggested agreement on your 3R property in the Patagonia Mountains.

Please consider this as a first draft and we will be happy to discuss any additions, deletions, or changes you consider imperative for Anaconda and ASARCO consummating an agreement on the 3R propetty.

Very truly yours,

W. L. Kurtz
Manager of Exploration

WLK:lad
Enc.

cc: RBCrist
JHCourtright
FTGraybeal

AGREEMENT

THIS AGREEMENT made as of the_____day of_____, 1972, between THE ANACONDA COMPANY, a _____corporation, hereinafter called "Anaconda", and AMERICAN SMELTING AND REFINING COMPANY, a New Jersey corporation, hereinafter called "ASARCO",

WITNESSETH:

WHEREAS, Anaconda holds interests in certain patented and unpatented mining claims located in Santa Cruz County, Arizona, all as more particularly set forth in Exhibit A annexed hereto;

WHEREAS, Anaconda has heretofore expended sums in the amount of THREE HUNDRED TWENTY THOUSAND DOLLARS ($320,000.00) in connection with said mining claims;

WHEREAS, ASARCO holds interests in the Flux group of twelve unpatented mining claims, Harshaw Mining District, Santa Cruz County, as set forth in Exhibit "B" and contiguous to Anaconda's interest.

WHEREAS, ASARCO is interested in conducting exploration activities in connection with said claims and acquiring an interest therein;

NOW THEREFORE, it is hereby agreed:

ARTICLE I - Option Period.

ASARCO is hereby granted the exclusive option, for a period of five (5) years after the date first above written, to acquire fifty per cent (50%) of the interest held by Anaconda in the property described on Exhibit A annexed hereto. During the said five (5) year period, ASARCO shall, at its expense, make all rental payments, and other payments necessary to protect Anaconda's interests in the land described on Exhibit A. During said option period, ASARCO shall have the right to terminate this agreement by giving its written notice to Anaconda of its election to so terminate; in the event of such election, ASARCO shall have no further obligations, except in case of termination of the entire agreement if the assessment year for any mining claims affected thereby expires within two months from the date of termination, ASARCO shall be obligated to perform and record the assessment work pertaining to such claims and this obligation shall survive any such termination. ASARCO

shall acquire fifty per cent (50%) of the interest held by Anaconda in said property if, during said option period, it gives written notice to Anaconda of its election to expend an amount or amounts in the aggregate of THREE HUNDRED TWENTY THOUSAND DOLLARS ($320,000.00), in exploration and geological evaluation of said properties and in assessment work, rents, and purchase prices in conjunction with said properties.

ARTICLE 2. - Initial Acquisition of Title.

In the event, during the option period specified in Article 1, ASARCO gives written notice to Anaconda of its commitment to expend sums aggregating THREE HUNDRED TWENTY THOUSAND DOLLARS ($320,000.00) as specified in Article 1, ASARCO shall thereupon become vested with the ownership of fifty per cent (50%) of all interest held by Anaconda in the properties described on Exhibit A. Thereafter, the interest of the parties will be adjusted and modified in accordance with the provisions hereinafter set forth. If ASARCO does not give such notice it shall have no further rights hereunder.

ARTICLE 3.- Protection of Property Interests.

Anaconda shall protect its interest in the properties during the option period and will extend the time for the final payment of all option or purchase payments for five (5) years. If ASARCO elects to proceed in accordance with Article 2, it will be responsible for the final payment of option and purchase payments to the extent of its THREE HUNDRED TWENTY THOUSAND DOLLAR ($320,000.00) commitment. In the event both ASARCO and Anaconda elect to proceed on a 50-50 basis, the parties shall equalize all future investments.

ARTICLE 4 - Adjustment of Interests.

If ASARCO incurs expenditures in excess of an aggregate of THREE HUNDRED TWENTY THOUSAND DOLLARS ($320,000.00) then, and in such event, the participating interest of Anaconda shall be reduced and that of ASARCO increased upon expenditures being incurred in excess of THREE HUNDRED TWENTY THOUSAND DOLLARS ($320,000.00) in accordance with the following schedule:

A. For the first ONE HUNDRED THOUSAND DOLLARS ($100,000.00) of expenditures in excess of THREE HUNDRED TWENTY THOUSAND DOLLARS ($320,000.00),

ARCO will automatically acquire an additional 20% participating interest or ASARCO 70% - Anaconda 30%. In the event both ASARCO and Anaconda elect to proceed on a 70%-30% basis, the parties shall equalize all future investments on the same basis.

B. For the second ONE HUNDRED THOUSAND DOLLARS ($100,000.00) of expenditures in excess of THREE HUNDRED TWENTY THOUSAND DOLLARS ($320,000.00), ASARCO will automatically acquire an additional 15% participating interest or ASARCO 85% - Anaconda 15%. In the event both ASARCO and Anaconda elect to proceed on a 85%-15% basis, the parties shall equalize all future investments on the same basis.

C. For the third ONE HUNDRED THOUSAND DOLLARS ($100,000.00) of expenditures in excess of THREE HUNDRED TWENTY THOUSAND DOLLARS ($320,000.00), ASARCO will automatically acquire an additional 10% participating interest or ASARCO 95% - Anaconda 5%.

At such time as the participating interest of Anaconda has been reduced to five per cent (5%), such participating interest shall automatically be converted into the right to receive five per cent (5%) of the net profits, if any, realized in connection with the operation or sale of said properties in each of ASARCO's taxable years; at such time ASARCO shall become the one hundred per cent (100%) owner of the properties subject only to the payment of said five per cent (5%) of net profits.

ARTICLE 5 - Definitions.

"Expenditures" as used herein shall include all advances, costs and expenses to the "date of beginning operations" as hereinafter defined, in examining, prospecting and exploring the Prospecting Areas, the acquisition of properties and mineral rights within the Prospecting Areas, acquisition of any properties outside the Prospecting Areas in connection with the equipping for operation of any mineral property in the Prospecting Areas, payments of charges, taxes, rents and royalties due under agreements or leases covering said properties, all expenditures to the date of beginning operations which would be allowable as operating expenses (as hereinafter defined) if they had been made after such date of beginning operations, and the developing and equipping of any part or parts of the Prospecting Areas for commercial production to such date of beginning operations, including a reasonably adequate working capital for commencement of commercial production. ASARCO shall not include in expenditures any charge for its home office overhead expenses or its traveling auditor's audit cost but may charge thereto direct out-of-pocket expenses including telephone, telegraph and the salaries and expenses of its geologists, mining engineers and other like

personnel while away from their offices and assigned to work on the Prospecting Areas or matters connected with the work to be done hereunder.

The "date of beginning operations" shall mean the time when commercial operations begin upon ores from the Property. ASARCO as the manager shall determine such date and advise Anaconda.

"Operating expenses" shall mean all costs, obligations, liabilities and expenses of whatsoever nature which are incurred or become chargeable after the date of beginning operations, in connection with or for the benefit of the Property, its development, improvement, maintenance and operation and products thereof, both during periods of operation and during periods when the Property may be shut down. The Manager shall not include in operating expenses any charge for its home office overhead expense or its traveling auditor's audit costs, but the Manager shall charge five per cent (5%) of the total Operating Expenses (excluding said 5%) as an Operating Expense, for its general administration service and expenses that is to say, for management above that of the resident manager of the Property, and may also charge thereto its home office expenses directly chargeable to the Property such as telephone, telegraph and traveling expenses but not salaries of home office personnel. Manager shall have the right to reopen negotiations concerning said charge at the end of each five-year period and in the event of such reopening by Manager and in event a substitute method cannot be agreed upon within a six months' period thereafter, the parties agree to abide by a recommendation made by a national firm of accountants, such firm to be selected by the American Arbitration Association, but in such event the then existing charge shall continue until a revised charge, if any, shall be agreed to and become effective.

"Prospecting Areas" are those areas described on Exhibit A and Exhibit B annexed hereto.

ARTICLE 6 - Advances and Participating Interests of Parties.

The participating interests of the parties in the venture hereunder shall be equal, upon the exercise of the option by ASARCO under ARTICLE 2 above, and shall thereafter be modified as in this agreement provided ASARCO shall bear all expenditures hereafter made under this agreement except as expressly provided to the contrary.

Anaconda shall do whatever is necessary to preserve its present interest in the Prospecting Areas during the five (5) year option period and shall have the time for final option and purchase payments extended for five (5) years.

All production of ores and minerals hereunder shall be owned by the parties in proportion to their participating interests.

All materials, supplies, machinery, equipment, buildings, structures and all other property, real or personal, acquired hereunder and chargeable hereunder as expenditures, operating expenses, or capital investments shall be owned by the parties in proportion to their contribution to the cost thereof. All rights and obligations under leases of, or options or agreements to purchase lands in the Prospecting Areas shall belong to and be performed by the parties in proportion to their participating interests.

Until Anaconda's interest has been converted into the right to receive five per cent (5%) of the net profits, all the foregoing property and property rights shall belong to the parties as tenants in common, and the liability of the parties shall be several and not joint, and each party shall be responsible only for its own obligations hereunder. It is not intended nor shall this agreement be construed as creating a mining or other partnership or association between the parties or to render them liable as partners. The parties elect to be excluded from all the provisions of subchapter K of the U.S. Internal Revenue Code of 1954 as now enacted or as amended hereafter.

Each party hereto shall pay its own federal and state income or franchise taxes based upon the income received by each from the Property. All taxes based upon or measured by "net annual proceeds" or based upon or measured by gross amounts received for, or Gross Value of Ores or metals sold from or Income from leased Property, or any severance or production taxes, shall be paid by each party, each paying its own share of such taxes based upon the share of the income, net annual proceeds, or gross amount or value of Ore or proceeds of Ore received by each. All taxes levied and assessed upon improvements, if any, placed upon the Property during the term of this agreement may be paid by Manager and shall be Expenditures or Operating Expenses, as the case may be.

ARTICLE 7 - Management.

ASARCO shall be the manager of all work and operations to be conducted hereunder, and shall decide in its discretion the exploration and development work to be done hereunder, and the operation of the Property in production of ores and minerals. Until ASARCO determines a commercial orebody exists in the Prospecting Areas and proceeds to equip the Property for operation, it shall prepare proposed schedules of exploration work and budgets therefor

for such reasonable periods as may be agreed upon by the parties and shall consult with Anaconda thereon, but ASARCO as manager shall be the party to determine such work and budget. Except as aforesaid, all matters relating to the Prospecting Areas and the Property shall be determined by the parties mutually so long as their participating interests are equal, and if not then by the party having the majority participating interest. Until the date of beginning operations, ASARCO shall render to Anaconda quarterly (or at the request of Anaconda, monthly) statement of account showing expenditures made and balances due from or to each of the parties. The results of exploration work, including logs of drill holes and assay reports shall be made available to both parties promptly.

ASARCO shall have such possession of the Property as it may require to perform its functions as manager hereunder, and if ASARCO determines an orebody exists on the Property and it advises Anaconda that it intends to equip the Property for commercial production, ASARCO as manager hereunder shall have exclusive possession, management and control of the Property.

As manager hereunder, ASARCO shall not be liable to Anaconda for any act or omission provided it be not grossly negligent or in reckless disregard of Anaconda's rights hereunder. All liabilities to third parties, and all losses, damages and expenses by reason of injury to person, including death, or damage to property, arising out of ASARCO's performance as manager of ASARCO's performance in doing any work hereunder requested by ASARCO, shall be deemed a chargeable expenditure or operating expense hereunder, even though any such damage or injury be caused by negligence or wilful wrong of any employee or agent of ASARCO or Anaconda, as the case may be. ASARCO shall be free to determine what insurance coverage to obtain both as to amount and risks to be insured against and in case of losses not covered by insurance, the repair or replacement required thereby shall be chargeable as expenditures or operating expenses.

ARTICLE 8 - Proceeding to Operating Basis.

ASARCO shall determine in its sole discretion whether to proceed on an operating basis.

ARTICLE 9 - Equipment and Operation of Property.

ASARCO as manager shall be in sole charge of the equipment of the Property for commercial production and the operation thereof. ASARCO shall have the authority in its discretion to construct, rent or purchase facilities including land, located outside the Property if it deems the same advantageous in the operation of the Property, and to do all such other things at places other than the Property as it may deem advisable for the benefit of the operation to be conducted hereunder, always keeping Anaconda advised of its intentions and actions with respect to such matters.

Each party shall have and reserves the right separately to take in kind or dispose of its share of the ores and concentrates produced, although such party may delegate authority, subject to revocation at will, to sell its share of the ores and concentrates produced, provided that any contracts of sale made pursuant to such authority shall be for a period of time not in excess of the minimum needs of the industry and in no event for more than a year.

ARTICLE 10 - Statements of Account and Payments.

ASARCO shall furnish to Anaconda as soon as conveniently practicable after the end of each calendar quarter (or at the request of Anaconda, at the end of each calendar month) a statement of account for said quarter in reasonable detail, pertinent to an accounting between the parties under the terms hereof. If Anaconda finds any error in any ASARCO statement of account, or should have found the same from an examination thereof, it shall not be binding on it (even though it shall have been a payment in accordance therewith promptly upon its presentment as provided above) unless it fails to object in writing to the same within six (6) months following the end of any calendar year, and failing such objection such statement shall be conclusively deemed correct.

ARTICLE 11 - Mining Operations and Suspension.

After the Property has been placed on a producing basis, ASARCO, as manager hereunder, shall continue to mine the same at such rate of production as in its judgment it may determine, shall pay all costs incurred, keep the Property free of all liens for labor, material and property taxes and other governmental charges and comply with all applicable governmental laws and regulations. When the products of the Property cannot be produced and sold at a profit by reason of low prices or otherwise or when such products or the metals derived therefrom cannot readily be sold at prevailing prices so that an

unreasonable inventory would otherwise accumulate, either party shall have the right upon thirty (30) days' notice to the other party, to suspend or curtail operations or cause the same to be done.

ARTICLE 12 - Records; Inspection; Reports.

ASARCO shall keep at or near the Property, accurate books of account and records covering the operations of the Property including the mining, milling and disposal of ores and concentrates, and such books and records including ASARCO's plans and maps pertaining to the Property, shall be available at all reasonable times to the inspection and audit of representatives of Anaconda who may make copies thereof and extracts therefrom. Upon request from Anaconda, ASARCO agrees to furnish Anaconda copies of all logs, assay reports, maps or other documents connected with work programs conducted under this agreement. ASARCO shall also furnish to Anaconda quarterly reports (monthly if so requested by Anaconda) describing the work performed during the preceding calendar quarter (or month, as the case may be). Representatives of Anaconda may enter upon the Property or any other location in which the operations hereunder are being conducted by ASARCO, at all reasonable times for purposes of inspection but such representatives shall enter thereon at their own risk and shall not hinder the operations of ASARCO; and Anaconda shall indemnify ASARCO against any damage, claim or demand by reason of injury (including death) to any such representative or any licensees or guests of such party who may be permitted on the Property.

ARTICLE 13 - Voluntary Termination of Managership While Anaconda Retains a Participating Interest.

At any time after ASARCO has placed the Property on a producing basis, (and while Anaconda retains a participating interest) it shall have the right to resign as manager and terminate its obligations as such hereunder, without affecting its participating interest, by giving Anaconda at least ninety (90) days' notice thereof. Upon such resignation, ASARCO shall have no further managerial rights or obligations as such hereunder, and Anaconda shall have the right to assume the position and all the rights and obligations given to and imposed on ASARCO as manager hereunder, and shall have a similar right to resign therefrom as aforesaid. If neither party hereto is willing to act as manager hereunder, this agreement shall terminate unless the parties mutually agree on the selection of a third party to act as such manager. All rights and obligations of ASARCO as manager hereunder shall become those of the successor manager, and the terms of this agreement shall apply to such successor mutatis mutandis. All rights and obligations of ASARCO hereunder, except those arising from its ownership of a

participating interest, are those of ASARCO in its capacity as manager hereunder, whether or not expressly stated to be such.

ARTICLE 14 - Removal of Manager for Cause While Anaconda Retains Participating Interest.

While Anaconda retains a participating interest, the failure of ASARCO as manager to keep or perform any obligations on its part to be kept or performed according to the terms and provisions hereof shall, at the election of Anaconda, and upon giving notice thereof to ASARCO, constitute a breach of its obligations as manager hereunder, unless such default be cured as hereinafter provided. In the event of any such default on the part of ASARCO and such election of Anaconda to terminate ASARCO's right to act as manager hereunder on account thereof, Anaconda shall first give to ASARCO a written notice of its intention to declare such breach of this agreement and to terminate such managership on account thereof, specifying the particular default or defaults relied upon by it. ASARCO shall have a reasonable time (which in any case shall not be less than ninety (90) days) after receipt of such notice in which to cure such specified default or defaults, and if such default or defaults are cured, there shall be no breach hereunder with respect to such default or defaults. No waiver of and no failure or neglect on the part of Anaconda to give notice of a default or defaults shall affect any subsequent default or impair Anaconda's right resulting therefrom. If ASARCO should dispute that a breach has occurred, it shall so advise Anaconda and the question shall be determined by arbitration as provided below. If the decision of the arbitrator(s) shall be that ASARCO was in breach, then it shall have the reasonable time aforesaid after said decision within which to cure the default or defaults before Anaconda may terminate the managership of ASARCO in the manner aforesaid, and if such default or defaults be cured, there shall be no breach hereunder with respect to the same. If Anaconda shall give notice of default and if either (1) ASARCO shall not give Anaconda notice that it disputes the existence of such default or (2) ASARCO shall so dispute the default but the decision of the arbitrators is that a default by ASARCO has occurred, and in either case ASARCO does not cure such default within the period specified above, then Anaconda at its option may terminate ASARCO's managership by giving ASARCO at least thirty (30) days' notice of such intention and upon the expiration of the period fixed by such notice such managership shall terminate.

In the event Anaconda terminates ASARCO's managership on account of breach by ASARCO, ASARCO shall be under no further obligation or liability hereunder as manager to Anaconda from and after the date of such termination except for its liabilities and obligations as manager already accrued to the date of such termination. Such termination of ASARCO's managership shall not affect its participating interest hereunder, and the provisions hereof shall apply as if ASARCO had voluntarily terminated its managership.

ARTICLE 15 - Arbitration.

In case of any dispute or difference between the parties the same shall be submitted to arbitration in the City of Tucson, Arizona, in accordance with the rules of the American Arbitration Association. The decision of the arbitrator or arbitrators shall be binding on the parties.

ARTICLE 16 - Termination of Agreement and Liquidation.

If ASARCO at any time elects not to advance any further moneys hereunder, this agreement shall terminate, but saving to each party its rights on termination and its rights against the other party for obligations and liabilities of the latter accrued to the date of termination. The terms of this agreement for arbitration shall continue to apply to the parties despite such termination and shall govern the settlement of any disputes or differences among them.

Upon termination of this agreement ASARCO as manager shall liquidate all available assets of the venture and after payment of all outstanding claims and expenses hereunder, including the expenses of liquidation, shall divide the balance between the parties hereto in the same proportion as their participating interests.

ARTICLE 17 - Force Majeure.

If either party shall be prevented or delayed from performing any of the obligations on its part to be performed hereunder by reason of act of nature, strike or threat of strike, fire, flood, interruption or delay in transportation, war, insurrection or mob violence, requirement or regulation of Government, plant breakdown or any disabling cause, without regard to the foregoing enumeration, beyond the control of such party or which cannot be overcome by the means normally employed in performance and at comparable expense, then and in such event any such failure to perform shall not be deemed a breach of this agreement but performance of the aforesaid obligations shall be suspended during such period of disability and all rights of such party and the time for performance of such obligations shall be extended for a period equal to the period or periods of disability. Such party shall use

reasonable diligence to remove such causes of disability as may occur from time to time.

ARTICLE 18 - Assignment.

Either party hereto may assign this agreement and all its rights hereunder including rights as manager, to a wholly-owned subsidiary corporation of such party, now or hereafter to be formed, and any such assignee may reassign the same to such party or to any other wholly-owned subsidiary corporation of such party or such assignee, provided each such assignee assumes to perform all the obligations of such party hereunder and provided further that in the event of any such assignment, such party shall nevertheless be and remain liable for the performance of all the obligations hereof on its part to be performed. Except as aforesaid, no party to this agreement nor any permitted assignee shall assign the same or any of its rights hereunder without the written consent of the other party and any purported assignment in violation of the foregoing shall be void and of no effect; and this agreement shall inure to the benefit of and be binding upon the successors and permitted assigns of the parties hereto.

ARTICLE 19 - Notices.

Any notice under this agreement shall be given in writing and may be given by registered mail, and if the mailed notice is posted for delivery to a party at a distance exceeding five hundred (500) miles from the place of posting, a copy thereof shall be sent by registered air mail. The act and time of posting of such notice shall be deemed the act and time of giving of such notice, and the same shall be addressed to the party to receive such notice as follows:

The Anaconda Company

American Smelting and Refining Company
Attention:-Exploration and Mining Departments
120 Broadway
New York, New York 10005
and
American Smelting and Refining Company
Attention: -Exploration Department
P.O. Box 5747
Tucson, Arizona 85703

Either party may give notice to the other at any time and from time to time of any other address and/or addresses different from or in addition to the above to which all notices thereafter given to such party shall be addressed.

IN WITNESS WHEREOF the parties have executed these presents as of the day and year first above written.

THE ANACONDA COMPANY

By_____

Attest:_____
Secretary

AMERICAN SMELTING AND REFINING COMPANY

By_____

Attest:_____
Secretary

STATE OF_____)
) ss.
COUNTY OF_____)

The foregoing instrument was acknowledged before me this_____day of _____, 1972 by_____as_____ of THE ANACONDA COMPANY, a corporation.

My Commission Expires:

_____

_____
Notary Public

STATE OF_____)
) ss.
COUNTY OF_____)

The foregoing instrument was acknowledged before me this_____day of _____, 1972, by_____as_____ of AMERICAN SMELTING AND REFINING COMPANY, a New Jersey corporation.

My Commission Expires:

_____

_____
Notary Public

J. H. C.

MAR 13 1972

AMERICAN SMELTING AND REFINING COMPANY
SOUTHWESTERN EXPLORATION DIVISION
P. O. BOX 5747, TUCSON, ARIZONA 85703

1150 NORTH 7TH AVENUE
TELEPHONE 602-792-3010

March 13, 1972

Mr. Art Barber
Exploration Manager
Anaconda Co.
151 South Tucson Blvd.
Tucson, Arizona 85716

Three R - Sunnyside Area
Santa Cruz County, Arizona

Dear Art:

Reference is made to my letter of January 7, 1972, and our subsequent meeting in the Tucson office, at which time Heddleston and the Three R-Sunnyside areas were discussed.

I repeat that ASARCO is definitely interested in exploring the ground held by Anaconda under the terms of my January 7, 1972 letter. We have some definite geologic and geochemical techniques and concepts that we shall apply to a study of the area. This, when coupled with the data already developed by Anaconda (which we have not yet seen), should allow a logical drill program to be started. However, since this work is necessary to delineate the drill targets, it is imperative that our work be started soon so that it may be completed before it is necessary to start the assessment work drilling.

I believe the terms proposed should work to the mutual benefit of Anaconda and ASARCO and I anticipate hearing a positive reply from you very soon.

Very truly yours,

W. L. Kurtz
Manager of Exploration

WLK:lad

cc: JHCourtright
FTGraybeal

AMERICAN SMELTING AND REFINING COMPANY
SOUTHWESTERN EXPLORATION DIVISION
P. O. BOX 5747, TUCSON, ARIZONA 85703

1150 NORTH 7TH AVENUE
TELEPHONE 602-792-3010

January 7, 1972

J. H. C.
JAN 10 1972

Mr. Art Barber
Exploration Manager
Anaconda Co.
151 South Tucson Blvd.
Tucson, Arizona 85716

Three R - Sunnyside Area
Santa Cruz County, Arizona

Dear Art:

During the past several months ASARCO has been conducting a reconnaissance program in the Patagonia Mountains. As a result of this reconnaissance work, ASARCO is extremely interested in exploring the Three R - Sunnyside area.

I should like to propose that ASARCO and Anaconda joint venture exploration on Anaconda's land holdings in this area. Under a joint venture exploration agreement, ASARCO would advance funds for exploration in an amount equal to the equity which Anaconda currently has in the property. At that point in time, ASARCO and Anaconda would advance exploration and development funds on a 50-50 basis.

I would welcome the opportunity to meet with you and Mr. Hunt to discuss this in further detail.

Very truly yours,

Bill

W. L. Kurtz
Manager of Exploration

WLK:lad

cc: JJCollins
JHCourtright