

CONTACT INFORMATION
Mining Records Curator
Arizona Geological Survey
416 W. Congress St., Suite 100
Tucson, Arizona 85701
520-770-3500
http://www.azgs.az.gov
inquiries@azgs.az.gov

The following file is part of the

James Doyle Sell Mining Collection

#### **ACCESS STATEMENT**

These digitized collections are accessible for purposes of education and research. We have indicated what we know about copyright and rights of privacy, publicity, or trademark. Due to the nature of archival collections, we are not always able to identify this information. We are eager to hear from any rights owners, so that we may obtain accurate information. Upon request, we will remove material from public view while we address a rights issue.

#### CONSTRAINTS STATEMENT

The Arizona Geological Survey does not claim to control all rights for all materials in its collection. These rights include, but are not limited to: copyright, privacy rights, and cultural protection rights. The User hereby assumes all responsibility for obtaining any rights to use the material in excess of "fair use."

The Survey makes no intellectual property claims to the products created by individual authors in the manuscript collections, except when the author deeded those rights to the Survey or when those authors were employed by the State of Arizona and created intellectual products as a function of their official duties. The Survey does maintain property rights to the physical and digital representations of the works.

#### **QUALITY STATEMENT**

The Arizona Geological Survey is not responsible for the accuracy of the records, information, or opinions that may be contained in the files. The Survey collects, catalogs, and archives data on mineral properties regardless of its views of the veracity or accuracy of those data.

A-4 Bryles Brother Failing 2500 Chi 50 1968 1948 39.4 11 2077 109 9.9 (Contacts Tormeint A-4 Shallon Milling Maybew 3000 Med 8 2183 100 13.3 52 3523 1410.  A-5 Shallon Milling Maybew 3000 Med 56 2290 2290 46.9 7 2011 321 45.9 17 3445 534 AT-1 Barnes-Brown Johns Lauren Dis 3634 1565 1565 42.6 8/2 2272 707 83.2 29/2 7768 496  A-7 Barnes-Brown Maybew Mind 15 40 2043 2043 57.0 6 2420 377 62.8 37/2 3150 780 A-6 Harness Properties One 14/4 1375 1375 96.5			•								
Hole Contractor. Reg Mais Shifts to Depth Fact Fifthigh Shifts to		Comparison	of Rolary Contr	actors, 1	Esp, Media,	Footage	and D	Julling	Roles	by Reck l	luits
Hole Contractor Rey Midia Shifts to Right Fact FH High Shifts to Aprile Took For FH High Shifts to Aprile Took For FH High Shifts to Aprile Took For					Doct		Each	e Volca	necs		
A-2 Coffeey-Brown Makew 3000 Air 14 1318 1318 9411 24 2004 CSC 28.C 19 3902 1888  A-4 Beyles Brokker Farking 2500 Air 50 1968 1968 39.4 11 2077 109 9.9 Continuely Terminals  A-4 Shallon Milling Maybow 3000 March — — — — — — — — — — — 8 2183 DC 13.3 52 3593 1410  A-5 Shallon Dulling Maybow 3000 March 56 2290 2290 46.9 7 2011 321 45.9 17 3445 534  AT-1 Barnes-Brown Abstraces Air 3624 1565 1065 42.6 8/2 2272 707 83.2 29/2 2768 4976  A-7 Barnes-Brown Abstraces Air 3624 1565 1065 42.6 8/2 2272 707 83.2 29/2 2768 4976  A-6 Copper States of Facility 100 Air 14/4 1375 1375 9675 — — — — — — — — — — — — — — — — — — —	Hole	Contractor	Rig Me	lia Shifts	to Depth Feet	Ft/Sligt	Shifts	to Depth	Fact F.	High Slife	le to Right 17 17
A-2 Coffee Brown Mafrew 3000 Air Hy 1318 1318 94.1 24 2004 CH 28.6 19 3902 1888  A-4 Bryles Brokker Farking 2500 Air 50 1968 1968 39.4 11 2077 109 9.9 Continue Terminal  A-4 Milling Mayber 3000 Med — — — 8 2183 AC 13.3 52 3593 1410  A-5 Ibalton Dilling Mayber 3000 Med 56 2290 2290 46.9 7 2011 321 45.9 17 3445 534  AT-1 Barnes-Brown Hourst termin Dis 3624 1565 1565 42.6 8/2 2272 707 83.2 29/2 2768 4976  A-7 Barnes-Bourn Hourst Termin Dis 3624 1565 1565 42.6 8/2 2272 707 83.2 29/2 2768 4976  A-6 Horneso Francis Air Market  A-6 Horneso Francis Air 440 2043 2043 5100 6 2420 377 62.1 37/2 5150 750  A-6 Copper sto-local facility on Mind 11 N75 1000 9.1											
A-2 Coffee Brown Makes 3000 Air 14 1318 1318 94.1 24 2004 CH 28.6 19 392 1888  A-4 Bayles Brokker Tarking 2500 Air 50 1968 1968 39.4 11 2077 109 9.9 Continuts Terminal  A-4 Milling Mayber 3000 Med — — — 8 2183 AC 13.3 52 3593 1410  A-5 Ihalton Dulling Mayber 3000 Med 56 2290 2290 46.9 7 2011 321 45.9 17 3445 534  AT-1 Barnes-Brown Abund turner Air 3624 1565 1865 42.6 8/2 2272 707 83.2 29/2 2768 4976  A-7 Barnes-Brown Assistance Air 40 2043 2043 5100 6 2420 377 6218 37/2 5150 750  A-6 Copper States of Facility of Mild 11 1875 1878 917 — — — — — — — — — — — — — — — — — — —	A-1	Barles Brothers	Failing 2500 As	3 42	1309 1309	31.2		-	+    -	_	
A-4 Bayles Brother Failing 2500 Air 50 1968 1968 39.4 11 2077 109 7.9 (Corticol Termenicte  A-4 Bayles Brother Failing 2500 Air 50 1968 39.4 11 2077 109 7.9 (Corticol Termenicte  A-4 Balton Dilling Maybew 3000 March 8 2183 100 13.3 52 3593 1410.  A-5 Shalton Dilling Maybew 3000 March 56 2290 2290 16.9 7 2011 321 45.9 17 3445 534  AT-1 Barnes-Brown Hamel Line Air 3624 1565 1565 42.6 81/2 2272 707 83.2 291/2 2768 496  A-7 Barnes-Brown March Min Air 40 2013 2013 51.0 6 2120 377 62.8 371/2 3150 780  A-6 Gyger 56 Brown Fairm Mind 11 1175 100 19 9.11  A-6 Copper 56 Brown Mind 11 1175 100 19 9.11						10 To	711	3000	ارين	12/ 10	3902 1898 9
A-4 Molton Milling Meyhow 3000 Med 8 2183 KC 13,3 52 3523 1410.  A-5 Shalton Mulling Mayhow 3000 Med 56 2290 2290 46,9 7 2611 321 45.9 17 3445 534.  AI-1 Barres-Brown Hound Termin Di, 34 <sup>2</sup> /4 1565 1565 42.6 8/2 2272 707 83.2 29/2 2768 496  A-7 Barres-Brown Mond Mind and 40 2043 2043 51.0 6 2420 377 62.8 37/2 3150 750 A-6 Harres Mind Mind 11 1375 1375 96.5	A-2	Coffeey-Brown	Molynow 2000 as	4 19	13/8 13/8	74,1	× 7	2009	406	20,6	
A-5 Shalton Dulling Maybour 3000 Med 56 2290 2290 46,9 7 26/1 321 45,9 17 345 534.  AT-1 Barner-Brown House France Dis 36 34 1565 1565 42.6 8/2 2272 707 83.2 29/2 2768 496  A-7 Barner-Brown Duel Marke Dis. 40 2043 2043 51.0 6 2420 377 62.8 37/2 3150 780  A-6 Harner Brown Facilities Dis 14/4 1375 1375 9655  A-6 Copper stablish Dux Mid 11 1175 1000 9.1	A-4	Bryles Brothers	Faching 2500 di	1 50	1948 1948	39.4	//	2077	109	7.9 Contra	coto Termenoted
A-5 Shelton Dulling Maybour 3000 Med 56 2290 2290 46,9 7 2611 321 45,9 17 345 534.  AT-1 Barres-Brown House Farmer Dis 36 34 1565 1565 42.6 81/2 2272 707 83.2 291/2 2768 496  A-7 Barres-Brown Duel Marke Dis. 40 2043 2043 51.0 6 2420 377 62.8 371/2 3150 780  A-6 Harreso Farling 1000 Dis 141/4 1375 1375 9655  A-6 Copper stabling 1000 farling 0 mx Mich 11 1175 1000 9.1		Walt 10.00.	m 10 2 m				s e	2282		22 0	2002 141027
AT-1 Barres-Brown Hund termen dis 3634 1565 1565 42.6 8/2 2272 707 83.2 29/2 2768 496  A-7 Barres-Brown Marker dis. 40 2043 2043 57.0 6 2420 377 62.8 37/2 3150 750 1  A-6 Harres Failurista dis 14/4 1375 1375 965  A-6 Copperstablish Alling DMX Mid 11 N75 1000 9.1  A-6 Copperstablish Alling DMX Mid 11 N75 1000 9.1		michael resetting	Mayrew Seco M				0	2/23		3,3 32	
A-7 Reenes-Brown Huster dej. 40 2043 2045 57.0 6 2420 377 62.0 37/2 3150 750 / A-6 Harness Farlingson dei 14/4 1375 1375 96.5 9 1665 190 A-6 Copperstation, DMX Mich 11 N75 100 9.1 - 9 1665 190	A-5			1		46.9	フ	2611	321 4	5.9 17	3145 534 31.
A-7 Romes-Brown Huster dig. 40 2043 2043 57.0 6 2420 377 62.0 37/2 3150 750 / A-6 Harness Faulingson dig 14/4 1375 1375 96.5 9 1665 190 Mich 11 N75 100 11 11 N75 100 11 11 N75 100 1	AI-1	Barnes-Brown	House Terner de	343/4	1565 1565	42.6	8/2	2272	707 8	3.2 29/2	2768 496 16
A-6 Harreso Falingson Die 14/4 1375 1375 9605  A-6 Congresson Congresson Mind 11 N75 1000 9.1  A-6 Congresson Falingson Mind 11 N75 1000 9.1	A-7	Barnes Brown	Howard Towner De	. 40	2043 2043	57.0	6	2420	377 6	2,8 37/2	3150 730 19,
A-C Copper Stational Factories D mx Mich // N75 1000 9:1			Failingson de		13 75 1375	96.5					
	A-6	Copper Stologol.		id 11	1175 100	9.1	+			- 9	1665 190 21.
The second of th			nolyatr			A control of the cont					
The state of the s						Control of the contro		Processing and the second seco			
* 1 1. 14 a love of my & hours, or 3 shifts perday. Contractors using 12 hour towns enter Established	<b>3</b> ₹			2	shift seeder	Cont	actors e	eseing 12	z-hou t	bever evere	concerted to 8 h

Dull Hole	Trotay	1-thkry	Footage	Ft/day	B. Tookuse	Hkky	Ov Fatage	eral FH/day	
K-101 # 1412	1374	80.4	1709	57.0	2/46	* 46,2	5229	54,0	Started from Surf.
A-1	820	39,0					(2129)TD.	39.0	Storted of 1209.
A-4			307/	45, 3			(6664)D 3071		Started at 35%
M-1A	551	30.0	2369	56.7			(5322) TD 2720	47.1	started at 2402
20CA-1			18/1	27.9 38.9			(5813) 1811	27.9 <del>38.9</del>	Started at 4002.
A-2			442	34.0			(4521) TD 442	34.0	Started of 4079.
A-ZW			710	28.4			(49 40) TD 710	28.4	Started at 4230
						rote compa	notar of the	le made a	oring the

Dull Holo Toolay Foliag Foliage Fifty Footage Fift	duy takage Afday
	* Started from Surface.
A-1 820 39.0	(2129) Started of 1309.
A-4 - 3071 45.3	(6664) 307/ 45.3 Started at 3593.
M-1A 551 30.0 2369 56.7 -	_ 2920 47.1 ot 2402.
DCA-1 1617 38.9	(4619) 1617 38.9 Started at 4002.
* 7 m	y I more realistic agracial of feotogo
rote K-M	u experison should be made civing the
hole Asi	

		Superiar Gast
	Traphie	Logs + assay Besulte
	File No.	Lugerian East Lage + Assay Besilte Hale No.
	2486	M-1A
	2486-A	A-1.
	2486-3	A-4
	2486-C	DCA-IA
***************************************	2486-D	A-5
	2486-E	A-2
	2486-F	A-2 W
	2486-6	1-7
	2186-GG	A-7 (revised by W.L.K.)
	2486 - H	DCA-3A
	2486- HH	DCA-3A (revised by W.L.K.)
1	2486 - I	DCA-2A
	2486-17	DCA-QA (revised by W.L.K.)
	2486-J	A-3
	2486-K	A-8
	2486-2	LB-4
	2486-m	A-9
The street street is the state of the street in the street		
	f	

Superior East avan

Hole Kumber: Shaft No. 9

Company: Magna Copper Company

Dulling Contractor: Contennial Development Congany

Location: NW'/4 NW'/4, See. 32, TIS, RIJE.

Collar Elevation: 4190

Total Depth: scholuled for 4900 feet

Holo Size: 22 feet, circular

Coul dituil.

Leap & Cultury .

Tormations:

0- 1875 Thate (includes vetrophyse and life)

1875 - 2100 Tw (and March 4, 1971)

### Will Hole Dates

Superior East alex

Hole Kernber: OF-1A

Company: Korr MEGEE

Dulling Contractor: C.C. Swith

Location: NW/4 NE/4 , Se 21, TIS, RIZE.

Colla Elevation: 4410

Total Wepth: 2150.

Holo Size: 6 1/4 notary; 33/4" core

Cored diterial: 2130-2150 (W10.06-0.07% a) in ASAKCO Files.

Logs & Cuttings: Dilling in asace fele

The Dilled: 10-27-64 & 11-15-64.

Shlumberger I-ES and FIX/GR logs to 1860 pt. (4/9/71) in ASARCE files.

Formations:

Theit 0-1635

0-1995 Talverto

1635-1670 Tuckophyc

1995-2000 Tuhilatad words

Tolorit 1470-1790

2050-2150 Thosalt-andesite

T. veloghyre 1790- 18-40

1840 - 1875 Tologita

Twitighye 1875-1930

1930 - 1995 Tdacit

T Whitetail Cgl. (?). 1995- 2050

diocas (2) Re-evolvation suggest wint 2050 - 2150

is post-mineral andesito. (ASARCO This-section). TD.

Coro samples non 0.00 % En with trace au-ag.

Superior East alien

Hole Kumber: DC-1
Company: Ken-Mc See
Andling Contractor: cc. Swith
Location: NE'M NE'My , So. 16, 725, R13E.
Coller Elevation: 3990
Total Alepth: 2303
Hole Siz: 6"4" rotary
Cored Siterial: None
Logg & Cuthing: log in ASARCO file

Tormations:

0-1130 Todoite

1130-1160 Twitigshipe

1160-1165 Theff

1165-1800 Twhiletond Col., whood sand coment.

1800-2303 Thefatetail Col., larger public, hander directing.

TD.

0-1165 Toloite
1165-0303 Tabitetail
TP.

The: Drilled 11/27/64 to 12/17/64.

Seperior East area

Hole Kernber: DCA-1 Company: Superior-Miani Joint Venture Willing Contractor: Technical dir Services Location: NW/4 NE/4, Sec. 3, TIS, RISE Colles Elevation: 4760 Total Depth: 4011. 5 feet Holo Seige: 9" with 12" surface coming.

Cored Sinterval: 1475 (volunies); 2370-2375 (Tw; 0,01876,000480xCu);

Cored Sinterval: 2959-2971 (Tw; 0.0247, Cu, 0.01080xCu); 25-14-3568 (Tw;

0.0249. Cu, 0.008 9, 0xCu); 4000-4011.5 (Tw; 0.02076,0.0047) Loop & Cultury: Log in ASAnce Files; See www. Simmons for cuttings. Other: Dulled 5-18-64 To 6-26-64 Formations: ( reinterpreted from log ). T dacite 0-460 Tretroshyre 460-520 Ttoff (dity white felsile). 520-550 Touly volcanies, felit, glass, some 550-2210

docite (?), andesite in lower portions.

2210-4011,5 Thatetail Cof; we sandstor, quartist,

siltstone, granite, lemistine, andesit,

basalt, and greiss.

Superior East Clien

Hole Kermber: DCA-2

Company: Superior-Miani Joint Ventus Dulling Contractor: Technical dis Service

Location: NW 4 SE'ly, Sec. 11, TIS, RISE.

Collar Elevation: 4720

Total Depth: 1772

Holo Legs: 7 %" (37 feet of 1315" caring at surface)

Cored diterial: Unknown

Logo & Cultings: Log to 1471 in ASARCO file See Williams and set of Control o

Formations: (reintegratation from log.)

0-1095 Toloute

1095-1300(?) Tearly volcaries; rhyslit, glass, felset?

1300(1) - 1400 Thilatail Cof; gant, glile, schit, andent:

1460-1525 Thehitetail Cgl. (Km report)

1525-1575 Pe Rual schiet (w/ exotic Ca)

1575-1678 K quarky mangarit (" " ")

1478-1772 Pe Penal schiet (w/ "").

TD

Seguin East Clien

Hole Kumber: DCA-3

Company: Superior-Maini Joint Ventus

Dulling Contractor: co Smith

Location: NW/4 NW/4, See, 23, TIS, R135

Collar Elevation: 4440

Total Depth: 3000

Holo Seiz: 5-5/8" @ Surface, no cosing.

Cored Stitues: Unknown

Loop & Cultury: See WW Simmons

The: Dulled Way-June 1965. Schlemberger hit buidge at 600 feet, unable to genetial - No log.

Formations:

0- 1400

Thouse

1400-1415

Tweliophyse

1415-1490

Tlof

1490-2430

Zev, bosalt.

2430-3000

Tubilatul ogli

72.



### Drill Hole Data

Superior East Clien

Hole Kermber: U-2

Company: United Verde

Dulling Contractor: Unknown

Location: NWH NW14, Sec. 12, TIS, RISE.

Collar Elevation: 4922

Total Depth: 1146

Holo Seize: Unknown

Cored Sateurs: 737 to 1144.

Logs & Cutting: X- Section alog in ASARCO file. Sample brom Other: Dulled 1/27/31 to 3/26/31

Formations:

0 - 600

Todocite

600- 710

Twetrophyse (obsidean).

710 - 735

T tell (lest con fin 732-737).

735-800

pr Shirt, laven to poor copping.

806-969

pe schiet, good capping

949 - 994

Togramit, good copping

996-1030

pt schiet, banen, no cosper

1030 - 1068

1068-1146

pt schiet, no liminite but 0. +0,3 % Cu, entire pt schiet, lanen.

Superior East aux

Hole Kernber: U-4

Company: United Verde

Dulling Contractor: Unknown

Location: NE'4NE'14, Sea Z, TIS, RIBE.

Collas Elevation: 4440 (4721?)

Total Depth: 1400

Holo Size: Unknown

Cored Siterial: 1234 - 1600

Logs & Culting: X- Section of log in ASARCO file. Sample Bacom Other: Dulled from 1/20/31 to 5/22/31

Formations:

Tolocite 0-1170

Tritashere obsidion 1170 - 1215

Theff (yellowalt docite). 1215-1235

pt schot, good carping w/0.115-2 Ce, 2 mod 1235- 1545

1545-1570 Red Sand

Doct dela?, w/ frag of schiet certaining chancely 1570 - 1589

15-29-1590 till ble docit, little chywcolla.

1590-1600 pE scheit, poor to feer corping.

71.

Superior East aven

Hole Kermber: U-5

Company: United Verde

Dulling Contractor: Unknown

Location: NW1/4, Sec. 1, 715, R13E.

Colla Elevation: 4145

Total Depth: 835

Holo Seize: Unknown

Cored ditarial: 488-835

Logo & Culturg: X Section & log in ASAROE Julas

Other:

Formations:

Surface encioses. 0-30

30- 418 7 docts

418-435 Twitrodese, should an.

435-480 They, alt docto.

pt schist, good sagging 488-475

475-835 pt schiet, goor capping, but exclie copper.

Superior East area

Hole Kernber: CE-1

Company: Cibola Exploration

Dulling Contractor: Unknown

Location: NW14 SE14, Sep. 14, TIS. RIZE

Collar Elevation: 4485

Total Depth: 2000?

Holo Seige: Unknown

Cored Suterial: Unknown

Logo Cutting: Log in Magna Cooper files. may secure.

Other:

Formations: loke by word of mouth 10th hand!

0-2200 Tdocite

2200 - 2850 TOV

TD.

Superior East aux

Hole Kumber: CE-2
Company: Cibola Englavation
Nulling Contractor: Universum
Location: SE'14 NW'14, Sec. 22, TIS, RIBE
Collar Elevation: 4000
Total Depth: Universum

Holo Sigs: Unknown Cored Suttered: Ushown

Logs & Cuttings: Lu Mogma files. Other:

de la composição de la co La composição de la compo

Formations: No info other than prot bottomed in bosact.

# Drill Hole Data

Superior East Clien

Ne Septemegorbel

Hole Keember: I-1

Company: Inspiration Consolidated Copper Company

Dulling Contractor: Boyles Brothers

Location: SE'14 NE 114, See, 35, TIS, RISE

Colla Elevation: 4200

Total Depth: 3475

Holo Seige: " 3" standard pipe at surface

Cored dutoural: Total

Loop & Cuthing: Log sympei supplied by Ken-Mogree.

Other:

Formations:

0-1105 Toloite

1105-2939 Tubletail

2939-3240 pt diabase

3240-3475 px schiet

TD,

Other Source GSB

0-1025- Tdoute

1025-1006 Twitoshere & tiff

1086-2939 Tabiletal (St. ps, md)

2939-3475 pe schiet, bornen quenollerd

TD.

Superior East alea

Hole Kunter: I-2 Company: Inspiration Dulling Contractor:

Location: SW14 NW14, Sec. 25, TIS, RISE

Colla Elevation: 4520.

Total Depth:

Holo Size:

Cored Siteral:

Long & Cultury:

Other:

Underson hole seol. assessment

Formations:

Segerior East Chen

Hole Kerneler: I-3 Company: Inspiration

Willing Contractor: ? Walson of Goo Grand Cligare

Location: SN/4 SE14, Se 24, TIS, R 13E verlal Threck

Collar Elevation: 4975

Total Depth: Unknown but said to be 840 in Tw? \*

Holo Seize: 5"Surfoce pipe. See Assess fil not

Cored Statemal:

Leap & Cultuigs:

Other.

Formations:

Tw chips of pesc, It, glyde at dull set.

. Penal Doc- 370, p. 470 (or 407?) Ice reported Sep1, is - Sept1, is spent 5000 by LA dulling Co down hole home to 862 ft on Crock 48

Diell Hole Dates

Superior East ain

Hole Kumber: I-4

Company: Inspiration

Dulling Contractor: Bayles Brothers verla from No Stores.

Location: 5E1/4 SE1/4, Sec. 24, TIS, RISE.

Colla Elevation: 5000

Total Depth: 3000

weelal from no facers. (Borgeston

Holo Sig.

Cored duteral:

Log & Cultuing:

Other.

Formations:

0 - Toloat

-3000 Twhitelail

TD.

Superior East Clien

Hole Kumber: I-5

Company: Inspiration

Dulling Contractor: J.C. Barnes

Location: NE"45E"4, Sec. 24, TIS, R13E.

Colla Elevation: 5100

Total Depth: 1410

Holo Sigs: 614" rotary

Cored Siterial: None

Lexp & Cultuig:

Other: Dulled

to 11/23/10.

Formations: Low cutture, & trouble observations

0 - 1150 Tdail

1150-1755 Tabite tail

? on 1410 TD?

72

Verlos Tom Breek Non 25, 1970.

Con 13 oct 1970, they were at 1933 which was depth the little ing ment it to with down have become colling were Two. Big no have to clion. Not but was in time to from the form.

On Od 29, down to 1416.

Stellwohing nov. 3.

Seguin East alea

Hole Kirnber: I-6
Company: Suspication
Dulling Contractor: Bayle Brother.
Location: SW/4 SE 14, Sec. 35, 71N, R)3£.
Collar Elevation: 3×40
Total Depth: 2000 (?) Suchind 55° @ N36° W.
Holo Size: NG?
Coreal Suttend:
Loop & Cutting:
Cother: Fall of 1970

Formations:

0-2000 Thocito; weekal OLovine.

Will Hole Dates

Superior East aux

Hole Kewler: M-w
Company: Continental Material
Willing Contractor: Whatley Dulling Company.
Location: NE'4 NE'4, Sec. 21, TIS, R13E
Coller Elevation: 4280
Total Depth: 200
Hole Size: 678" uncased.
Cored Interval: Nove;
Lexp & Cutting:
Other: Water-well for M-1.

Formations:

0-200 Tolouto

Superior East Chin

Holo Kumber: M-1

Company: Continental Minisals Company

Dulling Controlor: Whally Mulling Company

Location: SW/4 SW/4, Sec 15, 715, R13z.

Collar Elevation: 4550

Total Depth: 2402

Holo Sigs: 556" rotary af 324" core 31/2" Dissing to 202'.

Cored Interval: 2252-2261 (Asarco Hin section and soites)

Leogra Cutting: In ASARca file.

Other: Dulled Sept-Oct., 1970.

Formations:

By CM

0-1890 Tdocite

1890-1900 Collevien.

1900-1934 D Martindus.

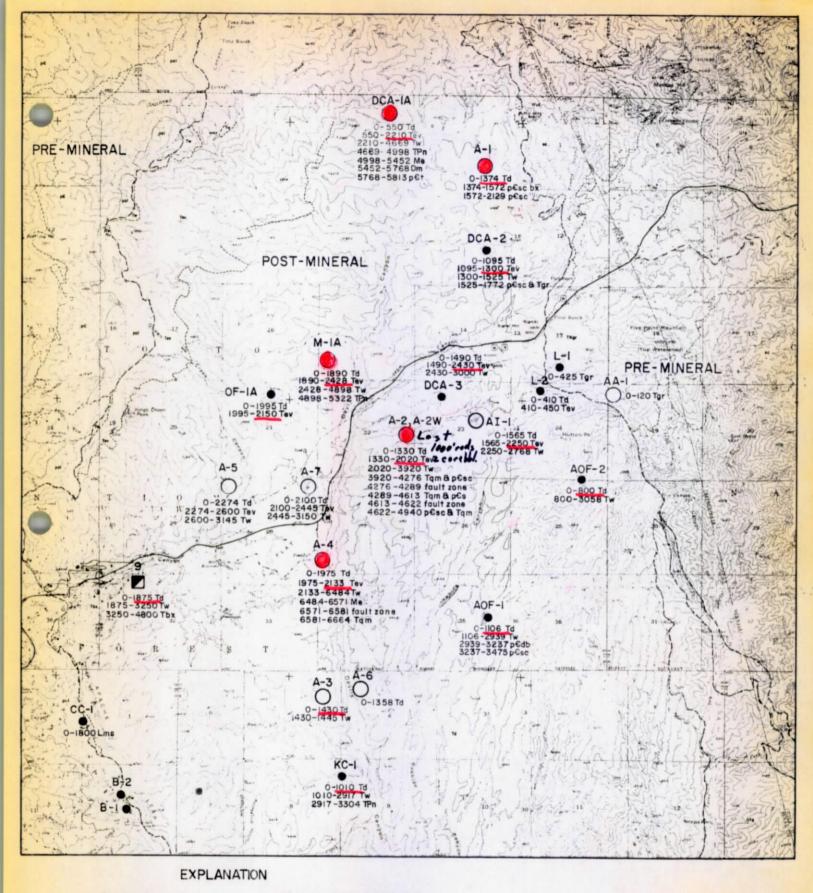
1934-2100 PE bosalt

2100-2402 pe dochose

T.D.

Reloggo attingo By ASARCO Thorsto, while 0-355 355-1180. Tolord, gray 1180-1420 Tolavite, red brown 1420-1575 Teloat, yellow law 1575-1600 Tdocito, viticous (?) 1400-1800 Tdoots, toff 1200-1830 Thout vetrogryce Totack, luft 130-1890 Bosal ogl-tuff (?) 1890-1900 Thosalt (Tow). 1900-2402

7-2.



Previous drill hole ASARCO drill hole Magma's #9 shaft DCA-I (hole designation)
40II Tw Rock type Bottom hole depth 0

Proposed drill site

#### POST-MINERAL ROCK UNIT

Td - Docite Tev-Early volcanics Tw-Whitetail

#### PRE-MINERAL ROCK UNIT

Tbx-Breccia Dm-Martin Ims Tam-Quartz Monzonite p€t-Troy qtz Tgr-Granite p€db-Diabase TPn-Naco limestone p€sc-Schist Me-Escabrosa limestone

DRILLING PROGRESS MAP for the month of . SUPERIOREAST GILA & PINAL COUNTY, ARIZONA SCALE: "= I mile J.D.S. J.D.S.



#### **EXPLANATION**

Previous drill hole

ASARCO drill hole 0

BC-2 (hole designation)

872 pepi Rock type Bottom of hole depth

0 Proposed drill hole

#### Post-Mineral Rock Unit

QTg-Gila Conglomerate Td—Dacite

Tev—Early volcanics
Tw—Whitetail

#### Pre-Mineral Rock Unit

Tgp — Granite porphyry Tsg — Schultze Granite Tigm-Lost Guich Quartz Monzonite
Tgd — Gold Guich Granodiorite Pal - Paleozoic, undivided pEds - Precambrian , Dripping Spg. Quartzite p€db-Precambrian Diabase p6pi-Precambrian Pinal Schist

### BOHME PROJECT

DRILLING PROGRESS MAP for the month of.

ASARCO-HANNA JOINT VENTURE

GILA COUNTY, ARIZ.

Scale 1:24,000 J.D.S. A-14MIAKAN WLK

AMERICAN SMELTING AND REFINING COMPANY Tucson Arizona

May 25, 1971

W.E.S. MAY 27 1971

T0:

J. D. Sell

FROM: H. L. Crittendon

Drilling Progress Superior East Project

Boyles Bros. Drilling Co. commenced drilling operations on the Superior East Project April 6, 1971. At this date, 3377 feet of rotary drilling and 1001 feet of diamond drilling have been completed.

The following will be a summary of drilling progress to date, with a tabulation of hours for the month of April. Comments regarding the drilling operations and difficulties encountered will be given as a matter of record.

#### Hole No. A-1

This hole presented considerable difficulties unrelated to hole conditions. The original plan was to carry the hole to depth by hammer drilling until hole conditions required that casing be set. However, the hammer drill was put out of order by the blowing of an "O" ring for which there was no immediate replacement. The broken "O" ring was caused by trying to ream a ten inch drill collar stabilizer behind a 9-7/8" hole. The swing shift driller had assumed the hole was crooked and did not check the collar to see if it was oversize. Drilling was continued with the tri-cone bit without the hammer with tolerable penetration rates (1 to 25 minutes/foot) carrying 6,000 to 18,000# on the bit. The I-R hammer was not used after being repaired because the Dresser bit representative claimed that the bit was not designed for hammer drilling and possible failure of the bit would occur if hammer drilling was continued. However, torque developed in broken ground causing two twist-offs in the 2-7/8" drill pipe being utilized (both joints of twisted-off pipe were definitely worn and fatigued). In both cases, the pipe was successfully fished out. At 809 feet, a large crevice in the dacite caused a complete loss of air circulation - - - it was then decided to case the hole with 7" OD casing and continue with a 6-1/4" rockbit, still using air as the circulating medium. This crevice would definitely have caused lost circulation problems if mud drilling had been used and either a good cement job or casing the hole would have been required to regain circulation. Air drilling continued satisfactorily with the 6-1/4" rockbit, however, water was encountered immediately beyond the casing and foam injection was used. After the vitrophyre was encountered at approximately 1260 feet, a very soft formation was encountered with more water inflow (10-30 gals./min.?). Very few cuttings were recovered in this formation and were of a very fine size. After reaching a depth of 1317 feet approximately 70 feet of fill had sloughed into the hole and it was decided to case the hole for coring. casing was washed to bottom with some difficulty and cemented in place.

Two days of drilling time were lost due to compressor failure.

A time distribution of April is tabulated below.

									Size of	Hole	
	ble Tir					able (H			Foota		
Drill-	Casing	Move & Set-up		Fish- ing	Mob	Equip. Repair		12-3/811	9-7/8"	6-1/4"	Total Depth
200 <del>1</del>	35 <del>1</del>	69	54-3/4	144	25 <u>부</u>	32 <u>1</u>	13 <del>1</del>	61	811.	5061	1317'

#### Direct Drilling Expense\*

Boyles	\$20,818.00
IR (est)	4,600.00
Chevron	902.77
Misc. (est.	500.00
Total	\$26,820.00
Cost/Foot	\$ 20.37

\*Attributed to drilling operations only

#### Contractor's Equipment

Drill rig: Failings model "2500"

Drill collars: (2) 30' x 8" diameter, (2) 20' x 8" diameter with stabilizers

Drill pipe: 2-7/8" IF API

Bits: (1) 9-7/8" Security model M-8, assortment 6-1/4" rockbits

Mack boom truck with fifth wheel Ford F-600 water truck 1,000 gal.

Gardner Denver steam pump for injection

IR

Model HHE Compressor Rated 1,200 scfm @ 250 psi (350 psi intermittant)

IR Hammerdrill model DDH 2076

#### Hole M-1

This hole was originally drilled to a depth of 2,402 feet by Whatley Drilling Co. for Continental Exploration. 3-1/2" standard pipe was floated to bottom (not cemented). ASARCO pulled the 3-1/2" pipe and replaced it with 1,882 feet of 4" pipe and 520 feet of NC flush joint casing. A mud pack was placed at the bottom of the casing in hopes of sealing the casing and enabling it to be recovered at the termination of the hole. When diamond drilling was commenced, approximately twenty feet of extremely hard dense andesite was encountered at the bottom of the hole causing very slow penetration and very high bit wear. High torque developed due to a metal to

metal contact with the drill rods and the black pipe. The cause of this condition is not known but the principal point of contact was near the surface. I believe that the casing was stretched beyond its yield point in setting which possibly buckled it near surface. Bud Mathews of Boyles believes that the torque was caused by a crooked hole...however, no drag was noted in pulling or setting of the casing. The casing then apparently wore completely in two and allowed circulation to flow up the outside. Moderate to severe intermittent loss of circulation occurred in the upper shaly portions of the Whitetail...hole conditioning procedures were not adequate and the contractor attempted to maintain a high viscosity, low-solids drilling mud throughout the lost circulation zones despite a verbal agreement with the previous foreman that this would not be done. Twenty-five 50# bags of Wasatch 25 (a Quik-Trol type additive) were added before NX casing was set. After NX casing was set, torque was reduced to a minimal amount and full circulation was regained.

Time distribution - April

Chargeable	Non-Chargeabl	e	Drilling	
Casing Set-up & Misc.*	Equip.	Drilling	Misc. NC	Core recovery
74 hrs. 64 hrs.	22 2	168 <del>1</del>	18½ 261 ft.	98%

\*Includes place & drill through mud pack, make up rods, etc.

#### Contractor's Equipment

CP-50 Diamond drill

+ 3500 NC wireline drill rod

3-15/16" oversize semi-pilot NC bits

+ 2500' (New style) upset NX wireline rods

+ 2000' NX wireline rods

Boyles stabilized oversize NX core barrels w/chrome inner-tubes

(1) Ford model - 600 water truck - 1000 gal. capacity

Contractors invoice for April was \$16,705.76. A cost per foot not meaningful at this time due to necessary casing and preparations to complete hole.

#### Hole A-4

Drilling commenced on May 1. Principal difficulties to date have been broken hammer bits and large quantities of water inflow. Three Mission 8-7/8" hammer bits were broken and (I) Mission 6-1/8" hammer bit. Apparent cause of bit breakage was improper heat treatment at the factory (Mission representative). Seven inch casing was set at 1,082 feet in order to seal

off large influx of water (± 100 gal./min). Cementing was not tried because three previous cement jobs attempted at 360' (± 15 gal./min.) and 580' (± 30 gal./min.) were not successful. After setting 7" casing and continuing with a 6-1/4" hammer, progress continued more or less satisfactorily with the hole being reasonably dry but picking up some water, until a hard dense andesite and more water (± 20 gal./min.) were encountered at approximately 1970 feet. Hammer drilling progress was reduced drastically to 20-40 min./ foot due to hard rock and changing of the choke in the hammer to unload heavy column of water (May 21).

#### Contractors Equipment

Same as A-1 with the following exceptions:

Mission model A60-70 hammer drill Mission megadrill  $(6-6\frac{1}{4})$  Mission 8-7/81 button bits Mission 61 and 6-1/41 button bits Bean model 20 pump for injection Boyles of Canada - one cylinder injection pump

H. L. Crittendon

AlChes

HLC:sh

Coretio I on good responsible momer jortrailed, on he note Alt WES 250 gsi- 400 efm. Weed below. Set up mud toute (still) early in system to be ready to correct Bock fell by oil-med mixture between " 47" when setting 4" ? on med pre grain. See Nor helling ANH Cocas ween red a come Cle ASI mile de CXM Diella. Mayh 2500 , 2500 ft. Tuesday

a sacowill re	maleurse for		
		x replacement	sf
down hale drilling	equiprendered	untit for tur	· T'
down drilling use	il the	me wear & over	
and above that	man inciden	t to annual	
drilling operation	. 3/ 15 Expea	rea that condi	<i>/</i> <del>/</del>
m the cased pa	tim of greviou	esly drilled hol	4
may cause exce	ssive wear.		
THE STATE OF THE S			-
Contractor well	per form m_	deligent &	
workanlike fast	rion and His	reo will not be 4	4 (
liable for losses	from causes	beyond their	•
entrol.			

8hr Hshift

Resta	ر لا			Holist		
heller A-5	0	t, zrday	p, 3145- ft	-, 39.3 ppe.	Mayhew 3000	3histay ey op.
Boylis SA-4	61 - "	, 21 "		, 34.0 au	Falling 2500	4 tristiffs - Coverties. dounting, 4- Dounting,
Seller Spe (A-Y	94 "	37 "	_	, 15.8 ave	meshew soro	Theolday egging ugos lings 4 days parts delay. times
Office Bun A-Z	a	- 24 ···	4076	, ble & ove	Mayhen 3000 hiais	muos delay, spot cores.
Buglis A-1	42 "	15"		,31. 2 ave	Facting 2500 hiais.	Tender of compressor dela
Boins A-7	83 /2	28		37.7 ove		5 his lang eggin of. 1 fest, jot. congressor pull collegen, constole
Hainess A-3	14 /2		1445-	87.6 ave	Howard-Tarner, hi aci.	1shipt - closery hol plus year harmen. No casi
Haines A-6	14 4		1375	96.5	Feeling 1500 DMX, air	Transing o conlecting hole.
, acques						No Gesui.
€ Core m-1A	184 shift			t, 15.7 au.	NC to NX in l	lus, slow at lease.
D + 1 1 1 1 1		15-161	N-11 //	<b>CP</b> (	AL.	1 has lateria a realitan
DCA-1A	184 shifts	, 65 dup,	1811 for	, 9.8 aux	NX Shu	I lus lat circ & problem
engyan A-ZW	184 shifts 72 shifts	, 25 day	, 70 Bt,	9.9 ave.	MX Jenechigstock	Treppin; everystunday band o.
enegges A-ZW	184 shifts 72 shifts 39 shifts	25 day	, 70 ft,	9.9 ave.	MX Jenechigstock	Treppin; everystunday band o.
° А-2 . А-2 . А-1	184 shifts 72 shifts 39 shifts 63 shifts	, 25 days , 13 days	, 70 ft, , 442 ft, , 820 ft,	9.9 ave. 11.3 ave. 13.0 ave.	NX Jennehigstock NX NC	Treggin; everyslendag bank & continue of 11 " 1265" brother caring slight carrier politics
enyas A-2w	184 shifts 72 shifts 39 shifts	, 25 days , 13 days	, 70 ft, , 442 ft, , 820 ft,	9.9 ave. 11.3 ave. 13.0 ave.	MX Jenechigstock	Treppin; everyotherday band s.
° А-2 . А-2 . А-1	184 shifts 72 shifts 39 shifts 63 shifts	, 25 days , 13 days	, 70 ft, , 442 ft, , 820 ft,	9.9 ave. 11.3 ave. 13.0 ave.	NX Jennehigstock NX NC	Treggin; everyslendag bank & continue of 11 " 1265" brother caring slight carrier politics
° А-2 . А-2 . А-1	184 shifts 72 shifts 39 shifts 63 shifts	, 25 days , 13 days	, 70 ft, , 442 ft, , 820 ft,	9.9 ave. 11.3 ave. 13.0 ave.	NX Jennehigstock NX NC	Treggin; everyslendag bank & continue of 11 " 1265" brother caring slight carrier politics
° А-2 . А-2 . А-1	184 shifts 72 shifts 39 shifts 63 shifts	, 25 days , 13 days	, 70 ft, , 442 ft, , 820 ft,	9.9 ave. 11.3 ave. 13.0 ave.	NX Jennehigstock NX NC	Treggin; everyslendag bank & continue of 11 " 1265" brother caring slight carrier politics
° А-2 . А-2 . А-1	184 shifts 72 shifts 39 shifts 63 shifts	, 25 days , 13 days	, 70 ft, , 442 ft, , 820 ft,	9.9 ave. 11.3 ave. 13.0 ave.	NX Jennehigstock NX NC	Treggin; everyslendag bank & continue of 11 " 1265" brother caring slight carrier politics
'enypus A-ZW " A-Z — A-I	184 shifts 72 shifts 39 shifts 63 shifts	, 25 days , 13 days	, 70 ft, , 442 ft, , 820 ft,	9.9 ave. 11.3 ave. 13.0 ave.	NX Jennehigstock NX NC	Treggin; everyslendag bank & continue of 11 " 1265" brother caring slight carrier politics
'enypus A-ZW " A-Z — A-I	184 shifts 72 shifts 39 shifts 63 shifts	, 25 days , 13 days	, 70 ft, , 442 ft, , 820 ft,	9.9 ave. 11.3 ave. 13.0 ave.	NX Jennehigstock NX NC	Treggin; everyslendag bank & continue of 11 " 1265" brother caring slight carrier politics
'enyas A-2 w . A-2 A-1	184 shifts 72 shifts 39 shifts 63 shifts	, 25 days , 13 days	, 70 ft, , 442 ft, , 820 ft,	9.9 ave. 11.3 ave. 13.0 ave.	NX Jennehigstock NX NC	Treggin; everyslendag bank & continue of 11 " 1265" brother caring slight carrier politics
'enyas A-2 w . A-2 A-1	184 shifts 72 shifts 39 shifts 63 shifts	, 25 days , 13 days	, 70 ft, , 442 ft, , 820 ft,	9.9 ave. 11.3 ave. 13.0 ave.	NX Jennehigstock NX NC	Treggin; everysteendag trant is come in 1265 brother carrier shift carrier profit.
'enyas A-2 w . A-2 A-1	184 shifts 72 shifts 39 shifts 63 shifts	, 25 days , 13 days	, 70 ft, , 442 ft, , 820 ft,	9.9 ave. 11.3 ave. 13.0 ave.	NX Jennehigstock NX NC	Treggin; everysteendag trant is come in 1265 brother carrier shift carrier profit.
'enypus A-ZW " A-Z — A-I	184 shifts 72 shifts 39 shifts 63 shifts	, 25 days , 13 days	, 70 ft, , 442 ft, , 820 ft,	9.9 ave. 11.3 ave. 13.0 ave.	NX Jennehigstock NX NC	Treggin; everysteendag trant is come in 1265 brother carrier shift carrier profit.
'enyas A-ZW . A-Z A-I	184 shifts 72 shifts 39 shifts 63 shifts	, 25 days , 13 days	, 70 ft, , 442 ft, , 820 ft,	9.9 ave. 11.3 ave. 13.0 ave.	NX Jennehigstock NX NC	Treggin; everysteendag trant is come in 1265 brother carrier shift carrier profit.

14 10 47 9 31 10/2 188 14 277 23 557 (8"/2 5 day.  200e 111' perday 13.7 hes play dollin; AIR  85 N/ 88 1C 1/2 144 10 1/2 1573 157 144 23 154 23 14 4 (6.1/2 81 116 1/2 7 day.  12 perflay 16.6 hes/day direlling  A-4 2071' 238 hus 21 day.  98.9' perday 11.3 highly dulling  A-4 1576' 492hm. 35 day.  1576' 492hm. 35 day.  133 /play 14.1 hm/kay direling  Muld Share.	
188 14 277 23 557 (81/2 5 day)  200 111 perday 13.7 hrs flay dollin; AIR  85 N 88 16 1/2 141 18 1/2 153 15 144 23 154 23 154 24 81 116 1/2 7 days  12 perflay 16.6 hrs/clay dollin;  A-4  2077 238 hrs. 21 days  98.9 perday 11.3 hrs/dy dollin;  AIR	
277 23 557 (8" 5 5 day.  200 111 perday 13.7 kes klay dullin; AIR  85 N 88 14 1/2 141 18 1/2 15-3 15- 144 23 15-14 23 15-14 23 15-14 23 15-14 23 15-14 27 81 11-6 1/2 7 day.  12 per flay 16.6 hes/clay dulling.  A-4  2077 238 hus 21 day.  98.9 perday 11.3 hes/dy dulling.  AIR	10 /2
557 (8" 5 day.  200e 111' perday 13.7 kes play dollar; AIR  85 N 88 14 1/2 141 18 1/2 15-3 15- 144 23 15-14 23 15-14 23 15-14 23 15-14 23 15-14 27 81 11'6 1/2 7 day.  12' per play 16.6 kes/clay direling.  A-4  2077' 238 hus 21 day.  98.9' perday 11.3 hesplay dullary.  AIR	
200e 111' perday 13.7 hrs flag dulling AIR  85 14'2 14 1 18'12 15-3 15- 14 4 23 15-4 23 15-4 23 15-4 23 15-4 23 15-4 27 81 116'12 7 days.  12' perfday 16.6 hrs/day dulling  A-4  2071' 238 hrs 21day dulling  99.9' perday 11.3 hrs/day dulling  AIR	
85 /4 88 /6 1/2 /4   18 1/2 /5 3 /5 /4 C 23 /5 1 23 /5 1 23 /5 1 1/6 1/2 7 day  12 perflay (6.6 his/day diveling  A-4  2077 238 his 21 day  98,9 perday 11,3 his/day duelling  AM	
85 /4 88 /6 1/2 /4   18 1/2 /5 3 /5 /4 C 23 /5 1 23 /5 1 23 /5 1 1/6 1/2 7 day  12 perflay (6.6 his/day diveling  A-4  2077 238 his 21 day  98,9 perday 11,3 his/day duelling  AM	day 13.7 hes play dulling AIR
88 16 1/2 14 1 18 1/2 15-3 15- 14 6 23 15-4 23 15-4 23 15-4 23 15-4 23 11-6 1/2 81 116 1/2 7 deep.  12' per flag 16.6 hes/dag direlling  A-4  2077' 238 hus 21dag 11.3 hes/dag deeltery  April A	
14 1 18 1/2 15-3 15- 14 4 23 15-1 23 15-1 23 15-1 23 15-1 23 11-6 1/2 7 day.  12 perflag 16.6 his/day direling  A-4  2077 238 his 21day  98.9 perday 11.3 his/day diellery  AIR	
15-3 14 G 23 15-4 23 15-4 23 14 G 1/2 81 116 1/2 7 days.  12 perfday 16.6 hes/day direlling  A-4  2077 238 hus 21day 11.3 hes/day dellary  AIR	<b>,</b> ,
14 G 23 15-4 23 14 G'2 81 116 12 7day.  12 perflay 16.6 his/day dielling.  A-4  2077 238 his 21day  98.9 perday 11.3 his/dy dielling  AIR	
15-4 23 14 , 6 1/2 81 116 1/2 7 day. 12' per/day 16.6 his/day direlling A-4 2077' 238 his 21day, 98.9' perday 11.3 his/day dielling  AIR	
8   116 1/2 7day.  12 perflay 16.4 hrs/day direlling  A-4  2077' 238 hrs 21day 11.3 hrs/day diellery  AIR	
12' per flag 16.4 hrs/clay direlling  A-4  2071' 238 hrs 21day 11.3 hrs/dy dellery  AIR	
12' per fley 16.4 his/day direling  A-4  2077' 238 hus 21day 11.3 his/day diellery  AIR	61/2 7day.
2077 238 hus 21day 11,3 his/dly dellery AIR	
7	
7	y 11,3 his/day deellery
15-16' 492hm. 35 day. 43.3'/play 14.1 hus/kuy direc't Mell Steel on	AIIC
1574' 492hm. 35 day. 43.3'/play 14.1 his/day diele't Mad Steel on	
43.3 /play 14.1 his/day dieleit Med ) het on	492hm. 35 day //
	14.1 hus/day diele's Med Justan

### AMERICAN SMELTING AND REFINING COMPANY Tucson Arizona

July 7, 1971

JUL 9 1971

TO: W. E. Saegart

FROM: J. D. Sell

ORIGINAL AND PRESENT FIGURES SUPERIOR EAST PROJECT PINAL COUNTY, ARIZONA

In a preliminary evaluation of the Superior East project, some figures shed light on happenings to date. R. B. Cummings compiled the costs figures. Figures are to July 1, 1971.

#### DRILLING

Hole Number	Projected Depth	Depth To Be Drilled	Present Depth	Actual Depth Drilled	Total Depth Now Estimated To Be Drilled	Differences
A-1	2300	23001	1317'	13171	1800*	(-) 500°
A-4	4000*	40001	30841	30841	55001	+ 1500°
M-1A	44001	2000	52631	<u>2861</u> '	53501	+ 9501
		83001		72621	10,250'	

#### COSTS

Seven categories were established: <u>Drilling</u> a) direct drilling costs; b) road building, site prep., maintenance, rig moving; c) samplers, sampling and miscellaneous equipment; d) supervision. <u>Project</u> a) administrative, office, trailers, supplies; b) miscellaneous contractors, Schlumberger, Cooksley; c) section 5 road and site work.

70,227.00

### COSTS (continued)

DR	11	Ĺ	l	NG	:

Hol Cated			<u>April</u>	<u>May</u>	June	<u>Total</u>	
A-1	a)		28,860.00			28,860.00	1317' 21,91/fl.
	<b>b</b> )		2,876.00	<b></b>	• • • • • • • • • • • • • • • • • • •	2,876.00	21,11/54.
•	c)		1,429.00	<b>60 (m</b> ):		1,429.00	
	d)		3,332.00	-		3,332.00	
		ST	36,497.00		<b>T</b>	36,497.00	
				Estimated Cos	t to Complete	10,000.00	
					T	46,497.00	
				Original Estimate  Estimated Overexpend		35,000.00	
						11,497.00	
A-4	a)			28,075.00	21,620.00	49,695.00	3084' 15,14/f.
	b)		1,521.00	26.00	1,000.00	2,547.00	13,14/4
	c)			1,607.00	1,280.00	2,887.00	
	d)			2,293.00	2,805.00	5,098.00	
		ST	1,521.00	32,001.00	26,705.00 T	60,227.00	
		Estimated Cost to Comp		t to Complete	90,000.00		
					<b>T</b>	150,227.00	
	omenika ani da iliya ayan da iliya da i Orig		Original Esti	mate	80,000.00		
						The second secon	

Estimated Overexpend

#### DRILLING (continued)

Hole Category		<u>April</u>	May	June	<u>Total</u>
M-IA a)		16,706.00	25,530.00	36,500.00	78,736.00 286 r
<b>b)</b>		773.00	• • • • • • • • • • • • • • • • • • •		773.00 <sup>27,52/ft</sup>
<b>c)</b>		1,522.00	589.00	354.00	2,465.00
d)		3,332.00	2,293.00	2,805.00	8,430.00
	ST	22,333.00	28,412.00	39,659.00	Т 90,404.00
			Estimated Co	st to Complet	e <u>5,500.00</u>
					95,904.00
			Original Est	imate	40,500.00
			Estimated Ov	verexpend	55,404.00
PROJECT:					
Costs a)		531.00	780.00	377.00	1,688.00
<b>b</b> )		5,502.00		9,381.00	14,883.00
<b>c)</b>			**************************************	3,424.50	3,424.50
	ST	6,033.00	780.00	13,182,50	т 19,995.50
			Estimated Ov	rerhead	20,000.00
			Grand Total	Expended	207,123.50

#### To Recap:

I originally asked for \$260,000.00 to expose bedrock in four holes with a total of 9800 feet of drilling. We have started only three holes (with an original total of 8300 feet), have drilled 7262 feet and need 2950 feet of hole to complete the three (11,214 total).

Original costs estimates were \$260,000.00; we have spent, on direct project some \$207,123.50, have approximately \$74,400.00 unspent for total direct of \$281,500.00. The overage is absorbed in the previous authorization for completion of claim staking, geological work, etc.

Costs per foot based on the above figures and footages to date are:

A-1 at \$27.64 per foot for 1317 feet (all rotary)

A-4 at \$19.53 per foot for 3084 feet (all rotary)

M-IA at \$31.59 per foot for 2861 feet (below 2402) (all coring)

Project overhead at \$2.75 per foot for total of 7262 feet.

Cames W Sell

J. D. Sell

JDS:sh

cc: RBCummings

October 1, 1971



Director Continuence

TO: J. D. Sell

FROM: R. B. Cummings

## Drill Hole Summaries Superior East Project

A number of drill hole summaries have been completed and will be submitted separately. In order to avoid repeating an explanation of the method of cost breakdown, that explanation will be given here.

All costs have been or will be applied toward a particular drill hole or toward the project as a whole. Four cost categories were utilized for each drill hole. They are as follows:

- a. Direct Drilling: This figure includes all services and materials in drilling including mud, water, cement, casing, air, bits, etc. Also included are mobilization charges, charges for moving rigs and compressors, and charges for pulling or setting casing. An effort has been made to note costs which do not reflect on drilling performance (eg: pulling existing casing in re-entered hole and excessive transportation costs).
- b. <u>Site Preparation</u>: Includes costs of preparing site, building or repairing roads into site, maintaining road and site, and site restoration.
- c. <u>Sampling</u>: Includes costs of samplers, sample preparation, sampling materials, sample trailers, assays, photographing core and sample storage in the field office.
- d. Supervision: Includes salaries and wages of ASARCO employees, travel and living expenses for employees, and vehicle expenses.

Project costs include costs which are not directly applicable toward a particular drill hole. They are categorized as follows:

- a. Administration: Includes ASARCO salaries, drafting charges, rent and utilities on field office and housing trailer, telephone bills, office supplies, and legal fees.
- b. Miscellaneous: Includes contractor costs not included in drilling (Schlumberger and seismic work).

October 1, 1971

TO: J. D. Sell

FROM: R. B. Cummings

Drill Hole Summaries Superior East Project

A number of drill hole summaries have been completed and will be submitted separately. In order to avoid repeating an explanation of the method of cost breakdown, that explanation will be given here.

All costs have been or will be applied toward a particular drill hole or toward the project as a whole. Four cost categories were utilized for each drill hole. They are as follows:

- a. Direct Drilling: This figure includes all services and materials in drilling including mud, water, cement, casing, air, bits, etc. Also included are mobilization charges, charges for moving rigs and compressors, and charges for pulling or setting casing. An effort has been made to note costs which do not reflect on drilling performance (eg: pulling existing casing in re-entered hole and excessive transportation costs).
- b. Site Preparation: Includes costs of preparing site, building or repairing roads into site, maintaining road and site, and site restoration.
- c. Sampling: Includes costs of samplers, sample preparation, sampling materials, sample trailers, assays, photographing core and sample storage in the field office.
- d. <u>Supervision</u>: Includes salaries and wages of ASARCO employees, travel and living expenses for employees, and vehicle expenses.

Project costs include costs which are not directly applicable toward a particular drill hole. They are categorized as follows:

- a. Administration: Includes ASARCO salaries, drafting charges, rent and utilities on field office and housing trailer, telephone bills, office supplies, and legal fees.
- b. <u>Miscellaneous</u>: Includes contractor costs not included in drilling (Schlumberger and seismic work).

R. B. Cummings

RBC: lad

# TAB

AH

October 1, 1971

TO: J. D. Sell

FROM: R. B. Cummings

Drill Hole A-1 Drilling and Cost Summary Superior East Project

Rotary-air drilling was initiated on Hole A-1 on April 9, 1971 and completed on April 27, 1971 at a depth of 1309'. Coring was initiated on July 15, 1971 and completed on August 12, 1971. During this period the hole was deepened from 1309' to 2129'. Both periods of drilling were done by Boyles Brothers Drilling Co. A Failings 2500 was used for rotary drilling and a CP-50 was used for coring.

Hole diameter and a casing inventory are shown below: (casing remaining in hole)

	Hole Size		Casing Size
12-3/8"	9-7/811 6-1/411	NC	1011 711 411
Depth 6'	811 1309 i	2129'	6' 811' 1309'

The cost breakdown on both segments of drilling on A-1 are as follows:

	Rotary Dr Cost	illing \$/ft.	Core Cost	Drilling \$/ft.	Total Cost
<ul><li>a. Direct Drilling</li><li>b. Site Prep.</li><li>c. Sampling</li><li>d. Supervision</li></ul>	\$26,832.26 2,090.92 1,428.75 2,339.71	\$20.50 1.60 1.09 1.79	\$20,026. 85. 237. 1,814.	00 0.10 36 0.29	\$46,858.51 2,775.92 1,666.11 4,153.94
(See Drill Hole Summaries report dated Oct. 1, 1971 for explanation of categorie					54, 854.48

\$24.97

The total cost of the hole was \$54,854.48.

Drilling mud and additives cost was \$4.21/ft.

The drilling rate in rotary drilling was 30'/shift and in core drilling was 13.2'/shift.

Total \$32,691.64

R. B. Cummings

\$22,162.84 \$27.03

RBC: lad

October 27, 1971

T0: J. D. Sell

FROM: R. B. Cummings

Daily Drill Data - Unit Contacts Drill Hole A-1 Core Rig, CP-50 Superior East Project Pinal County, Arizona

Attached is a daily log of the coring on drill hole A-1. The information shown is the date, depth of hole at end of day, the footage cut during the day, the hours charged to drilling, the number of shifts involved, short comments on the delays involved, the size of core, the geologic units and contact footages.

Compiled from this daily data is a breakdown of the shifts and footage by a) depth bracket based on Boyles footage rate contract, and b) by geologic units encountered.

R. B. Cummings

RBC: lad Attachs.

DRILL HOLE A-1 CORING, CP-50

DATE	DEPTH AT END OF DAY	FOOTAGE	DRILL HOURS	ING SHIFTS	DELAYS	FORMATION
July 14	1309				Setting up rig.	NC Core
15	1323	14	8	2	8 hrs. setting up rig.	Dacite
16	1363	40	14	2	2 hrs. equip. repair.	
17	1389	26	15-1/2	2	1/2 hr. equip. repair.	1374 ↑
18				•		
19	1415	26	16	2	Trouble with casing.	
20	1441	26	16	2	Worked on casing; bit change	
21	1441	0	12	2	4 hrs. equip. repair, 16 hrs. cementing.	Schist Breccia
22	1441	0	0	2	16 hrs. cementing.	
23	1467	26	16	2		
24	1495	28	16	2		
25						
26	1553	58	24	3		1527 Whitetail Congl.
27	1599	46	24	3		1566 Schist Breccia
28	1649	50	24	3	의 선생님 사용이 가장 기상이 가장 수 있다. [1] 기상 사용하다 그 등 기상 기상 기상 기상 기상 기상	Fault Zone
29	1697	48	24	3 } —		1585   Schist
30	1736	39	24	3		
31	1757	21	24	3	Bit change.	

Aug.	1						
	2	1786	29	24	3		
	3	1830	44	24	3		
	4	1879	49	24	3		
	5	1923	44	24	3	Bit change.	
	6	1950	27	20	3	Completed bit change; 4 hrs. equip. repair.	
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	7	1980	30	24	3		
	8			<b></b>	-		
	9	2017	37	24	3	Bit change.	
	10	2073	56	24	3		
4.824	11	2121	48	24	3		
r Police La Police	12	2129	8	3	1	End of hole; 5 hrs. tearing-down. NC	Core

DRILL HOLE A-1

Drilling Time, by footage brackets, including down time.

DEPTH	SIZE	SHIFTS	DAYS	FOOTAGE	FT/SH1FT	TROUBLES
1309-1495	NC	17	<b>9</b>	186	10.9	Bit change; problem w/casing, cement.
1495-1980	NC	36	12	485	13.5	Two bit changes.
1980-2129	NC	10	4	149	14.9	One bit change.
Totals:		63	25	820	13.0 ave	rage

Rock Unit	Interval	Size	Shifts to De	epth <u>Foota</u>	ge Ft/Shift
Dacite	1309-1374	NC	3 1	363 54	18.0
Schist Bx.	1374-1527	NC	17* 1	553 190	11.2
Whitetail Cgl.	1527-1566	NC )			
Schist Bx.	1566-1572	NC )	3 1	599 46	15.3
Fault Zone	1572-1585	NC )			
Schist	1585-2129	NC	<u>40</u> 2	129 <u>530</u>	<u>13.3</u>
Totals:	1309-2129		63	820	13.0

 $<sup>\</sup>star$  includes four shifts of repair, cementing, and drilling out cement.

## TAB

A-4

October 27, 1971

TO: J. D. Sell

FROM: R. B. Cummings

Drill Hole A-4 Rotary Drilling Cost Summary Superior East Project Pinal County, Arizona

Air rotary drilling was initiated by Boyles Brothers Drilling Co. on May 1, 1971. Boyles Brothers used a Failing 2500 drill rig with an Ingersoll Rand HHE three-stage compressor. Boyles was terminated from the hole on May 25, 1971 after drilling to a depth of 2077'. Shelton Drilling Co. re-entered the hole on June 12, 1971 and deepened it to 3593' (a total of 1516') by July 21, 1971. Four-inch casing was cemented in at 3593' in preparation for coring. The second stage of the drilling was done with mud using a Mayhew 3000.

Hole diameter and an inventory of casing remaining in the hole are shown below:

		Hole Size				Casing Size		
	12-3/811	9-7/8"	9''	6-1/4"-6"	5-5/8"	1011	711	411
Depth	61	181	10821	2077 '	3593 '	61	10821	3593 '

Costs have been computed on the rotary portion of hole A-4 through the September account. No further costs are expected. In the cost breakdown which follows, the May account has been separated from the remainder of the costs in order to compare costs incurred by Boyles and Shelton.

		Boyles Bro	thers	Shelto	on	Total	
		Cost	\$/ft	Cost	\$/ft	Cost	\$/ft
а.	Direct Drilling	\$30,200.26*	\$14.54	\$37.645.52	\$24.83	\$67,845.78	\$18.88
	Site Preparation	897.00	0.43	1,976.29	1.30	2,873.29	0.80
c.	Sampling	1,607.12	0.78	2,149.83	1.42	3,756.95	1.05
d.	Supervision	1,736.24	0.84	3,369.49	2.22	5,105.73	1.42
		\$34,440.62	\$16.58	\$45,141.13	\$29.78	\$79,581.75	\$22.15

<sup>\*</sup>Rebate on used bits and materials may be as much as \$500.00.

- 2 -Oct. 27, 1971 J. D. Sell In order to get a meaningful comparison between the two contractors, several factors must be considered. On completion of drilling the hole was cased with 4" casing. If the cost of the casing for Boyles portion of the hole (2077') is added to their direct drilling cost and subtracted from Shelton's cost, the direct drilling cost would be \$16.04/foot for Boyles Brothers and \$22.78/foot for Shelton Drilling. Almost \$2,000.00 was spent to improve the drill site for the larger rig of Shelton's. Part of the higher sampling cost during Shelton's part of the drilling was due to assay costs. The higher supervision cost in the later part of drilling was due to slower drilling rate. Average drilling rates (excluding setting-up time) were 36.3'/shift for Boyles Brothers and 15.61/shift for Shelton Drilling Co. A detailed report on drilling rates is being compiled and will be submitted shortly. Samplers were employed until July 15 (to a depth of 3390'). The samplers cost \$0.73/foot for the Boyles Brothers portion of the drilling and \$1.29/foot for the Shelton portion of the drilling which was sampled. The total cost of the samplers (over 33901) was \$0.95/foot. RB. Cermina R. B. Cummings RBC: lad cc: HLCrittendon

October 27, 1971

T0: J. D. Sell

FROM: R. B. Cummings

Daily Drill Data - Unit Contacts Drill Hole A-4 Core Rig, CP-50 Superior East Project Pinal County, Arizona

Attached is a daily log of the coring on drill hole A-4. The information shown is the date, depth of hole at end of day, the footage cut during the day, the hours charged to drilling, the number of shifts involved, short comments on the delays involved, the size of core, the geologic units and contact footages.

Compiled from this daily data is a breakdown of the shifts and footage by a) depth bracket based on Boyles footage rate contract, and b) by geologic units encountered.

R. B. Cummings

RBC: lad Attachs.

DRILL HOLE A-4 CORING, CP-50

DATE		DEPTH AT END OF DAY	FOOTAGE	DRILL HOURS	ING SHIFTS	DELAYS
Aug.	16	3593		en e		Setting up rig.
	17	3623	30	16	2	
	18	3702	79	24	3	
	19	3772	70	22	3	2 hrs. equip. repair.
•.	20	3831	59	24	3	
	21	3851	20	24	3	Bit change.
	22					
	23	3920	69	24	3	
	24	4000	80	24	3	
	25	4060	60	24	3	
	26	4123	63	24	3	Bit change.
	27	4193	70	24	<b>3</b> 3	
	28	4241	48	24	3	
	29				<u>.</u>	
	30	4301	60	24	3	
	30	4371	70	24	. <b>3</b>	
Sept.	1	4432	61	24	3	

FORMATION

NX Core

Whitetail Congl.

2	4471	39	24	3	Bit change.
3	4543	72	24	3	
4	4583	40	24	3	
5					
6			<b></b>	-	
7	4642	59	24	3	
8	4651	9	24	3	Dropped rods & pulled same.
9	4720	69	24	3	
10	4740	20	24	3	WL broke, pulled rods.
11	4790	50	24	3	
12				_	
13	4840	50	24	3	
14	4890	50	22	3	2 hrs. equip. repair.
15	4950	60	24	3	
16	4980	30	23	3	One hour equip. repair; pulled rods.
17	5039	59	24	3	일하고 있는 경험을 보고 있다는 것이 같아 된다고 있는 것이 같다. 그 사람들은 것이 있다고 하는데, 이 사람들이 되고 있다면 되었다.
18	5063	24	24	3	시마 시
19			•		
20	5103	40	24	3	
21	5163	60	24	3	

Whitetail Congl.

	22	5213	50	24	3	Whitetail Congl.
erika da karangan da karang Karangan da karangan da ka	23	5242	29	23	3	l hr. equip. repair; bit change.
	24	5302	60	24	3	
	25	5342	40	24	3	
	26				. * <del>*</del> *	
	27	5392	50	24	3	
	28	5422	30	12	3	12 hrs. equip. repair, hydraulic system.
•	29	5476	54	24	3	
	30	5523	47	24	3	마음의 사용에 가는 사용을 보고 있다. 그는 사용을 보고 있는 것이 되었다. 그는 사용을 받는 것이 되었다. 기업으로 바로 기업을 보고 있는 것이 되었다. 그는 사용을 보고 있는 것이 되었다.
Oct.	1	5523	0	17	3	7 hr. equip. repair, hoisting valve; changed bit.
	2	5580	57	24	3	
	<b>3</b>			<b></b> -		
	.4	5623	43	24	3	
	5	5683	60	24	3	기업을 하는 것이 되었다. 그는 이 사람들은 가장 하는 것이 되었다. 그는 것이 되었다. 그는 것이 되었다. 그는 이 사람들은 사람들은 사람들이 되는 것이 되었다. 그는 사람들은 사람들은 사람들이 되었다.
	6	5733	50	24	3	
	7	5783	50	24	3	는 사용하다는 경험을 하는 것이 되었다. 그 사용하는 것이 그는 것이 되었다는 것은 사용하는 것이다. 그렇게 하는 것이 많은 것이 없는 것이 되었다. 그런 것이 없는 것이 없는 것이 없는 것이 없는 것이 없는 것이다.
	8	5801	18	21	3	3 hrs. surveying; bit change.
	9	5861	60	24	3	- 전기에 가장 보고 있는 것이 되었다. 그 사람은 보고 있는 것이 되었다. 그는 것이 없는 것이 되었다. 그는 것이 없는 것이 없다 
	10	5921	60	24	3	
turia Table 1 Table 1	H	5981	60	24	3	

Ř, c						
12	6040	59	24	3		Whitetail Congl.
13	6099	59	24	3		
14	6133	14	24	3	WL broke, pulled rods; bit change.	
15	6153	40	24	3	Added cable, tripped in.	
16	6193	40	24	3		
17			<del>,- \</del> .	-		
18	6232	39	20	3	4 hrs. equip. repair, hydraulic system.	
19	6291	59	24	3		
20	6333	42	24	3		
21	6388	55	24	3		6336 Limestone slide
22	6433	45	24	3		block
23	6443	10	24	3	Start of bit change.	
24			asp 1500	-		6448 Whitetail Congl.
25	6461	18	24	3	Completed bit change, cored 18 feet, broke WL,	
26	6491	30	24	3	pulled rods Completed pull to recover WL; back into hole.	6484 Limestone and
27	6520	29	24	3	8 hrs. lost on sticking rods.	Limestone breccia
28	6530	10	24	3	Stuck rods several times.	
<b>2</b> 9	6580	<b>50</b>	24	3		6571 fault
30	6588	8	16	2	Pulled rods into casing	6575 Porphyritic
31	하는 그 호 <b>라</b> 및 16 년 1			_		Biotite Quartz Monzonite with
						Schist inclusions
						.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,

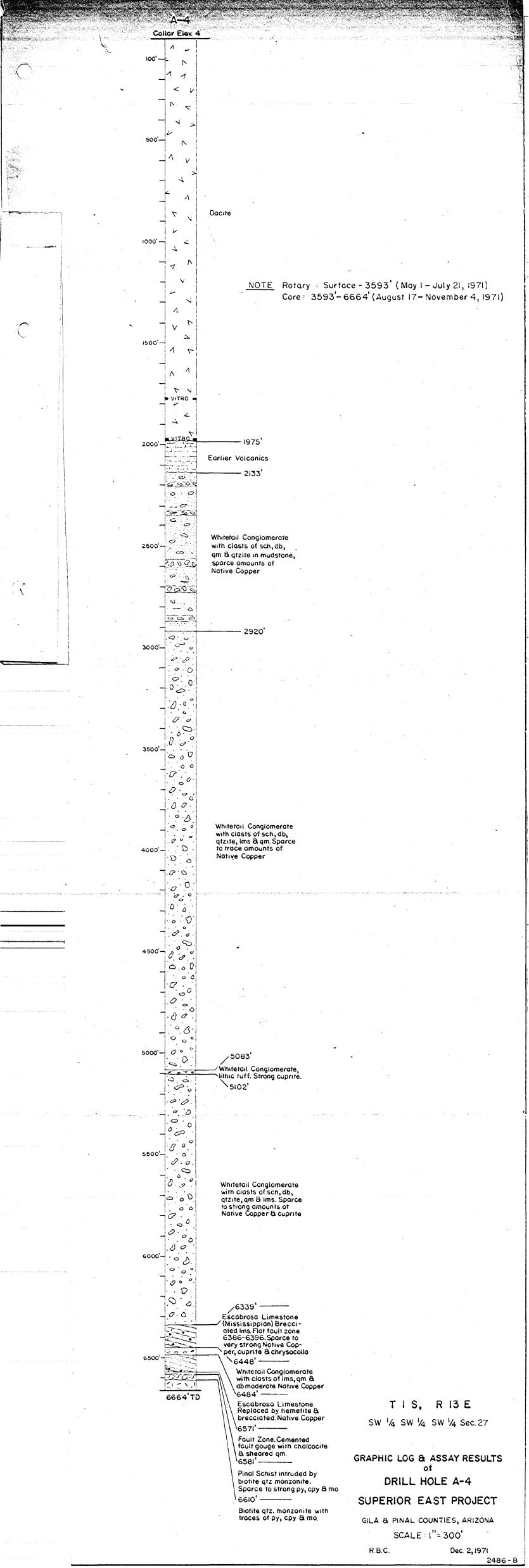
Nov. 1	6590	2 8	1	2 shifts standby for GP velocity probe.
2	6613	23 24	3	Problems with overshot retriever.
3	6643	30 24	3	1 hr. equip., hydraulic valve, repair.
4	6664	21 24	3	Termination of hole. 6664

DRILL HOLE A-4

Drilling time, by footage brackets, including down time.

<u>DEPTH</u>	SIZE	SHIFTS	DAYS	FOOTAGE	FT/SHIFT	TROUBLES
3593-4000	NX	20	7	407	20.4	One bit change.
4000-4471	NX	24	8	471	19.6	Two bit changes.
4471-4980	NX	33	11	509	16.0	Dropped rods, broke WL cable, pulled rods.
4980-5523	NX	36	12	543	15.1	One bit change, repair hydr. system.
5523-5981	NX	30	10	458	15.3	Two bit changes, repair hoist system.
5981-6232	NX	18	6	251	13.9	One bit change, WL cable, hydraulic repair.
6232-6491	NX	21	7	259	12.3	One bit change, broke WL cable, pulled rods.
6491-6664	NX	21	_8_	<u>173</u>	8.2	Sticking rods, overshot problems, repair work.
Totals		203	69	3071	15.1 ave	rage

ROCK UNIT	DEPTH	SIZE	SHIFTS	TO DEPTH	FOOTAGE	FT/SHIFT
Whitetail Cgl.	3593-6484	NX	182	6491	2898	15.9
Limestone (Me)	6484-6571	NX	9	6580	89	9.9
Fault zone	6571-6575	NX	2	6588	8	4.0
Quartz Monzonite	6575-6664	NX	10	6664	<u>76</u>	7.6
Totals:	3593-6664		203		3071	15.1



October 27, 1971

T0: J. D. Sell

FROM: R. B. Cummings

Drill Hole A-5 Rotary Drilling Cost Summary Superior East Project Pinal County, Arizona

Rotary drilling was initiated on July 28, 1971 by Shelton Drilling Co. The hole was drilled with air to a depth of 640' and with mud to a final rotary depth of 3145'. Drilling operations ceased on August 28, 1971. Four-inch casing was cemented in at 3145' in preparation for coring. The hole was drilled with the same Mayhew 3000 that was used on hole A-4.

Hole diameter and an inventory of casing remaining in the hole are shown below:

	8-3/411	Hole Size 6-3/4"	6-1/4"	Casing Size	
Depth	92'	1335'	3145'	3145'	

Costs have been computed on the rotary portion of A-5 through the September account. No further costs are expected. A cost breakdown follows:

	Cost	\$/ft.
a. Direct Drilling	\$46,045.28	\$14.64
b. Site Preparation	5,789.00	1.84
c. Sampling	136.11	0.04
d. Supervision	1,811.07	0.58
Total	\$53,781.46	\$17.10

Note: See Drill Hole Summaries report dated October 1, 1971 for explanation of categories.

The average drilling rate (excluding setting-up time) was 37.4'/shift. A detailed report on drilling rates is being compiled for submittal.

R. B. Cummings

RBC: lad

cc: HLCrittendon

#### October 27, 1971

TO: J. D. Sell

FROM: R. B. Cummings

Drill Hole M-1A
Drilling and Cost Summary
Superior East Project
Pinal County, Arizona

Drill hole M-1A was rotary drilled to a depth of 2402' for Continental Materials in September and October, 1970. After rotary drilling, the hole was cased to the bottom with 3-1/2" casing. Prior to ASARCO's re-entry of the hole, the 3-1/2" casing was pulled and 4" casing was set to 2402'. Coring operations began on April 21, 1971 and continued until July 3, 1971. The hole was deepened from 2402' to 5322' (a total of 2920'). The coring was done by Boyles Brothers and was drilled with a CP-50 core rig.

Hole diameter and an inventory of casing remaining in the hole is shown below:

	Hole Size				Casing Size			
	5-5/811	NC	NX		4" std	4" flush joint	NX	
Depth Total	2402 <sup>1</sup> 2402 <sup>1</sup>	2953 ' 551 '	5322 ¹ 2369 ¹		1882 ' 1882 '	1882-2402' 520'	2353-2953' 600'	

Costs have been computed through the September account. No further costs are expected. A cost breakdown follows:

	Cost	<u>\$/ft</u>
a. Direct Drilling	\$85,779.70	\$29.36
b. Site Preparation	648.41	0.22
c. Sampling	3,007.95	1.03
d. Supervision	6,590.11	2.26
Total	\$96,026.17	\$32.86

Note: Explanation of cost categories can be found in my report on Drill Hole Summaries dated October 1, 1971.

Several extraordinary items are included in the direct drilling costs. These costs did not reflect drilling performance. They are listed below:

Pulling 3-1/2" casing		\$ 720.00
Installation of 4" casing and	mud pack and	
drilling through mud pack,	etc	1,740.00
Drill hole survey		1,081.30
		\$3,541.30

Drilling mud and additives cost (which is included in the direct drilling cost) was \$1.94/foot.

The average drilling rate was 15.7 / shift.

Upon completion of the drilling, the Salt Lake City office attempted to emplace two geophysical electrodes in the hole. The first electrode was successfully emplaced, but the second got free and fell in on top of the first. Both electrodes, with a substantial amount of wire, are in the hole at a depth of about 4500'. The hole is now capped with a welded iron plate.

R. B. Cummings

RBC: lad

cc: HLCrittendon

## TAB

M-IA

October 27, 1971

TO: J. D. Sell

FROM: R. B. Cummings

Daily Drill Data - Unit Contacts Drill Hole M-1A Core Rig, CP-50 Superior East Project Pinal County, Arizona

Attached is a daily log of the coring on drill hole M-IA. The information shown is the date, depth of hole at end of day, the footage cut during the day, the hours charged to drilling, the number of shifts involved, short comments on the delays involved, the size of the core, the geologic units and contact footages.

Compiled from this daily data is a breakdown of the shifts and footage by a) depth bracket based on Boyles footage rate contract, and b) by geologic units encountered.

R. B. Cummings

RBC:lad Attachs.

DRILL HOLE M-1A CORING, CP-50

DATE		DEPTH AT END OF DAY	FOOTAGE	DRIL HOURS	LING SHIFTS	DELAYS
April	20	2402	V.		<u>.</u>	Setting up; pulling old casing.
	21	2416	14	12	2	4 hrs. setting-up.
	22	2425	9	16	2	
	23	2440	15	16	2	
	24	2460	20	16	2	
	25		<del></del>	ozosa <del>- •</del> Sos	-	
	26	2487	27	16	2	
	27	2533	46	24	3	
r in an America State	28	2578	45	24	3	
	29	2623	45	24	3	
e de la companya de l	30	2663	40	24	* . <b>3</b> } ** **	
May	<b>3</b> , ;	2693	30	24	3	
in the second	2	•• ••			-	
	3	2723	30	24	3	
	4	2762	39	19	3	5 hrs. equip. repair.
	5	2802	40	24	3	
	6	2812	10	24	3 3	Bit change.
	7	2843	31	24	3	

FORMATION

NC Core

Earlier Volcanic

2428 Mudstone Whitetai

8	2864	21	23	3	l hr. equip. repair.	
9						
10	2883	19	23	3	l hr. equip. repair.	
11	2903	20	23	3	l hr. equip repair.	Mudstone Whitetail 2920
12	2943	40	24	3	en formation of participation of the contract	Quartz Monzonite Slide Block
13	2953	10	24	3	Bottomed for casing point.	NC Core
14	2953	0		3	16 hrs. breaking out rods and 8 hrs. casin	g •
. 15	2953	0	. ==	3	16 hrs. casing; 8 hrs. rods.	
16				<del>-</del>	Casing completed. Change from NC to NX.	NX Core
17	3033	80	24	3		QM Slide Block 3108
18	3120	87	24	3		Whitetail Congl.
19	3200	80	24	3		
20	3273	73	24	3	Bit change.	
21	3353	80	24	3		
22	3413	60	24	3		
23	••• ••			-		
24	3481	68	24	3		
25	3551	70	24	3		
26	3621	70	24	3	Bit change.	
27	3710	89	24	3		

	28	3724	14	4	3	4 hrs. equip. repair; 16 hrs. parts delay. Whitetail Congl.
	29	3724	0	0	3	8 hrs. equip. repair; 16 hrs. parts delay.
	30				• •	
	31	3773	49	19	3	5 hrs. equip. repair.
June		3853	80	24	3	
	2	3912	59	24	3	Bit change.
	3	3982	70	24	3	
	4	4040	58	22	3	3 hrs. equip. repair.
	5	4080	40	24	3	Bit change.
	6				<del>-</del>	
	7	4123	43	21	3	3 hrs. equip. repair.
	8	4203	80	24	3	
	9	4273	70	24	3	
	10	4343	70	24	3	
		4381	38	24	3	
	12	4430	49	24	3	그러난 경기 이 이 마음이 이 생생이 하는 사람들은 소프로 보고 있는 것이 되고 있어야 한다. 그리고 있는 이 사람들은 이 사람들을 하는 것이 없는 것이 되는 것이 없는 것이 되었다.
	13					
	14	4493	63	23	3	l hr. equip. repair.
	15	4543	50	20	3	4 hrs. surveying; bit change.
	16	4603	60	24	3	

	17	4673	70	24	3		Whitetail Congl.
	18	4742	69	24	3		
	19	4782	40	24	3	Bit change.	
	20		v	==	<b>.</b>		
	21	4843	61	24	3		4898
	22	4913	70	24	3		Redbeds (Supai)
	23	4981	68	24	3		and the second second
	24	5033	<b>52</b>	24	3		
	25	5092	59	24	3		5108
	26	5122	30	24	3	Bit change.	Naco Limestone
	27				- -		
	28	5160	38	24	3		
	29	5213	53	24	3		
	30	5213	0	16	3	8 hrs. equip. repair.	
July	/ I	5263	50	20	3	4 hrs. equip. repair.	
	2	5312	49	24	3		
	3	5322	10	16	2	Closed down, end of hole.	Naco Limestone

DRILL HOLE M-1A

Drilling time, by footage brackets, including down time.

DEPTH	SIZE	SHIFTS	DAYS	FOOTAGE	FT/SHIFT	TROUBLES
2402-2487	NC	10	5	85	8.5	None.
2487-2953	NC	45	15	466	9.7	One bit change, equip. repair.
Casing		6	2			
2953-3481	NX	21	7	598	28.5	One bit change.
3481-3982	NX	<b>27</b>	9	431	16.0	Equip. repair, two bit changes.
3982-4493	NX	27	9	511	18.9	One bit change.
4493-4981	NX	24	8	488	20.3	Two bit changes; surveying hole
4981-5322	NX	26	<u>9</u>	341	13.1	Three bit changes.
Totals:		186	64	2920	15.7 aver	age

NC Coring, 55 shifts for 551 feet = 10.0 feet/shift average.

NX Coring, 125 shifts for 2369 feet = 18.9 feet/shift average.

ROCK UNIT	DEPTH	SIZE	SHIFTS	TO DEPTH	FOOTAGE	FT/SHIFT
Early Volcanics	2402-2428	NC	4	2425	23	5.7
Mudstone Whitetail	2428-2920	NC	45	2903	478	10.6
QM Slide Block )	2020 2100	NC	6	2953	50	8.3
QM Slide Block	2920-3108	NX	6	3120	167	27.8
Whitetail Cgl.	3108-4898	NX	90	4913	1793	19.9
Redbeds (Supai)	4898-5108	NX	9	5092	179	19.9
Naco Limestone	5108-5322	NX	20	5322	230	11.5
Setting casing, conv	erting to NX		6	(2953)		
Totals:			186		2920	15.7

November 8, 1971

TO: W. L. Kurtz

FROM: J. D. Sell &

Coring Rates CP-50
Drill Holes M-1A, A-1, A-4
Superior East Project
Pinal County, Arizona

also See Gan. 9, 1976

Coring rates for the first three holes have been compiled. All holes were cored by Boyles Brothers using a CP-50. Essentially the same drillers and helpers have been on the rig throughout the program. Overall, regardless of whether on a two or three shift per day basis, the following averages were determined.

NC Core, 118 shifts, 1371 feet for 11.6 feet/shift NX Core, 334 shifts, 5440 feet for 16.3 feet/shift

The above figures include all down time from start of coring to our termination of the hole.

Coring rates were also calculated based on the rock units encountered. The figures are not rigorous due to the necessity of calculating values. at the termination of shift days which generally does not coincide with formational breaks.

Dacite, NC, 3 shifts and 54 feet equals 18.0 feet/shift
Earlier Volcanics, NC, 4 shifts and 23 feet equals 5.7 feet/shift
Mudstone Whitetail, NC, 45 shifts and 478 feet equals 10.6 feet/shift
Whitetail Conglomerate, NX, 260 shifts and 4539 feet equals 17.5 feet/
shift

Fault zone, NX, 2 shifts and 8 feet equals 4.0 feet/shift Quartz Monzonite Breccia, NC, 6 shifts and 50 feet equals 8.3 feet/ shift

Quartz Monzonite Breccia, NX, 6 shifts and 167 feet equals 27.8 feet/shift

Quartz Monzonite, sheared, NX, 10 shifts and 76 feet equals 7.6 feet/

Redbeds (Supai), NX, 9 shifts and 179 feet equals 19.9 feet/shift Naco Limestone, NX, 20 shifts and 230 feet equals 11.5 feet/shift Escabrosa Limestone, NX, 9 shifts and 89 feet equals 9.9 feet/shift Schist Breccia, NC, 17 shifts and 190 feet equals 11.2 feet/shift Schist, NC, 40 shifts and 530 feet equals 13.3 feet/shift

Depth also is a factor in the penetration rate, however, only the coring in the Whitetail Conglomerate has been of sufficient duration to supply

the comparative information. Tabulated below is the average coring rates based on the Boyles Brothers rate changes (depth), rock type, and the calculated value per shift.

Footage	Rock Type, Size	Feet/ Shift	Value/ Foot	\$/ Shift
1300-1500 1300-1500	Dacite, NC Schist Bx., NC	18.0 11.2	\$12.90 12.90	\$232.20 144.48
1500-2000	Whitetail & Fault Zone, NC	15.3	13.90	212.67
2000-2500 200-2500	Schist, NC Early Volc., NC	13.3 5.7	14.90 14.90	198.17 84.93
2500-3000 2500-3000	Mudstone WT., NC QM Slide, NC	10.6 8.3	16.50 16.50	174.90 136.95
3000-3500 3000-3500	QM Slide, NX Whitetail Cgl., NX	27.8 24.1	17.30 17.30	480.94 416.93
3500-4000	Whitetail Cgl., NX	21.4	19.30	413.02
4000-4500	Whitetail Cgl., NX	19.3	21.60	416.88
4500-5000 4500-5000	Whitetail Cgl., NX Redbeds (Supai), NX	17.2 22.7	24.98 24.90	428.28 565.23
5000-6000 5000-6000 5000-6000	Redbeds (Supai), NX Naco Limestone, NX Whitetail Cgl., NX	18.5 11.5 15.2	29.90 29.90 29.90	553.15 343.85 454.48
6000-6250	Whitetail Cgl., NX	10.7	34.90	373.43
6250-6700 6250-6700 6250-6700 6250-6700	Whitetail Cgl., NX Escabrosa Limestone, NX Fault Zone, NX Quartz Monzonite, NX	11.9 11.5 4.0 7.6	39.90 39.90 39.90 39.90	474.81 458.85 159.60 303.24
				<del>=</del> <del>=</del>

As before, the dollar value is not rigorous because of the error in the average foot per shift figure for the various rock types. However, it does point up the fact that Boyles Brothers is maintaining a good footage per shift in the deep holes and receiving a large dollar value.

James D. Sell

James D. Sell

JDS:sg

cc: RBCummings HLCrittendon

# TAB

A-5

November 15, 1971

TO: J. D. Sell

FROM: R. B. Cummings

Daily Drill Data
Drill Hole A-5
Rotary Drilling
Superior East Project
Pinal County, Arizona

Attached is a daily log of the rotary drilling on drill hole A-5. The information shown is the date, depth at the end of the day, footage drilled during the day, number of hours charged to drilling and number of shifts involved, explanation of delays, size of the hole and type of drilling (air or mud), and the geologic formation.

Compiled from this data is a breakdown of the shifts and footage by a) depth -- using approximate  $1000^{\circ}$  intervals, b) hole size, c) air vs. mud for the total hole, d) air vs. mud for a given bit size  $(6-3/4^{\circ})$ , and e) rock unit.

R. B. Cummings Had

RBC: lad Attachs.

#### DRILL HOLE A-5 ROTARY DRILLING MAYHEW 3000

DATE	DEPTH END OF DAY	FOOTAGE	DRILLI HOURS S	ING SHIFTS	DELAYS	HOLE SIZE	FORMATION
July 27	0			<del>-</del>	Setting up rig.		
28	14	14	10	2	Finish setting up.	8-3/4-air	Dacite
29	61	47	9	2	Unloading equipment.		
30	92	31	10-1/2	2	4-1/2 hrs. equip. repair, bit change.		
31				-			
Aug. 1				- ·			
2	280	188	16	2		6-3/4-air	
3	557	277	23	3	l hr. equip. repalr.		
<b>. 4</b>	642	85	14	3	Rig for mud, 5 hrs. equip. repair, bit change.	640 6-3/4-mud	
5	730	88	16-1/2	3	4 hrs. equip. repair, 3-1/2 hrs. parts delay,		
6	871	141	18-1/2	3	checked bit. 5-1/2 hrs. equip. repair.		
7	1024	153	15	3	5 hrs. equip. repair, 4 hrs. cement.		
8				. <del>-</del>			
9	1170	146	23	。3	l hr. equip. repair.		
10	1324	154	23	3	l hr. equip. repair.		
11	1338	14	6-1/2	3	4 hrs. equip. repair, 13-1/2 hrs. misc. delay; 5 hrs. coring; bit change.	1335 6-1/4-mud	

12	1374	36	21-1/2	3	2-1/2 hrs. equip. repair; 15 hrs. coring.
13	1525	151	23-1/2	3	1/2 hr. equip. repair.
14	1663	138	23	3	l hr. equip. repair, bit change.
15	<b></b>	<b></b>		. <del>-</del> .	
16	1805	142	24	3	
17	2041	236	21-1/2	3	Work on mud pit.
18	2141	100	12-1/2	3	6-1/2 hrs. equip. repair, 5 hrs. parts delay,
19	2148	7	3-1/2	3	bit change. 1-1/2 hrs. equip. repair, 19 hrs. parts delay.
20	2290	142	22	3	2 hrs. equip. repair.
21	2489	199	20	3	2-1/2 hrs. equip. repair, 1-1/2 hrs. work on
22	2585	96	10	3	mud pit. 14 hrs. equip. repair & rig maintenance.
23	2676	91	24	3	Bit change.
24	2815	139	24	3	
25	2930	115	23	3	l hr. equip. repair, bit change.
26	3048	118	22	3	2 hr. equip. repair.
27	/ 3141	93	22	3	2 hrs. equip. repair.
28	3145	4	14	3	Twisted off, 5 hrs. parts delay, 5 hrs. fishing, bit change.
29				3	Casing, Tear down.

2159 Dacite-tuff 2274 Earlier Volcanics

2600 Whitetail Mudstone

2999 Whitetail Conglom.

DRILL HOLE A-5

Drilling time by depth brackets, including down time.

DEPTH	SIZE	SHIFTS	DAYS	FOOTAGE	FT/SHIFT	DELAYS
0-998	8-3/4 & 6-3/4	22	9	998	45.4	Finish setting up, minor repairs.
998-2041	6-3/4 & 6-1/4	25	8	1043	41.7	Spot coring,
2041-3048	6-1/4	27	9	1007	37.3	moderate repairs.  Major repairs, parts delay.
3948-3145	6-1/4	<u>-6</u>	_2	<u>97</u>	<u>16.2</u>	Twisted off, 7 hrs.
0-3145		80	28	3145	39.3	delay, 5 hrs. fishing, terminated hole.

Drilling time by bit size.

BIT SIZE	<u>DEPTH</u>	SHIFTS TO DEPTH FOOTAGE	FT/SHIFT
8-3/4	0-92	6 92 92	15.3
6-3/4	92-1335	26 1338 1246	47.9
6-1/4	1335-3145	48 3145 1807	37.6

Drilling time by air and mud - total hole.

AIR/MUD		DEPTH	SHIFTS TO	DEPTH	F00TAGE	FT/SHIFT
AIR		0-640	14	642	642	45.9
MUD	6	40-3145	66	3145	2503	38.0

Drilling time by air and mud -6-3/4 bit.

AIR/MUD	DEPTH	SHIFTS TO	DEPTH	FOOTAGE	FT/SHIFT
AIR	92-640	8	642	550	68.8
MUD	640-1335	15	1324*	682	45.5

<sup>\*</sup>The interval 1324-1338 was not included because much of the time involved included preparation for change in drill rod size and coring.

DRILL HOLE A-5 -- Continued

Drilling time by rock unit.

ROCK UNIT	DEPTH	SIZE	SHIFTS TO	DEPTH	FOOTAGE	FT/SHIFT
Dacite	0-2159	8-3/4-6-1/4	53	2148	2148	40.5
Dacite-Tuft	2159-2274	6-1/4	3	2290	142	47.3
Early Volcanics	2274-2600	6-1/4	7	2611	321	45.9
Whitetail-mudstone	2600-2999	6-1/4	10	3003	392	39.2
Whitetail-cgl.	2999-3145	6-1/4	7	3145	142	20.3

clasts of schist , monzonite (?) and diabase.

Rotary 3145' -

T.IS., R.I3 E.
sw I/4 nw I/4 nw I/4 sec.28
GRAPHIC LOG & ASSAY RESULTS
OF
DRILL HOLE A.5

SUPERIOR EAST PROJECT GILA & PINAL COUNTIES, ARIZONA scale I"= 300' MAY 25,1972

# TAB

4-1

### AMERICAN SMELTING AND REFINING COMPANY Tucson Arizona

November 22, 1971

TO: J. D. Sell

FROM: R. B. Cummings

Daily Drill Data
Drill Hole A-1
Rotary Drilling
Superior East Project
Pinal County, Arizona

Attached is a daily log of the rotary drilling on hole A-1. The information shown is the date, depth at the end of the day, number of hours charged to drilling and number of shifts involved, explanation of delays, size of the hole, and the geologic formation.

Compiled from this data is the average drill rate.

R. B. Cummings

R. B. Cummings

RBC: lad Attach.

### DRILL HOLE A-1 ROTARY DRILLING FAILING 2500

DATE		DEPTH AT END OF DAY	FOOTAGE	DRIL HOURS	LING SHIFTS	<u>DELAYS</u>	HOLE SIZE	FORMATION
April	8					Setting up.	10.0444	
	9	6	6	. 3	1	Setting up.	12-3/4" 6'	Dacite
	10	61	55	18	3	6 hrs. equip. repair.		
	11			<b></b>				
	12	132	71	13-1/2	3	Reverse drili collars, 8 hrs. ream oversize		
	13	214	82	19-1/2	3	stabilizer. 4-1/2 hrs. equip. repair.		
	14	459	245	19-1/2	3	4-1/2 hrs. equip. repair.		
	15	615	156	24	3		9-7/8"	
	16	696	81	9-1/2	3	Twisted-off, fished 14-1/2 hrs.		
	17	784	88	24	3			
	18			<b></b>	•			
Q	19	811	27	5-1/2	3	Came out of hole, hauled casing, 2 hrs. equip. rep	air.	
	20	811	0	0	2	Casing, cementing, and haufind drill collars.	811 1	
	21	811	0	0	3	24 hrs. compressor delay.		
	22	843	32	1-1/2	3	14-1/2 hrs. compressor delay, 4-1/2 hrs. equip.		
	23	1086	243	17	3	repair, 3-1/2 hrs. drilling cement.  1 hr. equip. repair, materials delay	6-1/4"	

24	1221	135 14		rs. equip. repair,	6 hrs. parts del	ay,	
25				bit change.			1250 Vitrophype
26	1309	88 20	3 3 h	rs. equip. repair,	bit change.		1297 09 Dacite Tuff
27				l of bolo		AT	1 Air 1309

### DRILL HOLE A-1

DEPTH	SIZE	SHIFTS	DAYS	FOOTAGE	FT/SHIFT
0-1309	12-3/8" to 6-1/4"	42	15	1309	31.2

# TAB

A-H

## AMERICAN SMELTING AND REFINING COMPANY Tucson Arizona

November 22, 1971

TO: J. D. Sell

FROM: R. B. Cummings

Daily Drill Data
Drill Hole A-4
Rotary Drilling
Superior East Project
Pinal County, Arizona

Attached is a daily log of the rotary drilling on drill hole A-4. Note that there are two phases of rotary drilling; one with Boyles Brothers Drilling Company using a Failing 2500, and the second with Shelton Drilling Company using a Mayhew 3000. The information shown is the date, depth at the end of the day, number of hours charged to drilling and the number of shifts involved, explanation of delays, size of the hole and type of drilling (air or mud), and the geologic formation.

Compiled from this data is a breakdown of the shifts and footage by a) contractor and air vs. mud, b) contractor, excluding parts and materials delays, c) depth -- using approximate 1000' intervals, d) bit size, and e) rock unit.

R. B. Cummings Slat

RBC:sg attachs.

## DRILL HOLE A-4 ROTARY DRILLING FAILING 2500

<u>DATE</u>	DEPTH AT END OF DAY	FOOTAGE	DRILI Hours	LING SHIFTS	DELAYS	HOLE SIZE	FORMATION
May I	14	14	7-1/2	2	6 hrs. set-up, cement surfact casing 3rd shift set-up	12-3/8"-air 6' ↑ 9-7/8"	Dacite
3	283	269	11-1/2	3	Twisted off bit, 10-1/2 hrs. fishing	ì8!	
4	358	75	4	3	Continued fishing, twisted off again,		
5	564	206	11	3	fishing Continued fishing, twisted off again, fishing		
6	613	49	5	3	19 hrs. cementing		
7	613	0	0	3	2nd cement job	9''-air	
8	613	0	0	3	3rd cement job, 8 hrs. equip. repair		
9	- 1		<b>-</b>				A STATE OF THE STA
10	921	308	24	3			Market Stranger Control
11	1082	161	22-1/2	3	1-1/2 hrs. equip repair, changed choke on hammer twice		
12	1082	.0	0	3	14 hrs. casing, 4 hrs. equip. repair, 6 hrs. standby	3.44	
13	1082	0	0	3	1-1/2 hrs. casing, remainder waiting on casing and prep. for cement		
14	1082	0	0	3	7 hrs. equip repair, 17 hrs. cement	1082	
15	1365	283	24	3		1	
16			÷ :				
17	1612	247	19	3	5 hrs. equip repair		
18	1630	18	4	<b>3</b>	Twisted off bit, 4 hrs. fishing, 16 hrs. wait on bit		
19	1762	132	18	3	6 hrs. equip. repair, checked bit		

### DRILL HOLE A-4 ROTARY PRILLING FAILING 2500

DATE		DEPTH END OF DAY	FOOTAGE	DRILLING HOURS SHIFTS	DELAYS	HOLE SIZE	FORMATION
May	20	1968	206	23 3	Removed choke from hammer,	6-1/4 to 6"	Dacite
	21	2028	60	24 3	l hr. Asarco stand by Installed choke in hammer	air	1975 Early
	22	2077	49	24 3			Volcanics
	23		<b>-</b>				
	24	2077	0	6 3	Bit change, 4 hrs. equip. repair,		
	25	2077	,	10-1/2 2	Bit change, 4 hrs. reaming, 5-1/2	↓ 1.0077	
	26	<u>-</u>	en e		hrs. equip. delay, Boyles terminate Tear down	a 20//	

Note: Boyles Brothers rotary contract terminated on May 26. Shelton Drilling Company rotary contract initiated with drilling on June 10 in same hole location

#### DRILL HOLE A-4 ROTARY DRILLING MAYHEW 3000

June	10	2077	1	<del>-</del>	<b>-</b>	Setting-up 2077 Early \tag{Volcanics}
	11	2077	0	14	2	2 hrs. equip delay, 5 hrs. lost circulation,
	12	2077	0	4	2	strapping rods on way in Repair mud pit
	13	2077	0	6	1	
	14	2183	106	24	3	Bit change 2133' Whitetail Mudstone
	15	2294	111	17	3	Repair brakes, bit change
	16	2294	0	0	3	Parts delay, work on brakes
	17	2383	89	16	3	Repair brakes, bit change
	18	2527	144	24	3	Bit change

DATE		DEPTH END OF DAY	FOOTAGE	DRILL HOURS		<u>DELAYS</u>	HOLE SIZE	FORMATION
June	19	2640	113	16	2			
	20	2640		e de la composition de la composition La composition de la composition de la La composition de la composition della comp		Tried to re-center rig		
	21	2659	19	9	3	2 hrs. equip. repair, 13 hrs. parts delay		
	22	2696	37	14	3	3 hrs. equip. repair, 7 hrs. parts dela	ay   5-5/8"-mud	
	23	2744	48	24	3	18 hrs. coring, 2 bit changes	)	
	24	2804	60	22	3	2 hrs. equip. repair, bit change,		
	25	2888	84	24	3	2 hrs. reaming Bit change, I hr. reaming		
	26	2920	32	15	2	l hr. cementing, bit change		2920'
	27	2944	24	8	1	2 hrs. reaming		Whitetail Conglom.
	28	3014	70	24	3	Bit change, 2 hrs. reaming		
	29	3040	26	11	3	l hr. equip. repair, 12 hrs. parts dela	ay,	
	30	3040			3	transmission out, bit changes 22 hrs. parts delay, 2 hrs. equip. rep	air	
July	1	3078	38	19	3	5 hrs. equip. repair, 2 bit changes		
	2	3119	41	24	3	17 hrs. coring, 2 bit changes		
	3	3121	2	4	1/2			
	4		- The state of the					
	5	3171	50	19	2-1/2	l hr. equip. repair, bit change		
	6	3221	50	24	3	2 bit changes		
	7	3267	46	23-1/2	3	<pre>1/2 hr. equip. repair, 2 bit changes, 2 hrs. reaming</pre>		

### DRILL HOLE A-4 ROTARY DRILLING MAYHEW 3000

DATE	DEPTH END OF DAY	FOOTAGE	DRILL HOURS	ING SHIFTS	<u>DELAYS</u>	HOLE SIZE	FORMATION
July 8	3321	54	20	3	Bit change, wait on drill pipe		
9	3321			•	Trip out of hole, 21 hrs. parts delay		
10	3321	11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		3	24 hrs. parts delay		
11	<del>-</del>		_	•			
12	3321		<u>-</u>	-	24 hrs. parts delay		
13	3321	•	≟.	<u>.</u>	24 hrs. parts delay		
1423	3321		<del>,</del>	2	16 hrs. parts delay		
15	3384	63	24	3			
16	3436	52	2]	3	3 hrs. equip. repair, 2 bit changes		
17	3487	51	19	3	5 hrs. equip. repair, bit change		
18	• • • • • • • • • • • • • • • • • • •	<del></del>		-,			
19	3520	33	11	2	5 hrs. equip. repair, bit change		
20	3546	26	15	3	9 hrs. equip. repair, bit change		
21	3593	47	21	3	3 hrs. tear down, bit change	3503	2502
22			<u>-</u>		Casing, Termination of hole	3593	3593

#### DRILL HOLE A-4

Drilling time by contractor, and air and mud, including down time.

CONTRACTOR	DEPTH	SIZE	SHIFTS DAYS	FOOTAGE FT/SHIFT	DELAYS
Boyles-air	0-2077	12-3/8-6-1/4 air	61 21	2077 34.0	Major delays-bits, cementing and broken
Shelton-mud	2077-3593	5-5/8 mud	96 37	1516 15.8	Major delays-waiting on parts, repairs, bit changes, spot coring

Drilling time by contractor, excluding parts and materials delays.

CONTRACTOR	DEPTH	SHIFTS	FOOTAGE	FT/SHIFT	ELIMINATED DELAYS
Boyles	0-2077	52	2077	39.9	9 shifts waiting on
Shelton	2077-3593	77	1516	19.7	casing and bits 19 shifts waiting
					on parts

NOTE: Approximately 100 hours (over twelve shifts) were used by Shelton in "tripping" (going into and out of the hole) for bit changes. In all 29 bits were used. Boyles "tripping" time for bit changes was very minor. On hole A-5 (see report dated November 15, 1971) Shelton used more expensive button bits. Shelton drilled over twice the footage on A-5 as on A-4, but used only 8 bits and consumed less than 35 hours in "tripping" for bit changes.

Drilling time by depth intervals, including down time.

DEPTH	SIZE	SHIFTS	DAYS	FOOTAGE	FT/SHIFT	DELAYS	
0-1004	12-3/8"to9"	25	9	1004	40.2	Broken bits, cementing	
1004-2011	9" + 6-1/4"	26	9	1007	38.7	Casing	
2011-3014	6-1/4"+5-5/8"	54	21	1003	18.6	Major repairs and parts	
3014-3593	5-5/8"	<u>52</u>	19	<u>579</u>	11.1	delays, bit changes Major repairs and parts	
0-3593		157	58	3593	22.9	delays, bit changes	

Drilling time by bit size, including down time.

BIT SIZE	DEPTH	SHIFTS TO	DEPTH	FOOTAGE	FT/SHIFT
12-3/8"to9"	1082	31*	1082	1082	34.9
6-1/4"	1082-2077	30*	2077	995	33.2
5-5/8"	2077	96	3593	1516	15.8

\* A total of 9 shifts were consumed in materials delay, casing and cementing when casing was set at 1082'. 5 shifts were charged to 12-3/8" to 9" bit size and 4 shifts were charged to 6-1/4" bit size.

Drilling time by rock unit, including down time.

ROCK UNIT	DEPTH	SIZE	SHIFTS T	O DEPTH	FOOTAGE	FT/SHIFT
Dacite	0-1975	12-3/8"-6-1/4"	50	1968	1968	39.4
Early Volcanics	1975-2133	6-1/4"+5-5/8"	18	2146	178	9.9
Whitetail-mudstone	2133-2920	5 <del>-</del> 5/8''	33	2920	774	23.5
Whitetial-conglom.	2920-3593	5-5/8"	<u>_56</u>	3593	673	12.0
Total Hole			157		3593	22.9

### AMERICAN SMELTING AND REFINING COMPANY Tucson Arizona

January 13, 1972

TO: J. D. Sell

FROM: R. B. Cummings

Drill Hole A-4 Core Drilling Cost Summary Superior East Project Pinal County, Arizona

Core drilling was initiated by Boyles Brothers Drilling Co. on August 17, 1971. A CP-50 core rig was used. The hole was cased to a depth of 3593' with 4" casing. Coring started at this point and was terminated at 6664' on November 4, 1971. The total footage cored was 3071'. All of this footage was drilled with NX bits.

Reports on the rotary drilling costs and the daily drill data for both rotary and the daily drill data for both rotary and core drilling have been submitted.

Costs have been computed for the coring on Hole A-4 through the November account.
Only minor costs are expected to be added. A core drilling cost breakdown follows:

		Cost	\$/ft
a.	Direct Drilling	\$ 95,638.17	\$31.14
b.	Site Preparation	84.00	.03
с.	Sampling	1,554.75	.51
d.	Supervision	5,122.20	1.67
	Total	\$102,399.12	\$33.35

Note: Explanation of cost categories can be found in my report on Drill Hole Summaries dated October 1, 1971.

Drilling mud and additive cost (included in direct drilling cost) was \$3,727.17 or \$1.21/foot.

The total cost of Hole A-4 (rotary and core drilling) is tabulated below.

	Rotary	Core	Total	
	Cost \$/ft	Cost \$/ft	Cost \$/ft	
a. Direct Drilli	ng \$67,845.78 \$18.88	\$ 95,638.17 \$31.14	\$163,483.95 \$24.53	
b. Site Preparat	ion 2,873.29 .80	84.00 .03	2,957.29 .44	
c. Sampling	3,756.95 1.05	1,554.75 .51	5,311.70 .80	
d. Supervision	5,105.73 1.42	5,122.20 1.67	10,227.93 1.53	
Totals	\$79,581.75 \$22.15	\$102,399.12 \$33.35	\$181,980.87 \$27.30	

J. D. Sell January 13, 1972 - 2 -Upon completion of drilling operations, the Salt Lake City office placed two geophysical electrodes in the hole. One electrode is on the bottom of the hole and the other is positioned just beneath the bottom of the 4" casing (3593'). The hole is now capped awaiting geophysical testing.

R. B. Cummings /lad

RBC: lad

Destrodes burned out upor lesting.

## AMERICAN SMELTING AND REFINING COMPANY Tucson Arizona

January 21, 1972

TO: H. L. Crittendon

FROM: J. D. Sell

DAILY DRILL DATA
KERR-McGEE DRILL HOLE # 142
JOY 22 HD, WIRE-LINE CORE
RED MOUNTAIN PROJECT
SANTA CRUZ COUNTY, ARIZONA

I have secured the daily drill logs of Kerr-McGee's Hole #142 located at their Red Mountain Project. The hole was cored from the surface to a depth of 5229 feet.

From the logs, I have compiled a daily drill data sheet conformable to the type form on our Superior East Project. This table of information shows the date, depth of drill hole at end of day, the footage cut during the day, the number of shifts involved, short comments on the delays involved, and the size of core. Compiled from this data is the breakdown of the shifts and footage by size of core.

The daily drill logs have been turned over to you for additional information. All coring was apparently in andesite and rhyolite of the Red Mountain area, although "quartz" was noted at depth.

James D. Sell

JDS:sgattach.

cc: WLKurtz

# KERR-MCGEE DRILL HOLE #142, RED MTN. ARIZONA Joy 22 HD rig, wire line coring

<u>Date</u>	Depth at End of Day	<u>Footage</u>	Drilling <u>Hours</u> <u>Shifts</u>	Delays
Jan. 26,				Setting up
1971 27	37 (NC)	37	2	NC drilling, completing set up; NC cement lost circulation
28	114	77	2	Lost circulation; cemented
29	194	80	2	Surveyed hole; 90°
30			성 경기 가장된 것이다. 1985년 - 1985년 (1987년 1987년	
31				
Feb. 1	326	132	2	
2	449	123	2	Bit change (409'); cleaned tanks
3	569	120	2	Broke coupling
4	669	100	2	bit change
5 6	747	78	<b>2</b>	
6				
7				
8	853	106	2	put in triple line cable
9	933	80	2	unlatched head, pulled rods
10	1030	97	2	
ll.	1119	89	2	bit change
12	1196	77	2	
13				
14				
15	1242	46		
16	1294	52	2	bit change(?); trouble w/rods
17	1364	70	2	and swivel washed hole
18	1374 (NC)	10	2	ran NX Casing; made up

<u>Date</u>	Depth at End of Day	<u>Footage</u>	Drilling Hours Shifts	<u>Delays</u>
Feb. 19	1423 (NX)	49	2	Completed rod make up; NXE drilling; surveyed hole; changed shell
20				하다 있는 것은 경험에 하는 것은 그런 경험을 모았다. 유리학교로 교실하다는 물론을 하는 하는 것을 받을 수 있다.
21				
22	1452	32	2	bit change (1428); lost circultation
23	1452	0		cementing; night shift sick
24	1452	0		drilling out; night shift sick
25	1476	36		lost circul.; night shift sick
26	1490	14		lost circul; night shift
27			가 있는 생활을 보고 하는데 다. 일 사람들은 하는 사람들 등 기를 받는다.	sick
28				
March l	1522	32		drilling out cement; no night shift
2	1600	78	<b>2</b>	surveyed hole; off 1° at 1550 ft.
3	1660	60		bit change; survey hole at 1610 ft.
4	1735	75		bit change; surveyed; off 1-1/2° at 1690 ft.
55	1785	50	2	lost circul.; survey off 1° at 1780 ft.
6				
<b>7</b>				
8	1850	65	2	bit change (1824)
9	1929	79	2	bit change (1929); surveyed off 1° at 1960 ft.
10	2017	88	2	
	2102	85		survey off 1/2° at 2020 ft.
12	2149	47	2	lost circul.; broke wire lens
13				
14				
15	2149	0		rods stuck; changed drill
16	2165	16	2	<pre>motor, etc. hard drilling; pulled rods; hole survey</pre>

<u>Date</u>	Depth at End of Day	Footage	Drilling <u>Hours</u> Shifts	<u>Delays</u>
March 17	2203	38	2	machine repair
18	2276	73	<b>2</b>	wire line broke; survey off
19	2315	39	2	1/2° at 2190 ft. pulled for broken wire line
20			하는 경기 (1995년 - 1997년 1997년 - 1997년 - 1997년 - 1997년 - 1997년 1997년 - 1997년	
21				
22	2377	62	2	completed bit change
23	2494	117	2	survey at 2400' is vertical
24	2544	<b>50</b> e	2	bit change; caving ground
25	2632	88	2	See this date for Feb 25-
26	2670	38	<b>2</b>	March 25 materials use. pulled rods; survey at 2650 1° off
27				
28				
29	2735	65	2	
30	2802	67	2	lost circulation @ 2762; survey @ 2800 = 1° off
31	2856	54	2	bit change; lost circulation; survey @ 2850 = 1-1/2° off.
April 1	2940	84	2	3di vey e 2030 - 1-1/2 011.
2	2958	18 * * * * * * * * * * * * * * * * * * *	2	lost circulation; sand & cave, washed hole
3				cave, washed hore
4				고, 등에 경험하는 기를 보는 것을 하는 것으로 했다. 그를 들고 있는 것들은 학교들이 되고 있는데, 함께 함께 되는 것이다.
5	3024	66	2	<pre>sand &amp; cave; survey @ 2940 =   l° off</pre>
6	3083 (NX)	59	2	survey @ 3045 = 1° off; pulled rods; NX
7	3087 (BX)	4	<b>2</b>	cased to 3083 with BX casing
8	3147	60		survey at 3083 = 1-1/2° off; change wire-line cable
9	3208	61	2	Paramac with title capte
10				

<u>Date</u>	Depth at End of Day	<u>Footage</u>	Drilling Hours Shifts	<u>Delays</u>
April 12	3281	73	2	lost circ. @ 3226; bit change at 3281; survey @ 3200 =
13	3333	52	2	2° off
14	3351	18	2	bit change @ 3343; lost
15	3371	20		circulation
16	3417	46	2	bit change
177				
18				
19	3487	70	2	bit change
20	3585	98	2	
21	3643	58	2	bit change
22	3665	22	2	motor trouble, hoist cable
23	3723	58	2	broke
24			(1) 1 (1) 12 (1) 1 (1)	
25			일 : 1 : 1 : 1 : 1 : 1 : 1 : 1 : 1 : 1 :	See this date for March-
26	3747	24	2	April materials use. bit change; wire line change
27	3800	53	2	survey = 4° off
28	3855	55	2	bit change at 3844
229	3899	44	2	bit change at 3899; survey = 5-1/2° off
30	3947	48		survey = 5° off
May 1				
2				다시 보고 하얗다. 이번 12 년 1일 전 12 년 1일 12 일 - 12 일 전 12 년 1일 전 12 년 12
3	3971	24		
4	4014	43	2.	bit change @ 3981
5	4040	26	2	survey; bit change
6	4082	42	2	surveyed hole eight times
7	4123	41	2	bit change
8	4132	9		bit change at 4132

<u>Date</u>	Depth at End of Day	<u>Footage</u>	Drilling Hours Shifts	<u>Delays</u>
May 9				Bit change at 4132 ft.
10	4199	67	. 100 - 100	
11	4259	60	2 2	two hole surveys
12	4269	10		gyro hole survey, bit change
13	4339	70	2	survey at 4330 = 8-1/4° off
14	4389	50	2	pulling rods for bit change
15				
16	-		명하시다. 그리고 11일 1년 1일 - 12일 - 근 12일 1일 1일	
17	4446	57	<b>2</b> -1-1	bit change; survey = 10° off
18	4512	66	<b>2</b>	survey at $4450 = 10-1/2^{\circ}$ off
19	4562	50	2	bit change
20	4583	21	<b>2</b>	bit change; broke chuck drive
21	4585	2	2.	repair; rods twisted off; recovered
22				
23				
24	4634	49	2	surveyed; bit change
25	4698	64	2	<pre>survey = l1° off; pulling for bit change</pre>
26	4731	33	<b></b>	two bit changes (4698 & 4731)
27	4788	57	2	survey = 12° off
28	4818	30	2	bit change
29				
30				
June 1	4872	54		wire line repair; started pulling rods
2	4940	68	<b>2</b>	bit change; survey @ 4870 = 13° off
3	4975	35	2	<pre>bit change; survey = 12° off   kelly rod broke</pre>
4	5004	29	2	motor repair

<u>Date</u>		Depth at End of Day	ootage_	Drill Hours	ing Shifts	Delays
June	6	200 - 10 - 10 - 10 - 12 - 12 - 12 - 12 -				
	70	5004	0		2	continued motor repair;
	8	5063	59		2	<pre>pulled rods replaced motor; survey at 50:</pre>
	9	5124	61		2	survey at 5085 = 12° off
	10	5185	61		2	survey; started rods out
	N	5229	44		2	bit change
	12					
	13					
1	14	5229				Hole Completed. Waiting on gyro survey

Core Size	From To	<u>Footage</u>	Shifts	ft./shift	No. of bits
NC	Surface 1374	1374	34	40.4	4
NX	1374 3083	1709	60	28.5	9
<u>BX</u>	<u>3083</u> <u>5229</u>	2146	<u>93</u>	<u>23.1</u>	<u>24</u>
Overal1	Surface 5229	5229	187	28.0	37

SUPERIOR EASY

#### AMERICAN SMELTING AND REFINING COMPANY Tucson Arizona

January 24, 1972

TO: W. L. Kurtz

FROM: H. L. Crittendon

I have compiled some averages for the time period from April 6, when Boyles commenced drilling on the Superior East Project, through December 31, 1971. Listed below are Boyles' average monthly receivables for footage and hourly billings; I believe a fairly close comparison can be made between these receivables vs. Boyles' straight hourly charge for their CP-50 machine and crew to determine profit margin:

. N	0.4	100 100	夏 30、 10						1.0		1000					1.00	200			100	. 7					200		A 18 6 18 1	3/2	
	100	. 2.7	4 20 1					25.00		1.0		1			100		9.5 g			100		·	25 16			1.000		N. 4 1100		40.11
- 1	200	4.7	35.1	F 12 12 12		40 ft 18		200					200					5 555	- 5-		100	347	100	67 137	100				100	100
	<b>6</b> 2				-				197	200		ta et o		100			and the					17 15		8. 24s	2 - 52"	1.00		100		
	74.00	10 m	vat			Sec. 2	Server Se						** · / .		14.		12.00			10.00		1.5	900 3	S		11000		100	4.17	1.
	district to	and the second				-5000	127 30, 30	100 Oct.	16				100					61 X.X	100	Server to	17.	- 30.0		200		100	1. 6. 2.			200
37	2 40.6	330		12 40			113%	1 ( C) ( W)	3.6	Same .	a ii ng	03.5		65.53			1	2.5	230	1.00	1.5		100					100		
	3 100	THE R. LEW	4 44 44	100	4	ALC: NO		100	48 - B						202			200							the con-		12.0	Services:	11/11/11	687.283
1	X BEE	2 2 5 6 2	Ty			40.0		ont	п		· · ·		00	56 B	1000	A 8		lon	1 44 3	3 6		100	Ю	7 5 mg			S. 144	on I	22.3	4.4
160		500	5.00			10.0					100		subject.	1			1.0	1000				链环式			100		50	40.03		
		100	54 5							Sec. 5	-	17.42	1.00	4.00	7	34		A	110	1.55	100	Sec. 15.		11. 23.50		3		7.5	30.20	A. 14.12
27	127		30 AL				- 23	100 B	-	and the		1.0	70.75	16 E	100		2. 75	4444	-	-			100	4.0				100		3.7
	71.00	950 L	age		1.0	100		Vel	- en	400				24 A -	- C 1 188	20		2.047	1 12 1					A 18		1.		ve i	dr: ∑ : 1	
	or Historian	AND LINE	Market Black	Marie Consti		9-19-50		in the later of		-		20.00			4444			Ve	Section 18	48.		200	10	200	A CONTRACT			Ve I	diam'r.	0.00
	1			P			S. 45 77	2	300	-	8.0	17777	1.7.2					***	100	a to atta	200	0.00	_		design to the		1000			
				7			7 - 5-77			4.00	8 6 3 1 1	A . 1900		5				100	(10 <u>.</u> 80.	13.13.		A 1		444.4		160.3	100			A 10
1.7	100			1. 821	1. 3.7.	1			100		1.00								4.2		100	1000			1179 15.			1 5 7 6	0.00	N. 1
13	2.00				200			S100 100 1	-	300			23.73		200	- 《食品》		1000	1100		200			A		71			100	13.5
	C 71.5	1 T.	396		<b>.</b>		. 0	22,	13 m		A.	438.73		40.0		1000			*					A .		12 35		-		6.00
15.1	3 2 4		- 30.00	0.0	42		1.00		- E 1		EJES.	1.2	<b>.</b>	SAY:	a dece				03	2		<ul> <li>1.270</li> </ul>	4 .			7	1.0	4.41	72.0	4.54
								,	Section.		~ ~			12.0		***	10000						100			6.7	350	535	A 1 1 1	. 10 - 10
- 81	100			1117			というかんき	100					100			4.00	1.0				31 7. 1.								2011	44 . 5

Given Boyles' hourly rate of \$30.00/hour and assuming a full 25 days (600 hours) work-month, with no down-time, would gross \$18,000.00 per month.

65.5		100	10.1		100					4 3 5		47.57	345		9 6			1.0	4"			451 5	1.5	400			4.0			
. 6			2 A		100	170		100	1 w 2000			* 2					400		. A. 6.1.			2.3.5						2.2. 2	W 104	
		par				2000年	200		4.0	4 7	1			20.4		1.12	2.723					2.2			- 10	2.53	- A	00	45 44 3	
- 4	A 35 73		A	S 14 4	1. 1.2		26-2-1	1 2 3	446 1 3	2011	24.5		2.0	36 T 31		100	Service Confe	n =	4 4 7	_						2.36			0.000	
	75 100	MANAGE.	200		100			Carlos Carlos	7.0	- A	-	Allen Co.				42 31.7	100	7.00	34 S A		****	42.4		4.4			140			
-79	THE OWNER WHEN			130																	4.3		1.0		2.1		10000		A STATE OF	15.12
20		F	6 67 5		- 320 N	5 4 4		. حدود	2.2				2.7					1 1			20 21	4		100		-		14.5		43.77
		er and the second							-144		D	3 246	10.13	V /			87 A	0.5 (0.1)	10 E								10.1		3.3	A
	S							A 100 A	M. 9-8 1					₹ 48			· # 42	110	R.B. '8				J 6		3.00	2.2		20		
	A . 1 44	3.174				10,000		135 41 .	2	, V.					100	5.5.		1.0	2. 2.	73 - 0	51 1.1.		856 B		Capter			73. T.		
	A 11 11	1000			1.7	U 2557	24	1.1			1.5					A							100		1,000		100	- The second	10.17	
				100				27.0		200	1.0	1	535 E	. 25.5	100			× %		1 - 7 - 7	144	4			1 2 2 2 3		1.20		1.5	100
					10.00	100		0.01	100	4.5 %	10.00						de la	300			100	1,000				1.00			1.0	
			5 S. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.					100	1.536	M. com			75%	2.50	4 15					5 × 5		. 33								144
200	4	5 212 A.		100.5	96 99	100			Sec. 16.		~~ ·		A	10.00			1.0		2 37	70 B .								Same		
Y	- 12-15	11.36	40.00	10 miles 20	100			F F.		-	40.0			1000	A	A 1984 6		4		5 J					1.0		V ( 0.0	20		<b>6</b>
17		100 100 100 100 100 100 100 100 100 100	3.			12.4		- 42.74	DR 35.4				57.0		83 ° 4 ° -	45. 2 2	1 ,	Contract to	1.6		4.0		· • • • •		- 20	100		755		

The only major difference in hourly costs vs. footage costs would be bit cost and rod wear which probably will not exceed \$2.00/foot; I believe Boyles' true operating cost/month for the CP-50 would be + \$15,000 - (profit excluded).

HLC:sg

ce: JDSell

H. L. Crittendon

# DRILL HOLE SUMMARY SHEET

		CON	TRACTOR	s INVOI	CES					
	COFFEY	DPLG.	Fo	oring - hour sing cement es trucking ie pipe, et			47969	- 1		1
		2/1/2/	C	oring - hour	·/v		2144			7
			Co	sing coment	+ misc		6648			1
			Cinclude	es trucking	extra	e labor	56761	<i>7</i> —		
			serfac	e pipe, et	رح)					
				i je sa je				total	5676	7
		MA.	TERIALS	and SERV	ICES					
		17174	I LINIALO I							7
				Viamon	1 01	t (pro r	ate ) 160/ft neat & mis		750	-1
				1" (45	119	1850 0	100/1/		2,960	1
				<u> </u>	ising	· · · · · · · · · · · · · · · · · · ·	11		7,352	4
				Centra	113015	, shot cer	ment & MIS	ic	600	-
<u> </u>				Geolo	41401	2	a labor fa	•	294	
· <del> · · · · · · · · · · · · · · · · ·</del>				Bryan	t Con	st -extra	14bor to	total	73	-
ootage ole size	drilled:	То	Spot core		Casi	T		Casin	a pulled	
le size	From	To 2/	From	То	153/3	Casing set		Casin	g pulled	
le size	From	2/	From 2559	To 2574	153/3	Casing set		Casin	g pulled	
le size 15'' 8 3/4	From	1	2559 35 40	To 2574	153/3	21 1848	15º/At	•	g pulled	
le size 15'' 8 3/4	From 0 2/	21	From 2559	70 2574 3500	163/4	21 1848	15º/At	•	g pulled	
le size 15'' 8 3/4	From 0 2/	2/ 1848 4079	From  25 5 9  35 40  40 77	70 2574 3500	163/4	21 1848	160/ft 132/ft			
le size 15" 8 3/4 6 44	From  0 21 1849	2/ 1848 4079	From  25 5 9  35 40  40 77	70 2574 3500	163/4	21 1848	160/ft 132/ft		g pulled	_ 
le size 15" 8 3/4 6 44	From 0 2/	2/ 1848 4079	From  25 5 9  35 40  40 77	70 2574 3500	163/4	Casing set 21 1848 4,039	160/ft 132/ft	al cost		
le size 15" 8 3/4 6 44	From  0 21 1849	2/ 1848 4079	From  2559 35 40 4077	70 2574 3500	163/4	Casing set 21 1848 4,039	100/ff 182/ff	al cost	68,75	
le size 15" 83/4 644	From  0 21 1849	2/ 1848 4079	From  2559 35 40 4077	70 2574 3500 4079	163/4	Casing set 21 1848 4,039	100/ff 182/ff	al cost	68,75	
le size /5" 8 3/4 6 "/4	From  0 21 1849	2/ 1848 4079	From  2559 35 40 4077	70 2574 3500 4079	163/4	Casing set 21 1848 4,039	100/ff 182/ff	al cost	68,75	
le size /5" 8 3/4 6 "/4	From  0 21 1849	2/ 1848 4079	From  2559 35 40 4077	70 2574 3500 4079	163/4	Casing set 21 1848 4,039	100/ff 182/ff	al cost	68,75	
le size /5" 8 3/4 6 "/4	From  0 21 1849	2/ 1848 4079	From  2559 35 40 4077	70 2574 3500 4079	163/4	Casing set 21 1848 4,039	100/ff 182/ff	al cost	68,75	
le size /5" 8 3/4 6 "/4	From  0 21 1849	2/ 1848 4079	From  2559 35 40 4077	70 2574 3500 4079	163/4	Casing set 21 1848 4,039	100/ff 182/ff	al cost	68,75	
le size /5" 8 3/4 6 "/4	From  0 21 1849	2/ 1848 4079	From  2559 35 40 4077	70 2574 3500 4079	163/4	Casing set 21 1848 4,039	100/ff 182/ff	al cost	68,75	
le size /5'' 8 3/4 6 1/4	From  0 21 1849	2/ 1848 4079	From  2559 35 40 4077	70 2574 3500 4079	163/4	Casing set 21 1848 4,039	100/ff 182/ff	al cost	68,75	2]
le size /5'' 8 3/4 6 1/4	From  0 21 1849	2/ 1848 4079	From  2559 35 40 4077	70 2574 3500 4079	163/4	Casing set 21 1848 4,039	100/ff 182/ff	al cost	68,75	
le size /5" 8 3/4 6 1/4	From  0 21 1849	2/ 1848 4079	From  2559 35 40 4077	70 2574 3500 4079	163/4	Casing set 21 1848 4,039	100/ff 182/ff	al cost	68,75	
le size /5" 8 3/4 6 1/4	From  0 21 1849	2/ 1848 4079	From  2559 35 40 4077	70 2574 3500 4079	163/4	Casing set 21 1848 4,039	100/ff 182/ff	al cost	68,75	
le size /5" 8 3/4 6 1/4	From  0 21 1849	2/ 1848 4079	From  2559 35 40 4077	70 2574 3500 4079	163/4	Casing set 21 1848 4,039	100/ff 182/ff	al cost	68,75	
le size /5'' 8 3/4 6 1/4	From  0 21 1849	2/ 1848 4079	From  2559 35 40 4077	70 2574 3500 4079	163/4	Casing set 21 1848 4,039	100/ff 182/ff	al cost	68,75	

## DRILL HOLE SUMMARY SHEET

Con	e no. <u>A-2 :</u> tractor <u>Low</u>	FA-ZW OYEHR	Date sta Date cor	rted <u>2/3</u> npleted <u>5/</u>	3/72 18/77	Total	depth 45	140	
		CON.	TRACTOR	S INVOICE	CES			•	
Long	year - To	tal direc	+ inveice	5 Fcb +1	rus	lung	**		Π
			r			22 224	50		
			He	ourly		5,637 2,021. Misc 型,34元 3 公 36	22		_
		i saran (pa	M	aterials M	ud et	2,021.	61		
			<u>ku</u>	ster truck	mob	MISC 11 348	8.6	<u> </u>	_
	<del></del>				<u> </u>	3 2 30			<u> </u>
							total	32305	5
		MAT	TERIALS C	and SERV	CES				
						W-Survey R	ental	418	5
						stir t mise		3ci	7
				12	rvant	Constructiq	sump (est)	75	
					1 1 3				Γ
		Trans.							
			•				total	793.	5
Footage Hole size	drilled:	То	Spot core:	_To		Casing <b>set</b>	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	pulled	
NQ	4014	4521			NX	4079	NX	2950	
	4230	4940		<del> </del>	+-+		+		_
_NQ_		.1		<del> </del>			1 1		
NG				1	1 1		- <del>  </del>		
IV G									
		+ 95	estentio				total cost	32,45 5	4
	re recovery	+ 95	estimation			the property of the control of the c	total cost	33055 125	_
	re recovery	+ 95	estimation			the property of the control of the c	total cost	33055 35	4
	re recovery	, + 95				the property of the control of the c	ed cost/ft.	<i>'3</i> 'S	4
COI			RI	EMARKS		estimate	ed cost/ft.	'3§ 2\$	7
co. Rot	ary dritt	set	Ri	EMARKS		estimate  H From L	ed cost/ft.	'38 28	+ 
co. Rot	ary drits	set s	Ri Y" 10 C	EMARKS Sasing 3	rod	estimate  H From 4  18' off	ed cost/ft.	'38 28 guired '4521	7
Rote fue ca	ary dritt	set " ps to p  230' + u	Ri 11" 10 C alch up	EMARKS  Stuck  Stuck	rod ek j	estimate  If From L  18' off  cols again of	tettem - R. bettem 6	'38 28 9011ed '4521	F 7
Rote fue ca Cut a Free p	ary dritt	set : ps +6 p 230' + u exter (N	RI 19" 10 Coatch up to eclased co the cullough	EMARKS  (asing 3  . Stuck  ff Stu  (a) Show	rod ck j	estimate  If from be  18' off  cols again of  245 to be	bettem - R.  bettem G  tettem G  tyqyo  stack	'38 28 90,red 4521 4521	1
Rote two ca Cut of Free p	any dritti ment job cods @ 4 reint indi- rods the	set set se per second s	RI 19" 10 C atch up adjed of Mc cullough Ving 2 S	EMARKS  (45ing 3  , Stuck  ff Stuck  i) Stynus  510 red;	rod ek j ed j	estimate  If from L  18' off  cols again of  ads to be  Note hote	bettem - R.  bettem G  f 4940  stack  then c	'38 28 29 4521 4521 & ±415 bandons	17
Rote fue ca Cut is Free p Cut Princip	ment job cods @ 4 cont indi- rods the	set of post of the	RI atch up adaded en accullough ving = 8	EMARKS  (asing 3  , Stuck  ff Stu  i) Styre  sio red  centrally	rod ek p ed p sfuck	estimate  If from L  Is 18' off  cols again of  eds 4 be  Note hole	bettem - R.  bettem G  f 4940  stack  flier a	'38 28 29 4521 W ± 415 bandons	127
Rote fuo ca Cut re Cut Princip	ment job cods @ 4 cont indi- rods the	set of post of the cater (Merce leading capacities	River 10 Codeh up odged of reculough	EMARKS  Stuck  Stuck  Stuck  Story  S	rod ek ed ed in stuck	estimate  If from L  18' off  cols again of  ads to be  Note hote	bettem - Restem Go stuck of they a lived a liv	'38 28 29 4521, E ± 415 bandons afe	7 7

(1)

(1)

11)

String NX

N×

"

reds

cusing

+ core bb1

, , ,

# TAB

DCA-IA

## AMERICAN SMELTING AND REFINING COMPANY Tucson Arizona

March 7, 1972

TO: J. D. Sell

FROM: R. B. Cummings

Daily Drill Data - Unit Contacts
Drill Hole DCA-1A
Core Rig, CP-50
Superior East Project
Pinal County, Arizona

Attached is a daily log of the coring on drill hole DCA-IA. The information given is the date, depth of the hole at the end of the day, footage cut during the day, hours charged to drilling, number of shifts involved, short comments on the delays involved and the geologic units and contact footages. All drilling was done with NX bits.

Compiled from this daily data is a breakdown of the shifts and footage by a) depth bracket based on the Boyles footage rate contract, and b) by geologic units encountered.

R. B. Cummings

RBC:sg attachs.

This hole originally dilled by Technical dir Services for this hole originally dilled by Technical dir Services for the Services Oil-Wiami Copper Joint Venture. At ever dilled 9", with a 12" serface caseing, to a depth of 4011/2 from 5-18 to 6-26, 1944. ASARCO reintered the hole with a chern dull, cleaned to 4002 and set casing.

### DRILL HOLE DCA-1A CORING, CP-50

DATE		DEPTH AT END OF DAY	FOOTAGE	DRILLING HOURS SHIFTS	<u>DELAYS</u>	FORMATION
Nov.	16	4002			Setting up.	Whitetail Cgl.
197	17	4007	5	8 1	Setting up 8 hrs., stret	ch casing.
	18	4043	36	16 2		
13	19	4082	39	16 2		
	20	4112	30	16 2		
	21		-			
	22	4081	69	24 3		
	23	4251	70	24 3		
	24	4307	56	24 3		
	25					
	26	4373	66	24 3		
	27	4403	30	24 3	Bit change.	
	28					
	29	4482	79	24 3		
	30	4572	90	24 3		Whitetail Cgl.
De€.	1: .	4642	70	24 3		1770
	2	4682	40	24 3	Bit change.	4669
	3	4769	87	24 3		Naco Limestone

					rage 2
	DATE	DEPTH AT END OF DAY	FOOTAGE	DRILLING HOURS SHIFTS	DELAYS FORMATION
	Dec. 44	4779	10	4 1	Snowed out.
	5				
	6	4843	64	24 3	
	7	4853	10	1	Snowed out.
	8				Snowed out.
	9	4903	50	24 3	
	10	4951	48	24 3	Bit change. Naco Limestone
	11	4997	46	24 3	4998
	12				4998 Escabrosa Limestone
	13	5006	9	8 1	Snowed out.
•	14				Snowed out.
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	15				Snowed out.
ting Hari	16	5053	47	24 3	Repair hydraulic line.
	17	5098	45	24 3	Lost circulation.
	18	5113	15	16 3	8 hrs. gunk squeeze.
A STATE OF THE STA	19	5163	50	24 3	
	20	5173	10	8 3	16 hrs. gunk squeeze.
	21	5173	0	24 3	24 hrs. lost circulation & bit change.
	22	5212	39	24 3	
	23	5222	10	16 2	Could not pull tube, pulled rods.

				Page 3
<u>DATE</u>	DEPTH AT END OF DAY	F00TAGE	DRILLING HOURS SHIFTS	<u>DELAYS</u> <u>FORMATION</u>
Dec. 24				
25				
26				
27	5257	35	24 3	Could not pull tube, pulled rods, bit change.
28	5293	36	24 3	
29	5313	20	24 3	Could not pull tube, pulled rods.
30	5313	0	12 2	4 hrs. repair, pulling & lowering rods.
31		- 1		
Jan. 1				
2				
3	5343	30	21 3	3 hrs. repair.
4	5378	35	22 3	2 hrs. repair.
5	5387	9	24 3	Torque high, bit change.
6	5387	0	19 3	5 hrs. survey, drilling cave.
7	5418	31	24 3	
8	5468	50	24 3	5452 Martin Limeston
9	5523	55	24 3	그리고 있는 경기에 가는 사람이 되는 것이 되었다. 그런 것이 그렇게 되는 것이 되었다. 생물에 있는 것들은 사람들은 것이 되었다. 1908년 1일
10	5567	44	24 3	
11	5611	44	24 3	
12	5619	8	24 3	Bit change. Tube sanded up.

DATE		DEPTH AT END OF DAY	FOOTAGE	DRILLI HOURS S	NG SHIFTS	DELAYS FORMATION
Jan.	13	5619	0	16	2	Pulled & cleaned rods, lowered rods.
	14				<del>-</del> .	
	15	5619	0	24	3	Drilled cave, drive quill broke.
	16		· · · · · · · · · · · · · · · · · · ·	<b>-</b>	-	
	17	5619	0	0	3	Tried to cement, rods sanded up.
	18	5619	0	0	3	Pulled & cleaned rods, lowered rods.
	19	5619	0	0	3	Cemented-15 sacks @ 4900 - 19 hrs, 5 hrs. repair.
	20	5619	0	0	3	Drilled cement & cave to 5019.
	21	5619	0	4	3	20 hrs. drilling cement & cave, pulled rock bit.
	22	5619	0	24	3	Drilled cave at 4900.
	23		- <u>-</u>	-	-	
ı	24	5619	0	0	3	Cemented @ 4915 - 30 sacks.
	25	5619	0	0	3	Wait on cement.
	26	5619	0	, 0	3	Drilling dement.
	27	5619	0	0	3	Pulled rock bit, lowered wash rods.
	28	5619	0	0	3	Cemented @ 5000 - 10 sacks.
	29	5619	0	0	2	Wait on cement.
	30			<b>-</b> *	-	
	31	5619	0	0	3	Drilled cement & cave, started in w/ cave bit.

		DEPTH AT		DRIL	LING		
DATE	•	END OF DAY	<u>FOOTAGE</u>	HOURS	SHIFTS	DELAYS	FORMATION
Feb.	1	5619	0	16	3	Drilled cave to bottom, b	it change.
	2	5619	0	0	3	Put squeeze @ 5060-5100, 15 sacks.	cement @ 5120-
	3	5619	0	0	3	Wait on cement.	
	4	5659	40	23	3	I hr. drill cement.	
	5 🧐	5703	44	24	<b>3</b> .		
	6	5743	40	24	3		Martin Limestone
	7	5778	35	24	3	Torque high, started out.	5768
	8	5796	18	24	3	Bit change.	Troy Quartzite
	4.9	5813	17	8	1	Hole Terminated.	

DRILL HOLE A=4-  $\mathcal{DCA}-IA$ .

Drilling time by footage brackets, including down time.

<u>DEPTH</u>	SHIFTS	DAYS	F00TAGE	FT/SHIFT	TROUBLES
4002-4512	26	10	510	19.6	One bit change.
4512-4997	25	10	485	19.4	Two bit changes, snow.
4997-5503	55	19	506	9.2	Three bit changes, lost circulation, problems with overshot retriever.
5503-5813	<u>78</u>	26	310	4.0	Extensive problems and cementing with cave zones at 4900 and 4990.
TOTALS	184	65	1811	9.8 average	

Sallling time by

Drilling time by footage brackets, excluding cementing time.

4002-5503	SAME AS	ABOVE.								
5503-5813 30	6	12	310	38.6	Drilling		with c	ave zon	es a	t
TOTALS 142	_		1811	12.8	4900 and	4990'.				

ROCK UNIT	DEPTH	SHIFTS T	O DEPTH	<u>FOOTAGE</u>	FT/SHIFT
Whitetail Cgl. (Tw)	4002-4669	32	4662	660	20.6
Naco Ls. (Pn)	4669-4998	19	4997	335	17.6
Escabrosa Ls. (Me)	4998-5452	52	5448	451	8.7
Martin Ls. (Dm)	5452-5768	76	5770	338	4.4
Troy Qtzite (p€t)	5768-5813	5	5813	43	8.6
TOTALS	4002-5813	184	5813	1811	9.8

NOTE: Extensive cementing was necessary to stablize shale zones in the lower part of the Naco limestone. The cementing took place during the time that the Martin limestone was being drilled. If delay time caused by shale zones in the Naco is subtracted from the Martin limestone and added to the Naco limestone the data for these units is as follows:

ROCK UNIT	DEPTH	SHIFTS '	TO DEPTH	FOOTAGE	FT/SHIFT
Naco Ls (Pn)	4669-4998	66	4997	335	5.1
Martin Ls (Dm)	5452-5768	29	5770	338	11.7

# TAB

A-2

#### AMERICAN SMELTING AND REFINING COMPANY Tucson Arizona

March 27, 1972

TO:

J. D. Sell

FROM: R. B. Cummings

DAILY DRILL DATA SUPERIOR EAST PROJECT
PINAL COUNTY

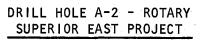
Attached is a daily log of the rotary drilling on drill hole A-2. The information shown is the date, depth at the end of the day, footage drilled during the day, number of hours charged to drilling, and number of shifts involved, explanation of delays, size of the hole, and geologic formation.

Compiled from this data is a breakdown of the shifts and footage by a) 1000' depth increments, b) bit size, and c) geologic unit.

RBC:sg attach.

### DRILL HOLE A-2 - ROTARY SUPERIOR EAST PROJECT

DATE		DEPTH AT END OF DAY	<u>FOOTAGE</u>	DRIL HOURS	LING SHIFTS	DELAYS HOLE SIZE	FORMATION
Jan.	12,	1972 0	. · · · · · · · ·	-	· •	Setting up	Dacite
	13	21	21	11	2	Wait on surface cement. 21'	
	14	246	225	17	3	" " Set up.	
	15	723	477	24	. 3		
	16	1055	332	24	3	Bit change 8-3/4"	
	17	1318	263	23	3	l hr. equip. repair, bit change.	1330'
13	18	1486	168	15	3	Bit change. 9 hrs. wait on drill pipe.	Early
	19	1748	262	24	3		Volcanics
	20	1863	115	13	3	Bit change. 11 hrs. casing	
	21	1863	0	0	3	Wait on H <sub>2</sub> O, pull casing 1863'	
	22	1863	0	0	3	Laying down casing. Clean hole.	
	23	1863	0	0	3	Cleaned hole, ran casing, cement.	
	24	1863	0	0	3	Wait on cement, trip to bottom.	$\bigvee$
	25	2004	141	19	3	4 hrs. drilling plug, 1 hr. equipt repair.	2020
	26	2422	418	24	3	Bit change	Whitetail Mudstone
	27	2574	152	8	3	16 hrs. coring.	
	28	2878	304	19	3	5 hrs. reaming hole. 6-1/4"	2810'
	29	3370	492	24	3	Bit change.	Whitetail Cgl.
	30	3550	11	24	3	13 hrs. coring	
	31			-	<b></b>		



DATE		DEPTH AT END OF DAY	FOOTAGE	DRIL HOURS	LING SHIFTS	DELAYS	HOLE SIZE	FORMATION
Feb.	1		_	· ·	_			
	<b>2</b> 2	-		-	-			
	3	-	) sa 🖷					
	4	-	. ••	-	·			
	5	3592	42	15	2	<pre>l hr. reaming. Picking up 2-7/8" drill pipe.</pre>	1	
	6	4006	414	24	3	driii pipe.		3920' Qtz. Monzonite
	7	4076	70	ି8 -	3	15 hr. coring, 1 hr. equipt. repair	V	4076'
	8	4076	0	0	0	Wait on casing and prepare to case	4076	40/0

NOTE: Hole A-2 was drilled with a Mayhew-3000 using high pressure air.

### DRILL HOLE A-2 - ROTARY SUPERIOR EAST PROJECT

Drilling time by depth brackets, including down time.

DEPTH	SIZE	SHIFTS	DAYS	FOOTAGE	FT./SHIFT	DELAYS
0-1055	15" & 8-3/4"	1.1	4	1055	95.9	
1055-2004	8-3/4"86-1/4"	27	9	949	35.1	Casing - 14 shifts.
2004-3035	6-1/4"	10-1/2	3.5	1031	98.2	Minor parts delay. Spot core.
3035-4076	6-1/4"	12-1/2	9.5	1041	83.3	Spot core
0-4076		61	26	4076	66.8	

Drilling time by bit size, including down time.

BIT SIZE	DEPTH	SHIFTS T	O DEPTH	FOOTAGE	 FT./SHIFT
15" & 8-3/4"	0-1863	27.5	1863	1863	67.7
6-1/4"	1863-4076	33.5	4076	2213	66.1

Note: installation of 7" casing required 14 shifts. These were divided evenly between the 8-3/4" and the 6-1/4" bit size.

Drilling time by rock unit.

ROCK UNIT	DEPTH	SHIFTS T	O DEPTH	FOOTAGE	FT./SHIFT
Dacite	0-1330	14	1318	1318	94.1
Early Volcanics*	1330-2020	24	2004	686	28.6*
Whitetail- Mudstone	2020-2810	9	2878	874	97.1
Whitetail-cgl.	2810-3920	10	3902	1024	102.4
Quartz-Mon- zonite	3920-4076	4	4076	174	43.5
	0-4076	61	4076	4076	66.8

\*Note: 14 shifts were spent in setting 7" casing.
All of this time is recorded under Early
Volcanics. If this time is eliminated,
the FT./SHIFT for the Early Volcanics is
68.6 ft.

Mr. Weber of Moss-Weber Chardler 963-5153 Wad April 24-72. 5 hp 1000 asogram. 1115 gola in 4"pipe in 7 hole; 25 hp. 1000 ft

6" pulmerable 3450 pm.

30 hp. 1000 ft 543pm 7'casing 2gol/ft. storage comacity. Weber very quite necessary to pull y"coving out so as to love enough room for the necessary pump de. He will look with the situation: Send Howard down late to chat.

# TAB

A-2

### AMERICAN SMELTING AND REFINING COMPANY Tucson Arizona

May 18, 1972

TO: W. L. Kurtz

FROM: J. D. Sell

Daily Drill Data
Drill Hole A-2
Diamond Core Drilling
Longyear - TRK Mounted 44
Superior East Project
Pinal County, Arizona

Attached is a daily log of the coring on drill hole A-2. The information shown is the date, depth of hole at end of day, the footage cut during the day, the hours charged to drilling, the number of shifts involved, short comments on the delays involved, the size of core, the geologic units and contact footages.

Compiled from this daily data is a breakdown of the shifts and footage by a) depth bracket based on Longyear's footage rate contract, and b) by geologic units encountered.

James D. Sell

James W. Sell

JDS: lad Attach.

<u>DATE</u>	DEPTH AT END OF DAY	FOOTAGE	DRIL Hours	LING SHIFTS	<u>DELAYS</u>	<u>FORMATION</u>
1972 Feb. 21-24	4078			11	Setting up; making up drill string; drilling out plug and cave to 4078.	
25-29	4079			12	Cemented; drilling out cement to 4079.	
March 1-3	4079			8	Stuck rods and core tube, recovered them, cemented, drilled back down.	NQ Wireline 4079
4	4107	28	22 .	3	Mixed mud.	
1900 - 1900					가 있는 것이 있는 말을 하는 것은 이 보였다. 그 전에 없었다. 한 기 본 기술을 하고 있는 것이 말을 하는 것을 하는 것이다.	
6	4138	31	16	3	Tripping; bit change (591).	p€pi cut by dikes and
	4185	47	14	<b>3</b>	Rods; equip. repair.	masses of Tqm
	4231	46	24	3		
9	4291	60	24	3	Bit change (153 <sup>4</sup> ).	↓ 4288-4295 fault.
					불하다 되다듬는 지시장이 가는 그렇게 그리하는 말이	个 Tam
10	4314	23	8	3	Tripping.	4321
	4352	38	22	3	Equip, repair.	<b>^</b>
12						
. 13	4364	12	9	3	Tripping; bit change (731).	
14	4409	45	23	3		
						p€pi
15	4433	24	16	3	Tripping; bit change (69').	with minor
16	4463	30	16	3	Tripping.	Tqm
17	4513	50	24	3		

18 4521 8	4 3 Shiv wheel broke; repair; rods stuck. 4521
19 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1	고양하는 것을 들어 있는 하는 것을 가는 하는 것을 가는 것이 되는 것을 가게 되었다. 그 것이 되었다. - 이 경우가 하고, 것으로 가고 있는 것이 되었다. 그 것은 것을 하고 있는 것이 되었다. 그 것은 것으로 되었다.
20-31 4521	16-1/2 Attempt to recover rods and core.
	Hole abandoned.
April 1-17 4230	17-1/2 Lost core barrel, 8 ft. of core, and 265 feet of NQ rods.

DRILL HOLE A-2, CORING

Drilling Time, by footage brackets, including down time.

Depth	Size	Shifts	Days	Footage	Ft/Shift	Troubles
4079-4513	NQ(NX)	36	12	434	12.1	4 bit changes; equip. repair.
4513-4521	NQ(NX)			8	2.7	Broke shiv wheel; rods stuck and lost.
Totals		<del></del> 39	13	442	 11.3 ave	rage

Rock Unit	Interval	Size	Shifts	to Depth	Footage	Ft/Shift
Quartz Monzonite (62%) and Pinal Schist (38%) Mixed	4079-4352	NQ(NX)	21	4352	273	13.0
Schist (93%) and Quartz Monzonite (7%) Mixed	4352-4513	NQ(NX)	15	4513	161	10.7
Unknown (Not Recovered)	4513-4521	NQ(NX)	<u>_3</u>	4521	8	2.7
Totals			39		442	11.3 average

## TAB

A-2W

### AMERICAN SMELTING AND REFINING COMPANY Tucson Arizona

May 23, 1972

TO: W. L. Kurtz

FROM: J. D. Sell

Daily Drill Data
Drill Hole A-2W (Wedge)
Diamond Core Drilling
Longyear - TRK Mounted 44
Superior East Project
Pinal County, Arizona

Attached is a daily log of the coring on drill hole A-2W. This is a wedged hole taking off from the original hole A-2 at a depth of 4230 feet. The same crews worked both A-2 and A-2W. The information shown is the date, depth of hole at the end of the day, the footage cut during the day, the hours charged to drilling, the number of shifts involved, short comments on the delays involved, the size of the core, the geologic units and contact footages.

Compiled from this daily data is a breakdown of the shifts and footage by a) depth bracket based on Longyear's footage rate contract, and b) by geologic units encountered.

James D. Sell

Junes W. Sell

JDS: lad Attach.

## DRILL HOLE A-2W (WHIPSTOCK WEDGE) Longyear, Truck Mounted 44

<u>DATÉ</u>	DEPTH AT END OF DAY	<u>FOOTAGE</u>	DRIL HOURS	LING SHIFTS	<u>DELAYS</u>	<u>FORMATION</u>
1972 April 18	4230			2	Drilling out of whipstock.	NQ Wireline 4230
19	4236	6	4	3	Change to coring bit.	p€pi cut by dike & masses of Tqm
20	4295	59	24	3		4276-4289 Fault
21	4327	32	13	2	Tripping; bit change (97').	Tạm
22	4335	8	9	2	Tripping; bit change (8')	4320
23						
24	4373	38	16	3	합니다. 100 100 전체 (1912년 1월 12일 12일 12일 12일 12일 12일 12일 12일 12일 12일 12일 12일 12일 12일 12일 12일	
25	4391	18	9	3	Tripping; bit change (47'); survey	
26	4415	24	11	3	Survey; tripping; bit change (33')	p€pi with dike and
27	4465	50	20	3	Tripping.	masses of Tqm
28	4514	49	24	3		
29	4526	12	5	3	Tripping; bit change (104').	
30						
May 1	4569	43	22	3	Tripping; bit change (50').	
2	4600	31	14-1/2	3		
3	4617	17	12	3	Tripping; bit change (40').	4613 -4622 Fault

4	4641	24	12	3	Tripping; bit change (32').	
5	4701	60	24	3		
6	4717	16	9	3	Tripping; bit change (67').	
7					[편집] [편집] : 전경 : 이 보는 이 경기를 보는 것이다. [편집] : [집] : [\Lambda]	
8	4726	9	6	3		Epi cut by dikes nd masses of Tqm
9	4747	21	13	3	Tripping; bit change (21').	
10	4778	31	16	3	Tripping; bit change (40').	
11	4817	39	21	3	Rig repair.	: 2 % . ]
12	4865	48	24	3	마하마 등에 된 이 경우 등이 있는데, 이 기가 있는데 그는데 하는데 이 기가 하게 되는 기가 있다. 이 기가 있는데 그 가는데 되지 않는데, 이 기가 있다.	
13	4875	10	1-1/2	2	Tripping; bit change (97').	
14					200일 : 100 : 100 : 100 : 100 : 100 : 100 : 100 : 100 : 100 : 100 : 100 : 100 : 100 : 100 : 100 : 100 : 100 : 1 100 : 100 : 100 : 100 : 100 : 100 : 100 : 100 : 100 : 100 : 100 : 100 : 100 : 100 : 100 : 100 : 100 : 100 : 100	
15	4877	2		3	Tripping; added new light-weight rods (1000').	
16	4895	18	8	3	Split pipe; tripping; recovered rods.	
17	4940	45	20-1/2	3	Stuck rods.	
18	4940			3	Stuck rods; hole abandoned. 818 feet of NQ(NX) rods and core barrel lost.	4940

### DRILL HOLE A-2W, CORING

Drilling time, by footage brackets, including down time.

DEPTH	SIZE	SHIFTS	DAYS FOOTAG	GE FT/SHIFT	TROUBLES
4230-4514	NQ (NX)	25	9 284	11.4	4 bit changes.
4514-4940	NQ(NX)	<u>47</u>	<u>16</u> <u>426</u>	<u>_9.1</u>	8 bit changes; equip.
Total	<b>s</b>	72	25 710	9.9 average	repair; stuck rods. Lost core barrel and 818 feet of rods.

ROCK UNIT	INTERVAL	SHIFTS 7	TO DEPTH	FOOTAGE	FT/SHIFT
Q. Monzonite 74%, P. Schist 26%	4230-4327	8	4327	97	12.1
P. Schist 89%, Q. Monzonite 11%	4327-4465	14	4465	138	9.9
P. Schist 53%, Q.Monzonite 47%	4465-4569	9	4569	104	11.6
P. Schist 82%, Q.Monzonite 18%	4569-4865	30	4765	296	9.9
Q. Monzonite 73%, P. Schist 27%	4865-4940	11	4940	<u>.75</u>	6.8
Totals		72		710	9.9 average

### AMERICAN SMELTING AND REFINING COMPANY Tucson Arizona

September 26, 1972

TO: W. L. Kurtz

FROM: J. D. Sell

Drill Hole A-2
Drilling and Cost Summary
Superior East Project
Pinal County, Arizona

Drill hole A-2 was rotary drilled from the surface to a depth of 4076 feet by Coffey Drilling Company using a Mayhew-3000 and high pressure air. Drilling commenced January 13, 1972 and terminated on February 7, 1972. Four-inch casing was set and cemented in preparation for coring operations.

Coring was commenced by Longyear Drilling Company using a truck mounted (TRK)-44 rig on March 4, 1972 and terminated coring on March 17, 1972 after coring from 4076 feet to 4521 feet, for a total of 445 feet using NQ wireline.

The core barrel stuck at the termination depth and recovery attempts were unsuccessful. The hole was abandoned on April 17, 1972 and a wedge (whipstock) set. (See report on drill hole A-2W for new hole below wedge.)

The hole diameter and depth intervals are as follows:

Hole Size Depth Int	erval Footage
15 inch 0-21	
8-3/4 inch 21-1863	
6-1/4 inch 1863-4076	feet 2213
NQ 4076-4521	feet 445

Casing, etc., remaining in the hole is as follows:

Casing Size	Depth l	nterval Rem	aining Fo	otage
10-3/4 inch		1-21 feet		21
¥ 10-3/4 inch 4 inch	ŏ	-4019 feet	4	019

Also lost and abandoned were 290 feet of NQ rods and a core barrel in the bottom of the hole.

+ also 7" fim surface & 1843'.

The cost breakdown of drilling A-2 is as follows:

	Rotary Dri Cost	11ing \$/ft	Core Dril Cost	ling \$/ft.	Total Cost	\$/ft.
a) Direct Drilling	\$70,102.69	\$17.20	\$20,804.77	\$46.75	\$90,907.46	
b) Site Preparation	4,016.64 1.812.20	0.99 0.44	120.00 5,372.07	0.27 12.07	4,136.64 7,184.27	0.91 1.59
<ul><li>c) Sampling</li><li>d) Supervision</li></ul>	1,012.20	0,47	3,936.15	8.85	5,861.59	1.30
	\$77.856.97	\$19.10	\$30,232.99	\$67.94	\$108,089.96	\$23.91

See Drill Hole Summaries report dated October 1, 1971 for explanation of categories.

The high sampling cost during coring was incurred with the use of three full-time samplers for core catching security.

Drilling rate during rotary drilling was 66.8 feet per shift and during coring was 9.9 feet per shift.

James D. Sell

JDS:lad

### AMERICAN SMELTING AND REFINING COMPANY Tucson Arizona

September 26, 1972

TO: W. L. Kurtz

FROM: J. D. Sell

Drill Hole A-2W Drilling and Cost Summary Superior East Project Pinal County, Arizona

Drill hole A-2W was started from a wedge (whipstock) set in hole A-2 at a depth of 4230 feet. Coring commenced on April 19, 1972 and terminated on May 18, 1972 at a depth of 4940 feet. A total of 710 feet of NQ was cored for the hole. The hole was drilled by Longyear Drilling Company using the truck mounted (TRK)-44 machine used previously on hole A-2. The hole was terminated and abandoned with the loss of a stuck core barrel and rods.

In addition to the core barrel, 810 feet of NQ rods were lost in the A-2W portion of the hole. Also lost in the upper portion (A-2 area) were 1130 feet of NQ casing (from 2949-4079 feet), 4019 feet of 4-inch casing (from 0-4019 feet), and 21 feet of 10-3/4-inch casing (from 0-21 feet). The last two items were originally left in hole A-2 and remained upon abandonment of hole A-2W.

The cost breakdown of the coring in A-2W is as follows:

	Core Dril	<u>ling</u>
	Cost	\$/ft.
a) Direct Drilling	\$12,797.63	\$18.02
b) Site Preparation	160.00	0.23
c) Sampling	4,018.75	5.66
d) Supervision	1,675.16	2.36
Totals	\$18,651.54	\$26.27

See Drill Hole Summaries report dated October 1, 1971 for explanation of the categories.

Core rate for A-2W was 9.9 feet per shift.

James W. Sell

JDS: lad

### AMERICAN SMELTING AND REFINING COMPANY Tucson Arizona

September 26, 1972

TO: W. L. Kurtz

FROM: J. D. Sell

Drill Hole DCA-1A
Drilling and Cost Summary
Superior East Project
Pinal County, Arizona

Drill hole DCA-1A was a reentry into the previously drilled DCA-1 hole of the Miami Copper-Superior Oil joint venture.

ASARCO cleaned the hole with a churn drill and set four-inch stabilized casing to the depth of 4002 feet. Coring with a CP-50 rig using NX wireline commenced on November 17, 1971 and terminated on February 9, 1972 at a depth of 5813 feet, for a total of 1811 cored feet.

No casing was recovered upon termination of the hole.

The cost breakdown of DCA-IA is as follows:

	Clean-out Cost \$/ft.	Core Drilling Cost \$/ft.	Total Cost \$/ft.*
a)Direct Drilling	\$13,812.77 \$3.45	\$73,351.62 \$40.50	\$87,164.39 \$48.13
b)Site Preparation		1,598.56 0.88	1,598.56 0.88
c)Sampling	860.00 <u>0.21</u>	609.64 0.34	609.64 0.34
d)Supervision		_5,531.69 3.05	6,391.69 3.53
Totals	\$14,672.77 \$3.67	\$81,091.51 \$44.77	\$95,764.28 \$52.88*

\*Cost per foot based on cored footage.

See Drill Hole Summaries report dated October 1, 1971 for explanation of categories.

Drilling rate during the core drilling averaged 9.8 feet per shift.

James D. Sell

JDS: lad

## AMERICAN SMELTING AND REFINING COMPANY Tucson Arizona

September 28, 1972

TO: W. L. Kurtz

FROM: J. D. Sell

Cost Summary as of September 1, 1972 Superior East Project Pinal County, Arizona

This report summarizes the authorization expenditures of the Superior East Project from mid-1970 to September 1, 1972. The report will supplement the detailed drilling expenditure report in preparation by H. L. Crittendon.

Five authorizations have been secured for the Superior East Project, as shown in Table 1. As of September 1, 1972 unexpended funds of \$8,129.77 were remaining from a total authorization of \$800,000.00.

TABLE 1 -- Authorizations and Expenditures

Number	Authorized	Expended	Unexpended (9-1-72)	
MA-0010	\$ 45,000.00	\$ 45,000.00	Zero	
MA-0010-01	31,000.00	31,000.00	Zero	
MA-0010-02	55,000.00	55.000.00	Zero	
MA-0010-03	260,000.00	260,000.00	Zero	
MA-0010-04	409,000.00	400,870.23	\$8,129.77	
Totals	\$800,000.00	\$791,870.23	\$8,129,77	

The first three authorizations were essentially for land acquisition, geologic studies, and related costs. The last two were essentially drilling phase authorizations with some drilling being accomplished on authorization -02.

Individual Drill Hole Summaries have been submitted on all the holes drilled to date. The figures reported are not final as some belated costs (refund on casing, drill bits, etc.) have been incurred. Similarly, the costs reported will vary somewhat from those reported for direct drilling costs in H. L. Crittendon's report.

In an attempt to relate total expenditures on the project to those incurred during the drilling phase (authorizations -03 and -04), Table 2 has been compiled along the categories given in the individual Drill Hole Summaries.

TABLE 2 - Costs by Categories

	Drill H	Total Project Costs	
<u>Category</u>	Individual Accounts	Accounting Authorizations -03 ε -04	All Authorizations
Drill Hole Segment a) Direct Drilling b) Site Preparation c) Sampling d) Supervision Subtotal	\$534,628.17 18,578.32 22,319.77 36,811.49 (612,337.75)	\$549,495.00 16,932.02 18,541.06* 1,979.88*	\$599,961.51 33,087.84 25,529.28* 2,285.67*
Project Segment A) Administration B) Miscellaneous Subtotal	26,860.16 39,343.79 (66,203.95)	11,094.49* 13,398.53	17,267.96* 42,850.63
PA+c+d(extra)** PA+c+d(total)	 (85,991.42)	49,429.29** (81,044.72)	70,887.34** (115,970.25)
TOTALS	\$678,541.70	\$660,870.27	\$791,870.23

\*These figures recorded by accounting office. However, they do not reflect total cost applicable to the category -- the additional costs were consolidated by the accounting office and are here recorded under the PA+c+d(extra)\*\* category. The individual figures (\*) plus the extra (\*\*) have been totaled in category PA+c+d(total) for comparative purposes.

The slightly lower total under authorizations -03 and -04 is a reflection of the work done under -02 authorization and charged to the individual accounts.

Table 3 is a compilation summary of the individual drill hole records with some correction from the original submitted. The table is compiled in the order of drilling sequence for the holes. The categories are the same as in Table 2. Rotary drilling is (R) while core drilling activities are (C) after the drill hole number.

TABLE 3 - Individual Drill Hole Categories and Costs

### Drill Hole Number (Activity) (footage)

Category	Cost	Subtotal	<u>\$/ft.</u>	Total	<u>\$/ft.</u>
a) b)	(2402 feet)* \$3,541.30				
c) d) (2402 fee	620.00 t)	\$ 4,161.30	\$ 1.73		
a) b) c)	(2920 feet) \$82,238.40 648.41 3,048.64				
d) (2920 fee (2920 fee		91,905.56	31.47	\$96,066.86	\$32.90

\*Drill hole originally rotaried to depth of 2402 feet and cased with 3-1/2" casing. ASARCO removed the 3-1/2" and installed 4" casing. The casing costs are reflected under the Rotary activities. Total cost per foot includes the rotary costs, but is calculated on the cored footage.

DIR.

```
TABLE 3 - Continued
A-4 (R) (3593 feet)
             $67,845.78
   a)
              2,873.29
   b)
               3,756.95
   c)
   d)
              5,105.73
                            $79,581.75
(3593 feet)
                                            $22.15
A-4 (C) (3071 feet)
             $95,638.17
   a)
   b)
                 267.75
   c)
               1,647.60
   d)
              5,122.20
(3071 feet)
                             102,675.72
                                             33.43
(6664 feet)
                                                       $182,257.47 $27.35
A-5 (R) (3145 feet)
              $46,045.28
   a)
   b)
                5,789.00
   c)
                  191.31
                1.811.07
(3145 feet)
                            $53,836.66
                                            $17.12
A-5 (C) (None)
   a)
   b)
                 203.75
   c)
   d)
(None)
                                 203.75
(3145 feet)
                                                       $ 54,040.41
                                                                       $17.18
DCA-3A (R) (485 feet)
              $1,550.25
   b)
                 725.00
   c)
   d)
                 100.00
(485 feet)
                                             $ 4.90
                            $ 2,375.25
                                                                       $ 4.90
(485 feet)
                                                       $ 2,375.25
DCA-1A (R) (4002 feet)*
              $13,812.77
   a)
   b)
   c)
   d)
                  860.00
(4002 feet)
                            $14,672.77
```

\$ 3.67

### TABLE 3 - Continued

\*Drill hole originally rotaried to depth of 4002 feet. ASARCO cleaned the hole and installed casing as reflected under Rotary costs. Total cost per foot includes rotary costs, but is calculated on the cored footage.

Taking the above Table 3 footages and costs, a subtotal is calculated in Table 3a. (Subtotal cost in Table 2, Individual Accounts)

TABLE 3a - Subtotal for all drill holes:

Footage		Cost		\$/ft.
22,385 fe	et	\$612,33	7.75	\$27.35

Project costs applicable to the same period and activities were subtotaled in Table 2, Individual Accounts. A subtotal of these accounts is given in Table 3b.

TABLE 3b - Project Costs and Footage

Project	Segments	Costs	Sub	total	<u>\$/f</u>	<u>t.</u>
Α		\$26,860.16				
В		39,343.79				~
(22,385	feet)		<b>\$66</b> ,	203.95	\$2.	.96

Table 4 summarizes the individual accounts for the total drill holes and project costs incurred during the Drilling Phase.

TABLE 4 - Summary: Drilling Phase

Segment Footage Costs	\$/ft. Costs \$/ft.
Drill Holes 22,385 \$612,337	7.75 \$27.35
Project 66,20	
TOTAL	\$678,541.70 \$30.31

Table 5 was prepared from the breakdown of figures in Table 2 (Individual Accounts) to show the percentages of the total expenditures during the drilling phase as charged to direct drilling, field overhead, and project segment.

TABLE 5 - Percentage of Individual Accounts Costs (Drilling Phase)

Segment	Percentage
Direct Drilling (a) \$534,628.17	78.79%
Field Overhead (b,c,d) 77,709.58	11.45
Project (A,B) <u>66,203.95</u>	<u>9.76</u>
TOTAL \$678,541.70	100.00%

Tables 3 through 5 were compiled from figures on individual drill holes during the drilling phase from records of the exploration department. These figures are reproduced in Table 2 under Individual Accounts (first column of numbers). The second column of numbers in Table 2 are the accounting department figures for approximately the same time. The third column is the accounting department figures over the total authorization expenditures for the project.

For a more accurate and comparative examination of costs distributed in the various categories, it is necessary to assign costs for categories "c", "d", and "PA", as the accounting department did not separate the various charges as did the exploration department. For the assignment I have compiled the

PA+c+d (total) figures for figure columns one and three of Table 2 (\$85,991.42 and \$115,970.25, respectively). Then, using the figure one column (individual accounts) ratios of c/(PA+c+d, total), d/(PA+c+d, total), and PA/(PA+c+d, total) and applying these ratios against the PA+c+d (total) of figure column three (Total Project) the appropriate figures for c, d, and PA could be assigned for figure column three (Total Project).

Using the above modified figures, Table 6 is compiled showing the modified total costs of the authorized expenditures and the related cost per foot.

TABLE 6 - Modified Total Project Costs of All Authorizations

Category	Subtotal	\$/ft.	Total	\$/ft.
Drill Hole Segment				
a) \$599,961.51				
b) 33,087.84				
c) 30,101.01				
d) 49,644.93				
(22,385 feet)	\$712,795.29	\$31.84		
Project Segment				
A \$ 36,224.31				
B 42,850.63				
시키 방 변경이 하고 있는 글로 모르다	79,074.94	3.53		
(22,385 feet)			\$791,870.23	\$35.38

Table 7 was prepared from the breakdown of the figures in Table 6 (Modified Total Project Costs) to show the percentage of the total expenditures during all authorizations as charged to direct drilling, field overhead, and project segment.

TABLE 7 - Percentage of Total Authorization Costs of Project

Segment	Cost Percentage
Direct Drilling (a)	\$599,961.51 75.77%
Field Overhead (b,c,d)	112,833.78
Project (A,B)	79,074.94 9.98
TOTAL	\$791,870.23

Comparison of the percentages as shown in Table 5 and Table 7 suggests that the direct drilling costs have been between 75 and 78 percent of the total costs of the Superior East Project.

- 8 -W. L. Kurtz September 28, 1972 In a more detailed breakdown of the direct costs incurred during the project, H. L. Crittendon will also compare this cost with the original contractor's bid. This will enable us to more realistically anticipate total drilling and related costs on a comparable project. James D. Sell JDS: lad cc: HLCrittendon

CPY for 215

AMERICAN SMELTING AND REFINING COMPANY Tucson Arizona

W. L. K.

January 22, 1973

TO: W. L. Kurtz

FROM: H. L. Crittendon

Rotary Drilling Report Bohme Project Gila County, Arizona

The following will be a general discussion of the rotary air drilling performed on the Bohme Project by Whatley Drilling Co. Cost breakdowns for direct drilling costs are given on the attached Drill Hole Summary Sheets. A brief discussion will be given regarding contractural and technical difficulties encountered in this project.

#### General

Two holes have been completed at depths of 1690 feet and 1988 feet. Rock types encountered are dacite capping and underlying Whitetail conglomerate. Both rocks are considered, in general, moderately competent air drilling formations but local sloughing and lost circulation can be present. Water present in the dacite is relating to fractures and the basal tuffaceous unit. Water present in the two holes drilled was noted as follows:

Depth En	countered (ft.	) [	Est. Volume	(gals./min.)
		•		
AH-1 23	0 - 250		20	-70
AH-2 55	0 and 620		- 14 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	25

A severe lost circulation zone is present in AH-2 above 400 ft. Static water level is at  $\pm$  450 ft.

The amount and location of the water present in the dacite has an effect on the drilling performance in the underlying Whitetail. As yet, no water influx has been noted in the Whitetail nor have lost circulation zones been present.

#### Sequence of Events -- AH-1

Hole drilled to 1690 feet without difficulties --

Some drag notice @ ± 1400 ft. but very little fill on connections --

Noticed increased drag and fill at 1690 ft. Blew hole 15 minutes while deciding to continue or come out of hole --

Pulled 5 joints with some difficulty, hammer plugged and pipe stuck solid -103-1/2 hours spent by Whatley recovering drill pipe. Operation required use of
four different hydraulic jars because of mechanical difficulty in jars.

Pipe almost certainly would have been retrieved immediately if first jar had worked properly. All in all, an excellent fishing job by Whatley considering difficulties present --

Re-entered hole and established definite cave zone at 1320 ft. in Whitetail.

Unable to penetrate and clean zone with air --

Cemented hole with 100 sacks of cement. Re-cemented with 40 sacks, unable to penetrate cave zone --

Mixed mud and washed to bottom with some difficulty. Hole not clean but decision made to set casing --

Washed casing to bottom with ± 30 fill present --

Casing came unscrewed while setting last joint. Pumped cement and plug down before it was known that casing had unscrewed --

Screwed casing back in with rotary table. Unable to pump plug down, casing pressured up.

### Sequence of Events -- AH-2

Broken zone encountered in dacite at ± 350, some lost circulation noted -- Hole cemented with 10 sacks Cal-Seal, apparently successful -- Second sloughing zone encountered at 390 ft. Cemented with 15 sacks cement -- First water encountered at 550 feet --

Hole continued successfully to 1028 --

Hammer bit broke in hole. Not possible to retrieve bit but able to reach bottom with tap --

Possible fault zone with abundant soapstone noted, probably at ± 760 feet -- Two plug-back cement jobs at 420 ft. and 760 ft. --

Bit retrieved. Hole appeared to be in shape to continue drilling. As a precautionary measure it was decided to cement hole --

Hole cemented with 200 sacks cement (plug-back @ 420 ft.). Cement reached to 30 ft. from surface --

Hole deviated at 115 ft., probably due to dog-leg --

Drilled to 795 ft. Dacite cave coming from 320-390 feet --

Hole cemented with 100 sacks cement --

Completed hole to 1988 ft. with minimal difficulties but some dacite cave still present --

Set casing on bottom, washed bottom 20 feet --

Cemented casing and dropped plug. Pressure of plug on impact apparently caused casing to burst, unable to build up pressure in casing --

Re-cemented and dropped second cement plug, no pressure build-up but casing still intact.

#### Contractural Difficulties

In hole AH-1 the contractor would not be responsible for cleaning the hole after freeing stuck drill pipe and, in effect, would not honor the cement clause in the drilling agreement. Hole difficulties were definitely compounded by the fishing operation. It is felt that the contractor should not revert to an hourly rate at his option because adverse drilling conditions are present in a

footage drilling contract, especially when the difficulties are circumstantial and a large part of his own making. Contractor should leave the hole in condition such that casing may be set with a reasonable chance that casing can be set on bottom before going on hourly rates. Conversely, it is not felt that the contractor should be held to an obviously undrillable condition, and that casing should be set or some other reasonable alterative if drilling ahead would be dangerous or excessively expensive for the contractor.

Contractural difficulties in AH-2 were first presented in the interpretation of hourly charges after fishing commenced for the broken hammer bit. The question is should ASARCO be responsible for conditioning (cementing) the hole to the point of being absolutely clean in order to retrieve a broken bit in the hole? A very slight amount of cave present might prevent the bit from being fished out. Also, in the case of the deviated hole -- should ASARCO be responsible? This is a very difficult point and subject to interpretation. In most standard footage contracts the company assumes all responsibility and consequences for work done on an hourly rate which the company requests such as coring, casing, surveying, etc. In the case of Whatley's cement job, it was done at contractor's request. The techniques, materials, etc. were all his responsibility. It was also made known that there was a severe dog-leg where the hole had deviated, very likely caused by not putting a collar behind the hammer tool. It can be argued whether mistakes were indeed made (difference of opinion) or even if ASARCO should be responsible for obvious errors (other than gross or deliberate) when on an hourly basis.

Considerable difficulties were also presented in the interpretation of Whatley's loosely worded drilling agreement. This agreement states that ASARCO pays for cementing and drilling of cement with no charge for waiting on cement to set up. My interpretation of this would define cementing as the cementing operation only. In practice, however, innumerable delays are incurred, mostly because of lack of planning. If contractor wants an all-inclusive hourly operation for cementing he should make this plain in his proposal, otherwise a strict interpretation of cementing time should be used.

To avoid these difficulties in the future, although these particular difficulties are not likely to be repeated, I cannot offer any radically different approach to the problem. I do not believe that turn-key contracts would be applicable or fair on the dacite plateau. I do believe in a strict interpretation of hourly charges, I also believe that ASARCO's field representative should take responsibility of specifying procedures of casing, coring, and other hourly work and be responsible for the consequences. If ASARCO has to be responsible for cementing or hole conditioning, I believe ASARCO should specify materials and techniques. Under this type of arrangement ASARCO could be responsible for the loss of a hole. Using proven procedures, however, I believe the danger of completely losing a hole are remote. It is possible that a hole can collapse and that casing cannot be washed to bottom. Using 4 inch 1D casing, however, the hole can probably be salvaged by setting NX casing through the 4 inch.

#### Techniques

After reviewing hole conditions of the Superior East and Bohme projects, I believe certain general procedures should be followed. Although more risky, air drilling is preferred over mud drilling due to the savings that can be made in time and materials. The following practices are considered applicable to the Dacite Plateau drilling and reflect some of the problems encountered thusfar.

- 1) Hole should be commenced with a ± 9-inch diameter hole and used API 7-inch casing set to seal of water, cave, and lost circulation zones in the dacite. Hole should be continued with 6-6-1/4-inch diameter and 4-inch ID casing set due to geological or drilling conditions.
- 2) Cement jobs should be used judiciously when necessary. Plug-back cement should require close supervision.
- 3) Cement should be Portland Cement Type III with a 2-3% addition of powdered CaCl<sub>2</sub>. In hot weather temperature should be watched closely.
- 4) Float shoes and cement plugs should be used in setting casing. Pressure should be watched closely when setting cement plug and pop-off valve set accordingly. Centralizers should be set in the 7-inch casing every 100-200 feet.
- 5) Thread lock compound should be used on 4-inch casing and casing stretched with approximate weight of casing and welded to surface pipe. Thread lock should not be used if there is danger of having to pull casing.
- 6) A rotating kelley packer (air-head) should be used. Preferably with a square kelley.
- 7) Casing depth should be determined by a strapped measurement and joints counted by ASARCO representative.
- 8) Contractor's invoices from third parties should be included in his billing with mark-up attached. Excluding mud and cement.

### Future Drilling

Two techniques which appear to have much promise for drilling in the Dacite Plateau area are:

1) Aerated mud drilling -- can be used under more severe hole conditions than straight air. Would require experienced crews and acceptable equipment.

2) Use of 3-5/8-4-inch diameter Mission hammer to continue air drilling through 4-inch casing. NX drilling can continue drilling or NX casing set to bottom for later diamond drilling.

### Cost Summary

The attached Hole Summary Sheets are self-explanatory.

H. L. Crittendon

Howard Cuttendon

HLC:1b

Attachs.

#### DRILL HOLE SUMMARY SHEET Hole no. AH-1 \_\_\_\_\_\_ Date started 10/25/72 Total depth 1690 Contractor WHATLEY DRILLING Co Date completed 11/12/72 Total footage 1690 MATERIALS & SERVICES TIME DISTRIBUTION Hrs. Charge Non-Charae 14, 473 .10 Drilling 73 WHATLEY DRILLING 12 1/2 SW PIPE & SUPPLY ズ, フラク 13 Move & Set-up DOWELL 9/ .75 Tripping 16 .7/ Stand by GLOBE HARDWARE 27 1/2 46.81 Repairs GILS COMPRESSOR SWARTZ LUMBER 1.00 -Spot core 103 1/2 MISC Fishing Casing & Casing WOC WOC Condition Hole Misc. delays 17618.50 Total 10 42 Total Est.Cost /ft. CORE FOOTAGE ROTARY FOOTAGE CASING Size From From To Recov. Size Casing set Casing pulled 83/4 201 20 711 0 411 1690 16901 20 DIRECT COST BREAKDOWN MATERIALS BREAKDOWN ltem item Contractor Operator Cost/ft Quantity Amount Footage 11.675 6:10 MISC MUD MATERIALS 746.27 516.04 Casing 2 730.13 162 CEMENT Mud 146.27 Bits Misc. Materials 125 425-Drilling (Hrly.) Casing, WOC (Hrly.) 280-.16 Cementing,WOC (Hrly.) 300 Moving (Hrly.) Misc. Delays (Hrly.) 850:-Condition Hole .52 (Hrly.) Misc. Services 112.50 07 Contractor Services CEMENT 516.04 130 EQUIPMENT USED ESTIMATED FOOTAGE / BIT GD "2000" From To Aver. 11. 1 2500 Aver. ft. Drillers: CLARK, SANDERS From To Aver. ft. From Τo Drill pipe: 27/8" ALUMINUM EST. ON-BOTTOM PENETRATION RATE Compressors: GD. WEN, GD. WES, GD Beaster ft/Shr shift /36 To From 1690 Bits: GAULT From 41./10. 1/2 min/St To . 1670 1.R MODEL 16 DOWN-HOLE HAMMER From To ft./hr.

From

From

To

To

To

EST. INCLUSIVE PENETRATION RATE

ft./hr.

ft./hr.

ft./ahr.shift 54

Hole no. 1911-2		Date	started	11/15/	72	Tota	l depth_	1733	
Contractor 19/1/0		ING CO. Date						<u>-</u>	
MATERIALS & SI	ERVICES		Ti	ME DIST	राष्ट्रपा	ION Hr	6. Charg	je	Non-Charge
WHATLEY DRILL	ING (O.	22,598.							130
SIN PIPE & SL	PPLY	3,211		ve & Set-up					171/2
DOWELL		<del></del>		pping	<u>-</u>	· · · · · · · · · · · · · · · · · · ·			
GILS COMPRE	SOR	200		and by	<del></del>	· · · · · · · · · · · · · · · · · · ·	_		43 1/2
(11)	/	<del>1</del>		ot core	<del></del>				
			<del></del>	shing					10 1/2
				sing & Casin	g WOC				29
		<b></b>		oc			_		681/2
		<b>.</b>		ondition Hole					
			[5/1	isc. delays	<del></del>				44
	Total	26/21	44			····	<del>- </del>		
	Est.Cost /ft			otal					<del></del>
ROTARY FO	OTAGE	CORE	FOOT	AGE			CA	SING	
Size From	То	Size Fro	m To	Recov.		Casina		Size	Casing pulled
83/4 0	15				17		15		
6 1/4 15	1988				14	"   /7	188		
							<del> </del>		<u> </u>
					-				· · · · · · · · · · · · · · · · · · ·
DIRECT COST	Contractor Contractor		Cost /ft	Quantity	MA'		S BR	EAKDOW	Amount
Footage		13,910	7.00	4473	ks I	CRTLAI	V (EN	PENT	
Casing		3,211-	1.60				MUD	MATERIA	
Mud		546.21	27	<u> </u>		-CAM	- ,	at sites	967.5
Bits Misc. Materials		3// 75	.16	,	$-\mu \nu$	CHIELL	- 1201	71 5/1/0/	7/./.
Drilling (Hrly.)			1,7,8						
Cosing, WOC (Hrty.)	<b>)</b>	11990	2.51						
Cementing, WOC (Hrly.)		27,116							
Moving (Hrly.)	7 )								
Misc. Delays (Hrly.)									
Condition Hole (Hrly.)		<b> </b>		<del> </del>			<del></del>		
Misc. Services  Contractor Services		9250	.05						
CEMENT		1,132.46							
FOAM		961.50	49						
	ISED			ESTI	MATE	D FOC	TAGE	/ EIT	
Fig: G.D "2000				From		То			#2500
Drillers: CLARK	SANDER	\$		From		То		Aver ft.	
Collors:	O Lucaso	1111		From		То		Aver. ft.	
Drill pipe: 27/5" Compressors:	ALVANN	oni		EST. C	N-BC	MOTTO	PENE	TRATION	1 RATE
Fumps:			<del></del>	From	0	То	1988	fi./Shr.	shift /7 3
Bits: GALLT				···	9	To /	958		+ 1.5 min/1
1-R MODEL	-16 Den1	V. HOLE HO	201081	From		To		ft./hr.	
				Frem		То		O./hr.	
NOTE - ORIGIN	E DEVIAL	بنست المحالي والمستحد المحاليب	10 15/1	<u> </u>				TRATION	
AND WAS RE-	DRILLED	10 1958	11.	From	0	To	1788	1./6hi	r.shift 4:5.
				From		То		ft./hr.	

## TAB

AH-1

W. L. T. 1973

#### AMERICAN SMELTING AND REFINING COMPANY Tucson Arizona

February 15, 1973

TO: W. L. Kurtz

FROM: J. D. Sell

Daily Drill Data - Unit Contacts Drill Hole AH-1 Diamond Drilling, Boyles CP-50 Bohme-Coryell Project Gila County, Arizona

Attached is a daily log of the coring on drill hole AH-1. The information shown is the date, depth of hole at the end of the day, the footage cut during the day, the hours charged to drilling, the number of shifts involved, short comments on the delays involved, the geologic units and contact footages. The hole was cored NX for the total length.

Compiled from this daily data is a breakdown of the shifts and footage by a) depth bracket based on Boyles footage rate contract, and b) by geologic units encountered. Seiner D. Sell

James D. Sell

JDS:1b Attachs.

cc: HLCrittendon - w/attachs.

DRILL HOLE AH-1 CORING, CP-50 (NX Core by Boyles Brothers)
Nov. 25, 1972 to Feb. 6, 1973

DATE	DEPTH AT END OF DAY	FOOTAGE	DRII Hours	LING SHIFTS	DELAYS	FORMATION
11/25-28/72	1690			3	Setting up & mixing mud.	Whitetail Cgl.
29	1690			2	Completed set-up; cleaning hole.	1
30	1690		-	1	Cleaning hole.	
12/01/72	1695	5	6	2	8 hrs. cleaning hole; 2 hrs. equip. repair.	
02	1698	3	5	2	7 hrs. equip. repair.	
03						
04	1710	12	8-1/2	2	7-1/2 hrs. equip. repair; hole caving.	
05	1719	9	8	2	8 hrs. cementing.	
06	1719		-	3	24 hrs. cementing.	
. 07	1719		-	3	24 hrs. cleaning cement out.	
08	1773	54	24	3		
. 09	1783	10	4	3	20 hrs. cementing.	
10			• •			
11	1783			3	8 hrs. cleaning cement; casing parted; bit change; 12 hrs. casing work; 4 hrs. rig repair.	
12	1783		•	3	22 hrs. casing work; 2 hrs. rig repair.	
13	1783		-	3	24 hrs. casing work.	

14	1783			3	24 hrs. casing work; set NX casing.
15	1783			3	24 hrs. cementing casing.
16	1787	4	8	3	16 hrs. drilling cement.
17		••		•	
18	1863	76	21	3	3 hrs. equip. repair & mixing mud.
19	1943	80	22	3	2 hrs. pulling for bit change.
20	2020	77	22	3	2 hrs. for running in rods.
21	2081	61	18	3	6 hrs. for mislatch & bit change.
22	2153	72	20-1/2	3	3-1/2 hrs. equip. repair.
23	2183	30	8	3	16 hrs. cementing 1623-2000', caving ground.
24-25				_	
26	2183			3	24 hrs. drilling cement.
27	2183			3	9 hrs. drilling cement; 7 hrs. equip. repair; 8 hrs. pulling rods.
28	2243	60	23	3	1 hr. mixing mud.
29	2301	58	22	3	2 hrs. equip. repair.
30	2343	42	16	3	8 hrs. bit change, mix mud, equip. repair.
31				•	
1/01/73					
02	2440	97	24	3	
.03	2500	60	16	3	8 hrs. clean out mud pits, mix mud.
04	2593	93	24	3	

05	2652	59	14	3	6 hrs. bit change; 4 hrs. equip. repai	r.
06	2742	90	24	3		
07						
08	2810	68	18	3	6 hrs. equip. repair.	
09	2900	90	24	3	Latch broke, started pulling.	
10	2933	33	8-1/2	3	12 hrs. tripping bit change; 3-1/2 hrs equip. repair.	
11	3022	89	24	3		
12	3111	89	24	3		
13	3170	59	16	3	8 hrs. tripping for bit change.	
14						
15	3233	63	20	3	4 hrs. tripping & service rig.	
16	3321	88	22	3	2 hrs. equip. repair	Whitetail Cgl.
17	3393	72	24	3		(Coarse) 3390
18	3423	30	16	3	8 hrs. tripping (mislatch) bit change.	Whitetail Cgl. (Mudstone)
19	3473	50	15	3	2 hrs. equip. repair; 7 hrs. mislatch bit change.	
20 21	3533	60 	20	<b>3</b>	4 hrs. pulled rods into casing.	Whitetail Cgl. (Mudstone) 3539
						Escabrosa Limestone
22		-			First Aid Meeting.	

12-1/2 hrs. tripping bit change; 3-1/2 hrs. equip. repair.

8 hrs. running rods to bottom.

25	3623	35	16-1/2	<b>.</b> 3	7-1/2 hrs. tripping for bit change.
26	3657	34	17	3	7 hrs. tripping mislatch bit change.
27	3667	10	13	3	12 hrs. tripping mislatch bit change.  Escabrosa Limestone
28			•	•	3674 Martin Limestone
29	3686	19	12	3	10 hrs. tripping mislatch bit change; 2 hrs. equip. repair.
30	3713	27	11	3	10-1/2 hrs. tripping time; 2-1/2 hrs. surveying (deviation 3/4° from vertical).
31	3763	50	20	3	4 hrs. equip. repair.
2/01/73	3823	60	23	3	l hr. equip. repair.
02	3863*	40	16	2	Twisted off rods.
03-06				8	Cutting casing, pulling casing, rods, Martin Limestone moving to new drill site. 3863

\*Swing shift driller pulled on rods to break the core as he thought the core barrel was blocked at 3868 feet; however, the drill rods had twisted off but he was unaware of it as the weight indicator and water pressure gauge did not show much change. He then dropped the core barrel retriever down to pull the tube but the bottom broken ends of the rods were past the top of the lower broken rods and the retriever went into the open hole and became stuck by hanging up.

Hole was abandoned with 440 feet of NX drill rods plus 13-foot core barrel, tube, and bit (plus 5 feet of core) left from 3415 to 3868 feet. 286 feet of NX casing left from 1418 to 1704 feet. Overshot retriever and 600 feet of wireline cable lost at around 3415 feet.

DRILL HOLE AH-1

Drilling time by footage brackets, including down time (all NX coring).

Depth	Shifts	Days	Footage	Ft/Shift	Troubles
1690-1988	45	17	298	6.6	Casing parted; cementing; 2 bit changes.
1988-2500	31	10	512	16.5	Drilling cement; 2 bit changes.
2500-2992 2992-349 <b>3</b> 3493-3863	20 23 31	7 7 11	492 501 370	24.6 21.8 11.9	<pre>2 bit changes. 3 bit changes. 5 bit changes (mislatches)</pre>
1690-3863	150	52	2173	14.5 avera	ge

Rock Unit	Depth Shifts to Depth	Footage	Ft/Shift
Whitetail Cgl. (Coarse) Whitetail Cgl. (Mudstone) Escabrosa Limestone Martin Limestone	1690-3390     112     3393       3390-3539     10     3533       3539-3674     15     3676       3674-3863     13     3863	1703 140 143 187	15.2 14.0 9.5 14.4
	150	2173	14.5 average

### TAB

# ADF-1-5

AMERICAN SMELTING AND REFINING COMPANY Tucson Arizona

7. C. J.

April 17, 1973

FILE MEMORANDUM

Daily Drill Data - Unit Contacts
AOF (American Oak Flat) Series
Inspiration Consolidated Copper
Company
Rawhide Project Area
Pinal County, Arizona

Attached is the data secured from the drillers' logs of holes drilled by various contractors for ICC on their holes in the joint venture Rawhide Project area. Mr. Norm Whaley transcribed the drillers' notes into the present log form.

Table One lists the data on each hole based on the type of drill and the rock units encountered, with the size of the hole, the shifts, footage, and feet per shift.

Although each hole was apparently plagued with numerous problems, the rotary drilled holes progressed at a much higher foot-per-shift rate than did the diamond drill holes.

Junes D. Sell
James D. Sell

JDS:1b Attachs.

cc: HLCrittendon

TABLE ONE

Hole #	Drill Type	Rock Unit	Depth	Size	Shifts	to Depth	Footage	Ft/Shift	Remarks*
AOF-1	DDH	Dacite	0-1106	NCWL	77	1106	1106	14.4	
	DDH	Whitetail	1106-1524	NCWL	62	1524	418	6.7	
	DDH	Whitetail	1524-2939	NXWL	117	2939	1415	12.1	
	DDH	Diabase	2939-3150	NXWL	17	3150	211	12.4	Does not include 16
	DDH	Diabase	3150-3237	BXWL	7	3237	87	12.4	shifts of fishing.
	DDH	Schist	<u>3237-3475</u>	BXWL	35	<u>3475</u>	238	6.8	
	DDH To	tal	0-3475		315	3475	3475	11.0	
A0F-2	Rotary	Dacite	0-800	5''-4-3/4''	18	800	800	44.4	
	Rotary	Whitetail	800-1581	4-3/4"	42	1581	781	18.6	Some spot cores.
	Rotary	Subtotal	0-1581		60	1581	1581	26.4	
	DDH	Whitetail	1581-2993	NXWL	117	2993	1412	12.1	Does not include 23
	DDH Sub	total	1581-2993		117	2993	1412	12.1	shifts of fishing.
	Tota	Total			177	2993	2993	16.9	
AOF-3	Rotary	Dacite	0-122	No time in	formation	available	<b>:</b> .		

TABLE ONE - Cont'd.

Hole #	Drill Type	Rock Unit	Depth	Size	Shifts	to Depth	Footage	Ft/Shift	Remarks*
AOF-4	Rotary	Dacite	0-864	5-3/4"-5"	20	864	864	43.2	
	Rotary	Total	0-864		20	864	864	43.2	
A0F-5	Rotary	Dacite	0-1040	6-1/2"	14	1040	1040	74.3	
	Rotary	Whitetail	1040-1685	6-1/2"	32	1685	645	20.2	Does not include 25
	Rotary Whitetail 168	1685-1755	6-1/4"	<u>7</u>	1755	<u>70</u>	10.0	shifts for equip. change-over.	
	Rotary	Total	0-1755		53	1755	1 755	33.1	
Totals	of all dr	Illing:							*All drilling had
	Rotary	Td-Tw	1755		133		4200	31.6	numerous problems.
	DDH	Td-Tw-db-sc	3475		432		4887	11.3	

## TAB

AH-2

AMERICAN SMELTING AND REFINING COMPANY Tucson Arizona

April 25, 1973

TO: W. L. Kurtz

FROM: J. D. Sell

Daily Drill Data - Unit Contacts Drill Hole AH-2 Diamond Drilling, Boyles CP-50 Bohme-Coryell Project Gila County, Arizona

Attached is a daily log of the coring on drill hole AH-2. The information shown is the date, depth of hole at the end of the day, the footage cut during the day, the hours charged to drilling, the number of shifts involved, short comments on the delays involved, the geologic units, and contact footages. The hole was cored NX for the total length.

Compiled from this daily data is a breakdown of the shifts and footage by a) depth bracket based on Boyles footage rate contract, and b) by geologic units encountered.

James D. Sell

genes WSell

JDS:1b Attachs.

cc: HLCrittendon - w/attachs.

DRILL HOLE AH-2, CP-50 Rig Boyles Brothers; NX Coring Feb. 7, 1973 thru April 11, 1973

DATE	DEPTH AT END OF DAY	F00TAGE	DRIL HOURS	LING SHIFTS	<u>DELAYS</u>	FORMATION
	ley's measureme nt on top of co		depth wa	s 1988 fe	et; Boyles measured 1995 feet to botto	m of last plug with
<u>1973</u> Feb. 7	1995			2	16 hrs. moving & setting up.	Whitetail Cgl.
8	1995			2	16 hrs. moving & setting up.	$\uparrow$
9	1995			2	4 hrs. setting up; 4 hrs. running rods; first plug at 504; 8 hrs. drilling cement.	
10	1995			2	16 hrs. drilling cement & bottom	
11		<u></u>	<b></b>	<b>-</b>	plug.	
12	1995			2	8 hrs. cleaning; separated casing;	
13	2030	35	13	2	<pre>3 hrs. equip. repair. 4 hrs. mix mud &amp; pulling rods.</pre>	
14	2030		• • • • • • • • • • • • • • • • • • •	2	16 hrs. running NX casing to 1700'.	
15	2053	23	6-1/2	2	8 hrs. running NX casing to 2000'; 1-1/2 hrs. reaming to 2030; 2 hrs. lower rods and mixing mud.	
16	2112	59	16	2-1/4	2 hrs. equip. repair.	
17	2138	26	11	2	5 hrs. equip. repair and pulling for bit change.	
18			<b>-</b> -	•		
19		<b></b> -		-	Holiday.	

20	2233	95	24	3	이 되는 경험 중에 하는 것이 하는 것이 되는 것이 되었다. 19. 1일 전략 전략 전략 기계 기계 전략 기계 되었다.
21	2253	20	8	1	2 other shifts unable to get to rig rain, snow, and mud.
22	2323	70	19	3	5 hrs. bit change; mix mud.
23	2413	90	22	<b>3</b> .	2 hrs. tripping (mislatch); bit change.
24	2489	76	22	3	2 hrs. tripping in.
25				•	
26	2561	72	23	3	l hr. equip. repair.
27	2633	72	19-1/2	3	3-1/2 hrs. tripping bit change; 1 hr. mud mix.
28	2722	89	24	3	
Mar. 1	2790	68	18	3	3-1/2 hrs. tripping bit change; 2-1/2 hrs. equip. repair.
2	2868	78	22	3	2 hrs. equip. repair.
3	2921	53	19	. 3	5 hrs. tripping for bit change.
4			<u> </u>	-	
5	2997	76	24	3	
6	3083	86	24	3	
7	3133	50	15	3	<pre>2 hrs. tripping bit change; 3 hrs. equip. repair; 4 hrs. broken water swivel repair.</pre>
8	3163	30	10	2	6 hrs. tripping; hung tube.
9	3262	99	24	3	
10	3342	80	23	3	l hr. pulling rods up off bottom.
u					

12	3346	4	6	3	<pre>16 hrs. hauling fuel; broke wireline,etc. 2 hrs. pulling for bit change. Snow.</pre>	
13	3348	2	4	2 .	12 hrs. running rods; cave. Snow.	
14	3348			•	Snow; unable to get to work.	
15	3348			3	24 hrs. cementing (5 sacks); cleaning out.	
16	3348			3	24 hrs. cleaning cement or waiting.	
17	3348			3	24 hrs. cleaning; placing 5 sacks cement.	
18		<b></b>	•••	- 1.		
19	3348	- <u>-</u> -		3	24 hrs. cleaning; squeeze w/Geoseal.	
20	3373	25	10	3	8 hrs. washing; 6 hrs. tripping; bit change.	
21	3393	20	12	3	4 hrs. problems; 8 hrs. tripping; bit Whitet	ail Cgl. 400
22	3430	37	16	3		osa Lms.
23	3430	<b></b>		2	16 hrs. tripping rods; other shift not working.	
24	3454	24	16.	3	8 hrs. bit change; tripping in.	
25				<u>-</u>		
26	3500	46	16	3	8 hrs. change oil etc.; going back to bottom.	
27	3533	33	16	3	8 hrs. bit change; reamed last 50 feet.	
28	3583	50	24	3	Slow going; heavy snow. Escabr	osa Lms. 90
29	3603	20	8	3		n Lms.
30	3654	51	24	3	Torquing up.	

31	3683	29	15	3	1 hr. equip. repair; 8 hrs. tripping bit change.	
Apr. 1			<u></u> -	_	Change of lead driller from Robinson to Kokko.	
2	3710	27	24	3	Reamed 90 feet with new bit.	
<b>3</b>	3749	39	16	3	8 hrs. tripping - bit change.	
4	3762	13	10	2	6 hrs. tripping - bit change; 8 hrs. shift not working.	
5	3768	6	10	3	14 hrs. running & reaming new bit to bottom	↓ Martin Lms.
6	3781	13	12	3	12 hrs. pulling for 2 bit changes, reaming, etc.	3770 Dripping Spring
7	3781		•	2	16 hrs. pulling for bit change; 8 hours. shift not working.	Quartzite
8	<b></b>			•		
9	3781			3	24 hrs. drilling cave to 3440; pulling bit change.	
10	3781	Terminat	ion of h	ole.	11 hrs. breaking rods; 13 hrs. pulling casing.	
11				3	18 hrs. pulling casing; 6 hrs. loading rods.	Dripping Spring Quartzite

All rods and casing pulled. Surface casing left: 15 feet of 7 inch.

DRILL HOLE AH-2

Drilling time by footage brackets, including down time.

Depth	Shifts	Days	Footage	Ft/Shift	Troubles
1995-2510	26	11	515	19.8	Casing parted, cementing; 2 bit changes.
2510-2997	20	7	487	24.4	3 bit changes.
2997-3500	48	18	503	10.5	5 bit changes; cave; snow.
3500-3781	34	12	281	8.3	9 bit changes; cave; snow.
1995-3781	128	48	1786	13.2 ave	rage

Rock Unit	Depth	Shifts	to Depth	Footage	Ft/Shift
Whitetail Cgl. (Coarse)	1995-2937	44	2940	945	21.5
Whitetail Cgl. (Mudstone)	2937-3400	40	3415	475	11.9
Escabrosa Limestone	3400-3590	18	3583	168	9.3
Martin Limestone	3590-3770	18	3768	185	10.3
Dripping Spring Qtzite.	3770-3781	8	3781	13	1.6
	1995-3781	128		1786	13.2 average

### AMERICAN SMELTING AND REFINING COMPANY Tucson Arizona

May 4, 1973

TO: W. L. Kurtz

FROM: H. L. Crittendon

Drilling Report Bohme Project

#### COSTS

Enclosed are Drill Hole Summary Sheets with diamond drilling cost data contained. Direct drilling costs for rotary drilling were previously given in my report to you dated January 22, 1973.

Aggregate direct drilling costs for the two holes drilled on the Bohme Project are given below:

AH-1 ---- T.D. 3863 ft.

	Rotary	Diamond
Footage Cost Cost/ft.	1691 ft. \$17,619 \$10.42	2172 ft. \$45,123 \$20.77
Total Cost Cost/ft.	\$62,742 \$16.24	

AH-2 --- T.D. 3781 ft.

	Rotary	Diamond
Footage Cost Cost/ft.	1995 ft. \$26,121 \$13.14	1786 ft. \$35,975 \$20.14
Total Cost Cost/ft.	\$62,096 \$16.42	

Total Direct Drilling Cost - Project	\$124,838
Total Footage	7,644 ft.
Direct Drilling Cost/ft Project	\$16.33

#### Discussion -- Diamond Drilling

Tabulations of diamond drill log data were given to you in memos by J. D. Sell on February 15th and April 25th, which broke down penetration rates on a rock-type basis.

AH-1 -- The major difficulty in this hole was caused by lost circulation and cave as a result of the 4-inch casing not being cemented at bottom. The 4-inch casing later parted creating more difficulty. In retrospect, had the NX casing been set through the 4" casing at the beginning, most of the problems encountered would not have happened.

The hole was bottomed after a twist-off occurred 440 feet above the bottom of the hole. There was an apparent wash-out at the point of the twist-off.

A single bore-hole survey reading was taken at 3600; the hole was inclined  $3/4^{\circ}$  in a S55°E direction at that depth.

AH-2 -- Due to a <u>split</u> in the 4-inch casing at roughly 550 ft., it was necessary to case the hole with NX casing to obtain circulation. Circulation was lost at 2780 ft. and only partial returns were obtained to TD. Mud and additive costs for AH-2 were roughly three times that of AH-1.

Caving mudstone below 2900 ft. required cementing, which was largely ineffective and added greatly to the non-productive cost. Broken quartzite below 3770 ft. plus caving from the mudstone above made continuation of the hole impossible without further cementing or hole conditioning. Four bits were destroyed in the cave without reaching bottom. In the last attempt the bit failed to penetrate a cave zone in the mudstone at 3440 ft.

The hole was not surveyed.

#### Recommendations for Future Drilling

A study of the attached cost breakdown reveals where non-productive costs occurred and where to put emphasis on future drilling. Roughly 25% of the diamond drilling costs could conceivably have been avoided. The two major factors in non-productive costs were the unscrewing and splitting of the 4-inch casing and ineffective cement jobs on the diamond drill.

The use of the 4-inch casing was a positive factor, allowing the continuation of NX hole after the parting and splitting of the 4-inch casing.

I believe the following procedures will alleviate some of the problems encountered in this area:

- 1) Rotary holes should be as deep as possible and should be started with a large diameter hole (8 to 9 inches). This will take advantage of the cheaper rotary drilling and possibly alleviate problems in the diamond drilling.
- 2) Thread lock compound should be used on the four-inch casing.
- 3) Diamond drilling cement procedures should be and can be improved upon.

Howard Cittendon
H. L. Crittendon

HLC:1b Encs. cc: JDSe11

· D	RILL	HO	LE	SI	UM		RY	SHE	ET		
Hole no. ##-1			Date	starte	d			Total d	enth	3863	
Contractor_13041	FS BRU	٠ς .	Date	∞mple	ted	2/61	7.3	Total fo	otage	2/72	
MATERIALS & SE	RVICES			1	IME	DISTRI	BUTIO	N Hrs.	Charge		Non-Charge
BUYLES	NOU 72			760							
	DEC 72			.45 N					· · ·		
	JAN 73			.55T							
WATER TRUCK PRO-	FEB 73	1 2.		. \2 R		у			<del></del>		
EASTMAN OIL W				· - s		re					
BRYANT (ON	ST. (est.)		200	F	ishing						
						& Casing	wo <b>c</b>				
					/OC		· · · · · · · · · · · · · · · · · · ·				· · · · · · · · · · · · · · · · · · ·
						on Hole					
				-   6	lisc. de	iuys					
	Total	115	12	<del>,                                    </del>			·				
	Est.Cost /ft.			<u>, 77 ) 1</u>	otal						
ROTARY FOO	TAGE	CO		FOO			T T		CASI		
Size From	То	Size	From				Size	Cosing se	1	<del></del>	Cosing pulled
		NX	16	91	3863	ļ				911	<u> </u>
	1	ļ	-			<b> </b>	1/X	170	4	NX	1418
	-	<del> </del>		<del></del> -	· · · · · · · · · · · · · · · · · · ·						
		<del> </del>	+			<del> </del>		-			
DIDECT COCT 6	225 14204	/81				<del></del>	BAATE	DIALC	DC=4	WDO!!	
DIRECT COST E	MARIOUN	114					MAIL	RIALS	E116	KOON	N
and the second s	Contractor	िperator		Cost /f		entity		lt c			Amount
Foctoge		25,3		13.0		115 sks			citch	#2_	764
Casing Mud		2,4	•	1.1		5 SK			14V	1.5	309
Bits		1/1	73		4_	<del></del>		ment isc Mu			
Misc. Materials					-		1	130 MG	<u>U_170</u> 1	ALLINE?	322
Drilling (Hrly.)						2861	NX	CASING	LEFT	IN HOL	E)
Casing, WOC (Hrly.)		500	$\mathcal{L}$	2.3		2001	1	MAGED			2445
Cementing, COC (Hrly.)		6,51		30			ļ				1
Moving Meb (Hrty.)		20	0	.0	4						
Misc. Delays (Hrly.) Condition Hole (Hrly.)							<del>                                     </del>				
Misc. Services (Enstman)		90	<del>5 =</del>	.04	1		1				<del>- </del>
Contractor Services Water In		90		4		<del></del>	1				
BRYNNT		200	; =	.00						· · · · · · · · · · · · · · · · · · ·	
SURVEY (Hrly)		24	> =	. 1	<u> </u>						
	ED					ESTIM	ATED	FOOT	GE /	BIT	
Rig: CP-50					Fror			То		Aver. ft.	
Drillers: Rois INSON	LEE, MA	THEW	5		From		· · · · · ·	To		Aver ft.	
Collors:					Fron			To		Aver. ft.	
Drill pipe: NX UP	<u> </u>				⊢ E	ST. C	I-EOT	TOM PE	METR	MOLTAS	I RATE
Pumps:					Froi	n		То		ft/Ehr	shift
Bits:					From			То	-	ft./hr.	
* Twisted off	@ 3863'	- Left		1401	Fror	ח		То		ft./hr.	
Nx rock in hor		core 1		+	From	n	7.7	То		ft./hr.	
Apparent washed	to retri	eve :			E	ST. 11:	CLUSI	VE PE	NETR.	ATION	RATE
					Fron	n		То		ft./ahr	.shift
					Fron	n		То		ft./hr.	
			200		10			Т-	100		And the second second second second

· · · · · · · · · · · · · · · · · · ·	DRILL										
Hole no. <u>A H - 2</u>			Date st	orted		2/7/	7.3	Total o	lepth	378	<u>/</u>
Contractor_Boy	LES BRO	25.	Date cor	nplet	ed	<i>[[]]</i>	73	Total fo	ootage_	173	6
MATERIALS & SE				T	ME	DISTR	IBUTIC	N Hrs.	Charge	•	Non-Charge
BOYLES BRUS.			3.33		illing						23N
Minus Water Truck	Pre-rate		17.50			Set-up				46	
·			15.83								gar dir
<del> </del>	MARCH 73		46.10								
	APRIL	8,4	23.52								/3
BRYHNT CONS	= /= \		<u> </u>		ot co		·····				
BRYANT CONS	ī. ( <i>es</i> t)	<u> </u>	200 -		sning		····				
					Sing OC	& Casing	WOC		4,		ļ
	<del></del>	<del>                                     </del>				on Hole			104		
	<del></del>		<del> </del>		sc. de				24		32
					30.00	au y s	<del></del>				33
	Total	25	975	+-		· · · · · · · · · · · · · · · · · · ·	<del></del>				ļ
	Est.Cost / ft.		121.14	To	tal	<u>`</u>			<del></del>		
POTARY FOO		COF			AGE	-	T .	<del></del>	CAC	11.1G	<u> </u>
Size From	To	Size	From	To	701	Recov.	Size	Casing se		Size	Casing pulled
		NX	1995	-13	781	Γ		1	<del></del>	411	Coama paras
		-14-13	1				NX	199		NX	1995
			1	1				<del>                                     </del>		111/2	1112
									1 1 4		
DIRECT COST	REAKDOW	'N					MATE	RIALS	ERZ.	AKDOV	VN.
ltem	Contractor	Operator	;Coot	/ft	Cue	ntity		lt:c	m	-	Amount
Footage		23 54	007/	3.32	۲ ,	36 5KS	Wa	sateli		much	555
Casing	. •	30	0	17	1	24 SKS		MC - 1		- 17,0027	1451-
Mud + Cament		3,25	57 /	82		10 sks		ortlan			- 17 19 =
Bits							Miss	c. Muc		ditives	590
Misc. Materials					6.51	ks -50#	Ge	0-50a	1		300 2
Drilling (Hrly.)											
Casing, WOC (Hrly.)		2,50		560	10	01	Da	maged	NXC	asing @	300-
Comenting,WCC (Hrly.)		_3'.65		04	<u> </u>			J-	1.		
Moving (Hrly.)		1,30	207	<u>73</u>			<u> </u>		To	tal	3253
Misc. Delays (Hrly.) Condition Hote (Hrly.)				<u> </u>				· · · · · · · · · · · · · · · · · · ·			
				- 7			ļ			<u> </u>	
Misc. Services - BRYANT Contractor Services-Water		20	~	11.			ļ				
TYMK		68	3 .	38		<del></del>			<del></del>	<u> </u>	
Wack						· · · · · · · · · · · · · · · · · · ·	ļ	·			
EQUIPMENT US	ΞD				F	STIM	ATED	FOOTA	GE /	, DIT	
Rig: CP50		<del> </del>	<del> </del>								
		- T	<del> </del>		From			To 37	8/_	Aver. ft.	< 120
Drillers: Ko BANSON D	TATHEWS, LI	EE, K	CKC		From			То		Aver ft.	
	<del>,,_</del>				From	<del></del>		То		Ayor, ft.	
Compressors:	<u> </u>	<del></del>	<del> </del>		E	ST. CN	-SOTT	OM PE	NET	TOTTO	N RATE
Pumps:			-								
Bits:	- N	- <u>-                                  </u>	<del></del>		From			10 37 To	8/	/t/3hr	snift / 7. 2
	-	-			From			To	·	ft./hr.	
			<del>- i</del>		From			To		ft./hr.	
				$\dashv$		- A				ft./hr.	
					_ E:			VE PE	JETR.	MION	RATE
					From			To 378	'/	rt./3hi	r.snitt /3 /
			N 1 N		From			То		ft./nr.	
			* * .	- 1	From		,	To	3 N. A.	#1 /ha	

# TAB

AI-1

### AMERICAN SMELTING AND REFINING COMPANY Tucson Arizona

September 6, 1973

TO: W. L. Kurtz

FROM: J. D. Sell

Daily Drill Data
Drill Hole AI-1
Rotary Drilling
ASARCO/ICC Joint Venture
Rawhide Project
Pinal County, Arizona

Attached is a daily log of the rotary drilling on drill hole Al-1. The information shown is the date, depth at end of the day, footage drilled during the day, the number of hours charged to drilling and the number of shifts involved, explanation of delays, size of hole, and the geological units encountered.

Compiled from this data is a breakdown of the shifts and footage by a) depth, using approximate 1000-foot intervals; b) by bit size; and c) by rock unit, 1) with all down time included, and 2) excluding down time.

These figures are in the same format for comparison of drill holes A-1, A-2, A-4, and A-5 rotary drilling.

\*\*A-2, A-4, and A-5 rotary drilling.\*\*

James D. Sell

JDS:1b Attachs. ASARCO/ICC Joint Venture Hole AI-1
Drill Rig: J.O. Barnes Howard-Turner Drill Master
Air: 2 - JOY WB-102 Compressors w/JOY 02-1500 Booter.

<u>Date</u>	Depth at End of Day	Footage		lling Shifts*	Delays	Hole Size	Formation
1973							
7/16				<u>.</u>	Moving on location.		
7/17		<b></b> _		•	Rigging up.	ρ	<del></del> 0-
7/18	25	25	8	3	Completing rigging. Drilling pilot hole - reaming w/15".	15 <sup>tt</sup>	
7/19	25			3	Set 20 feet of 12-3/4" surface casing & cemented same.	25	
7/20	263	238	11	3	Worked on hammer & drilling head.		
7/21	505	242	16	3	Hard drilling; changed out hammer; bit change @ 386 ft.		
7/22	938	433	11	3	Water at 762 ft. Low fuel supply - compression down. Tripped.		
7/23	1092	154	7	3	Hammer plugged twice; compressor repair.	انۇ	Dacite
7/24	1179	87	5	3	Tripping; hammer plugged twice.		
7/25	1287	108	7-1/2	3	Hammer plugged; winch truck repair; moved casing.		
7/26	1287			3	Cleaned hole; running 7" OD casing in hole.		
7/27	1287		<b>-</b> -	. 3	Set casing at 1282 feet; 35 sacks cement.	1287	
7/28	1287			2-1/4	Remounted casing head; changed out tools.	6-1/4"	
7/29	1312	25	12	3	Completed change out; drilled plug out.		
7/30	1479	167	14	3	Tripped; bit change @ 1357 ft (Hole reduction)	— 1357— 	—1565— 

mixing, etc.  8/09 2342 3 Mixing mud; equip. repair; washing & reaming.  8/10 2718 3 Repair work; washing & reaming.  8/11 2768 2 1 3 Cleaning hole; washing & reaming; laying down; preparing to case.  8/12 2768 3 Running casing to 2768' & cementing — 2768—								
8/01 2139 234 19 3 Worked on air head.  8/02 2272 133 14 3 Compressor oil low; one compressor down.	7/31	1905	426	20	3			Earlier
## ## ## ## ## ## ## ## ## ## ## ## ##	8/01	2139	234	19	3		611	Volcanics
8/03 2550 278 19-1/2 3 Tripping; bit change @ 2377'; reaming.  8/04 2766 216 14 3 Tripping; bit changes @ 2570' & 2766'; reaming.  8/05 3 Standby for fuel for compressors.  8/06 2312 2-1/2 8 hrs. standby; repair work; tripped; bit plugged; fill-up.  8/07 2312 3 Hole fill-up problems; unable to make connection on clean-up. 5-5/8"  8/08 2312 3 Clean-up; converting to mud; mixing, etc.  8/09 2342 3 Mixing mud; equip. repair; washing & reaming.  8/10 2718 3 Repair work; washing & reaming.  8/11 2768 2 1 3 Cleaning hole; washing & reaming; laying down; preparing to case.  8/12 2768 3 Running casing to 2768' & cementing 2768	8/02	2272	133	14	3	Compressor oil low; one compressor down	1.	2250
2766'; reaming.  8/05 3 Standby for fuel for compressors.  8/06 2312 2-1/2 8 hrs. standby; repair work; tripped; bit plugged; fill-up.  8/07 2312 3 Hole fill-up problems; unable to make connection on clean-up. 5-5/8"  8/08 2312 3 Clean-up; converting to mud; mixing, etc.  8/09 2342 3 Mixing mud; equip. repair; washing & reaming.  8/10 2718 3 Repair work; washing & reaming.  8/11 2768 2 1 3 Cleaning hole; washing & reaming; laying down; preparing to case.  8/12 2768 3 Running casing to 2768' & cementing —— 2768 ——	8/03	2550	278	19-1/2	3	Tripping; bit change @ 2377'; reaming.	— 23//— 	
8/05 3 Standby for fuel for compressors.  8/06 2312 2-1/2 8 hrs. standby; repair work; tripped; bit plugged; fill-up.  8/07 2312 3 Hole fill-up problems; unable to make connection on clean-up. 5-5/8"  8/08 2312 3 Clean-up; converting to mud; mixing, etc.  8/09 2342 3 Mixing mud; equip. repair; washing & reaming.  8/10 2718 3 Repair work; washing & reaming.  8/11 2768 2 1 3 Cleaning hole; washing & reaming; laying down; preparing to case.  8/12 2768 3 Running casing to 2768 & cementing — 2768 —	8/04	2766	216	14	3			
bit plugged; fill-up.  8/07 2312 3 Hole fill-up problems; unable to make connection on clean-up. 5-5/8"  8/08 2312 3 Clean-up; converting to mud; mixing, etc.  8/09 2342 3 Mixing mud; equip. repair; washing & reaming.  8/10 2718 3 Repair work; washing & reaming.  8/11 2768 2 1 3 Cleaning hole; washing & reaming; laying down; preparing to case.  8/12 2768 3 Running casing to 2768' & cementing — 2768—	8/05				3			
8/07 2312 3 Hole fill-up problems; unable to make connection on clean-up. 5-5/8"  8/08 2312 3 Clean-up; converting to mud; mixing, etc.  8/09 2342 3 Mixing mud; equip. repair; washing & reaming.  8/10 2718 3 Repair work; washing & reaming.  8/11 2768 2 1 3 Cleaning hole; washing & reaming; laying down; preparing to case.  8/12 2768 3 Running casing to 2768' & cementing — 2768 —	8/06	2312		orden sid Pro <mark>sta</mark> ncio Prostancio	2-1/2			
8/08 2312 3 Clean-up; converting to mud; mixing, etc.  8/09 2342 3 Mixing mud; equip. repair; washing & reaming.  8/10 2718 3 Repair work; washing & reaming.  8/11 2768 2 1 3 Cleaning hole; washing & reaming; laying down; preparing to case.  8/12 2768 3 Running casing to 2768' & cementing — 2768—	8/07	2312	<b></b>		3	Hole fill-up problems; unable to make		
8/09 2342 3 Mixing mud; equip. repair; washing & reaming.  8/10 2718 3 Repair work; washing & reaming.  8/11 2768 2 1 3 Cleaning hole; washing & reaming; laying down; preparing to case.  8/12 2768 3 Running casing to 2768' & cementing — 2768—	8/08	2312			3	Clean-up; converting to mud;	5-5/8''	Whitetail Conglomerate
8/10 2718 3 Repair work; washing & reaming.  8/11 2768 2 1 3 Cleaning hole; washing & reaming; laying down; preparing to case.  8/12 2768 3 Running casing to 2768' & cementing — 2768—	8/09	2342			3	Mixing mud; equip. repair; washing		
laying down; preparing to case.  8/12 2768 3 Running casing to 2768' & cementing — 2768 —	8/10	2718	<b></b>		3			
8/12 2768 3 Running casing to 2768' & cementing — 2768 —	8/11	2768	2	1	3			
w/44 sacks.	8/12	2768		<b></b>	<b>3</b>		<u> </u>	2768

Total Depth

### DRILL HOLE AI-I Rotary Drilling

Drilling time by depth brackets, including down time.

Depth	Size	Shifts	Days	Footage	Ft/Shift	Delays
0-938	15"-9"	13	5	938	72.2	Surf. casing (3),
938-1905	9", 6-1/4", 6"	26-1/4	9	967	36.8	water, compress. 7" Casing (11-1/2),
1905-2768	6" - 5-5/8"	35-1/2	12	863	24.3	plugged hammers. Comp. standby (4),
0-2768		74-3/4	26	2768	37.0	hole-fillup (16-1/2), 4" casing (3).

Drilling time by bit size, including down time.

Bit Size	Depth	Shifts to	Depth	<u>Footage</u>	Ft/Shift
15"-9"	1287	26	1287	1287	49.5
6-1/4"-6"-5-5/8"	2768	48-1/2	2768	1481	30.5

Note: Installation of 7" casing required 11-1/2 shifts. These were distributed 6 & 5-1/2 between the two categories above.

Drilling time by rock unit.

Rock Unit	Depth	Shifts to	Depth	Footage	Ft/Shift W/Downtime	Ft/Shift Excluding Downtime
Dacite	0-1565	36-3/4*	1565	1565	42.6	62.0
Earlier Volcanics	1565-2250	8-1/2	2272	707	83.2	83.2
Whitetail Cgl.	2250-2768	29-1/2**	2768	496	16.8	82.7

<sup>\* 11-1/2</sup> shifts involved in placing 7" casing.

<sup>\*\* 23-1/2</sup> shifts involved in standby, hole-cleanup, & placing 4" casing.

### AMERICAN SMELTING AND REFINING COMPANY TUCSON ARIZONA

October 5, 1973

TO: Joe Wojcik

FROM: Jim Sell

Here is some data on the drilling programs at the Bohme, Superior East, and Rawhide Projects.

I'll get back to you upon my return to the Tucson Office on the 15th.

JDS:1b Encs.

## TAB

A-7

### AMERICAN SMELTING AND REFINING COMPANY TUCSON ARIZONA

October 8, 1973

TO: W. L. Kurtz

FROM: J. D. Sell

Daily Drill Data
Drill Hole A-7
Rotary Drilling
Superior East Project
Pinal County, Arizona

Attached is a daily log of the rotary drilling on Hole A-7. The information shown is the date, depth at end of the day, number of hours charged to drilling and number of shifts involved (converted to 8-hour shifts), explanation of delays, size of hole, and the geologic formation.

Compiled from this data is a breakdown of the shifts and footage by a) 1000' depth increments, b) bit size, and c) geologic unit.

James D. Sell

JDS:1b Attachs.

Rotary Drill Hole A-7
J. O. Barnes Howard-Turner w/Air Package

	Depth at Drilling						
<u>Date</u>	End of Day	Footage	Hours	Shifts	Delays	Hole Size	Formation
197 <u>3</u> 8/1 <b>7</b>				2-1/4	Rigging up.	o	0
8/18			<b>-</b> -	2-1/4	Rigging up.	15"	
8/19				_	Sunday.		
8/20	22	22	16-1/2	2-1/2	Reamed 15" hole; set 12-3/4" pipe and cemented.	22	
8/21	133	111	9	3	Set air head, etc.; hammer came apart; 7-1/2 hrs. fishing.		
8/22	135	2	1-1/2	3	Completed fishing job; redressed tools; hard drilling.		
8/23	160	25	1	3	Metal in hole; secured magnet and recovered metal 2 runs.		
8/24	601	441	16	3	Water at 360'; hammer plugged, tripped; bit change at 601.		
8/25	862	261	10-1/2	3	Worked on hammer; changed float; compressor down 1 hr.		
8/26	1331	469	24	3	Rotating head giving problems.	9''	
8/27	1400	69	2-3/4	3	Laying down pipe; ran 7" casing.	1400	Dacite
					그는 일본 통상이 그렇게 없는 것은 그 없는 것이 없었다.		
8/28	1400	<b></b> 10.		3	Completed casing and cemented in.		
8/29	1400			3	Changed out drill head welded to 7"; weld broke, etc.		
8/30	1473	73	10	3	Completed change; drilled plug; drilling head problem; water at 1469; bit change at 1473.	6-1/4''	
8/31	1771	304	21	3	Finished tripping in. Increased water at 1945.		
9/01	1953	176	17	3	Tripped and strapped pipe; bit change at 1921.		2100

9/02	2245	292	24	3	Hard formation broke thru	2100
	A STATE				at 2010.	Earlier
9/03	2373	128	17	3	Tripped, bit change at 2262; 1/2 hr. check valve on air comp.; 1 hr.	Volcanics
					changing slip dies and circ. 2420	
9/04	2566	193	16-1/2	3	Tripped, bit change 2420; new rubber stripper; repair mist pump.	24 <sup>4</sup> 5
9/05	2887	321	11-1/2	3	Booster down 12 hrs; tripping out of hole.	
9/06	2887			3	Booster repair 19 hrs; 5 hrs. tripping in 64' fill up.	
9/07	3133	246	13	3	Hole fell in on last connection	
7/0/	ررار	240	()	<b>)</b>	try; worked bit off bottom and pulled 6"	
					4 stands fill; drilling lines bad;	
					started to replace. Bit change 3133.	
9/08	3133			3	Completed cable replacement; repaired	
					rotary table. P.Bryant fixed mud pits;	
					mud delivered; mixed mud 8 hrs.	
					Released Air Service.	
9/09	3133			3	Mixed and pumped 7 pits of mud.	
9/10	2847		7-1/2	3	Can't break circulation; mixed more	
					mud; worked on mud pump. Hit fill	Whitetail
					at 2693' washed and reamed to 2847.	Conglomerate
9/11	2847		2	3	Started working pipe down; mud pump	
					plugged w/cement. Worked on suction	
					hose, mud pump, and welder.	
9/12	2869	<b></b>	1-1/2	3	Repaired pump w/plastic carbide, etc.	
0/12	2000		17.1/0	•	Mix new mud.	
9/13	2900	•	17-1/2	3	Mix mud and new barite mud. Circulated and reamed.	
9/14	3150	17	2	3	7 hrs. reaming to 3133'. Mixed mud	
ון על	טנונ		•	ر	and circulated. Drilled ahead and	
					circulated. Laid down 98 joints	
					(5 hrs.). 3150	3150
9/15	3150	- 1. Pul <b>4.</b> - 1	:	3	4 hrs. laying down pipe and drill	
					collar. 20 hrs. running 4" OD	
					casing to 2919.	
9/16	3150			3	1-1/2 hrs. completing casing (stabilized)	
	J.D.				to 3150. 3-1/2 hrs. mixing and pumping	
					cement and plug to bottom. Completed at	
					6:10 AM. Laying down rig.	

### Drill Hole A-7, Rotary-air & mud SUPERIOR EAST PROJECT

Drilling Time by Depth Brackets, including down time.

Depth	Size	Shifts	Days	Footage	Ft/Shift	Delays
0-1118	15" ε 9"	19	6-1/2	1118	58.8	Reaming; set surface casing; 8 shifts
1118-2043	9" & 6-1/4"	21	7	925	44.0	fishing. Rotating head, 6 shifts running 7" casing; 4-1/2
2043-3150	6-1/4" & 6"	43-1/2	14-1/2	1107	25.4	shifts getting started again. 4-1/2 shifts booster repair; hole slough;
						4-1/2 shifts changing cables; 3 shifts converting to mud; 15 shifts cleaning
						hole; 6 shifts running 4" casing & completion.
0-3150		83-1/2	28	3150	37.7	

Drilling Time by Bit Size, including down time.

Bit Size	Depth	Shifts to Depth	Footage	Ft./Shift
15" & 9"	0-1400	22 1400	1400	63.6
6-1/4" & 6"	1400-3150	61-1/2 3150	<u>1750</u>	<u>28.5</u> *
	0-3150	83-1/2	3150	37.7

\*Note: 43-1/2 shifts used in running 7" and 4" casing, booster repair, changing cables, converting to mud, and cleaning out hole. If this time is eliminated, the Ft./Shift for 6-1/4" & 6" is 97.2 feet.

Drilling Time by Rock Unit.

Rock Unit	Depth	Shifts to	Depth	<u>Footage</u>	Ft./Shift
Dacite Earlier Volc.	0-2100 2100-2445	40 6	2043 2420	2043 377	51.0* 62.8
Whitetail Cgl. (Mudstone)	2445-3150	37-1/2	3150	<u>730</u>	19.5**
		83-1/2		3150	37.7***

\*Note 1. 18-1/2 shifts lost in fishing, running 7" casing, and getting started again. If this time is eliminated, the Ft./Shift in Dacite is 95.0 ft.

\*\*Note 2. 33 shifts lost in booster repair, hole slough, cable repair, converting to mud, cleaning out hole, running 4" casing and cementing. If this time is eliminated, the Ft./Shift in Whitetail Conglomerate (Mudstone) is 162.2 ft.

\*\*\*Note 3. Elimination of 51-1/2 shifts as in notes 1 and 2 above, gives 98.4 Ft./Shift in overall drilling time for entire hole.

### AMERICAN SMELTING AND REFINING COMPANY TUCSON ARIZONA

October 31, 1973

Mr. Joe Wojcik ASARCO Salt Lake City Office

Dear Joe:

Attached is the first batch of the "ground truth" items:

Bohme Project:

Rotary Drilling

Drill Hole AH-1

- 1) Daily Drill Sheets -- Whatley Drilling Company
- 2) Geolograph Records -- " " " "

Drill Hole AH-2

- 1) Daily Drill Sheets -- Whatley Drilling Company
- 2) Geolograph Records -- "

Drill Hole AH-3

- 1) Daily Drill Sheets -- Harness Drilling Company
- 2) Daily Drill Data -- ASARCO compilation summary

Drilling Progress Map -- Bohme Project
Drilling Progress Map -- Superior East Project

You should already have in your possession a copy of the Daily Drill Data -- ASARCO compilation Summary for drill hole AH-1 and AH-2.

Will get the other holes in Superior East ready and sent to you soon.

Regards,

James D. Sell

JDS:1b Encs.

# TAB

A-3

AMERICAN SMELTING AND REFINING COMPANY
TUCSON

November 7, 1973

See

And A-3 Deepening
June 3, 1974.

TO: W. L. Kurtz

FROM: J. D. Sell

Daily Drill Data
Drill Hole A-3
Rotary Drilling
Superior East Project
Pinal Gila County, Arizona

Attached is a daily log of the rotary drilling of Hole A-3. The information shown is the date, depth at end of the day, number of hours charged to drilling, and the number of shifts involved (converted to 8-hour shifts), explanation of delays, size of hole, and the geologic formation.

Compiled from this data is a breakdown of the shifts and footage by a) bit size (and essentially depth based on 1000-foot increments), and b) geologic unit.

James D. Sell

JDS:1b Attachs.

# DRILL HOLE No. A-3 - ROTARY DRILLING WITH AIR-HAMMER Harness Drilling Company - Failings 1500 DMX with WEJ Compressors

	Depth at			lling			
Date	End of Shift	Footage	Hours	Shifts*	Delays	Hole Size	<u>Formation</u>
1973						-0-	-0-
5/21	0		•	1-1/2	Moving on location	10" -10-	
5/22	20	20	4	1-1/2	Drilled 8" hole to 20; reamed 10" hole to 10; set 8" ID casing to 10-foot and cemented.		
5/23	20	₩.		1-1/4	Welded drill head; repair, clean-up work.		
5/24	243	223	6-1/2	1-1/2	Waiting on hammer; tripping time.		
5/25	518	275	8	1-1/2	Service rig; welding on drilling head.		
5/26	693	175	6-3/4	1-1/2	Tripping; clutch repair.	8''	
5/27	813	110	5	1	Repair master clutch; water at 708'		Dacite
5/28	1038	225	10	1-1/2	Service rig.		
5/29	1038		-	1-1/4	Plugged hammer, repair & tripping time.		
5/30	1203	165	9-1/2	1-1/2	Cleaning hole.		
5/31	1218	15	1	1-1/2	Unloading hole; plugged hammer; repair.		
6/01	1428	210	10-1/2	1-1/2	Unloading hole.		
6/02	1428	<b></b>	-	•	Saturday; no work.		
6/03	1428	••	•	<b>-</b>	Sunday; no work.		-1430-
6/04	1445	17	1/2		Clean up hole; laying down pipe.	-1445-	Whitetail Cgl. -1445-

\*Based on 8 hours per shift.

Note: Only ten-feet of 8" ID surface casing in hole.

## Drill Hole A-3, Rotary-Air-Hammer SUPERIOR EAST PROJECT

Drilling Time by Bit Size, including down time:

Bit Size	Depth	Shifts to Depth Footage	Ft./Shift	Delays
1011 & 811	1445	16-1/2 1445 1445	87.6*	Surface casing;
				unloading hole; laying down pipe.

\*Note: No casing set except 10 feet of surface casing.

#### Drilling Time by Rock Unit, including down time:

Rock Unit	Depth Shifts to Depth Footage	Ft./Shift
Dacite	0-1430 15-1/2 1428 1428	• 92.1
Whitetail Cgl.	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	17.0* 87.6

\*Note: This amount of hole actually drilled in 1/2 hour of on-the-bottom drilling.

# TAB

A-V

## AMERICAN SMELTING AND REFINING COMPANY TUCSON ARIZONA

November 7, 1973

TO:

W. L. Kurtz

FROM: J. D. Sell

Also: A-4 Decemency 1974 Jun 10, 1974

Daily Drill Data Drill Hole A-6 Rotary Drilling Superior East Project Gila County, Arizona

Attached is a daily log of the rotary drilling of Hole A-6. The information shown is the date, depth at end of the day, number of hours charged to drilling, and the number of shifts involved (converted to 8-hour shifts), explanation of delays, size of hole, and the geologic formation.

Compiled from this data is a breakdown of the shifts and footage by a) bit size (and essentially depth based on 1000-foot increments), and b) geologic unit.

James D. Sell

JDS:1b Attachs.

DRILL HOLE NO. A-6 - ROTARY DRILLING W/AIR-HAMMER
Harness Drilling Company - Failings 1500 DMX with WEJ Compressors

	Depth at		Dri	lling			
Date	End of Day	Footage	Hours	Shifts*	Delays	<u>Hole Size</u>	<u>Formation</u>
1973					상태를 보겠다. 날이 하는데 하다		
6/06	10	10	1-1/2	1-1/2	Set-up on site; drilled 8" hole.	-0-	-0-
6/07	10		1-1/2	1-1/2	Reamed to 10", set 10' of 1D 8" surf. pipe & cemented.	1'0'' -1'0- 	
6/08	108	98	8-1/2	1-1/2	Welded on drilling head.		
6/09	308	200	8	1-1/4	Service rig.		
6/10			•		Sunday		Dacite
6/11	553	245	9-3/4	1-1/2	Tripping.	QII.	
6/12	833	280	10	1-1/2	Making approx. 25 gpm water.		
6/13	1013	180	10	1-1/2			
6/14	1193	180	9-1/4	1-1/2	Tripping.		
6/15	1298	105	8	1-1/2	Trouble unloading hole.		
6/16	1375	77	6-1/2	1	Tripping.	-1375-	-1375-

NOTE: Only ten feet of 8" ID surface casing in hole.

<sup>\*</sup>Based on 8-hours per shift.

## Drill Hole A-6, Rotary-Air-Hammer SUPERIOR EAST PROJECT

#### Drilling Time by Bit Size, including down time:

E	3i t	Si	ze	Depth	1	Shifts	to Depth	Footage	t./Shif	<u>t</u>	Delays	
1	011	3	811	1375		14-1/4	1375	1375	96.5*		Setting s	urface
											casing, t	ripping.

\*Note: No casing set except ten feet of surface casing.

### Drilling Time by Rock Unit, including down time:

Same as above, as total hole was in Dacite. Dacite is 96.5 ft./shift.

# TAB

AH-3

#### AMERICAN SMELTING AND REFINING COMPANY TUCSON ARIZONA

November 7, 1973

T0: W. L. Kurtz

FROM: J. D. Sell

Daily Drill Data Drill Hole AH-3 Rotary Drilling Bohme Project Gila County, Arizona

Attached is a daily log of the rotary drilling of Hole AH-3. The information shown is the date, depth at end of day, number of hours charged to drilling, and the number of shifts involved (converted to 8-hour shifts), explanation of delays, size of hole, and the geologic formation.

Compiled from this data is a breakdown of the shifts and footage by a) bit size (and essentially depth based on 1000-foot increments), and b) geologic unit.

James D. Sell

JDS:1b Attachs.

# DRILL HOLE No. AH-3 - ROTARY DRILLING WITH AIR-HAMMER Harness Drilling Company - Failings 1500 DMX with WEJ Compressors

	Depth at		Dri	lling			
Date	End of Day	Footage	Hours	Shifts*	Delays	Hole Size	Formation
1973							
6/20	0			1-1/2	Moving on location.	-0- 10''	-0-
6/21	25	25	6	1-1/4	Drilled and reamed 10" hole; set 18' of 8" ID surf. casing.	-25-	
6/22	39	14	3	1-1/2	Set rotating head, etc.; cement didn't set.		
6/23	39			1-1/2	Filled hole with calcium chloride cement.		Gi <sup>'</sup> la Cgl.
6/24	39				Sunday.		
6/25	250	211	12	1-1/2	Drilled out cement.	811	
6/26	583	333	10-1/2	1-1/2	Tripping.		-770 <b>-</b>
6/27	883	300	10	1-1/2	Tripping.		-//0-
6/28	993	110	4	1-1/2	Trouble unloading hole.	-	
6/29	1093	100	4	1-3/4	Chased boulders, cleaned hole,	-1093-	
6/30	1093	- 1	•	1-1/4	started casing. Cemented 6-5/8" casing to		
7/01	1093	<b></b>	_	. <b>.</b>	973 feet. Sunday.	6-1/8"	Dacite
7/02	1093	1		1-1/2	Cut off casing; welded rotating		
7/03	1093		• • • • • • • • • • • • • • • • • • •	1-1/4	head; unloaded hole. Unloaded hole; drilled cement; air		
7/04	1093		• •	1-1/4	hammer would not cut out the shoe. Tripped for 6" cone bit - drilled		
7/05	1167	74	10-1/2	1-1/2	out shoe; tripped for air hammer. Unloaded hole. Metal in hole!		
7/06	1167			1-1/4	Couldn't drill. Layed down drill pipe and collars.		
7/07	1167			1-1/2	Placed 4" ID casing to 1167 feet and cemented. Plug went down early and cement filled pipe.	-1167-	-1167-

## Drill Hole AH-3, Rotary-Air-Hammer BOHME PROJECT

#### Drilling Time by Bit Size, including down time:

Bit Size	Depth	Shifts t	o Depth	Footage	Ft./Shift	Delays
10" & 8"	0-1093	14-1/2	1093	1093	75.4	Reaming; set surf. casing; 2-1/2 shfts for running 6-5/8"
6-1/8"	1093-1167	7	1167	74	10.6	casing. 2-3/4 shifts for running 6-5/8" casing
						& drilling out; 2-3/4 shifts for laying down pipe & running 4" casing w/cement.

#### Drilling Time by Rock Unit, including down time:

Rock Unit	Depth	Shifts to Depth	Footage	Ft./Shift
Gila Cgl. Dacite	0-770 770-1167	8-3/4 883 12-3/4 1167	883 284	100.9 22.3*
		21-1/2	1167	54.3

\*Note: 8 shifts lost in running two sets of casing, getting started again, and laying down pipe. If these are eliminated, then Dacite is 59.8 ft./shift, and average total rock drill time is 86.4 ft./shift.

# TAB

A-U

## AMERICAN SMELTING AND REFINING COMPANY TUCSON ARIZONA

November 7, 1973

TO: W. L. Kurtz

FROM: J. D. Sell

Daily Drill Data
Drill Hole A-6
Rotary Drilling
Superior East Project
Gila County, Arizona

Attached is a daily log of the rotary drilling of Hole A-6. The information shown is the date, depth at end of the day, number of hours charged to drilling, and the number of shifts involved (converted to 8-hour shifts), explanation of delays, size of hole, and the geologic formation.

Compiled from this data is a breakdown of the shifts and footage by a) bit size (and essentially depth based on 1000-foot increments), and b) geologic unit.

James D. Sell

JDS:1b Attachs.

DRILL HOLE NO. A-6 - ROTARY DRILLING W/AIR-HAMMER
Harness Drilling Company - Failings 1500 DMX with WEJ Compressors

Date	Depth at End of Day	Footage	Dri <u>Hours</u>	lling Shifts*	Delays	Hole Size	Formation
1973							
6/06	- 10	10	1-1/2	1-1/2	Set-up on site; drilled 8" hole.	70-	-0-
6/07	10		1-1/2	1-1/2	Reamed to 10", set 10' of ID 8" surf. pipe & cemented.	-10-	
6/08	108	98	8-1/2	1-1/2	Welded on drilling head.		
6/09	308	200	8	1-1/4	Service rig.		
6/10					Sunday		Dacite
6/11	553	245	9-3/4	1-1/2	Tripping.	8"	
6/12	833	280	10	1-1/2	Making approx. 25 gpm water.	0"	
6/13	1013	1 80	10	1-1/2			
6/14	1193	180	9-1/4	1-1/2	Tripping.		
6/15	1298	105	8	1-1/2	Trouble unloading hole.		
6/16	1375	77	6-1/2	1	Tripping.	-1375-	<b>-</b> 1375-

NOTE: Only ten feet of 8" ID surface casing in hole.

<sup>\*</sup>Based on 8-hours per shift.

#### Drill Hole A-6, Rotary-Air-Hammer SUPERIOR EAST PROJECT

#### Drilling Time by Bit Size, including down time:

Bit Size	Depth	Shifts to Depth	Footage Ft./Shift	Delays
1011 & 811	1375	14-1/4 1375	1375 96.5*	Setting surface
				casing, tripping.

\*Note: No casing set except ten feet of surface casing.

### Drilling Time by Rock Unit, including down time:

Same as above, as total hole was in Dacite. Dacite is 96.5 ft./shift.

Them before be 10HUS.

W. L. M.

AMERICAN SMELTING AND REFINING COMPANY
TUCSON ARIZONA

JAN 2 1974

December 28, 1973

the 20' are lavel might be lated into again

J. Fi. C.

JAN 2 1974

TO: W. L. Kurtz

FROM: H. L. Crittendon

#### Drilling -- General

I have some thoughts which I think may be helpful for future drilling projects and I thought I would pass them along.

#### Superior East

Holes No. A-3 and A-6 could probably have casing set more cheaply by a cable tool rig. Since 6-5/8" casing with a .188 wall will probably be set, the bit size passing through the casing will have to be 6.0" or less. If 5-7/8" sealed bearing carbide insert bits can be ordered in advance on special order, I believe that is the size that should be used. The 1/4" difference in annulus could very well mean the difference in being able to set the casing on bottom or not. An ideal rig to complete these two holes would be a Failing "DMX" capable of diamond drilling. The upper part could be drilled with mud or air and completed with diamond drilling equipment.

I believe the following methods are worth considering on future drilling of the Superior East Project.

- 1) Use of a new mud hammer....available from Dresser Industries or Cherokee Tool Co.
  - 2) Use of aerated mud.
- 3) Use of new Mission  $3-5/8^{11}-4^{11}$  hi-pressure air hammer to continue drilling through  $4^{11}$  ID casing.
- 4) Use of quick-set cements and gels for lost circulation and to stop water influx.
  - 5) Packed-hole drill collars to help keep hole straight.
  - 6) Use of specially designed rotating air head for small drill rigs.
- 7) The use of combination rotary-diamond rigs....Heath & Sherwood, Shaft Drillers, Inc., Boyles.

- 8) Use of twenty-foot core barrels in Whitetail Conglomerate.
- 9) Use of 6-5/8"-7" casing to case off the dacite. This method is advantageous in air or mud drilling. There are local severe lost circulation zones in the dacite; e.g., DCA-1, A-1, AH-2, AI-1, the hole Barnes drilled for Inspiration.

#### General

I believe the most obvious need for improvement in diamond drilling is in cementing procedures. Sophisticated equipment and materials are available from the petroleum industry and elsewhere, the problem is getting diamond drillers to use them. Normally, cementing and hole conditioning is at the expense of the mining company and there is not a great deal of incentive for improvement on the part of the diamond drillers.

Possibly some improvement could be made on combination rotary-diamond drilling rigs. Any sophisticated diamond drilling rig, however, runs the risk of being non-competitive with low overhead diamond drilling rigs such as Joys's 22HD. Some air-hammer work could be done with any diamond drill, however, and the 4" Mission hammer offers good possibilities for some cost reduction in the upper parts of the hole. As casing becomes more expensive, cementing techniques should be improved upon and used more.

\*\*Munual Attentor\*\*

\*\*Attentor\*\*

\*\*Munual Attentor\*\*

\*\*Attentor\*\*

\*

H. L. Crittendon

HLC:16

# TAB

MJ-1

140-1

MJ-1: Rotary to 2370', cored to 3304'. 0-1010 dacite 1010-2917 Whiletail Congl.: brn, sdy, 30ft to about 1950; harder, mostly unoridized cobbles thereafter. Last + 400 native copper present in small amounts, as veinlets in cobbles of attered diabase, disemminations in same, and as coatings on slickensided surfaces of mudstone matrix. Best assay interval: 2750-2800 0.09 7. Cu. Cobbles mostly diabase, minor schist, guite, LS; mudstone common in watrix to the base, though sand also present one von gtz cobble and one unidentifiable altered pebble also had native Co in veinlets. 2917 - 3304 Maco LS. Belding generally 15 to 20° Generally atternating beds, to ±30', of LS + MS. Occasional veinlets of Feor wear vertical, with pseudomorphs of Feox after pyrite Several small concentrations of MuOx; the one assayed contained 1.57. In, 0.1 Pb. Magna geologists consider the beds to be high in the Naco

	Comparation	e Note	)	197	3	Name of Street, and the Street
	From Hole AI-1 8 A				201).	
			A-7			7
	Dulling Charges	#/4	#/5+	2	9	
	A. plicet blilling					
	Rotary	31,20	2377	542	43,8	
	Core	31.14	29.40	24.3	49.8	
	B. Site Legaration					
	Rotary	1.06	0.51	1.9	0.9	
	love	0.12	0.05	0.1	0.1	
	CField administration					
	1. Supero & Geol.					
	Potary	0.46	0.32	1.2	0.6	
	Core	1.01	0.93	0.8	1.4	
· garagaga kalik kalik - Millingking kalik k	2 Sough Preg- 4 dosay					
	Rotary	0.22	0.02	0.4	0.0	
, a same a sense proper out the sequence approximate on the sense of the sequence	Cou	1.74	0.65	1.4	1.1	\
	3. Miscellaneous					
	Potacy	0.30	0.07	0.5	0.1	
ally the second superior have been a second as a second se	Core	0.70	0.26	0.6	0.4	
agenga agagan ina sirikgamanaan ma mahadak diganisan aka baha	Willing Charges Sub Total	<sup>#</sup> 33.84	* 27.85	87.4%	98.4%	
	Project Charges					
	D. General administration	1.07	0.28	2.7	1.1	of a Alberta a supplementary
	E. Legal fees	0.45	-	1.2	-	e en esta super a para a esta en
	F. Drill Road access	3,23	0.14	8.3	0,5	omin form, it flagges to pro- to the street o
	G. Claim Work - Servezuy	0.14		0.4	-	
	Project Charges Sub- Total	4.89	\$0.42	12.4%	1.6%	er ik eriko, sengapo ga va
				== :	== -	
	Total Expenditures	\$38,73	\$28,27	100%	100%	
		·				

Note

Read Work 1973

Feet of Road A-3 5500

A-6 17,500

AI-1 4,000

A-7 1,000

28,000 feet.

Costo:

Dull Site Riged Cost

A-3 480.00 6,284.86

A-6 3,072.25 15, 305.67

AI-1 3,086.75 12,799.81

A-7 1,760.15 847.29

8, 399.15 35, 237.63

: + Average per dill site is \$ 2,100°. + Average per foot of access is \$ 130 or \$6,700°/mile Boyles Brothers Costs: 1 March 74

NC 1000-1500 = 911.60/ft 1500-2000 = 12.10

2000 - 2500 = 13.10 2500-3000 = 14.10

3000-3000 = 15,60

NX 1500-2000 = \$10.85/ft.

2000-2500 = 11.60

2500-3000 = 12.85

3000-3500 = 14.35

3500-4000 = 16.10

4000-4500 = 18.60

4500-5000 = 21.85

5000-5500 = 2635

5500-6000 - 30,05

6000-6500 = 35.65



P. O. BOX 19117 / SALT LAKE CITY, UTAH 84119 / PHONE (801) 487-1171

### DRILLING FLUID INFORMATION

DATE- MAR, 4YEAR - 19 74
LOCATION- BOHME

DRESS <u>Tucson, ARIZ.</u> AD LE#AH4NX		ENIX, ARIZ, Gleghörn	COUNTY ARIZONA
150# Press,		TEST # 2	Z > PiNA!
TIME	3,00 FM		DUCT RECOMMENDATIONS AND COMM
DEPTH	2452		PRENT MUD IN USE
OPERATION	CORING	M	UD-25-MUD-Z-DEXTA
MUD WEIGHT	8.4		
FUNNEL VISCOSITY	42	MUZ	PROPERTIES ARE
FILTRATE	8.5	Goo	$m{\phi}$
FILTER CAKE	1/32 Q	oct _	And the second of the second o
- 14 등 - 15 등 기계 기계 등 등 기계 기계 등 기계 - <b>PH</b> 설명 기계 등 기계	6.8	Mv.	DABOVE IS MORE
CHLORIDES FIRM	800	ecol	Nomical & iFiT Will
CALCIUM	220	CON	TAIN bad ground show. Fine-However MUD-2
ALKALINITY (API) PHENOH/BROM-CR.	0 0,3	& :	11 WITH ANINKIBITO
SAND CONTENT % BY VOL.	TRACE	500	h AS POTASHOY DAT
SOLIDS	1/204/1%	سے (	A CONSIDERA ble beller
PLASTIC VISCOSITY (CP)	10		Tem IN Most bad
YIELD POINT Ib./100 Sq. Ft.	5	970	oundi
GEL STRENTGHS 10 SEC./10 MIN.	0/1		
WATER	98 7		
SUIFATES	5-10EIRA	2	THANX
MMENDED DRILLING FLUID PROPERTIES:			
WEIGHT- Below 8.9#Gal.  COSITY- 35-405 SECRET.  ATE- 10-15 cc.			

RECOMMENDATIONS MADE HEREON ARE MADE WITHOUT ASSUMPTION OF ANY LIABILITY BY FLUIDRIL, INC. OR ITS AGENTS AND SHALL NOT BE CONSTRUED AS AUTHORIZING ANY PATENT INFRINGEMENTS AND ARE STATEMENTS OF OPINION ONLY.

PH-

DRILLING FLUID ENGINEER:
Name G. COFFEY

# TAB

A-7

## AMERICAN SMELTING AND REFINING COMPANY TUCSON ARIZONA

March 8, 1974

TO: W. L. Kurtz

FROM: J. D. Sell

Daily Drill Data - Unit Contacts

Drill Hole A-7 Core Rig, CP-50 Superior East Project Pinal County, Arizona

Attached is a daily log of the coring on drill hole A-7. The information shown is the date, depth of hole at end of day, the footage cut during the day, the hours chargeable to drilling, the number of shifts involved, short comments on the delays involved, the size of core (all NX), the geologic units and contact footages.

Compiled from this daily data is a breakdown of the shifts and footage by a) depth bracket, and b) by geologic units encountered.

Also shown is the comparison of the footage cut and feet per shift of drill holes A-7, A-4, and M-1A, the three deep holes in similar rock units.

James D. Sell

JDS:1b Attachs.

DRILL HOLE A-7
Boyles Brothers, CP-50
Nov. 27, 1973 - Feb. 9, 1974
3150 feet to 6042 feet; All NX Core

Date	Depth at End of Day	Footage		ling Shifts	Delays	<u>Formation</u>
197 <u>3</u> 11/27	3150	0		3	Moving, equip. repair, setting up.	-3150-
11/28	3150	0		3	Setting up & making up rods w/rock bit.	
11/29	3162	12	6	3	7 hrs. drilling cement 3148-3157.	
11/30	3192	30	13	3	9 hrs. pulling for mislatch; 2 hrs. mix mud. Bit change @ 3192.	
12/01	3245	53	23	3	1 hr. changing oil in all motors.	
12/02	3245	0			Sunday	
12/03	3327	82	24	3		Tertiary Whitetail
12/04	3421	94	24	3		Cgl.
12/05	3506	85	24	3		
12/06	3526	20	4	2	4 hrs. water swivel repair; 8 hrs. pulling for bit change at 3526. No night shift.	
12/07	3612	86	23	3	l hr. equip. repair.	
12/08	3712	100	30 ·	4	2 hrs. pulling rods into casing for weekend. Night shift pulled double to make up for 6th.	
12/09	3712	0			Sunday.	
12/10	3810	98	23	3	l hr. running rods to bottom.	

12/11	3901	91	24	<b>3</b>	다음에 마양하다 경험이 하루하다는 보고에 다르는 다. 나는 사용 경찰을 보고 하는 것 같은 보고 하는 것이다.
12/12	3991	90	23	3	1 hr. replacing 0-ring on drill pump.
12/13	4050	59	16	3	4 hrs. pulling for bit change at 4006';
12/14	4139	89	23	3	4 hrs. running rods to bottom. 1 hr. replacing wire line cable.
12/15	4208	69	22	3	<pre>l hr. changing oil and filters; l hr. delay no helper, battery out.</pre>
12/16	4208	0	<u>.</u>		Sunday.
12/17	4238	30	8	2	8 hrs. equip. repair & releasing rods sanded in over weekend; no swing shift.
12/18	4298	60	16	2	Dick M. transferred; no night shift.
12/19	4382	84	20	2-1/2	(Two shifts doubling up)
12/20	4440	58	16	3	4 hrs. pulling for bit change at 4412; 4 hrs. running rods in.
12/21	4500	60	15	2	l hr. pulling rods off bottom.
22-25	4500	0			Christmas Holidays.
12/26	4580	80	22	3	2 hrs. washing rods to bottom.
12/27	4660	80	24	3	
12/28	4740	80	24	3	
12/29	4760	20	8		
12/30	4760	0			Sunday.
12/31	4780	20	8	2	Hole caving badly. 8 hrs. tripping for bit change at 4780.

Tertiary Whitetail Cgl.

				er en la situation Transporter En appropriation	그 얼마를 잘 못했다. 그를 그릇을 하다는 것이 살아가 하나요?	
1974 1/01	4780	0			New Year's Holiday.	
1/02	4780	0		2	16 hrs. placing Geoseal squeeze & waiting.	
1/03	4780	0		4	16 hrs. changing to rock bit, cleaning hole and cementing. 8 hrs. cementing hole. (Doubling on cement shift.)	
1/04	4780	0		2	16 hrs. waiting on cement to set.	
05-06	4780	Saturda	y & Sunda	ıy	Secured third shift personnel.	
1/07	4780	Ō		3	5 hrs. drilling cement 4604-4665. 11 hrs. equip. repair; 8 hrs. sump cleanup & weather delay.	
1/08	4780	0		3	14 hrs. drilling cement 4665-4772; 2 hrs. equip. repair; 5 hrs. pulling rods; 3 hrs. weather delay (high winds).	
1/09	4820	40	1.1	3	8 hrs. equip. repair, hauling fuel & mix mud; 5 hrs. drilling cement 4772-4780.	Tertiary
1/10	4902	82	24	3	Back to work!	Whitetail
1/11	4971	69	20	3	4 hrs. rebuilding transmission on pump.	Cg1.
1/12	4980	9	5	3	2 hrs. equip. repair. Oops! 17 hrs.	
1/13	4980	0		-	cementing (15 sacks thru bit) & waiting. Sunday.	
1/14	4980	0	<u> </u>	3	1 hr. equip. repair; 23 hrs. drilling cement 4640-4860.	
1/15	4980	0		3	24 hrs. drilling cement 4860-4972.	
1/16	5032	52	19 •	<b>3</b> 2	2 hrs. drilling cement 4972-4980; 1 hr. mix mud.	
1/17	5092	<b>\$</b> 60	24	3	Off again to work!	
1/18	5131	39	16	3	4 hrs. pulling bit change at 5102; 4 hrs. running rods in.	

						1
1/19	5181	50	20	3	4 hrs. pulling up for weekend, draining pumps.	
1/20	5181	0		•	Sunday.	
1/21	5212	31	17	3	3 hrs. running rods to bottom (7' cave); 4 hrs. pulling for mislatch.	
1/22	5233	21	12	3	4 hrs. running in rods-washed to bottom; 8 hrs. freeing stuck rods.	
1/23	5260	27	8	3	16 hrs. pulling and changing bit at 5233; running in.	
1/24	5300	40	П	3	Hydraulic line blew; 13 hrs. running pumps and moving rods to prevent sticking.	Tertiary Whitetail
1/25	5350	50	20	3	4 hrs. equip. repair.	Cg1.
1/26	5410	60	22	3	2 hrs. pulling rods for weekend.	
1/27	5410	0		•	Sunday.	
1/28	5452	42	19-1/2	3	2 hrs. hauling fuel; 2-1/2 hrs. washing rods and tube to bottom.	
1/29	5512	60	24	3		
1/30	5572	60	24	3		
1/31	5632	60	24	3		√ -5610-
2/01	5692	60	24	3		$\uparrow$
2/02	5732	40	16	3	8 hrs. tripping for bit change at 5732.	Permian Supai
2/03	5732	0	•		Sunday.	Frm.
2/04	5778	46	20	3	4 hrs. washing to bottom (200)	↓ -5810-
2/05	5838	60	24	3		
2/06	5898	60	24	3 .		

去	- 1	

2/07	5938	40	16 3	Gasket blew; 8 hrs. delay keeping rods	Penn.
2/08	5978	40	16 3	free. 4 hrs. equip. repair; 4 hrs. hole survey.	Naco Lms.
2/09	6042	64	2 1-1/2	(Actually drilled 10 feet and took 54 feet out of "footage bank" built up during past few weeks.) 2 hrs. temperature hole survey;	
				8 hrs. breaking out rods. Preparing to move.	-6042-

NOTE: Crews put some footage into a footage "bank" during the time of rapid cutting. It has been estimated that they actually intercepted the top of the Naco Limestone during the night shift of Feb. 2, 1974; similarly, they were at a depth of 6000 feet during the day shift of Feb. 8, 1974. The tabulated shifts and footage per shifts on the attached summary table are based on the above estimations.

# DRILL HOLE A-7 (All NX Core)

## Drilling Time, by Footage Brackets, including down time:

Depth	Shifts	Days	Footage	Ft/Shift	Troubles
3150-3506	18	6	356	19.8	Drilling cement; mislatch;
3506-4006	19	6-1/3	500	26.3	<pre>l bit change. Minor equip. repair; l bit change.</pre>
4006-4500	19-1/2	17-2/3	494	25.3	Minor equip. repair; 2 bit changes.
4500-4992	45	16-1/3	492	10.9	Holidays; caving hole; lots of
4992-5492	34	11-1/3	500	14.7	cementing; I bit change. Mislatches; Hydraulic lines; sloughing hole.
5492-6000	26	8-2/3	508	19.5	Minor; 1 bit change.
6000*-6042	3-1/2	1-2/3	42	12.0	Minor; hole surveying.
3150-6042	165	58	2892	17.5 ave	erage

### Drilling Time, by Rock Type, including down time:

Rock Unit	Depth	Shifts to	Depth	Footage	<u>Ft/Shift</u>
Whitetail Cgl. Supai Frm. Naco Lms.*	3150-5610 5610-5810 5810-6042	141-1/2 6 <u>17-1/2</u>	5612 5800 6042	2462 188 242	17.4 31.3 13.8
	3150-6042	165		2892	17.5 average

<sup>\*</sup>See Note at end of Daily Log Sheet.

## Footage and Footage/Shift Comparisons between A-7, A-4, & M-1A:

	(Foot	age) and Ft/	Shift			
Rock Units	A-7		A-4		M-1A	
Whitetail Cgl.	(2462) 17	.4 (	2898) 15.	9	(1793)	19.9
Supai	(188) 31					19.9
Naco/Esc.	(242) 13	.8 (	89) 9.	9 (	( 230)	11.5

## AMERICAN SMELTING AND REFINING COMPANY TUCSON ARIZONA

March 19, 1974

TO: W. L. Kurtz

FROM: J. D. Sell

Distribution of Costs Claim Staking, Legal, etc. Sept. 1, 1972 to Aug. 1, 1973 Superior East Project Pinal County, Arizona

During Sept. 1972 and August 1973, a substantial amount of claim staking, validation drilling, surveying and legal costs were incurred in the LD claim area. These costs have been separated out and charged to the total project and not to individual drill holes.

The distribution of these charges are given below following the modified system of cost summaries.

#### Drilling Charges:

A. Direct Drilling (Validation) \$	,931.17
B. Site Preparation	
C. Field Administration	
1. Supervision & Geology	1,184.12
2. Sample Preparation & Assaying	
3. Miscellaneous	362.30
Drilling Charges Sub-Total	\$ 3,477.59

#### Project Charges:

D. General Administration \$ 4,037.70	
E. Legal Fees 9,369.98	
F. Drill Road Access	
G. Claim Work - Surveying 11,565.04	
Project Charges Sub-Total	24,972.72

Total Expenditures

\$28,450.31

James D. Sell

JDS:1b

## AMERICAN SMELTING AND REFINING COMPANY TUCSON ARIZONA

March 19, 1974

TO: W. L. Kurtz

FROM: J. D. Sell

Drill Hole AA-1 Rotary Drilling Costs Clark Option Superior East Project Pinal County, Arizona

\$/ft. \$/ft.

The L. R. Cox Drilling Company drilled a 5" air-hammer hole on July 23, 1973 to a depth of 120 feet. The hole is capped for reentry. Cox used a Mayhew 500 with a Gardner-Denver 600 compressor.

Project charges assigned to this hole include the option payments to March 1, 1974, and a prorated amount of surveying of the Clark claims and a compromise line with the adjoining property.

Distribution of costs:

Rotary Drilling 120 feet.

#### **Drilling Charges:**

A. Direct Drilling B. Drill Site Preparation	\$ 750.00 50.00		6.25 0.42	
C. Field Administration 1. Supervision & Geology 2. Sample Preparation & Assaying	86.80 46.95		0.72 0.39	
Drilling Charges Sub-Total		\$ 933.75		7.78
Project Charges:				
D. General Administration E. Option Payments F. Drill Road Access	\$ 1,300.00		10.83	
G. Claim Work, Surveying Project Charges Sub-Total	3,483.97	\$4,783.97	29.03	39.86
Total Expenditures:		\$5,717.72		\$47.64

James D. Sell

## AMERICAN SMELTING AND REFINING COMPANY TUCSON ARIZONA

March 19, 1974

TO: W. L. Kurtz

FROM: J. D. Sell

Drill Hole A-3
Rotary Drilling Costs
State Lease Section 5
Superior East Project
Pinal County, Arizona

Drill Hole A-3 was drilled by Harness Drilling Company using a Failings DMX 1500 with 2 WEJ compressors and an air-hammer. The work was performed from May 22 to June 1, 1973 and completed to a depth of 1445 feet. The hole is capped for reentry.

The drilling cost distribution follows a modification of the Cost Summary memorandum of Oct. 2, 1972.

The excess cost per foot is reflected in the assignment of the cost in constructing an access road into the drill site.

Distribution of Costs:

Rotary Drilling 1445 feet

#### Drilling Charges:

A. Direct Drilling B. Site Preparation	\$14,270.87 480.00		\$/ft. 9.88 0.33	<u>\$/ft.</u>
C. Field Administration 1. Supervision & Geology 2. Samples and Assaying 3. Miscellaneous Drilling Charges Sub-Total	614.97 146.10 168.65	\$15,680.59	0.43 0.10 0.11	10.85
Project Charges:				
D. General Administration E. Legal Fees	\$ 422.19 		0.29	
F. Drill Road Access G. Claim Work - Surveying Project Charges Sub-Total	6,284.86	6,707.05	4.35	4.64
Total Expenditures:		\$22.387.64		\$15.49

James D. Sell

#### AMERICAN SMELTING AND REFINING COMPANY TUCSON ARIZONA

March 19, 1974

W. L. Kurtz T0:

FROM: J. D. Sell

> Drill Hole A-6 Rotary Drilling Costs State Lease Section 4 Superior East Project Pinal County, Arizona

Harness Drilling Company, from June 4 to June 16, 1973 drilled A-6 to a depth of 1358 feet using a Failings DMX 1500 with 2 WEJ compressors and an air-hammer. The hole is capped for reentry.

The extra heavy project charges were incurred by charging the entire access road costs, which was necessary to reach the drill site.

Distribution of Costs:

Rotary Drilling 1375 feet

Dr	illing	Charg	es:		
Δ	Direc	t Dril	lin	a .	

			\$/ft.	\$/ft.
A. Direct Drilling	\$11,046.99		8.04	
B. Site Preparation	3,072.25		2.23	
C. Field Administration				
1. Supervision & Geology	459.63		0.33	
2. Sampling and Assaying	76.78		0.06	
3. Miscellaneous	168.64		0.12	
Drilling Charges Sub-Total		\$14,824.29		10.78
Project Charges:				
D. General Administration	\$ 189.02		0.14	
E. Legal Fees				
F. Drill Road Access	15,305.67		11.13	
G. Claim Work, Surveying				
Project Charges Sub-Total		15,494.69		11.27
Total Expenditures:		\$30,318.98		\$22.05

Sames D. Sell

JDS:1b

## AMERICAN SMELTING AND REFINING COMPANY TUCSON ARIZONA

#### March 19, 1974

TO: W. L. Kurtz

FROM: J. D. Sell

Drill Hole A-7
Rotary and Core Drilling Costs
Superior East Project
Pinal County, Arizona

The deep hole A-7 was initiated by the J. O. Barnes Drilling Company using a Howard-Turner Drill Master and an air package supplied by Air Equipment, Inc. consisting of 2 Joy WB-102 compressors and a Joy 2-1500 booster. The rotary hole was drilled from August 17 to September 16, 1973 and cased with 4" pipe to a depth of 3150 feet.

Boyles Brothers cored the hole from 3150 feet to the terminal depth of 6042 feet by NX coring with a CP-50 machine from November 27, 1973 to February 9, 1974.

Higher costs than anticipated were incurred during the contractor costs of rotary drilling. The cost distribution below follows a modification of the Cost Summary memorandum dated October 2, 1972.

#### Distribution of Costs:

Rotary 3150 ft.; Core 2892 ft; Total 6042 ft.

Drilling Charges:			\$/ft.	\$/ft.
A. Direct Drilling		and the first of the second		
Rotary	\$74,866.38		23.77	
Core	<u>85,029.98</u>	\$159,896.36	29.40	26.46
B. Site Preparation		- 4,000.00		
Rotary	\$ 1,609.51		0.51	
性 Core も 自作 と と 単級 デート とき	150.64	1,760.15	0.05	0.29
C. Field Administration		+441.80		
1. Supervision & Geology				
Rotary	\$ 1,020.65		0.32	
Core	2,703.21	3,723.86	0.93	0.62
2. Sample Prep. & Assay				
Rotary	\$ 50.09		0.02	
Core	1,872.22	1,922.31	0.65	0.32
3. Miscellaneous		+ 234.86		
Rotary	\$ 210.22		0.07	
Core	740.03	950.25	0.26	0.16
Drilling Charges Sub-Total		\$168,252.93		27.85

## Project Charges:

D. General Administration	\$ 1,720.20	0.28
E. Legal Fees F. Drill Road Access G. Claim Work - Surveying	847.29	0.14
Project Charges Sub-Total	2,567.49	0.42
Total Expenditures:	\$170.820.42	\$28.27

James D. Sell

JDS:1b

### AMERICAN SMELTING AND REFINING COMPANY TUCSON ARIZONA

March 19, 1974

TO: W. L. Kurtz

FROM: J. D. Sell

Cost Summary as of March 1, 1974 Superior East Project Pinal County, Arizona

This report is the second summation report on the project and covers the period September 1, 1972 to March 1, 1974. The previous report was submitted September 28, 1972.

Seven authorizations have been secured for the Superior East Project. As of March 1, 1974, the project had a deficit of \$4,565.30 from the total authorization of \$1,045,000.00, as shown on Table 1.

TABLE 1 -- Authorizations and Expenditures

Number	Authorization	Expended	(March 1, 1974) Unexpended
MA-0010*	\$ 45,000.00	\$ 45,000.00	Zero
MA-0010-01*	31,000.00	31,000.00	Zero
MA-0010-02*	55,000.00	55,000.00	Zero
MA-0010-03*	260,000.00	260,000.00	Zero
MA-0010-04*	409,000.00	409,000.00	Zero
MA-0010-05**	130,000.00	130,000.00	Zero
MA-0010-06**		119,565.30	(\$4,565.30)
	\$1,045,000.00	\$1,049,565.30	

\*Reported in September 1, 1972 Costs; \*\*Reported in this report.

Table 2 is a synopsis of the authorizations and expenditures by activity during the second report period. Individual cost summaries have been submitted for each activity.

### TABLE 2 -- Activity Expenditures

MA-0010-04 Unexpended funds, Sept. 1, 1 MA-0010-05 Appropriation, April 1973	972 \$ 8,129.77 (+) 130,000.00
Sub-Total Claim Staking, Validations, Surveying a Legal Work, Sept. 1, 1972 to Aug. 1, Drill Hole AA-1 (Incomplete) Drill Hole A-3 (Incomplete) Drill Hole A-6 (Incomplete)	nd
Sub-Total	\$ 51,255.12
MA-0010-06 Appropriation, Sept. 1973	(+) <u>115,000.00</u>
Sub-Total	\$166,255.12
Drill Hole A-7 (Completed)	(-) <u>170,820.42</u>
Total	(\$ 4,565.30)

(Note: Accounting Sheet for end of February shows deficit of \$4,479.05. I included assaying charges of \$86.25, bringing total deficit of \$4,565.30. (See details on A-7 summary report.)

Table 3 is a synopsis of the above costs by categories, for the individual holes and total project period.

Table 3 shows that for the total of 8,982 feet rotary and core drilled, the average drilling charges cost per foot were \$22.62. This compares with \$27.35 during the first reporting period. However, during the second period, the project charges were \$6.07 compared to \$2.96 for the earlier period. The overall cost on expenditures were \$28.69 per foot on second period compared to \$30.31 for the first period.

TABLE 3 - Individual Drill Hole Categories and Costs

Category	Activity	Activity and Drill Hole No.	le No.								
FOOTAGE	Claim, Legal, etc.	AA-1	\$/ft.	A-3 \$/ft.	\$/ft.	A-6 \$/ft.	\$/ft.	A-7	\$/ft.	Total	\$/ft.
Rotary		120		1445		1375		3150 2892		6,090 2,892	
DRILLING CHARGES			•								
A. Direct Drilling Rotary Core Rice Presenting	\$1,931.17	\$750.00	6.25	\$14,270.87	88 80 80	\$11,046.99 8.04	8.04	\$ 74,866.38 85,029.98	23.77 29.40	\$102,865.41 85,029.98	16.89
Rotary Core Field Admir		20.00	0.42	480.00	0.33	3,072.25	2.23	1,609.51	0.51	5,211.76 150.64	0.86
A 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1,184.12	86.80	0.72	614.97	0.43	459.63 0.33	0.33	1,020.65	0.32	3,366.17 2,703.21	0.55
5.77		46.95	0.39	146.10	0.10	76.78 0.06	90.0	50.09	0.02	319.92	0.05
Sortianeous Rotary Core	362.30			168.65	0.1	168.64	0.12	210.22 740.03	0.07	909.81	0.15
Drilling Charges Sub-Total	\$3,477.59	\$933.75	7.78	\$15,680.59	10.85	\$14,824.29	10.78	\$168,252.93	27.85	\$203,169.15	22.62*
D. General Administration E. Legal Fees F. Drill Road Access G. Claim Work-Surveying Project Charges Sub-Total Total Expenditures:	\$ 4,037.70 9,369.98 11,565.04 24,972.72 \$28,450.31	\$1,300.00 3,483.97 4,783.97 \$5,717.72	10.83 29.03 39.86 47.64	\$ 422.19 6,284.86 6,707.05 \$22,387.64	0.29 4.35 4.64 15.49	\$ 189.02 15,305.67 15,494.69 \$30,318.98	0.14 11.13 11.27 22.05	\$ 1,720.20 847.29 2,567.49 \$170,820.42	0.28	\$ 6,369.11 10,669.98 22,437.82 15,049.01 54,525.92 \$257,695.07	0.71* 1.19* 2.49* 1.68* 6.07*
The second secon											

\*Based on Total Footage drilled of 8,982 ft.

Table 4 below shows the percentage of individual account costs during this reporting period and is compared to similar figures (p. 6 of Sept. 28, 1972 report) of the earlier period during the drilling activity areas.

TABLE 4 -- Percentage of Individual Account Costs

Segment Cost	Percentage Percentage 1974 Report 1972 Report
Direct Drilling (A) \$187,895.3 Field Overhead (B,C) 15,273.7 Project (D,E,F,G) 54,525.9	6 5.93 7.8.89 11.45 90.29
Total \$257,695.0	7 100.0% 100.0%

The large increase in project charges was occurred in the 28,000 feet of project road building charges, the claim staking and validation work and the legal involvement in the LD-claim group.

James D. Sell

JDS:1b

DIAMOND CORE DRILLING BOTARY BRILLING GROUTING FOUNDATION TESTING DIAMOND DRILLING EQUIPMENT DRILLING ADDITIVES



CONTRACTORS-ENGINEERS General Offices and Plant

1624 Pioneer Road P. O. Box 58 Phone (801) 487-3671

SALT LAKE CITY, UTAH 84110

Cable: BOYLESCO Telex: 388-321

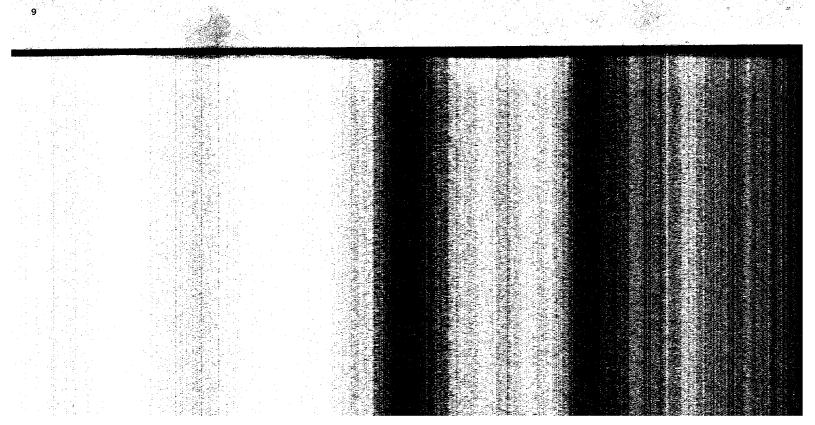
INVOICE DATE: 3-31-74 Cable: 1
ORDER NUMBER:
INVOICE NUMBER:
CONTRACT: ASAMO Sullon Summit

PHOENIX, ARIZONA GOLDEN, COLORADO SPARKS, NEVADA

BRANCH OFFICES

SPOKANE, WASHINGTON MURFREESBORO, TENNESSEE IRONWOOD, MICHIGAN SANTIAGO, CHILE cable: BOYLESBROS LIMA, PERU cable: BOYLESCOP MEXICO CITY, MEXICO telex: 001774546

Hole No.	From	То	Footage	Rate	Total
)CA.3	0	2983		45,00	
	93 hrs r	ig up wash du	wn	45,00	4185.0
		ace hale + Cer		45.00	1485,00
		I ve rode out &	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	45,00	1990
	17 Sack C			2.37	40.29
		A plug 3 1/2		13.00	13.00
		Rock Bit			69,00
			Sales	Taf	1.61
				Total	6000
i de la companya de l					6783.90
XXX					



CONTRACTORS-ENGINEERS General Offices and Plant

1624 Pioneer Road P. O. Box 58 Phone (801) 487-3671 SALT LAKE CITY, UTAH 84110

Cable: BOYLESCO

Telex: 388-321

American Smelting & Refining Company P. 0. Box 5747

BRANCH OFFICES

BRANCH OFFICES

PHOENIX, ARIZONA

GOLDEN, COLORADO

SPARKS, NEVADA SPOKANE, WASHINGTON

URFREESBORO, TENNESSEE

IRONWOOD, MICHIGAN

SANTIAGO, CHILE cable: BOYLESBROS

cable: BOYLESCOP

MEXICO CITY, MEXICO telex: 001774546

LIMA, PERU

Tucson, Arizona 85705

INVOICE DATE: March 31, 1974

T-73-340 VOICE NUMBER:

CONTRACT: 6-664

TERMS: Net 30 Days

LOCATION: Superior East, Arizona

Hole No.	From	То	Footage	3	Rate	Total
<b>A-3</b>						
ve on, rig up, wa	sh down to 2983		93	Hrs.	45.00	4,185.00
se hole and cemen	t	The second secon	33	Hrs,	45.00	1,485.00
ve rods out and r	ig down	the control of the co	22	Hrs,	45.00	990.00
terials Used:	Cement	entre A supraminadam no 2 - An - Antonomica susupa Anoma no 2	17	Sks.	1.95	33.15
	St Cement Plug			- Adding the second	13.00	13,00
	Rock Bit 5"	4		***************************************	69.00	69.00
			TOTAL BILI	JING	**************************************	6,775.15
		the state of the s	D FOR PAYMENT		APPROVED FO	R PAYMENT
		By:(S	lanovusio)		By: (Signa	

ximum amount permitted by law, whichever is lower, will be charged in the event payment is not made within the s of this invoice. It will be computed from the due date to the date we receive payment.

E DRILLING OUTING UNDATION TESTING AMOND DRILLING EQUIPMENT HLLING ADDITIVES

### COMPANY

**CONTRACTORS-ENGINEERS General Offices and Plant** 

1624 Pioneer Road P. O. Box 58 Phone (801) 487-3671

SALT LAKE CITY, UTAH 84110

Cable: BOYLESCO

Telex: 388-321

INVOICE DATE:

IRDER NUMBER:

VOICE NUMBER:

CENUMBER: asarco Sutton Summit

TERMS:

LOCATION: Summer & Summer

GOLDEN, COLORADO

SPARKS, NEVADA SPOKANE, WASHINGTON

MURFREESBORO, TENNESSEE IRONWOOD, MICHIGAN

SANTIAGO, CHILE cable: BOYLESBROS LIMA, PERU

cable: BOYLESCOP

MEXICO CITY, MEXICO telex: 001774546

Hole No.	From	То	Footage	Rate	Total
DCA 3	0	2983		45,00	The state of the s
	93 hrs ru	gup wash de	wn.	45,00	4185.00
		se hale + Ces		45.00	1485,00
	1	re rode out &	)	45.00	990.0
	17 Sack Ce		3	2.37	40.29
	The second of th	Plug 3 2		13.00	13.00
	15 in 1				69,00
			Sales	Taf	1.61
				Total	Legiste
				5	6783,90

400000000000

2982 6783.70 594 × 8/99 5944 22350

not recluding cost of

or + 424/A for Boyle cleaning only last roca of

## TAB

DCA-3A

DC A-3 Cleaning & Casing Boothers.

					helter a Booles Brother.
Sate 19	Depth at End Nay	Facting	His Dilling	No.	Reverlo - Helsiz Forma
She,	104				
Shal	tor class	red hol	i w	el	ceir med return to desthof 1995 ft.
Bayle	Broth	us_	DM	<b>L</b> –	1500
3/25 D	0			<b>]</b> +	The rig down of movingones & Astrace ente
3 L D	0			L.:	10 hes rig up, houlding pint
3/27 D	1	800		<u>/+</u>	who going in sign , set up mir head Swde, cleaning of she going in, mining much howler, woto, weld Timeoni;
	1100?	300		1	The rely rods inhol, my need a lost cirel; got cirel a 1000 pt
3/28 D	2100	375 525		)  /	This running red to 1475 hilling bidges.
5		260			8 hrs dulling cave to 2360'; Mix med a lost and moter
		300 223		-	8 hre standling deaned hol to bottom; Laying Lown pipe.
<u>S</u>				1	The Startly laster Sounded & culling real to ren care
3/30 D	20	rews	00 13 Hen 10	he	8 hestiennic casing in hol. (?).  20 hes rennic, MX casing from 0 to 2483 ft; 33/4" flust  plus 17 sachrof coment & 1 coment play.
N				,	plus 17 such of coment & I coment pluy.
3/31D_				3	plu 17 soch of coment & I coment pluy.  The case & coment come;  24hes traving down a moving rock out o mig down.
					and the control of th
detanc	as other	sit	Y how	e de	y had moved to new Newment site about some
Not: on	3/25 Bu	om ca	Olean 1	cis 1	norming to osh if we were still interested in howing work
done if	norma w religios et	ruled no	liase	rig	form standly. The collect in lot of there That May me

## TAB

A-3

### AMERICAN SMELTING AND REFINING COMPANY TUCSON ARIZONA

June 3, 1974

TO: W. L. Kurtz

FROM: J. D. Sell

Daily Drill Data
Drill Hole A-3 (Deepening)
Rotary Drilling
Superior East Project
Pinal County, Arizona

Attached is a daily log of the rotary drilling in deepening Hole A-3 by Copper State Exploration. The information shown is the date, depth at end of day, number of hours charged to drilling, the number of shifts involved (converted to 8-hour shifts), explanation of delays, size of hole, and the geologic formation.

Compiled from this data is a breakdown of the shifts and footage by a) bit size, and b) geologic unit.

As noted, the hole was drilled from surface to 1445 feet by Harness Drilling Company (see report dated Nov. 7, 1973).

James D. Sell

JDS:1b

cc: NPWhaley

The sed like week convert pour

Deepening DRILL HOLE A-3 - Rotary-mud Drilling
Copper State Exploration (J.C. Tackett) - Failings CF1500 Rig

	Depth at			lling			
Date	End of Day	Footage	Hours	Shifts*	Delays	<u>Hole Size</u>	Formation
1974					(Note: Static water level found at 1010	feet.)	
5/10	1445	0	0	1-1/2	Moving on site; mixing mud.	1	1
5/11	1490	45	12	3	<pre>1 hr. equip. repair; 3 hrs. tripping in; 8 hrs. haul water.</pre>		
5/12	1515	25	5	3	Bit change @ 1500'; 3 hrs. equip. repair; 4 hrs. tripping bits; 10 hrs. lost circulation.		
5/13	1640	125	20	3	Bit change @ 1545'; 4 hrs. tripping.		
5/14	1724	84	19	3	Bit change @ 1680'; 4 hrs. tripping;	5-1/8''	
5/15	1803	79	18	3	<pre>1 hr. equip. repair. Bit change @ 1760'; 4 hrs. tripping; 2 hrs. mix mud.</pre>	5-1/6"	W
5/16	1858	55	20	3	4 hrs. mix mud & lost circulation.		
5/17	1890	32	19	3	Bit change @ 1858'; 5 hrs. tripping.		
5/18	1925	35	17	3	Bit change @ 1920'; 5 hrs. tripping; 2 hrs. equip. repair.		
5/19	1949	24	10	2	4 hrs. conditioning mud for shutdown; 2 hrs. rigging down.		$\downarrow$
						1949	<del></del>

\*Based on 8 hours per shift.
NOTE: Only ten feet of 8" ID surface casing in hole.

### DRILL HOLE A-3 (Deepening), Rotary-air and mud. SUPERIOR EAST PROJECT (Includes total hole figures)

### Drilling Time by Bit Size, including down time:

Bit Size	Depth	Shifts	to Depth	Footage	Ft/Shift	Delays
A) 10" & 8"	0-1445	16-1/2	1445	1445	87.6*	Surface casing; unloading hole;
B) 5-1/8"	1445-1949	26	1949	504	19.4	laying down pipe. Lost circulation;
		42-1/2		1949	45.9	tripping.

<sup>\*</sup>Note: No casing set except 10 feet of surface casing.

### Drilling Time by Rock Unit, including down time:

Rock Unit	Depth	Shifts to Depth	Footage	Ft/Shift
A) Dacite A) Whitetail Cgl. B) Whitetail Cgl.	0-1430 1430-1445 1445-1949	15-1/2 1428 1 1445 26 1949	1428 17 <u>504</u>	92.1 17.0* 19.4
		42-1/2	1949	45.9

\*Note: This amount of hole actually drilled in 1/2 hour of on-the-bottom drilling.

A) Harness Drilling Company; Rotary-air (Report dated Nov. 7, 1973).

B) Copper State Exploration; Rotary-mud (this report).

# TAB

A-U

### AMERICAN SMELTING AND REFINING COMPANY TUCSON ARIZONA

June 18, 1974

TO: W. L. Kurtz

FROM: J. D. Sell

Daily Drill Data
Drill Hole A-6 (Deepening)
Rotary Drilling
Superior East Project
Pinal County, Arizona

Attached is a daily log of the rotary drilling with mud in deepening Hole A-6 by Copper State Exploration. The information shown is the date, depth at end of day, number of hours charged to drilling, the number of shifts involved (converted to 8-hour shifts), explanation of delays, size of hole, and the geologic formation.

Compiled from this data is a breakdown of the shifts and footages by a) bit size, and b) geologic unit.

As noted, the hole was drilled from the surface to 1375 feet by Harness Drilling Company (see report dated Nov. 7, 1973). Copper State Exploration deepened the hole to 1665 feet.

James D. Sell

JDS:1b Attach.

cc: NPWhaley

Deepening DRILL HOLE A-6 - Rotary-mud Drilling Copper State Exploration (J.C. Tackett) - Failings DMX Holemaster

Date	Depth at End of Day	Footage	and the second second	lling Shifts*	Delays	Hole Size	Formation
1974					(Note: Water level was at 800 feet.)	-1375-	
5/20	1375	0	0	3	6 hrs. rigging up; 12 hrs. mixing mud	1	
5/21	1375	0	0	3	and lost-circulation material (LCM). 24 hrs. blind hole, mix mud & LCM.		
5/22	1390	15	6	3	18 hrs. recovering circulation, mix mud & LCM.		Dacite
5/23	1420	30	20	3	4 hrs. bit change @ 1410 ft.; mix		
5/24	1440	20	18	3	mud & LCM. 6 hrs. rd. trip, bit change @ 1428 ft.; mix mud & LCM.		-1475-
5/25	1490	50	20	3	4 hrs. rd. trip; bit change @ 1460 ft.; mix mud & LCM.	5-1/8''	
5/26	1557	67	18	3	4 hrs. rd. trip; bit change @ 1520 ft.; mix mud & LCM; 2 hrs. tripping; bit change @ 1557 ft.		
5/27	1640	83	22	3	2 hrs. tripping in.		Whitetail
5/28	1665	25	12	3	4 hrs. tripping for bit change @ 1655 ft; 4-1/2 hrs. conditioning mud for shutdown & tripping out; 3-1/2 hrs. rigging down.		Cgl. ↓
5/29	1665	0	0	<b>2</b>	15 hrs. rigging down & moving	- 1665-	-1665-

\*Based on 8 hours per shift.
NOTE: Only ten feet of 8" ID surface casing in hole.

### DRILL HOLE A-6 (Deepening), Rotary-air and mud SUPERIOR EAST PROJECT (includes total hole figures)

### Drilling Time by Bit Size, including down time:

Bit Size	Depth	Shifts to	Depth	Footage	Ft./Shift	Delays
A) 10" & 8"	1375	14-1/4	1375	1375	96.5*	Setting surface casing, tripping.
B) 5-1/8"	1665	24-1/4	1665	290	12.0	Lost circulation, tripping.
		38-1/2		1665	43.2	tripping.

\*Note: No casing set except 10 feet of surface casing.

### Drilling Time by Rock Unit, including down time:

Rock Unit	Depth	Shifts t	o Depth	Footage	Ft./Shift
A) Dacite B) Dacite B) Whitetail	0-1375 1375-1475 1475-1665	14-1/4 16-1/4 8	1375 1475 1665	1375 100 190	96.5 6.2 <u>23.8</u>
		38-1/2		1665	43.2

- A) Harness Drilling Company; Rotary-air (Report dated Nov. 7, 1973)
- B) Copper State Exploration; Rotary-mud (this report)

FROM: W. L. KURTZ

To: NPW

Bryant how requested new sate. Based on the attucked what is your opinum. of The following

3°10 43°0 37.50 42.50 20,00 25,00

How we'ld This compare w.

ceixos > comments >

3 holes le=5 600. Quiledon of michale 40 pm backe give 1 findoling /4 ml with ancred 400 t Some 0.2 assession Two (soot are) lent no visible - clos? mefice? Troles bollows in Line Holes dilled by Convex ing on claim held by Novanda (time of Pon Kouverien) - Medhelle Group, S. of & Beggiet. 200 25/2

473-9914 28, 991.95 1365 feet 2980 NPW Oct 24, 1974 to DCH-.
SU l'ège delivered 4" casing 65 joint, 21 ft or 1365 fat from



AILING ADDRESS:

# Jouthwest Pipe and Supply Co.

SHIPPIN 61b.

LOCATION: 7600 West Olive

Glendale, Arizon	a 85301				Peoria, Arizo	
SOLD TO:	ich. Swalth	1 Refund	SHIP TO:	ODE-	SULTER	/
			SUM	WET.	DEILLE.	RILIL
			NIEE.	TYCL	1:00	H,M,
			117	5011	71 341	ハルドー
ORDERED BY	CUSTOMER P. O. NO.  T - 77 - 61	7 F.o.s.	TAX	( RESALE	TERMS: 10TH PROX.	
ORDER DATE 12 16 - 73	10/24/74	SHIP-VIA Cardoll	#35	SALESMAN	TALLY NO.	1/2
ORD. No. Jts. SH	IPPED	DESCRIPTION	N		PRICE	AMOUNT
3780						
7001/5/12	101 41 -1	1111 74	C >	1		

Receipt is hereby acknowledged for the above listed material. If this account is not paid when due, the customer agrees to pay as a service charge, one percent per month on the unpaid balance thereof, until paid in full. If legal action is necessary to enforce collection, the customer agrees to pay a reasonable attorney's fee.

3780 1345

REC'D

**SALES TAX** TOTAL

CUSTOMER COPY

0 0			1 a #
V			Box 463, Mainis Aly 85539 LB#4
++.	% Cu	Tilled Sof.	Cargos & To Mas 2
600+620	0.006	,004	600-700 tr.
640-660	,009	007	720-820 In
480-700	.014	.006	900-1025 La
720-746	.004	,002	1085-1115 0.002
760-780	.014	1006	1205-1305 ,003
800-820	1004	,001	1325-1415 ,002
900-905	,011	1004	1625-1715 ,003
1025-1055	ti		1775-1805 to.
108-5-1115	1002	lr	1505-1535 ,003
1205-1305	ta	t	1895-1925- 1002
1385-1415	,004	tr	1985-211 to
1505-1535	,004	_tr	Cu oxiu
1595-1625	,007	.003	3245-3251 0.018 0.011
1685-1715	,000	.002	3272-3282 .019 .010 .0088
1685-1715	.006	.002	3604-3614 .012 .006 .0012 .004Z
1775- 1805	,011	.003	3657-3647 .021 .006 .002 ₹
1895-1925	.010		3724-3734 ,004 ,001 ,0041 ,002 Zn
1985-2011	,008	,002	3749-3757 ,009 ,006 ,0062 ,003 Zn
2075-2105	.004	mos2	<b>A</b>
2/95-2225	1005	ta .001	3807-3817 .002 to to
# 22x0-2310		•	3×69-3878,012:007:0021
2310-2340		(	3943-3953 .017 .007 .0041 Fr g Ag
2340-2344			3942-3969 .008 ,005 ,0018
2361-2372/2			4036-4046 .008 .005 .0007
2460-2467			4086-4096,002 to to
2567-2577			4172-4181 ,008 ,004 ,0004
2662-2674		(	4220-4229,006,003.0002
2754-2764			-4247-4277,024,009,0005 to Ag
2846-2856			4286-4297 ,009 ,005 .004
2967- 2976			-4327-4337 .021 .012 .006
3042-3050	· ·	Mosz	4399-4404 .002 to .004 to Aq
3079-3087			4445-4455 ,004 to .006
= 3189-3198			4497-4507 .012 .004 .006 .11 Sulpar
210 1 21 70	,045 .	009 ,0047	1416-1301 , OLE , ODY , OOG , 11 Suppose
			Город — <del> </del>

footose The 2 can	46
4508-4518 0.008 0.003	
	0.009
4518-4528 .017 .006	7007
4528-4538 .014 .004	,006 1012 Suffer TAL TAg,
- 4538-4548 .022 .007	.003 .110 "
4548-4541 .019 .004	140"
4577-4587 ,007 ,002	1005 - Ta Au Ta Ag.
4592-4602,008,002	.004 .12 Sup TaAu TaAg 0.023
4624-4634 1005 th	1006 10092 10975 1093 10092 10975 1093
4697-4657,009 to	,009z .097Joffe,
44.75-4685 .013 .004	,0084
4695-4705 to tr	10064
4707-4717 .012 .003	,0040 .013 Suffly
4727-4737 ,006 ,001	,0092 ,011
Nood to below \$ 48.60.	
0094	
67soup 0.430	
.009	
6610.62\$ 5 59 4 30	Se 2 100
30	AA-1-8 10
	PR-1 7
433 py Fe	47% 5 538
0 /	% Fe 30% S 35%
,	60 5 40
21	7 -5 13
75 Zn 6	

· <del>- · - ·</del> · ·

A STATE OF THE PROPERTY OF THE	more in the first and an address of the contract of the contra
Appropriate the second	
Algeria de la companya del companya de la companya del companya de la companya del companya de la companya de la companya de la companya del companya de la companya del la companya del la companya del la companya del la companya de	
The second section of the second section between the second second second second section (second section ).	
The second second control of the second cont	
The man and all the state of the control of the control of the first of the first of the control of the control	and the state of the common terms of the contract of the contr
A CONTRACTOR CONTRACTO	
Approximation of the contract	AND THE PROPERTY OF THE PROPER
هر د مایشد. این بایده از رسی از چی با در باید را باید و مشتقی در ماهند به در و مشال در محمدی و و باید. دی	a Marian (12 a filip mina maril 1 a magha taong 1 a magha taong 1
The contract of the contract o	regions with the control of the cont
and for a complete contract of the following the following the following the contract of the complete contract	and the state of t
The first contract with and a local contract contract contract and an experience of the contract contr	en e
A control of the cont	and the second of the second o
Total Deviation 203 ft. A Nayle E	
The state of the s	And the second section of the second section of the second section is the second section of the second section in the second section is a second section of the second section section section is a second section sec
203 ft. & N 64/2 E	
A series de la companya de la compa	
and the second s	
and the control of the second of the control of the	
	<del>and the second of the second </del>
- State of the Control of the American State of the Control of the	
A finding transfer of the control of	
A second	
The contraction of the contraction	
A CONTROL OF THE PARTY OF THE P	
and the control of th	
The state of the s	
The state of the s	
Andrew to the control of the control	and the state of t
and the first the control of the second process of the second proc	
- Park All Barrier - All Control of the Artist - A	
+++++++++++++++++++++++++++++++++++++++	
+++++++++++++++++++++++++++++++++++++++	
(3101) + + + + + + + + + + + + + + + + + + +	
(3004) + + + + + + + + + + + + + + + + + + +	
(3007.) + + + + (3007.) (300.)	
328 (3202) + + + + + + + + + + + + + + + + + + +	
(3007.) + + + + (3007.) (300.)	
(3007.) + + + + (3007.) (300.)	
(3007.) + + + + (3007.) (300.)	
(3007.) + + + + (3007.) (300.)	PLAN & DELINITION
(3007.) + + + + (3007.) (300.)	PLAN of DEVIATION
(3007.) + + + + (3007.) (300.)	
(3007.) + + + + (3007.) (300.)	DRILL HOLE LB-4
(3007.) + + + + (3007.) (300.)	
(3007.) + + + + (3007.) (300.)	DRILL HOLE LB-4 ARIZONA MINING CO.
(3007.) + + + + (3007.) (300.)	DRILL HOLE LB-4
(3007.) + + + + (3007.) (300.)	DRILL HOLE LB-4 ARIZONA MINING CO.
(3007.) + + + + (3007.) (300.)	DRILL HOLE LB-4 ARIZONA MINING CO.
(3007.) + + + + (3007.) (300.)	DRILL HOLE LB-4 ARIZONA MINING CO.
(3007.) + + + + (3007.) (300.)	DRILL HOLE LB-4 ARIZONA MINING CO.
	DRILL HOLE LB-4 ARIZONA MINING CO.

## TAB

Dvill Water.

		Oates of Willing - Rotary o	and Cor, Superior East
	Diell Hole	Rotary	Ĝie
	A-1	April 8- April 27, 1971	Joh 14 - August 12, 1971
	بالمتناء والمتناه والمتناها والمتناء	(Revises hole, cased).	April 20 - July 3, 1971
	and the second of the second o	(Oldhob, + lwk tockany case).	November 16, 1971 - February 9, 1972
	A-2	January 12 - February 8, 1972	{ Tabruary 21- March 17, 1972
	A-7	August 17, - September 16, 1973	{ Tehnay 21- March 17, 1972 { April 18 - May 18, 1972 (Wedge). November 27, 1973 - Februay 9, 1974.
	DCA-3 A	(Old hole, I luck te clean 4 case)	July 1 - October 21, 1974
	DCA-2A	(old hole).	October 23 - December 18, 1974.
4			
er er hegen felder er er kanne, en blevenere er kanne er			

Compan	son o	1 Cost	A, AIFA
as of Fe	l. 1,	1975	for the
as of Fe	East.	Bolin	e, and
Rawhide	Rio	iels	

Rawhide P.	rosiets		
			·
Lea	Superior East	Bohme	Rawhide
Toolage_	37,793	18,578'	3,967'
Dulling Charges			
A. Derect Willing	# 24.39	\$ 17.71	\$ 31.18
B & C. Site Prep. & Find Supero.	3.74	2.13	2,66
Drilling Sub-total	428.13	4 19.84	2.66 \$ 33.84
Project Charges			
D thy G. Proj. Sub- total	\$ 3.86	\$ 2.03	# 4.89
Total Expenditures	\$ 31.99	#21.87	\$ 38.73

## TAB

LB-H

### AMERICAN SMELTING AND REFINING COMPANY TUCSON ARIZONA

### February 4, 1975

TO: W. L. Kurtz

FROM: J. D. Sell

Drill Hole LB-4 Arizona Mining Company Pinal County, Arizona

Through the courtesy of Mr. Paul Kayser, President of Arizona Mining Company, ASARCO was granted permission to log their deep drill hole, LB-4, which is located within several hundred feet of a common boundary line with ASARCO.

The logging was aided by Mr. Nick Carouso, who also provided the assay data and the basic Spot Deviation Survey data.

#### DRILL HOLE

The hole is located in the center of the NW1/4 NE1/4 NW1/4 of Section 24, south of Pinal Ranch. Whatley Drilling Company rotaried the hole from the surface to 2361-1/2 feet, from November 24 to December 24, 1973. Longyear Drilling Company reentered the cased hole and cored NX from 2361-1/2 to the terminal depth at 4860 feet, from January 28 to July 30, 1974.

#### GEOLOGIC LOG

The hole was collared in Dacite and encountered a minor amount of Earlier Volcanics before entering Schultze Granite at a depth of 334 feet (Verbal, Nick Carouso). As noted above, the rotary hole continued in the granite to the casing point at 2361-1/2 feet. No cuttings were examined during the core logging by ASARCO.

The Schultze Granite as logged is typical granite of the adjacent outcropping area. It is generally equigranular, salt and pepper textured, medium grained with bright fresh biotite which is partially wispy books. The large feldspar phenocrysts are variable throughout the length of core examined. Few granite aplites were found throughout. The hole in general was very massive and cut by few zones of shears or narrow faults.

Alteration of the granite is essentially nonexistent with only very narrow clay selvages adjacent to some shears. Minor quartz-sericite selvages increased with depth.

Attached to this report is the geologic log of the core (Attachments A-1 thru A-3).

#### PETROGRAPHIC REPORT

Five samples were collected from the core for thin-section and petrographic examination. Samples were collected at 2600, 3092, 3410, 4200, and 4850-foot depths and represent the entire cored interval.

Attached is the report on each sample (Attachments B-1 thru B-5) prepared and examined by Western Petrographic of Tucson, Arizona. Note the real absence of any alteration products from an outside source and the lack of visible mineralization of any consequence. The alteration as described is minor and may be related strictly to a deuteric phase unrelated to an alteration-mineralization system.

#### ASSAYS

All assays reported were from splits, by personnel of Arizona Mining, on the core and submitted to Mr. H. F. Fountain, Assayer, Miami, Arizona. None of the samples were rerun or verified by ASARCO, but the visual inspection of the core would suggest values in the range found by the assayer.

The assays are listed in Attachment C and most include moly results and some show sulfur, zinc, gold, and silver values. The arithmetic average value of all the samples recorded is 0.009% total copper, with a high value of 0.024% copper. Only one zone of any appreciable length contained a two-fold increase in value; this zone, from 3189 to 3667 feet, averaged 0.019% copper. All values are within the range of values found in sampling the outcrops of Schultze Granite where alteration-mineralization is essentially absent.

It should also be noted that in the samples having sulfur values the amount of sulfur is a magnitude higher than is needed for the copper assay and indicates that most of the sulfur is tied with pyrite rather than chalcopyrite, molybdenite, or the sphalerite. Calculations based on the amount of copper, moly, zinc, and sulfur suggest values of 6 to 1 and up to 22 to 1 ratios of pyrite to chalcopyrite. Only the last two samples, 4707-4717 and 4727-4737, indicate that the sulfur is tied entirely with the copper, moly, and zinc sulfides with no pyrite available. The total copper value is very low throughout the hole.

#### HOLE DEVIATION

The list of spot deviation survey points and values as received from Arizona Mining are recorded in Attachment D. A plan plot of the hole is shown on Attachment E and graphically shows the hole deviating in the northeasterly direction. Calculations suggest the bottom of the hole is some 203 feet in a north  $64-1/2^{\circ}$  east direction from the collar location.

### CONCLUSIONS

The drill hole LB-4 is located near the axial trace projection of the outcropping Schultze Granite. The logging generally shows an equigranular texture with a relatively thin phenocryst zone at 3400-foot depth, which was cut for a distance of 200-250 feet before again being in the equigranular phase.

Alteration is almost nonexistent, but does increase slightly toward the bottom of the hole. Likewise, assay sulfur calculations suggest a high pyrite to chalcopyrite ratio upward in the hole and a paucity of sulfur available for pyrite in the bottom of the hole. All alteration-mineralization characteristics and values are of a very low magnitude.

Junes W. Sell

James D. Sell

JDS:1b Attachs.

ATTACHMENT A-PROJECT ARIZ Mining HOLE NO LB-4 Su face to 1344 - Whatley Drilling Co. GEOLOGIC LOG Pinal Ranch 7/2 Topo qued. Collar elev. 4700 ft. Final depth 4860 FF Nov. 24 - - Dec. 24, 1973 Contend NW 4 NE 4 NW4 Indination Vertical Poge 1 of 3 of Sec. 24, TIS, RIBE. 2361/2- 4800 - Longyas DullingCo. MINERALS ORE MINERALS GANGUE Logged by 910-Soci Jun 28 - July 30, 1974 11 11/29/74 Pinal County, Arizona. Date start Nev. 24 1923 Date finish July 30, 1774 NXCose total. STRUCTURE DEPTH ASSAY ROCK TYPE and REMARKS DACITE & CARLIER VOICANKS on sludge giles. Depths slicen verbal from R. Franks & N. Gruss 384 Marito , 4 mino Garler Valcanice (Verial). -24/2 Shelly Swante. SCHULTZE GRANITE. Medium grained fresh, bright biotiles with the wisey, very massive, few joints, or freetures. 15-20% hootile, two few falliges. phenecrysts, Few of eyes. Equipranular Sitts paper.
Ten sleet the freeters, few 14" of veintals at few ministin cavities.
6" papel o 2496 2450 2500 18 grande aplila ut pag characteristics a 2504-2505/2. Sucreased at appropriate

11-2" spored I per fti Increase sugar biotita, still slight way. C 2550 2040-2648 + 705 shows week zone I movement stoop about all for faired or Cloudy folds purs in both sides. 9 2700 Beginning to be internally broken, worselay development of fellspace, space to - star 2750 En large 1"+ folds per planes, sucremed disprentation of history As peq. - 90 apt tos continues. 2775 -> 2798 0 The reased showing up stay star, when stakensides. 2814 -> 2829 stoep + 15 zure. up alog. Continues to 245 4. Antin Marval up 2200 Back to good agreganular, low to gh - & Sellaper phroceros to fresh. Four 1916 > 2921 steep + 70 - vel. shows af chy. Fear high angled show of they shire. 2950 2,300 ; sleep + ro gare genes 1-6 in length experated by 11-10 massin 3100 5 3200 43250 Few qualita veinlete.

												3						1							<b>子,</b> 公准。	1000		ATTACHMENT A-2
																PRO	G[ ject_		,©@	31C	; L@	)G						PROJECT Arz. Whater Hole No. 48+4  Collar elev. Final depth  Coord N. Coord E  Inclination Page 2 of 3  Logged by  Date start Date finish
				43.7							005			MINE	DALC	1 64	NGUE				AINERA	NI G						Inclination Page 2 of 3
											ORE			MILLE	MALS	1 10	MODE	$\Box$			MINERA	II		H				Logged by.
								<u> </u>																-	· · · · · · · · · · · · · · · · · · ·			Date finish.
DEPTH	lc	%				ASS	AY																		STF	RUCTU	RE	ROCK TYPE and REMARKS
from to in	Rt nt'vi	ECOV.																										
						-+						4				+			11	11								Schultze GRANITS. Fresh, bright biotites, equigranular, four langer foldspar phonocrepts, Four graphite dikelets, four stoop +>0° shows w/ class (1/6").  33910-> recrewed number of foldspar phonos (1/6") + increwed biotites slight sphere (1) development in biotites. (larphyritic phone) + 20.30° biotites.
3350																							( ) ( ) ( ) ( ) ( )					phenocents, Face an calife dikelets for store two chans all class (1/4")
2400																											<b>3.</b> (1)	33910-> recrewed number of feldspar planes (12-11) + increwel brotile
3400)							, př																				*	slight splane (?) development in biotites (lorphyritis phase) + 2030 biotite.
3420 7																				++								는 많은 경험 사람들이 되었다. 그런 사용 전에 가장 전용한 것이 되었다면 함께 생각하는 것이 되었다면 함께 하는 것이 되었다. 그는 것이 되었다. 그런 것이 되었다면 함께 되었다. - 19 20 - 19 20 - 19 20 20 20 20 20 20 20 20 20 20 20 20 20
C 32.50													$\longrightarrow$			+ $+$				++								
3550																	2 1 134 24 1.28		-	++		1 /						Tau stay stipe in shows; very southered.
3550														++				1 3 8		++					<i>u</i>			
35500																									*			[4] 유민들은 그리는 그리는 전화학 회사는 사람들이 하나 되었다고 들어가고 들어가는 사람들이 가는 사람들이 되었다는 것이 되었다는 것이다.
2100										. 4.3.								3						32	, A(-)			Germal decrose in "h" phenocacy le -> Yory for by soro"  graphine, wookly pagnotic continue. "- 18".
3100 3				<u> </u>																						3 10		or action, wookly pagnottic continue. 1"-18".
3150 0																				11		\$ 2.5 2.5				<u> </u>		
3100																				11		╂-						
3700 5																				++								few +45"+70" classia share 3715-3
3250																				11								
3700														11		+				++						1777		
2700																												
skip 3			<u>.</u>																									
3850 )																										j. 7		
3850 3																		$\perp \perp \perp$		11								
3900 D													-			-												[6] 첫 보기는 사람들은 하는 사람들이 사용하는 사람들이 되었다. 사람들이 생각하는 사람들이 되었다. 그는 사람들이 나는 사람들이 가장 사용하는 것이 되었다. 그는 사람들이 함께 되었다. [6] 첫 10 - 10 - 10 - 10 - 10 - 10 - 10 - 10
· < 3750											**												1 2 2 3 4					
3950										-+				++						+++		++-	++-	++				
4000													+	++		++-		+		++	-							4030 > 4040 Stay, vertical, starting af chay stips (1/10).
- 4050	-								<del></del>											11					•			
4050												1 4 5 5																
4050																												
4100																				11		11						
4150																				44		1:1-	1-1-		-		1	
4150									•				-		*				-H	++		+	++-					
C 430	-   -								* .		_				***		-			++		+	++	$\Box$				
4200	$\dashv$				<u> </u>	+		+					1					$\dashv \dashv$		11		++-	+		38.6			
4200								-+	<del></del>											11								
4300		1																										
4300 1																												Be option forwaring many pegmatitic of large biotite plates. No mirroral
4300 1 (4350)																	1						44-			1		
4350								· · · · · · · ·									- -		_ _	+ +			++-					
4350																		-		++	+	+		++	3			
				<u> </u>		1							<u> </u>			<u>_L_L_</u>				11								
									-			100							100		\$ 100		1000	4.00		er ere to Air	A3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	mr 2555 dan

				. 142 1											Ų.												ATTACHMENT A
																(	386	SI (C	ിര		10	ഭ					PROJECT Any, mining HOLE NO LB-4
												•			PR	OJECT	<u></u>	<i></i>	<i>-</i>	u 🍑		<i>∕</i>					Collar elev.  Coord N.:  Coord E
									C	RE			MINER	ALS	1	ANG	JE			MIN	IERAL	LS	$\neg$				InclinationPoge_3_of 3
															H		$\prod$										Logged by Date finish
DEP	гн	% cor	e l	T		ASS	SAY																	STR	RUCTU	RE	
	to int	TI RECO	òv.		T																						ROCK TYPE and REMARKS
po																											SCHULTZE GRANIE. Quieranulas fresh, bright biolifo, cotty for 25
	4450									+_							+										+ graphite divolets. Very massive.
450	4500					. N						2	4														
500	W-10															+											Par gragge copliter of glassicite frectures
30	770																										
- 4	4600																+		+								
-	4610															$\Box$		+	$\bot$								
1320	1700									•																	
200	4750																										
202	4750							_			,				++				+-								
٤.	ysca					1, 2, 2, 4, 1															-						
na	ony.	-											11			+	+										[18] 이 전 경험 전 등이 그리고 있다. 이 나는 사람들은 한 경험을 받았다. 전상 등 환경을 모든 사고 함께 되었다. 현실 등 전 경험을 받았다. 
rse	11160									-					11	i											Very wassing, oguspranulus granite, fow phagungto, fow proplite & grapogo
75	1260 1 Dept.			1											$\dagger \dagger$	+	+		$\dashv$								Very warring, equipramulus granite, fow phonocourts, fow graphite & quipoque apliter. Tow Vivi gh-sociale close fractures.
														-													
			•												+												
																						. 1:					
$\dashv$																											[의 사용 기사실이 가입하다면 이 전기를 기록한 경험을 보면하게 되었다면 목 기록 보다를 보고 있다면 보다면 되었다.]
										•																	【・・・というできょう こうしゅう しゅうきょう 人間の いっぱん しゅんがいじょうしゅ しゅうしゅうせん ありたい だいしょう はっぱん はいけい はっぱん はいしゅう はんだい はんしゅん はんしゅん はんしゅん はんしゅん はんしゅん はんしゅう はんしゅん はんしゅう はんしゅん はんしゃんしゃんしゃんしゃんしゃんしゃんしゃんしゃんしゃんしゃんしゃんしゃんしゃん
														N.	11								$\vdash \vdash$				
															$\pm \pm$												
					/																		-				DESERTION OF THE PROPERTY OF STATES AND STA
															$\prod$	$\prod$				•							
												,													**** *********************************		
															$\prod$	$\blacksquare$							H				
																						7 y					
				1					<u> </u>							$\prod$	Ш	Ш						$\Box$			

### WESTERN PETROGRAPHIC

Sample No.: LB-4-2600

Name: Quartz monzonite

	Comp.	(%)		Individual Minerals								
	Est.	X PC	Average	%								
Mineralogy:	Orig.	Pres.	size (mm	) Alt'd.	Alteration products							
-quartz	30:	30	1-2									
K-feldspar	25	25	1-3									
plagioclase	40	40	1-4	tr	clay-illite, carbonat							
hiotite	4	4	2	tr	chlorite, rutile							
apatite	tr	_tr_	0.1		,							
chlorite		tr	0.2									
clay-illite		tr_										
anhydri te		tr	_0.3		isolated patches							
carbonate		tr	0.1		•							
magnetite		<u>,                                     </u>	0.2	<u> </u>								
rutile		_tr_	0.02									
			-									
			:									

### Petrography:

This sample is of a relatively equigranular quartz monzonite. The rock is essentially fresh appearing in thin section, with only traces of clay-illite alteration occurring in plagioclase, and minor chlorite replacement of biotite. Small quantities of anhydrite, unrelatable to any preexisting mineral, occur as isolated, sparsely scattered patches. No sulfides are visible in thin section; however, and primary disseminated magnetite is unsulfidized. No secondary biotite, sericite, or secondary K-feldspar is present. Myrmekite textures are locally present.

### WESTERN PETROGRAPHIC

Sample No.: LB-4-3092

Name:

Quartz monzonite

	Comp. (%)		Individual Minerals		
	Est.	PC_	Average	%	
Mineralogy:	Orig.	Pres.	size (mm)	Alt'd.	Alteration products
quartz	30	30	0.5-4		
K-feldspar	25	25	1-6		
plagioclase	40	39	0.5-3	5	clay-illite, carbonat
biotite	4	4	0.5-2	5	chlorite, rutile
apatite	tr	tr	0.05-0.2		
muscovite		tr	0.1		
zircon	tr	tr	0.1		ev 15 to 15
carbonate		tr	0.2		
clay-illite		1	1 11	100	
chlorite		tr	0.1		
rutile		tr	0.02	in a few p	
magnetite	1	1	0.17		
				1.1	
			•	·	

### Petrography:

With respect to primary composition and texture, and with respect to the lack of appreciable alteration, this quartz monzonite is virtually identical to Sample LB-4-2600. Only traces of clay-illite and chlorite, respectively, replace plagioclase and biotite. Sericite, secondary biotite, secondary K-feldspar, and anhydrite are absent. Disseminated primary magnetite is unoxidized and has not been sulfidized.

#### WESTERN PETROGRAPHIC

Sample No.: LB-4-3410

Name: Quartz monzonite

	Comp.	(%)		Individ	ual Minerals	
		PC		%		
Mineralogy:	Orig.	Pres.	size (mm)	Alt'd.	Alteration products	
quartz	30	30	0.5-5			
K-feldspar	25	25	0.2-3			
plagioclase	40	40	0.5-5	tr	clay-illite, carbona	te
biotite	4	4	0.5-2	10	chlorite, rutile, car	rbonate
muscovite	tr	tr	0.2			
apatite	tr	tr	0-05-0-1			
chlorite	(A)	_tr_	0.2			
carbonate		_tr_	0.3			
mutile		tr	0.05			
magnetite	11	1	0.15			
		4.5				
					en la	

#### Petrography:

This quartz monzonite is essentially fresh. Traces of apparently deuteric clay-illite appear in plagioclase, and the biotite is slightly chloritized. No sericite, secondary biotite, secondary K-feldspar, or other hydrothermal alteration products are in evidence. Primary magnetite is unoxidized. No sulfides are present in the thin section.

#### WESTERN PETROGRAPHIC

Sample No.: LB-4-4200

Name: Quartz monzonite porphyry

	Comp. (%)			Individual Minerals			
	Est.X		Average	%			
Mineralogy:	Orig.	Pres.	size (mm)	Alt'd.	Alteration products		
quartz	30	30	0.5-5				
K-feldspar	25	25	0.5-5				
plagioclase	40	39	1-4	5	clay-illite, sericite	.K-feldspar	
biotite	4	4	0.2-2	10	chlorite, rutile, mus		
apatite	tr	tr	0.15		. A Company of the co		
muscovite	tr	tr	0.2				
_zircon	tr	tr	0.5				
clay-illite-seric		1					
chlorite		tr	0.5				
K-spar(deuteric)		tr	0.05				
_epidote		tr	0.2				
magnetite	1	1	0.8				
					<u> </u>		
	<u> </u>						
1000 - 100 -							
			·				

#### Petrography:

This sample, like the previous examples of quartz monzonite from IB-4, is essentially fresh, with only minor, apparently essentially deuteric alteration. Plagioclase is slightly dusted with clay-illite in the cores of individual crystals, and biotite is lightly replaced by chlorite-epidote. No secondary biotite, secondary K-feldspar, or extensive argillization are in evidence. Disseminated primary magnetite is fresh. No sulfides were detected in thin section.

Sample No.: LB-4-4850

Name: Quartz monzonite

	Comp. (%) Individual Minerals					
	Est.X	_ PC	Average	%		
Mineralogy:	Orig.	Pres.	size (mm)	Alt'd.	Alteration products	
quartz	22	22	0.5			
K-spar(perthitic)	45	45	0.5-15			
plagioclase	30	_28	1-4	5-10	clay-illite.muscovit	e/sericite
biotite	3	3	1-0	10	clay-illite, muscovit chlorite, sericite/mu	scovite, rutile
apatite	tr	tr	0.15			
sericite/muscov.			0.15			
clay-illite		1				
chlorite		tr	0.2			
epidote		tr	0.15			
rutile		tr	0.02			
magnetite	_tr'_	_tr_	0.25			
			•			

#### Petrography:

Alteration is only lightly developed in this sample of quartz monzonite. Relatively coarse-grained white K-mica very lightly stipples the cores of some plagioclase crystals, and in hand sample, occurs along a fracture surface. Biotite is slightly altered to chlorite, sericite-muscovite, and rutile. Disseminated magnetite is unoxidized, and sulfides are absent in thin section.

## DRILL HOLE LB-4 Arizona Mining Company Assayer: H. F. Fountain Box 463

Miami, AZ 85539

Rotary Cuttings to 2361-1/2 ft.; NX Core from 2361-1/2 ft. to 4860 ft. T.D.

		Perce	ent Copper	Percent	
	Interval	Total		MoS <sub>2</sub>	Other
	(00 (00	0.006	0.001		
	600-620	0.006	0.004 )		
	640-660	0.009		tr.	
٠.	680-700	0.014	0.006 )		
	720-740	0.004	0.002)		
	760-780	0.014	0.006)	tr.	
	800-820	0.004	0.001)		
	900-905	0.011	0.004	tr.	
٠.	1025-1055	tr.	tr.		그는 그는 바람에 가는 많은 나는 이 문학이다.
	1085-1115	0.002	tr.	0.0020	
	1205-1305	tr.	tr.	0.0030	
	1385-1415	0.004	tr.	0.0020	
	1505-1535	0.004	tr.	0.0030	
	1595-1625	0.007	0.003		
	1685-1715	0.008	0.002	0.0030	
	1685-1715	0.006	0.002	•	Repeat sample
	1775-1805	0.011	0.003	tr.	
	1895-1925	0.010	0.003	0.0020	en de la composition de la composition La composition de la
	1985-2011	0.008	0.002	tr.	
	2075-2105	0.004	tr.	0.0020	
	2195-2225	0.005	tr.	0.0010	
	2280-2310	0.016	0.009 )		
	2310-2340	0.014	0.003 )	0.0014	
	2340-2344	0.010	0.004 )		
	2361-2372-1/2	0.004	0.002		
	2460-2467	0.003	0.002	•	
	2567-2577	0.006	0.004		
	2662-2674	0.007	0.003		Tr. sulfur
	2754-2764	0.016	0.012		
	2846-2856	0.005	0.003		
	2967-2976	0.009	0.004	•	
	3042-3050	0.013	0.007	0.0042	
	3079-3087	0.014	0.007		
	3189-3198	0.023	0.009	-0.0067	
	3245-3251	0.013	0.011		
-	3272-3282	0.019	0.010	0.0088	
	3604-3614	0.012	0.006	0.0012	0.004% Zinc
	3657-3667	0.021	0.006		0.002% Zinc
	3724-3734	0.004	0.001	0.0041	0.002% Zinc
	3749-3757	0.009	0.006	0.0062	0.003% Zinc
•	3776-3786	0.003	tr.	0.0008	
	3807-3817	0.002	tr.	tr.	
	3869-3878	0.012	0.007	0.0021	[하는 사람이 나는 사람들과 사고를 하는 것 같아.
	3943-3953	0.017	0.007	0.0041	0.005 oz. Gold; tr. oz. Silver
				· · · · · ·	the contract of the contract o

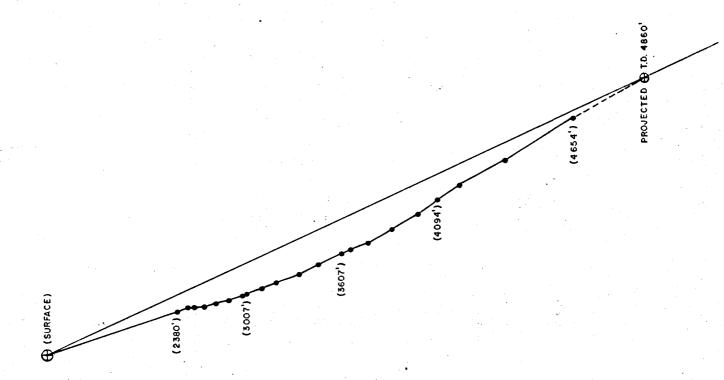
	Percent Copper	Percent	
Interval	Total Acid. So	$MoS_2$	0ther
3962-3969	0.008 0.005	0.0018	
4036-4046	0.008 0.005	0.0007	
4086-4096	0.002 tr.	tr.	ر المعرب وأند النائل المعرب البيداد المعالم المعالم المعالم المعالم المعالم المعالم المعالم المعالم المعالم الم
4172-4181	0.008 0.004	0.0004	
4220-4229	0.006 0.003	0.0002	
4267-4277	0.024 0.009	0.0005	Tr. Gold; tr. Silver
4286-4297	0.009 0.005	0.0040	The dota, ch. Striver
4327-4337	0.021 0.012	0.0060	
4399-4404	0.002 tr.	0.0040	Tr. Gold; tr. Silver
4445-4455	0.004 tr.	0.0060	
4497-4507	0.012 0.004		0.11% Sulfur
4508-4518	0.008 0.003	0.0090	
4518-4528	0.017 0.006	0.0070	
4528-4538	0.014 0.004	0.0060	0.12% Sulfur; tr. Gold; tr. Silver
4538-4548	0.022 0.007	0.0030	0.110% Sulfur
4548-4561	0.019 0.006	0.0080	0.140% Sulfur
4577-4587	0.007 0.002	0.0050	Tr. Gold; tr. Silver
4592-4602	0.008 0.002	0.0040	0.120% Sulfur; tr. Gold; tr. Silver
4624-4634	0.005 tr.	0.0060	orizon barrary crit abita, crit britan
4647-4657	0.004 tr.	0.0092	0.097% Sulfur
4675-4685	0.013 0.004	0.0084	
4695-4705	tr. tr.	0.0064	
4707-4717	0.012 0.003	0.0040	0.013% Sulfur
4727-4737	0.006 0.001	0.s092	0.011% Sulfur

### Spot Deviation Survey - Arizona Mining Company

### LINDBURGH - LB #4

Survey Date	Mag. Brg.	True Brg.	Deviation	Accumulative Drift	Depth
1-28-74	N85°E	N71°E	1°0'	41.55'	23801
2-06-74	N87°E	N73°E	1°45'	45.281	2502
2-11-74	s78°E	N88°E	1°45+	47.42'	25721
2-15-74	S83°E	N83°E	2°0'	50.841	26701
2-20-74	S87°E	N79°E	2°10'	54.74'	27731
2-23-74	N88°E	N74°E	2°20'	58.90'	28751
3-02-74	N85°E	N71°E	2°30'	63.70'	29851
3-04-74	N85°E	N71°E	2°40'	64.72'	3007
3-08-74	N82°E	N68°E	2°451	69.67	3110'
3-15-74	N82°E	N68°E	2°50'	74.62	3210'
3-26-74	N83°E	N69°E	3°0'	82.17'	33541
4-04-74	N78°E	N64°E	3°10'	88.59	3470'
4-16-74	N78°E	N64°E	3°20'	96.48	3607!
	N81°E	N67°E	3°40'	105.26	3744 ·
4-25-74			-	113.64'	3869
5-01-74	N75°E	N61°E	3°50'		
5-08-74	N76°E	N62°E	4°10'	122.75'	39941
5-15-74	N68°E	N54°E	4°351	130.77'	4044
5-22-74	N70°E	N56°E	4°35'	138.861	4190
6-11-74	N75°E	N61°E	4°35'	154.861	4394
7-01-74	N72°E	N58°E	5°25'	179.86'	4654

Total Deviation 203 ft. at N 64  $\frac{1}{2}$ ° E.



### PLAN OF DEVIATION

DRILL HOLE LB-4
ARIZONA MINING COMPANY
SCALE I"= 30'

J.D.S.

Jan. 1975



### AMERICAN SMELTING AND REFINING COMPANY SOUTHWESTERN EXPLORATION DIVISION

P. O. BOX 5747, TUCSON, ARIZONA 85703

1150 NORTH 7TH AVENUE - TELEPHONE 602-792-3010

February 14, 1975

Mr. Paul Kayser, President Arizona Mining Properties, Inc. 1006 Main Street Houston, Texas 77002

Dear Mr. Kayser:

The ASARCO report, based on the information received from your group, from petrographic samples submitted to Western Petrographics, and from logging of the core, has been prepared on your hole LB-4 and is submitted by the enclosed two copies.

Recorded within the report are the location of the drill hole LB-4, the geologic log (3 sheets), the petrographic report (5 sheets), the assays (2 sheets), the spot survey data for the hole deviation (1 sheet), a plot of the survey data (1 sheet), and my conclusions.

ASARCO is pleased to have had the opportunity of logging your hole and compiling the above information. I hope this report will be of aid to you in your continuing work.

> Sincerely. Junes W. Sell

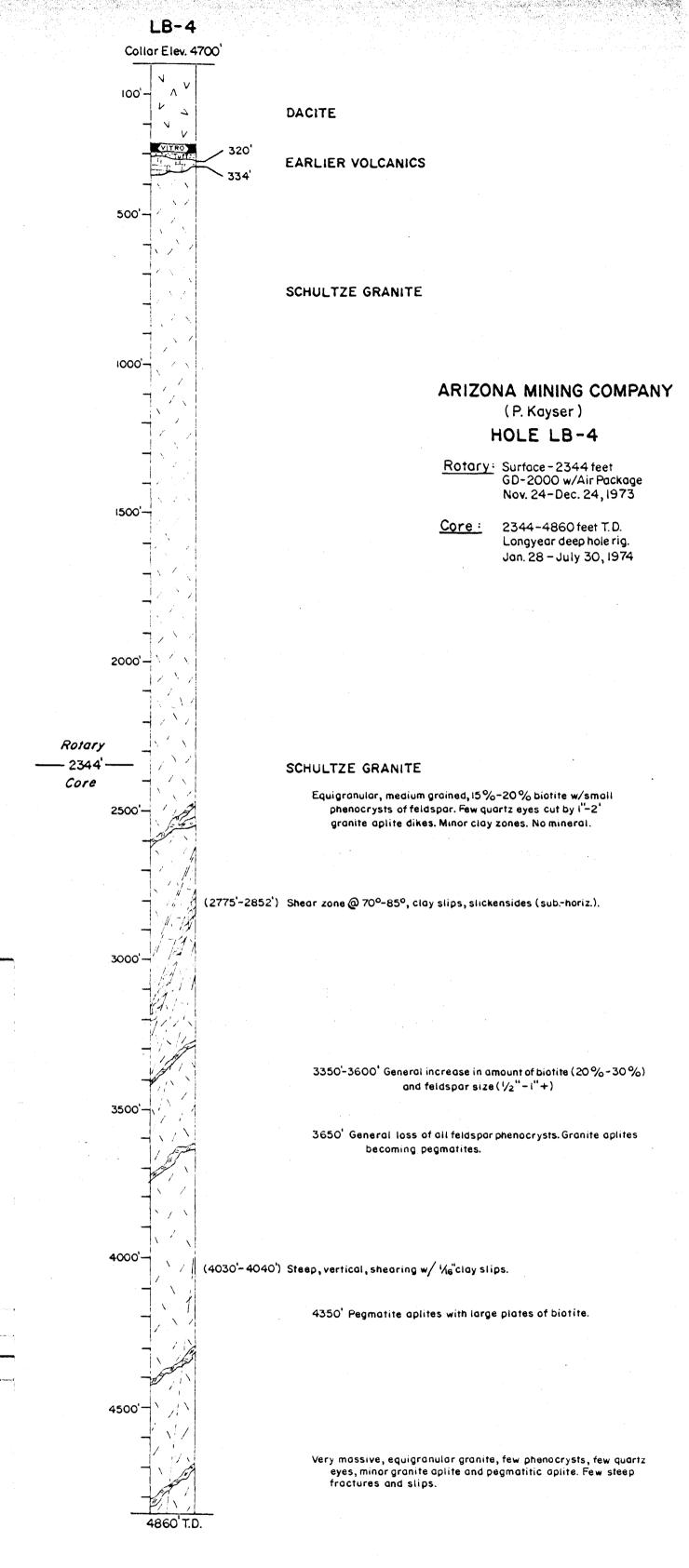
James D. Sell

JDS:1b

Encs. (2 copies)

cc: WLKurtz - w/o enc.

RBCrist - w/o enc.



NOTE: Very low ppm Cu reported in hole.
See memo dated Feb. 4, 1975.

T. I S. R. I3 E.

Center Of The

NW 1/4 NE 1/4 NW 1/4 of Sec. 24

GRAPHIC LOG

of

### DRILL HOLE LB-4

# SUPERIOR EAST PROJECT

PINAL COUNTY, ARIZONA SCALE I"= 300'

#### February 18, 1975

TO: W. L. Kurtz

FROM: J. D. Sell

Distribution of Costs Legal, Water Report, & Bridge Repair Superior East Project Pinal County, Arizona

During this report period, since March 1, 1974, some project charges have occurred which are separated out and not charged to individual drill holes.

The distribution of these charges are as follows:

Drilling Charges:	
A. Direct Drilling	\$
B. Site Preparation	
C. Field Administration	
l. Supervision & Geology	
2. Sample Preparation & Assay	
3. Miscellaneous	
Drilling Charges Sub-Total	\$
Project Charges:	
D. General Administration	\$
E. Legal Fees (& Water Report)	1,776.65
F. Drill Road Access (Bridge Repair & Racks)	4,178.94
Project Charges Sub-Total	\$5,955.59
Total Expenditures:	\$5,955.59

James D. Sell

JDS:1b

#### February 18, 1975

TO: W. L. Kurtz

FROM: J. D. Sell

Drill Hole AA-1
Rotary Drilling Costs
Individual & Consolidated
Clark Option
Superior East Project
Pinal County, Arizona

The Clark Option was terminated on December 31, 1974. One hole was drilled over two years of assessment work.

The L. R. Cox Drilling Company originally drilled July 23, 1973 to a depth of 120 feet. See Memo dated March 19, 1974, and also below for distribution of costs. Cox reentered the hole on August 24, 1974 and deepened the hole from 120 feet to 225 feet (105 feet) using the same equipment as before. See below for the distribution of costs.

The consolidated distribution of costs for the entire hole AA-1 is listed below.

Date:	July 23, 1973	August 24, 1974	Total
Footage:	1201		225'
	\$/Ft.	Cost \$/Ft.	Cost \$/Ft.
Drilling Charges:			
A. Direct Drilling	\$ 6.25	\$ 922.50 \$ 8.79	\$1,672.50 \$ 7.43
B. Drill Site Preparation	0.42		50.00 0.22
C. Field Administration			
1. Supervision & Geology	0.72	48.00 0.46	134.80 0.60
2. Sample Prep. & Assay	0.39	60.50 0.57	107.45 0.48
Drilling Charges Sub-Total	\$ 7.78	\$1,031.00 \$ 9.82	\$1,964.75 \$ 8.73
Project Charges:			
D. General Administration		\$ 100.00 \$ 0.95	\$ 100.00 \$ 0.45
E. Option Payments	\$10.83	1,000.00 9.52	2,300.00 10.22
F. Drill Road Access			
G. Claim Work, Surveying	29.03		3,483.97 15.48
Project Charges Sub-Total	\$39.86	\$1,100.00 \$10.47	\$5,883.97 \$26.15
TOTAL EXPENDITURES:	\$47.64	\$2,131.00 \$20.29	\$7,848.72 \$34.88

James D. Sell
James D. Sell

#### February 18, 1975

TO: W. L. Kurtz

FROM: J. D. Sell

Drill Hole A-3
Rotary Drilling Costs
Individual & Consolidated
State Lease Section 5
Superior East Project
Pinal County, Arizona

Drill hole A-3 was originally drilled by Harness Drilling Company, using air, to a depth of 1445 feet (see report dated March 19, 1974). The hole was reentered and deepened by Copper State Drilling (J.C. Tackett) using a DMX-1500 and a mud program. Copper State deepened the hole from 1445 ft. to 1949 ft., and recapped the hole. No casing installed.

A comparison of the Distribution of Costs between the two contractors and for the total hole is given below.

Contractor: Footage:	Harness 1445'	Copper S 504'	tate	Total 1949'	
	\$/Ft.	\$	\$/Ft.	\$	\$/Ft.
Drilling Charges					
A. Direct Drilling	\$ 9.88	\$11,702.55	\$23.22	\$25,973.42	\$13.33
B. Site Preparation	0.33	629.20	1.25	1,109.20	0.57
C. Field Administration					
1. Supervision & Geology	0.43			614.97	0.31
2. Samples & Assaying	0.10	20.34	0.04	166.44	0.08
3. Miscellaneous	0.11			168.65	0.09
Drilling Charges Sub-Total:	\$10.85	\$12,352.09	\$24.51	\$28,032.68	\$14.38
Project Charges					
D. General Administration	\$ 0.29	\$ 271.29	\$ 0.54	\$ 693.48	\$ 0.36
E. Legal Fees		656.65	1.30	656.65	0.34
F. Drill Road Access	4.35			6,284.86	3.22
G. Claim Work - Surveying					
Project Charges Sub-Total:	\$ 4.64	\$ 927.94	\$ 1.84	\$ 7,634.99	\$ 3.92
Total Expenditures:	\$15.49	\$13,280.03	\$26.35	\$35,667.67	\$18.30

James D. Sell

JDS:16

#### February 18, 1975

TO: W. L. Kurtz

FROM: J. D. Sell

Drill Hole A-6
Rotary Drilling Costs
Individual & Consolidated
State Lease Section 4
Superior East Project
Pinal County, Arizona

Harness Drilling Company drilled hole A-6 from the surface to 1375 ft. using an air system (see report dated March 19, 1975). Copper State Drilling reentered the hole and extended it to a depth of 1665 feet (May 20-29, 1974) using an DMX-1500 and a mud system. The hole is capped for reentry. A comparison and total cost distribution follows.

Contractor: Footage:	Harness 1375'	Copper S 290'	tate	Total 1665'	
100 cage:	\$/Ft.	\$	\$/Ft.	\$	\$/Ft.
Drilling Charges:	And A			100	
A. Direct Drilling	\$ 8.04	\$11,700.37	\$40.34	\$22 <b>,</b> 747 <b>.36</b>	\$13.66
B. Site Preparation	2.23			3,072.25	1.84
C. Field Administration					
<ol> <li>Supervision &amp; Geology</li> </ol>	0.33			459.63	0.28
2. Sampling & Assaying	0.06	22.34	0.08	99.12	0.06
<ol><li>Miscellaneous</li></ol>	0.12			168.64	0.10
Drilling Charges Sub-Total:	\$10.78	\$11,722.72	\$40.42	\$26,547.00	\$15.94
Project Charges:	•				
D. General Administration	\$ 0.14	\$ 230.55	\$ 0.80	\$ 419.57	\$ 0.25
E. Legal Fees		1,140.44	3.93	1,140.44	0.69
F. Drill Road Access	11.13			15,305.67	9.19
G. Claim Work, Surveying					
Project Charges Sub-Total:	\$11,27	\$ 1,370.99	\$ 4.73	\$16,865.68	\$10.13
Total Expenditures:	\$22.05	\$13,093.70	\$45.15	\$43,412.68	\$26.07

James D. Sell

JDS:1b

February 5, 1975

TO: W. L. Kurtz

FROM: J. D. Sell

Drill Hole A-7 Adjusted Costs Rotary and Core Drilling Costs Superior East Project Pinal County, Arizona

Charges accumulated after closing of report dated March 19, 1974, have been compiled. This includes an additional sum of \$644.80 to be placed in "B, Site Preparation, Core" and \$234.86 in "C-2, Sample Prep. & Assay". In addition, \$4,000.00 were placed in "A, Direct Drilling-Core" which should have been marked for hole DCA-3A Rotary.

The following distribution of costs reflects these changes. Rotary 3150 feet, Core 2892 feet; total 6042 feet.

Drilling Charges:			\$/Ft.	\$/Ft.
A. Direct Drilling				
Rotary	\$74,866.38		\$23.77	
Core	81,029.98	\$155,896.36	28.02	\$25.80
B. Site Preparation				
Rotary	\$ 1,609.51		\$ 0.51	
Core	795.44	2,404.95	0.28	0.40
C. Field Administration		•		
1. Supervision & Geology			•	
Rotary	\$ 1,020.65		\$ 0.32	
Core	2,703.21	3,723.86	0.93	0.62
2. Sample Prep. & Assay				
Rotary	\$ 50.09		\$ 0.02	
Core	2,107.08	2,157.17	0.73	0.35
3. Miscellaneous				
Rotary	\$ 210.22	and the second of the second o	\$ 0.07	
Core	740.03	950.25	0.26	0.16
Drilling Charges Sub-Total:		\$165,132.59		\$27.33
Project Charges:				
D. General Administration	\$ 1,720.20		\$ 0.28	•
E. Legal Fees				2
F. Drill Road Access	847.29		0.14	11
G. Claim Work—Surveying				
Project Charges Sub-Total:		2,567.49		0.42
Total Expenditures:		\$167,700.08		\$27.75

Junes Whell James D. Sell

JDS:1b

February 18, 1975

TO: W. L. Kurtz

FROM: J. D. Sell

Drill Hole DCA-2A Diamond Drilling Costs Superior East Project Pinal County, Arizona

Boyles Brothers reentered the old Superior Oil-Miami Copper Company hole (DCA-2), cleaned the hole and set  $4^{tt}$  casing with wedge at 1339 feet. Coring continued NX and BX to the terminal depth of 2422 feet (1083 feet). Work started November 4, 1974 and terminated on December 19, 1974, using a CP-50 rig.

The cost distribution for the work is as follows:

Drilling Charges:	\$ C	\$/Ft.		
A. Direct Drilling	\$33,555.59	Jan Star	\$30.98	
B. Site Preparation	93.60		0.09	
C. Field Administration				,
<ol> <li>Supervision &amp; Geology</li> </ol>	3,767.54		3.48	
<ol><li>Sampling and Assaying</li></ol>	114.26		0.10	
3. Miscellaneous	833.27		0.77	
Drilling Charges Sub-Total:		\$38,364.26		\$35.42
Project Charges:				•
D. General Administration	\$ 1,554.36		\$ 1.44	
E. Legal Fees	264.51		0.24	
F. Drill Road Access				
G. Claim Work, Surveying				
Project Charges Sub-Total:		1,818.87		1.68
Total Expenditures:		\$40,183.13		\$37.10

James D. Sell

Jane W. Sell

JDS:16

February 18, 1975

TO: W. L. Kurtz

FROM: J. D. Sell

Drill Hole DCA-3A Rotary Drilling Costs Individual & Consolidated Superior East Project Pinal County, Arizona

Drill hole DCA-3A had previously been drilled to a reported depth of 3000 feet using a 5-1/4" bit with mud system by the joint venture of Miami Copper and Superior 0il.

ASARCO attempted to clean the hole with a Moss-Weber churn drill and did clean to 485 feet before hitting an obstacle which prevented further progress at the time (August 1971).

Shelton Drilling Company, on Jan. 29-30, 1974, reentered the hole and cleaned to a total depth of 1985 feet, or 1500 feet below Moss-Weber.

Boyles Brothers, on March 27-31, 1974, reentered the hole and cleaned to a final depth of 2980 feet (i.e., 995 additional feet) and set casing for the full depth of the hole. Both Shelton and Boyles used a mud system for cleaning the hole.

A cost distribution of the individual contractors and the total rotary costs is attached.

Onumber M. Sell

James D. Sell

JDS:1b Att.

DRILL HOLE DCA-3A
Rotary Drilling Costs
Individual & Consolidated
Superior East Project
Pinal County, Arizona

Contractor: Footage:	Moss-Weber (Clean) 485'		Shelton (C	lean)	Boyle (Clean & 995'	Case)	Total 2980'		
	\$	\$/Ft.	\$	\$/Ft.	\$	\$/Ft.	\$	\$/Ft.	
Drilling Charges:									
A. Direct Drilling	\$1,550.25	\$3.20	\$4,437.74	\$2.96	\$18,032.78	\$18.12	\$24,020.77	\$8.06	
B. Site Preparation	725.00	1.49					725.00	0.24	
C. Field Administration									
1. Supervision & Geology	100.00	0.21	525.88	0.35			625.88	0.21	
<ol><li>Sampling &amp; Assaying</li></ol>	AP 400	-5-	~				<b>**</b>		
3. Miscellaneous			12.71	0.01			12.71	0.01	
Drilling Charges Sub-Total:	\$2,375.25	\$4.90	\$4,976.33	\$3.32	\$18,032.78	\$18.12	\$25,384.36	\$8.52	
Project Charges:									
D. General Administration			\$ 30.33	\$0.02	\$ 95.34	\$ 0.10	\$ 125.67	\$0.04	
E. Legal Fees									
F. Drill Road Access						***************************************			
G. Claim Work, etc.									
Project Charges Sub-Total:	\$	\$	\$ 30.33	\$0.02	\$ 95.34	\$ 0.10	\$ 125.67	\$0.04	
Total Expenditures:	\$2,375.25	\$4.90	\$5,006.66	\$3.34	\$18,128.12	\$18.22	\$25,510.03	\$8.56	

#### February 18, 1975

TO: W. L. Kurtz

FROM: J. D. Sell

Drill Hole DCA-3A Core Drilling Costs Superior East Project Pinal County, Arizona

Boyles Brothers reentered the cased hole DCA-3A and, using a CP-50 core drill, cored from 2980 ft. to the terminal depth of 5154 ft. (2174 ft.). The work was performed from July 2 to October 16, 1974.

The core distribution of cost follows:

Drilling Charges:	\$ C	ost	\$/Ft.
A. Direct Drilling	\$57,922.35		\$26.64
B. Site Preparation	239.20	•	0.11
C. Field Administration		e de la companya de l	
1. Supervision & Geology	4,844.84		2.23
2. Sampling & Assaying	533.12		0.25
3. Miscellaneous	810.47		0.37
Drilling Charges Sub-Total:		\$64,349.98	\$29.60
Project Charges:			
D. General Administration	\$ 2,246.24		\$ 1.03
E. Legal Fees	342.92		0.16
F. Drill Road Access			· • • • · · · · · · · · · · · · · · · ·
G. Claim Work, Surveying	125.24	٠.	0.06
Project Charges Sub-Total:		2,714.40	1.25
Total Expenditures:		\$67,064.38	\$30.85

James W. Sell

JDS:1b

#### February 27, 1975

TO: W. L. Kurtz

FROM: J. D. Sell

Cost Summary as of Feb. 1, 1975 Superior East Project Pinal County, Arizona

This report is the third cost summation report on the project and covers the period March 1, 1974 to February 1, 1975. The previous reports were dated Sept. 28, 1972, and March 19, 1974.

Eight authorizations have been secured for the Superior East Project. As of February 1, 1975, the project had an unexpended balance of \$55,843.43 from a total authorization of \$1,265,000.00, as shown in Table 1.

TABLE 1 — Authorizations and Expenditures

Number	Authorization	Expended	(Feb. 1, 1975) Unexpended
MA-0010*	\$ 45,000.00	\$ 45,000.00	\$ Zero
MA-0010-01*	31,000.00	31,000.00	Zero
MA-0010-02*	55,000.00	55,000.00	Zero
MA-0010-03*	260,000.00	260,000.00	Zero
MA-0010-04*	409,000.00	409,000.00	Zero
MA-0010-05**	130,000.00	130,000.00	Zero
MA-0010-06**	115,000.00	115,000.00	Zero
MA-0010-07	JI Ranch Purcha	se & Operation.	Not Applicable.
EA-0010-08***	220,000.00	164,156.57	55,843.43
Total	\$1,265,000.00	\$1,209,156.57	\$55,843.4 <b>3</b>

<sup>\*</sup>Reported in Sept. 1, 1972 Cost Memo (Dated Feb. 28, 1972)
\*\*Reported in March 1, 1974 Cost Memo (Dated March 19, 1974)
\*\*\*Reported in this Memo.

Table 2 is a synopsis of the authorizations and expenditures by activity during the third report period. Individual drill hole and project cost summaries have been submitted for each activity.

#### TABLE 2 — Activity Expenditures

End of Report, March 1, 1974 (Deficit EA-0010-08 Appropriation, March 1974	(-)\$ 4,565.30 (+) 220,000.00
Sub-T	otal \$215,434.70
Drill Hole A-3 (Incomplete) (reentry) Drill Hole A-6 (Incomplete) (reentry) Drill Hole A-7 (Complete—Clean-Up) (R Drill Hole DCA-2A (Complete) Drill Hole DCA-3A (Complete)*2 Project Charges to Feb. 1, 1975	(-) 40,183.13 (-) 86,199.16 (-) 5,955.59
Sub-T	otal \$159,591.27
' Total	\$ 55,843.43

(Note: \*1, plus \$565.30 in deficit of 3/1/74.

\*2, plus \$4000.00 in deficit of 3/1/74, plus \$2,375.25 restated from p. 4 of report of Sept. 28, 1972, Churn drill costs on first cleaning attempt.)

Table 3 (attached) is a synopsis of the above costs by categories, for the individual holes and total project period. Also included is the restated total of hole A-7 which is not included in the total project period as tabulated. The Table 3 shows that for the total of 7,136 feet of rotary and core drilling, during this project period, the drilling charges sub-total was \$21.68 per foot with a project charges sub-total of \$1.98 per foot, giving a total expenditure of \$23.66 per foot.

Table 4 below shows the percentage of individual account costs incurred during this reporting period and is compared to similar figures of the previous reports (See p. 7 of Sept. 28, 1972 report, and p. 4 of March 19, 1974 report).

TABLE 4 — Percentage of Individual Account Costs

	19 <b>75</b> Rep	1974	1972	
Segment	Cost	%	%	%
Direct Drilling (A)	\$141,313.39	83.7%	72.9%	75.8%
Field Overhead (B,C)	13,380.27	7.9	5.9	14.2
Project (D,E,F,G)	14,139.13	8.4	21.2	10.0
Total	\$168,832.79	100.0%	100.0%	100.0%

From the inception of the project through this reporting period, eleven holes have been rotoried and/or cored. This includes three holes with rotary work only (A-3, A-5, & A-6), five with both rotary and core (A-1, A-2, A-4, A-7, and DCA-3A, included because of the high cost of recleaning the hole and setting casing in a previously drilled hole), and three holes

cored only after recleaning and setting casing in preexisting holes (DCA-1A, DCA-2A, and M-1A). The total footage of work applicable in these holes is 37,793 feet. The cost distribution for the entire Superior East authorization to date is shown below.

Authorizations	Amount	Expende	<b>d</b>	
MA-0010-00 thru EA-0010-08	\$1,265,000.00	\$1,209,15	156.57	
Activity	Cost	\$/Ft. P	ercentage	
Drilling Charges:				
A. Direct Drilling	\$ 921,947.54	\$24.39	76.2%	
B-C. Site Prep. & Field Superv.	141,250.22	3.74	<u>11.7</u>	
Drilling Sub-Total .	\$1,063,197.76	\$28.13	87.9%	
Project Charges:		en e		
D. thru G. Project Sub-Total	145,958.81	3.86	12.1	
Total Expenditures:	\$1,209,156.57	\$31.99	100.0%	

James D. Sell

JDS:1b Attach.

TABLE 3 — Individual Drill Hole Categories and Costs

Category	Activity and Drill Hole	Number										
FOOTAGE Rotary Coring	A-7 Restated (Not included in Totals) (See March 19, 1974 Memo 3150' 2892'		AA-1 Clark Option (Second drilling, reentry) (See March 19, 1974 Memo)	\$/Ft.	A-3 (State Lease) (Second drilling, reentry) (See March 19, 1974 Memo) 504'	\$/Ft	A-6 (State Lease) (Second drilling, reentry) (See March 19, 1974 Memo) 290'	\$/Ft.	DCA-2A \$/Ft.	DCA-3A \$/Ft. 2980' 2174'	Project (Legal, Bridge Repair, Etc.)	\$/Ft. 3,879' 3,257'
DRILLING CHARGES				•								(7,136'total)
A. Direct Drilling Rotary Core	\$ 74,866.38 81,029.98	\$23.77 28.02	\$ 922.50 	\$ 8.79	\$11,702.55	\$23.22	\$11,700.37	\$40.34	\$ 33,555.59 \$0.98	\$25,510.03 \$ 8.56 57,922.35 26.64	\$	\$ 49,835.45 \$12.85 91,477.94 28.09
B. Site Preparation Rotary Core C. Field Administration	1,609.51 795.44	0.51 0.28			629.20	1.25			93.60 0.09	725.00 0.24 239.20 0.11		1,354.20 0.35 332.80 0.10
1. Superv. & Geology Rotary Core	1,020.65 2,703.21	0.32	48.00	0.46					3,767.54 3.48	625.88 0.21 4,844.84 2.23		673.88 0.17 8,612.38 2.64
<ol> <li>Assaying         Rotary         Core         Miscellaneous</li> </ol>	50.09 2,107.08	0.02 0.73	60.50	0.57	20.34	0.04	22.34	0.08	114.26 0.10	533.12 0.25		103.18 0.03 647.38 0.20
Rotary Core Drilling Charges Sub-Total	210.22 740.03 \$165,132.59	0.07 0.26 \$27.33		\$ 9.82	\$12,352.09	\$24.51	\$11,722.71	\$40.42	833.27 0.77 \$38,364.26 \$35.42	12.71 0.01 810.47 0.37 \$91,223.60 \$17.70		12.71 0.00 1,643.74 0.50 \$154,693.66 \$21.68*
	\$105,152.55	\$27.33	\$1,031.00	\$ 9.02	\$12,352.09	\$24.51	***************************************	, , , , ,	<b>430,301120 433,12</b>	<b>431,223.00 417.70</b>	• • • • • • • • • • • • • • • • • • •	\$154,055.00 \$21.00°
PROJECT CHARGES  D. General Administration E. Legal Fees F. Drill Road Access G. Claim Work-Surveying	\$ 1,720.20  847.29	\$ 0.28	\$ 100.00 1,000.00	\$ 0.95 9.52	\$ 271.29 656.65	\$ 0.54	\$ 230.55 1,140.44	\$ 0.80 3.93	\$ 1,554.36 \$ 1.44 264.51 0.24	\$ 2,497.58 \$ 0.49 342.92 0.07  125.24 0.02	\$ 1,776.65 4,178.94	\$ 4,653.78 \$ 0.65* 5,181.17 0.73* 4,178.94 0.58* 125.24 0.02*
Project Charges Sub-Total	\$ 2,567.49	\$ 0.42	\$1,100.00	\$10.47	\$ 927.94	\$ 1.84	\$ 1,370.99	\$ 4.73	\$ 1,818.87 \$ 1.68	\$ 2,965.74 \$ 0.58	\$5,955.59	\$ 14,139.13 \$ 1.98*
TOTAL EXPENDITURES:	\$167,700.08	\$27.75	\$2,131.00	\$20.29	\$13,280.03	\$26.35	\$13,093.70	\$45.15	\$40,183.13 \$37.10	\$94,189.34 \$18.28	<b>\$5,</b> 955 <b>.5</b> 9	\$168,832.79 \$23.66*
			(See Footnote	1)	(See Footnote 1)		(See Footnote	1)		(See Footnote 1)		

Footnote 1: See Memo 2/18/75 for consolidation.

\*Based on Total Footage drilled of 7,136 ft.

1 A A	110	<u></u>	# 11-0	C1/1-1	beto a - 110 1
Contractor	Hole	Footage	#flit	ft/bit	offer Cathel pu for
Boyle	A-1	820	4	205	\$4.39
Longyear	A-2	442	4	///	8.11
Longyear	A-2W	710	12	59	15.25
Boyle	A-4	3071	8	384	2,34
7.	A-7	2892	6	402	1.87
	M-1A	2920		292	3.08
	DCA-IA	1811		302	2.98
	DCA-ZA	1090	<u>5</u>	218	4.13
	DCH -3A	1358	9	151	5.96
, N	DCH-3A Red	L. 814		143	5.52
Je	AI-1	1147		147	5.39
		17,093	76	225	4,00
Does not	include a	ny solvose	e value et.	I. nor p	vice various of bi
· .	APAS		~	, ,	
	· ·				
Copies to					
WLK					

April 30, 1975

(Markey)

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

> Supplemental Exploration Authorization Request Superior East Project Pinal County, Arizona

> > Fst Total

Dear Sir:

On April 25, 1975 I submitted a Supplemental Exploration Authorization Request for Superior East totaling \$450,000. You have asked that request to be modified to a more limited program. I therefore propose that work items I and 2 of that request be done at this time.

	Work	Project Cost	
1)	Deepen rotary hole A-5 from 3145 feet to 4645 feet by diamond drilling	\$ 40,000	
2)	Clean out, case, and deepen rotary hole	120,000 -	Clean of 10,000 Ferrilland 15,000
~- <i>j</i>	A-3 from 1949 feet to 4950 feet by		Road 6, 800
	diamond drilling		W/m 45.800
	Estimated Total	\$160,000	
	Less Balance SEA #0010-08	(50,000)	
	Amount requested	\$110,000	

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

Respectfully submitted,

W. L. Kurtz

WLK:16 Atts.

cc: JHCourtright - w/o atts.

RBCrist " "

JDSeli " "

NPWhaley " "

WGKellogg - w/atts.

70	TE CRANI	ITE INTERFACE OF 330'
	116 - 611110	
11	24-73	Started LB#4 Rotary Drilling Completed TD=2344'  Started LB#4 Diamond Didling completed TD=4860'
12	24-73	Completed TD = 2344'
/	28-74	4-73 Started LB#4 Rotary Drilling 4-73 Completed TD=2344'
7	11-24-73 Started LB#4 Rotary Drilling 12-24-73 Completed TD=2344'	

June 17, 1975

T0:

J. D. Sell

FROM: N. P. Whaley

Superior East Project Casing of Hole A-3

The cleaning out and casing of hole A-3 was accomplished by CXM Drilling Company of Mammoth, Arizona between May 15 and May 22 of this year.

Total depth of the hole was found to be somewhat less than the previously reported depth of 1949 feet, with CXM reporting washing to bottom at 1939 feet and drilling to approximately 1940 feet for verification.

The lower portion of the hole was cased with 517.19 ft. of 4" ID flush joint casing with a threaded adapter on top. The upper portion of the hole was cased with 4" ID std. black pipe with API couplings. Casing in this upper portion of the hole was supported with sixteen 4-1/2" centralizers with 7-3/4" bow. A total of 1940.64 feet of casing was strapped and set.

Approximately 16 cubic yards of cement slurry was pumped around the casing from the bottom, the cement allowed to set up, and the casing put under tension before being welded to the surface pipe and capped.

Current costs incurred in this operation were as follows:

	CXM Drilling Company (cleaning hole	\$6,218.16
	and setting casing)	
	Guzman Construction Company	799.99
	(16 yds. of cement slurry)	
c)	Gils Compressor Service	79.00
	(welding and towing)	
d)	Southwest Pipe and Supply Company	1,708.46
	(546 ft. flush-joint casing)	
	Total	\$8,805.61

The std. black 4" ID pipe, centralizers, Thread Lock, etc. were in Asarco stock and had been charged to the Superior East project at some time in the

N. P. Whaley

NPW: 1b

June 30, 1975

FILE MEMORANDUM

Drilling Costs Superior East Area Pinal County, Arizona

Newmont has recently filed their affidavits for work on the State Lease sections of T2S, R13E, covering through February 1975.

Comparative costs for the various contractors and depths are given below.

- Section 2, Copper State Exploration

  Deepening from 470 ft. to 970 ft., or 500 ft. @ \$12,231.08

  Cost per foot \$24.46
- Section 8, Boyles Brothers
  From surface to 1950 ft., or 1950 ft. @ \$17,395.97
  Cost per foot \$8.92
- Section 9, LWD (Les Cox) From surface to 795 ft., or 795 ft. @ \$12,123.35 Cost per foot \$15.25
- Section 10, Copper State Exploration

  Deepening from 740 ft. to 1315 ft., or 575 ft. @ \$11,632.60

  Cost per foot \$20.23
- Section 12, Boyles Brothers From surface to 420 ft., or 420 ft. @ \$4,857.16 Cost per foot \$11.56
- Section 16, Boyles Brothers
  Deepening from 2593 ft. to 3434 ft., or 841 ft. @ \$23,719.30
  Cost per foot \$28.20
  (Note: Average Boyles cost to Asarco at these depths average \$17.45 per foot. Remaining cost must be pipe to 2593 ft., mud, and materials.)

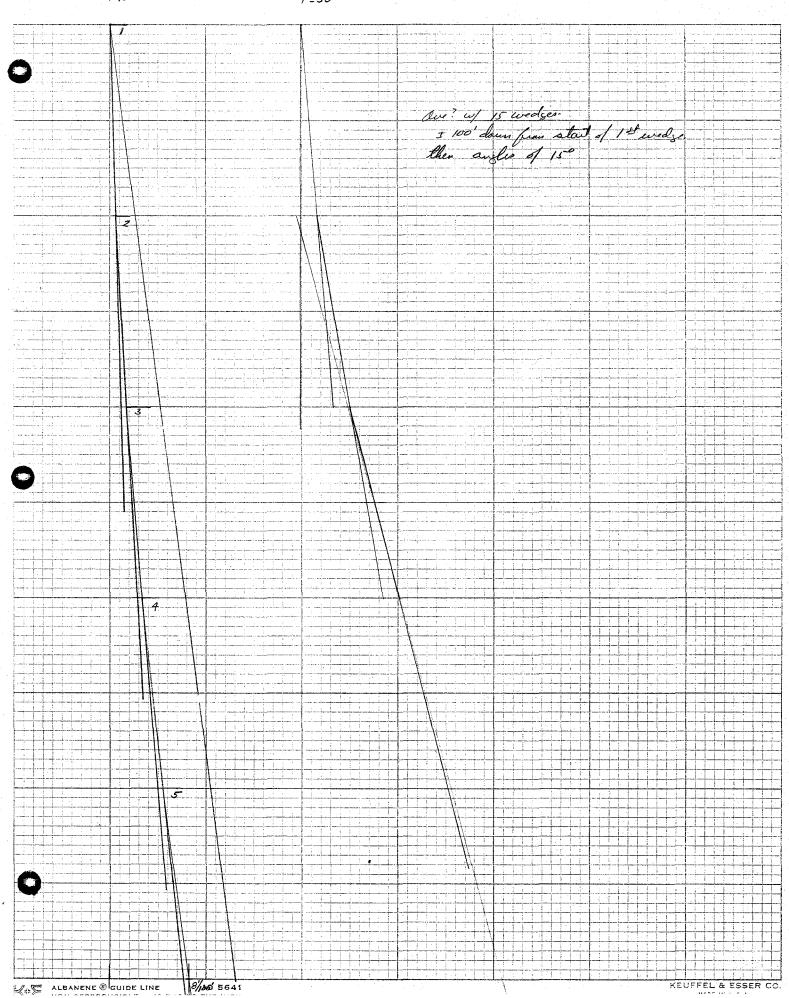
All holes were probably by rotary-air or rotary-mud.

James D. Sell

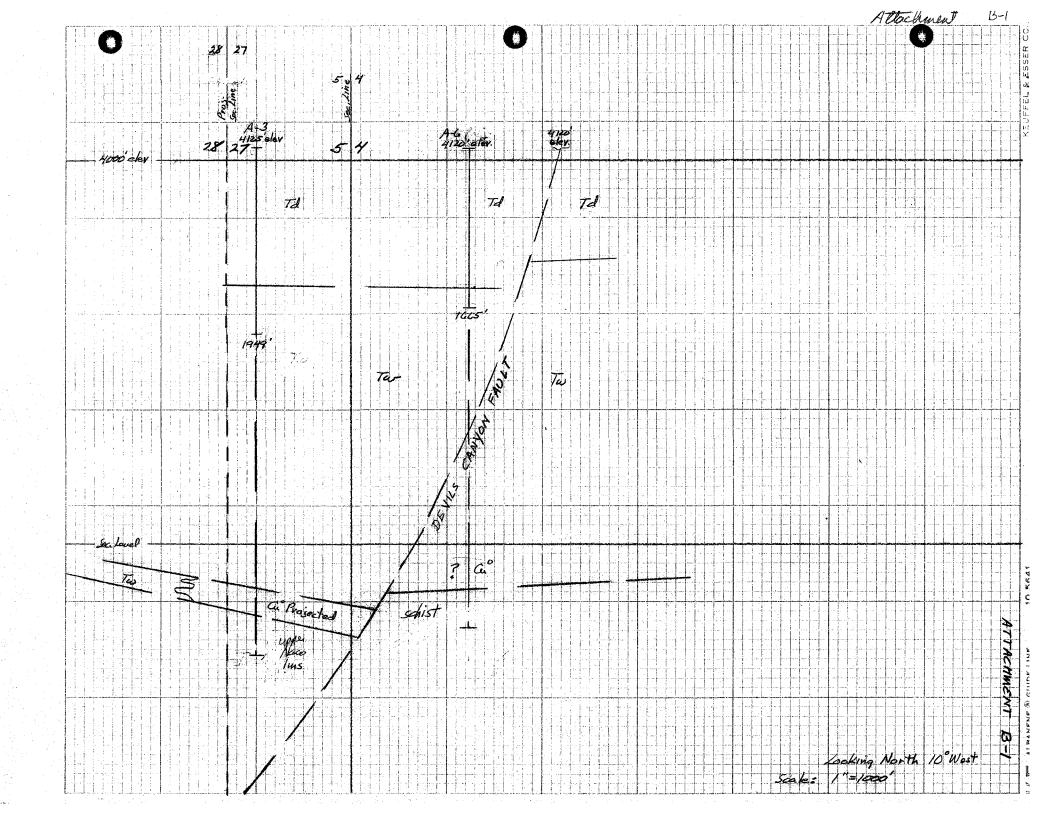
JDS:1b

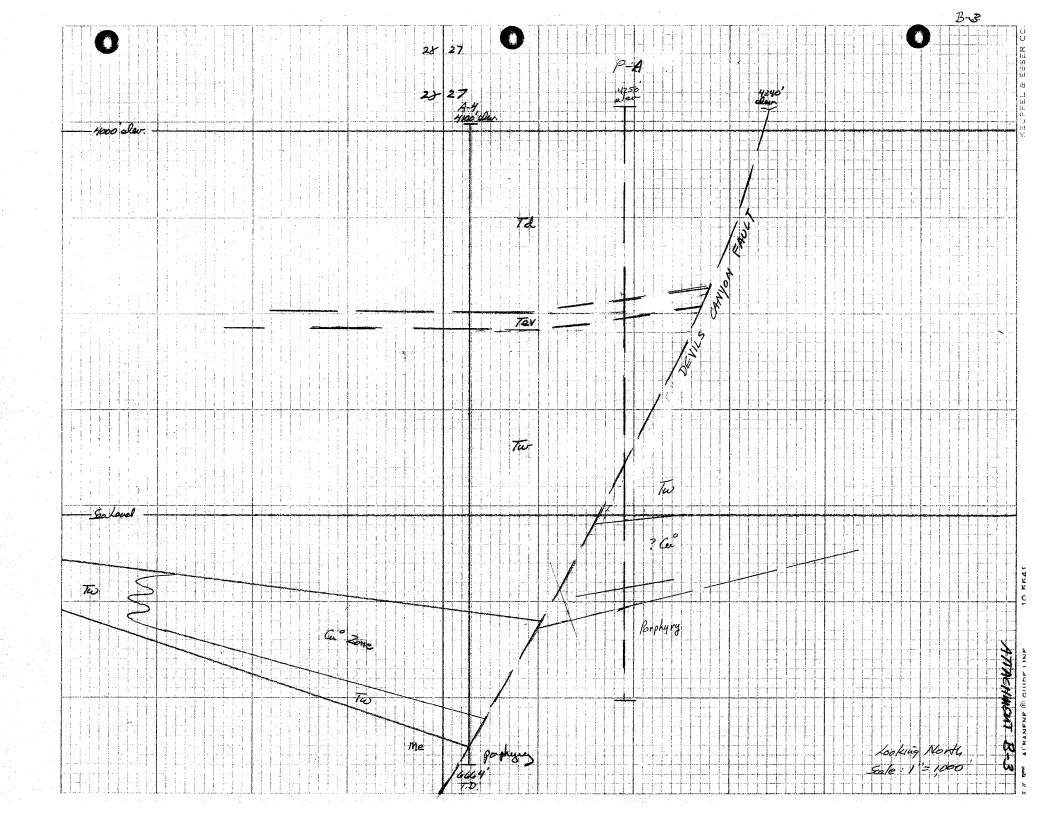
cc: NPWhaley

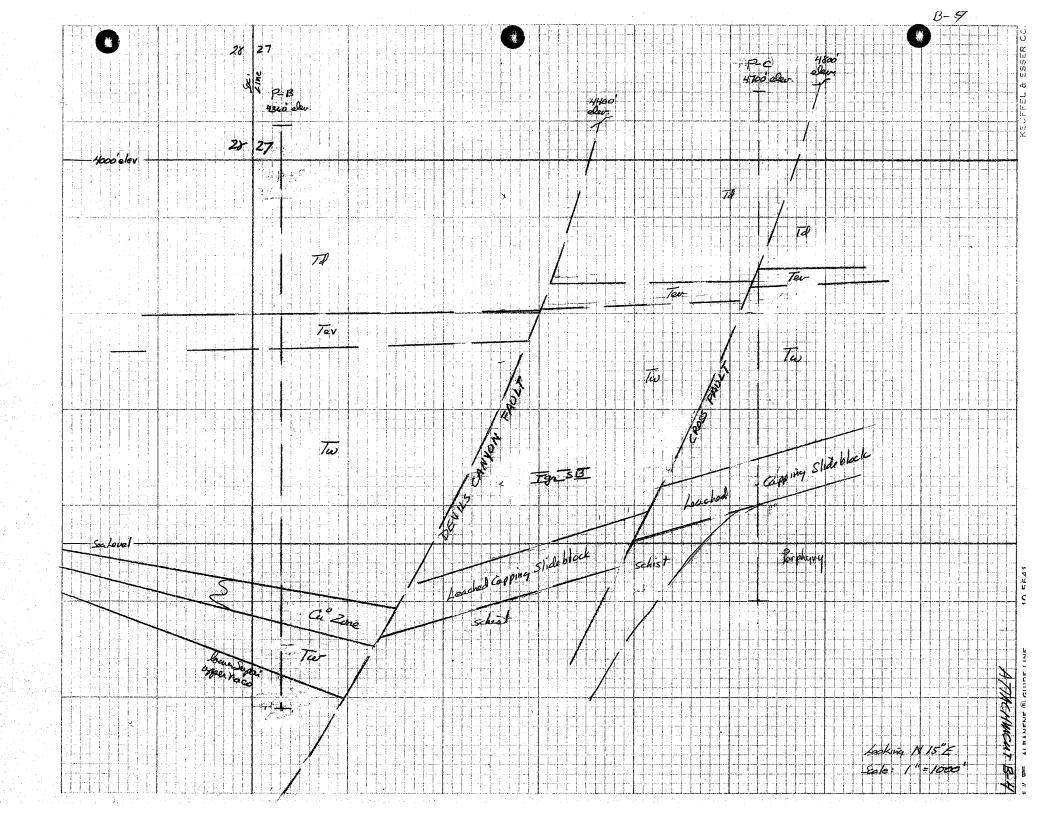
April 25, 1975 Roy Muney 258-4543 or Leeland ? on number of wedge of a degrees of curvatur possible to put in hol, all same direction. ? on 100' f them, thu dill zor, they another of or? 20-23 Con prob go up to 20-23°
o perhaps 30° as max.
Best to do in one curve on 20 ft encrement & then check
to see how cell is going ofter dilling connences.



									<b></b>	
11										
				LOOKING NO	ORTH 15°EA	\$T				
11111				SCALE I"=I	000'					
										-1
Thi								4		<b> \</b>
								1 7	Section	ç
									Section Line	,
4-4-1-								<i>u V</i>		
444	نىدىلىدىد. سىلىدىدىد					<u> </u>	<u> </u>			
										•
-										
111:										
							1			1
										#
										-
										1
++++										-
										1
\$ B										4
	Ĭ									$\blacksquare$
1 1										
12										
8										
			i le				<b>\$</b>	1100		
$\pm \pm \pm$	-8	L NOWHOW					1	18		







WLK Tonto Dulling Roles Tonto los dilled (coud) No (NC) fran 1940 ft to 2347 ft (407 in 5 days for a \$1.4 ft /day averose, including doubtine in that without.

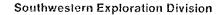
This foologe is within the Mudotine Meet fthe Whitehall and the only other meditive fixing for NC is 15 days for 474 feet or and 31.8 ft/day average. Overall previous journ; in Whitetail using N ch 1x has averaged 52.5 ft /day from deths of 1527 to 6404 fot) Moing the top put averages for holes 4-1, A-1, 4 47 the average is 55.5 ft folay. Thus it would agree that the towing by Toute may be at an increased not over the average of the previous dulling.

9/26/15	Sheft Foota	3	from 1940 to	2347)
/ 27	D 24	7		
	N 37	12		
128	D 50	9/2		
(27 M	' 3;	12_		
129 D		9		
129 N	. 51	12		
130 D	44	10k		
(3c N	73	12		
at 1 D	16	3		
	· / /			
5 days.				
15 equi ship	t (		4 ft peday	
40 7 feet		5)407		
		27	It as diff (	he equivoled)
		15-1407	ft pu shift ( 8	
	-\$	t/day	apiteta	
	Ove	all Rote	ft/day	Botese Depth
jlull Hole	NC	NX		
A-1	39.0		NC 45.9	(1527-1575)
	·	33.9	None	
A-2				
A-2W	_	28.7	None	
		28.7 45.3	None	(3593-4424)
A-2W	_	45.3	None N X 47.7	
A-2W		45.3	None NX 47.7 part NX 61.2	
A-2W A-4		45.3 be 52.5	None NX 47.7 ggat NX 61.2 NX 52.2	(35-93-4000) (3150-5610)
A-2W A-4 A-7	30.0	45.3 52.5	None N X 47.7 pgat N X 61.2 N X 52.2 part N X 59.4	(35-93-4000) (3150-5610) (3150-3504)
A-2W A-4	30.0	45.3 52.5 50.7	None  NX 47.7  ggat NX 61.2  NX 52.2  part NX 59.4  mudston NC 31.8	(35-93-4000) (3150-5610) (3150-3506) (2422-2920)
A-2W A-4 A-7 M-1A		45.3 52.5 50.7 cg	None NX 47.7 9 part NX 61.2 NX 52.2 part NX 59.4 wedstin NC 31.8 Last NX 59.7	(35-93-4000) (3150-5610) (3150-3504)
A-2W A-4 A-7		45.3 52.5 50.7 cs	None  NX 47.7  ggat NX 61.2  NX 52.2  part NX 59.4  mudston NC 31.8	(3593-4000) (3150-5610) (3150-3506) (2422-2920) (3108-4890)

Nema d Nov. 8, 1971) Whiletail Mucholome NC, 15 days & 478 ft = 31.8 ft/day in range

# TAB

A-3





December 29, 1975

TO: W. L. Kurtz

FROM: J. D. Sell

Daily Drill Data
Drill Hole A-3
Core Rig, CP-50
Superior East Project
Pinal County, Arizona

Attached is a daily log of the coring on drill hole A-3 by Tonto Drilling Company, Vancouver, Canada. The information shown is the date, depth of hole at end of day, the footage cut during the day, the hours charged to drilling, the number of shifts involved, short comments on the delays involved, the drilling of cement inside the rotary portion casing, and the geologic units and contact footages.

Compiled from this daily data is a breakdown of the shifts and footages by depth bracket based on the Tonto footage rate contract and a short note on the coring of a small diabase slide block. (All coring of rock units was in the Whitetail Conglomerate except for the cement and the diabase.)

James D. Sell

oj dan oktigas og er ejemen militaren. Bolimir avet en er melligen formeren for ette om en og en en meller Romer om meller for en er meller dem en en en en en en en en en meller en en

JDS:1b Att.

		Depth at		Drill	ing	
Dat	~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	End of Day	Footage	Hours	Shifts	Delays
197						
Sept.		<del></del>		THE SAME	-	10-1/2 hrs. pulling rig to site.
	17	year sales	-		· mu	II hrs. setting up.
	18	NAV	***		**	10 hrs. setting up.
	19				-	ll hrs. setting up; hauled I load
	20					water.
	20		1 Vive 400			8 hrs. running 1100 ft. of rods
						and core barrel in hole; 4 hrs.
	21	(1210)			_	starter repair.
	۷1	(1210)				10 hrs. rig repair; hit cement in
	22	(1353)	(143)	(11-1/2)	3	casing.
		(1)))	((7)	(1.1~1/2)	<b>)</b>	6 hrs. repair; washed hole; 6-1/2
	23	(1411)	(58)	(9-1/2)	3	hrs. pulling rods - overshot broke.
		(1311)	(50)	() 1/2/		13-1/2 hrs. repair overshot and swivel.
	24	(1501)	(90)	(8)	1-1/2	2 hrs. pulling core barrel; 2 hrs.
•		(1)017	(30)	(0)	1 1/2	lowering 3-7/8" bit.
	25	(1790)	(289)	(21)	2-1/2	Drilling with tricone bit.
	26D	(1940)	(150)	(10)	1-1/4	Drilled cement to rubberplug bottom
			, , ,	<b>,</b> ,	• • • •	of casing.
	26N	1949	9	3	1-1/2	9 hrs. pulling rods and tricone bit,
				· -		ran in core barrel with HQ bit.
	27	2012	63	19	3	5 hrs. rig repair, wireline pulley.
	28	2100	88	21-1/2	3 3	2-1/2 hrs. repair. Drilled in low
						gear due to overheating.
	29	2192	92	21 .	3	3 hrs. hydrostatic system repair,
						drilling slow.
	30	2331	1 39	22-1/2	3	1-1/2 hrs. motor repair.
Oct.	1	2347	16	3	1-1/2	9 hrs. shut down, hoist pulley broke.
	2		~~		•	To Phoenix for parts.
	3	2427	80	15-1/2	3	8-1/2 hrs. repair shive pulley hous-
	1.	01.00				ing.
	4 5 6	2498	71	16-1/2	3	7-1/2 hrs. bit change at 2438 ft.
	2	2629	131	24	3	
	_	2752	123	24	3	
نم.	7 8	2852	100	21-1/2	3	2-1/2 hrs. picking up supplies.
	9	2962	110 16	24	3	
	י	2978	10	6	3	Completed HQ drilling; 6 hrs. going
						with NPW to look at sites; 12 hrs.
						lowering HQWL rods with shoe for
	10	2982	4	3-1/2	1-1/2	8 hrs. changing shuck laws alaking
		2,02	• • • • • • • • • • • • • • • • • • •	J 1/2	1 1/2	8 hrs. changing chuck jaws, picking
	11	3092	110	21	3	up supplies. Coring NQ 3 hrs. picking up supplies and
		- Ju Ju				replacing drive bushing.
	12	3202	110	23	3	I hr. servicing rig. High range
						went out.
	13	3262	60	14	3	10 hrs. picking up supplies, trouble
						with hydraulic chuck, reamed HQ rods
						another foot.
1245 1727	E. Maria				- Par State	

	1 4	3358	96	23	3	l hr. conditioning hole with quick
	15	3381	23	5	3	seal. 12 hrs. changing bit, trouble going thru shoe, 7 hrs. pulling rods as
	16	3482	101	20	3	wireline broke. 4 hrs. lowering rods, picking up
	17	3569	87	17	3	supplies and payroll.  3 hrs. with CP representative and
						replacing wireline; 4 hrs. fishing
	18	3569	<b></b>	4	1-1/2	and pulling rods for broken bit. 6 hrs. servicing rig, pulling rods, no bit, shell left, inner tube
	19	3569		<b></b>		damaged; 6 hrs. going for supplies. 6 hrs. watching drill and looking
						for equipment.
	20	3569	<b></b>	10	1-1/2	12 hrs. repair traveling block, cleaning sump, mud mix, and 10 hrs.
						lowering rods, new bit; bit plugged 2 hrs. pulling.
	21	3569	. Made Wald	5	1-1/2	5 hrs. pulling rods, 7 hrs. hoist
	22	3569			1-1/2	drum repair. 12 hrs. repair.
	23	3569		4	3	8 hrs. repair; 16 hrs. pulling,
						cleaning, and lowering rods to 3500, bit blocked and tube stuck
	24	3577	8	1-1/2	3	again! 12 hrs. recleaning rods, 9 hrs. washing to bottom, 1-1/2 hrs.
	25	3653	76	15-1/2	3	drilling out broken bit.  Drilled 30 ft., then pulled to re-
· * · · · · · · · · · · · · · · · · · ·	26	3793	1 40	23	3	place bit, back to drilling.  I hr. mix mud, having rod torque troubles.
	27	3895	102	18-1/2	3	4 hrs. conditioning mud, 1-1/2
	28	3952	57	13-1/2	3	hrs. pick up supplies. 7 hrs. bit change, 3-1/2 hrs.
	00	1.005				wireline etc. repair.
	29	4025	73	14	3	10 hrs. rod pulling & lowering, repair of back bearings.
	30	4153	128	24	3	
	31	4253	100	21	3	3 hrs. conditioning hole with
Nov.	1	1,202	40	71 /2	: 2	flosal to lift cuttings.
NOV.		4293		7-1/2	3	16-1/2 hrs. conditioning hole and making bit change.
	2	4433	140	24	3	
	3	4513	80	12	1-1/2	Night driller did not work, 12 hrs. circulating.
taring district	4	4648	135	24	3	
	5	4731	83	16	3	8 hrs. circulating and making bit change.
		gginer (fr. 1944) Magaziner (fr. 1944)		San	grad gradi Tawaran Ali	ได้ และทุกรูปกลาด ได้สายเรียกเรียกเรียก และ เรียกสุด เรียกที่สายให้ ได้ โดยสามารถ ผู้ผลเลย เทียกให้ เ เลยสลาย และ เรยากรณ เรียกเรียกเรียกสามารถเกลียก ได้สามารถ เรียกสามารถและ และ และ เรยากรณ

我的歌歌中的一句话的有多多的一句的意思的意思的意思的意思的话。

	6	4731	PRE APR	2-1/2	3	2-1/2 hrs. lowering rods to
						casing; 2-1/2 hrs. culling rods,
	<del>. ,</del>	1.721				12 hrs. watching drill.
	7 8	4731	, 'ma	***	3	24 hrs. watching drill.
		4731	1.0	~ ~	3	24 hrs. watching drill.
	9	4773	42	9	. 3	12 hrs. watching drill, 3 hrs.
	10	1.002	1.00	0.1		lower rods starting to drill.
	10	4893	120	21	3	3 hrs. checking with social
	3 1	F012	100	00		security.
	11	5013	120	22	3	2 hrs. changing pump seals, adding
	12	TOTA	li a			wireline.
	12	5056	43	9	3	15 hrs. circulating and making bit
	13	5182	106	a.l.		change.
	14		126	24	3 3 3	
		5305	123	24	3	
	15	5405	100	22	3	2 hrs. work on wireline.
	16	5405		* •• ••	3	10 hrs. repair on hoist, need parts,
		-11-	4.4	_		14 hrs. watching drill.
	17	5440	35	8	3	8 hrs. hoist repair, 8 hrs. changing
	1.0					bit and reaming last 50 ft.
	18	5548	108	22	3	2 hrs. repair rotary RPM gauge and
	• •					adding wireline.
	19	5658	110	22-1/2	3	1-1/2 hrs. down on batteries, etc.,
				•		head making noise.
	20	566 <b>3</b>	5	2	3	10 hrs. circulating, 12 hrs. making
						m bit change.
	21	5663			3	12 hrs. servo repair, 12 hrs. mix
						mud and watching drill.
	22	566 <b>3</b>	***	otale ente	3	12 hrs. repair cooling system; 12
						hrs. watching drill.
	23	5663			3	12 hrs. getting parts and repair of
					1 6	shiv-wheel shaft and 12 hrs. watching
						drill.
	24	5663		<del></del> -	3	3 hrs. repair, 21 hrs. waiting on
						hydraulic parts, running temp-deviation
			×			survey.
\$ 10	25	5663		· · · · · · · · · · · · · · · · · · ·	3	24 hrs. waiting on parts.
	26	5746	83	19-1/2	3	4-1/2 hrs. repair.
	27	5843	97	22-1/2	. 3	1-1/2 hrs. changing wireline.
	28	5863	20	4-1/2	. 3	19-1/2 hrs. waiting on drill rods from
		L 12 84 5				Eagle Mtn.
	29	5886	23	8	1-1/2	4 hrs. conditioning hole, night shift
.3	**	. * .				sick with flu.
1.5	30	5976	90	24	3	
Dec.	1	6008	32	10-1/2	1-1/2	1-1/2 hrs. alternator repair. Hole
		1000				terminated.
2 th	ru 15		. v. p <del>. – t</del>		-	Pulling rods, cutting casing, pulling
		and the second s				casing, lower tower, moving out,
						cleanup, etc. Welded cap on hole
			e de la companya de La companya de la co			after filling with heavy mud.
Left	HQ rods	(casing	and shoe	from 2950-2	978 ft.	Left all of 4" and flush-jointed

Left HQ rods (casing and shoe from 2950-2978 ft. Left all of 4" and flush-jointed casing in rotary portion of hole (surface-1940 feet). Left 10 ft. of 8" ID surface casing.

Drill Hole A-3
Tonto Drilling Company

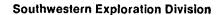
Drilling Time, by Footage Brackets, including Down Time

Depth	Size	Shifts	Days	Footage	Ft/Shi	t Troubles
Drilling Ce (1210-1501)		7-1/2	3	291	38.8	Overshot and swivel
(1501~1940)		3-3/4	1-1/2	439	117.1	repair.
Coring White 1940-2498	HQ	21	7-1/2	558	26.6	Rig and WL repair; 1 bit change
2498-2978	HQ	15	5	480	32.0	Running HQ casing with shoe.
anne som men semb sumb men						
2978-3482	NQ	16-1/2	6	504	30.5	Hydraulic problems;
3482-3983	NQ	31	12-1/2	501	16.2	<pre>1 bit change. 2 fishing jobs; numerous repair problems; 2 bit</pre>
3983-4513 4513-5013	NQ NQ	15 15-3/4	5 6	530 500	35.3 31.7	changes. I bit change. Rig problems; closed two days (not included)
5013-5490	NQ	19-1/2	6-1/2	477	24.5	for parts;   bit change Includes 4-1/2 shifts of hoist repair; 2 bit
5490-6008	ИQ	22-1/2	8	518	23.0	changes. Servo and cooling problems. Does not
						include 5 days parts wait; 1 bit change.
1940-2978 2978-6008	HQ* NQ**	36 120-1/4	12-1/2	1038 3030		average* average**
1940-6008	-	156-1/4	56-1/2	4068	26.0	average

<sup>\*</sup>Rock type was Whitetail Conglomerate, mudstone variety, HQ-NC size core.

<sup>\*\*</sup>Rock type was Whitetail Conglomerate, cobble to boulder variety, NQ-NX size core. The average includes the coring of a diabase slide block at 5885-5930. If separated out it would be:

Whitetail	NQ	118-3/4 43-1/2	2991	25.2
Diabase	NQ	1-1/2 1/2	49	32.7 average





January 9, 1976

TO: F. T. Graybeal

FROM: J. D. Sell

Coring Rates
Superior East Project
Pinal County, Arizona

Coring rates for the drilling on the Superior East Project have been compiled. This memo is an update of a similar compilation dated November 8, 1971.

A CP-50 machine was used by both Boyles Brothers Drilling and Tonto Drilling. Tonto had modified their rig to handle fifty-foot rod pulls versus the normal forty-foot pull and also used a twenty-foot core barrel for a substantial part of the hole. Longyear Drilling Company used a truck-mounted 44 machine.

The drilling rates are based on an eight-hour shift and all work shifts have been converted. The rates include normal down time for minor repair, bit change, and other similar operations; but normally any large amount of down time for major repair, offset wedging, etc., is not included. See the individual drill hole reports for daily performance.

As before, the figures for the rock units are not rigorous due to the necessity of calculating values at the termination of the shift, which generally does not coincide with formational breaks.

For comparative purposes, the coring rate data has been tabulated in several tables.

Table 1 records the rate of drilling in the various rock units encountered, with the companies separated as to the holes drilled and the core size. Averages have been calculated where sufficient drilling permits. The Dacite, Whitetail Conglomerate, Supai red beds, and parts of the Schultze Granite and Pinal Schist all cored at the best rates. Poor drilling rates, such as in some of the slide blocks and in the various limestones, were due to broken and "lost circulation" conditions which necessitated short pulls and hole conditioning techniques. The Troy Quartzite is very abrasive and hard, which inhibited the drilling rate.

Coring of the Whitetail Conglomerate has accounted for sixty-five percent of the total project coring. The Whitetail is also one of the units that can be used to compare the drilling performance between Boyles Brothers and Tonto. Table 2 breaks the Whitetail into the several facies and by core size, as well as cumulating the total Whitetail coring. Note that Tonto far surpassed Boyles in each category.

Table 3 lists the total drilling irregardless of rock type, core size, or depth by hole and company. Again Tonto drilled at a faster rate than either Boyles or Longyear, but Tonto only drilled in Whitetail units and thus had very limited lost circulation problems and did not do any wedging work. As noted between Tables 2 and 3, the total Whitetail drilling rate for Boyles is not substantially above that for the overall drilling rate (16.7 in Whitetail versus 14.7 overall) and thus was not a critical contributing factor for the poorer performance by Boyles Brothers.

It has long been realized that drilling costs have been high at the Superior East Project. Detailed report summaries of the drill holes have been submitted and indicate that between seventy-five and eighty percent of the costs are direct drilling costs. Table 4 breaks the drilling down in five hundred foot intervals, the contractors' price change bracket, and by the type of rock being cored and core size. The average feet per shift of eight hours has been compiled from the individual reports and is also listed. Finally, the latest contract price per foot, see Table 5, is used to calculate the dollar cost per shift in that depth range and rock type interval. Naturally the ease of drilling is the largest factor in maintaining a good penetration rate. However, as in the case of some of the Boyles Brothers crews, they often strived only for a "minimum" footage per shift and any excess footage was put in the "bank" to be withdrawn during periods of poor production.

The increased performance by Tonto may also be partially the result of the desire to do an exceptional first-time job for the future image and work recommendation. Also, one of the Tonto crew was on a profit-sharing plan and he was thus motivated to do more productive footage work.

A figure of \$33.50 per hour was suggested as the operating cost, including 15% profit and 6% administrative fee, for the utilization of the CP-50 in 1971. This amounts to approximately \$28.00 per hour base rate. At that time, 1971, the hourly rate for standby, casing, etc., was \$30.00 per hour, suggesting the hourly rate quoted had a "half" margin of profitadministration fee built into the charge. If these hourly figures can be used, then the drilling contracts in 1975, having an hourly rate of \$37.50 for Boyles, \$32.75 for Longyear, and \$41.00 for Tonto, may represent the basic cost the companies expect to recover, with a profit margin, during their operations. Table 6 uses these hourly figures to arrive at the operating cost per shift (Boyles \$300.00, Longyear \$262.00, and Tonto \$328.00) for the company minimum expectations.

Returning to Table 4, where the average footage per shift is tabulated along with the charge per foot and the resultant cost paid for the shift, it can be suggested that Boyles would have made no to little money in their drilling above 3000 feet, while most drilling below 3000 feet would have returned a good to excellect margin of profit. In contrast, Longyear was right around their shift figure. Tonto was consistently two to three times above their suggested cost per shift figure and must have returned a very excellent profit for the drilling done.

Attachment A pictorially shows the ranges expressed in Table 4 and the suspected operating costs per shift as expressed in Table 6. Although Boyles has a number of points in the "loss" side of their line, it should be remembered that the majority of coring was in the Whitetail, which was profitable for the most part.

True profit and loss per hole could only be arrived at if we had the correct operating figures and costs versus the invoiced costs. However, it appears that no company lost on their contract during the past drilling at Superior East.

James D. Sell/L James D. Sell

JDS:1b Atts.

TABLE 1 — Rock Type Rates, by Company

Rock Type Company	Hole Number	Depth Footage	Core Size	Number of Shifts	Footage (in Shifts)	Feet per Shift
DACITE						
Boyles	A-1	1309-1374	NC	3	54	18.0
EARLIER VOL	CANICS					
Boyles	M-1A	2402-2428	NC	4	23	5.7
\#\!\TFT\ \ /:		COUCL OMERATE				
		CONGLOMERATE	N.C	l.e	1.50	10 (
Boyles	M-1A	2428-2920	NC	45	478	10.6
Tonto	A-3.	1940-2978	NC	36	1038	28.8
WHITETAIL (	Pebble) CO	NGLOMERATE				
Boyles	A-1	1527-1585	NC	3	46	15.3
Boyles	A-4	3593-6484	NX	182	2898	15.9
Boyles	A-7	3150-5610	NX	141-1/2	2462	17.4
Boyles	M-1A	3108-4898	NX	90	1793	19.9
Boyles	DCA-1A	4002-4669	NX	32	660	20.6
Boyles	DCA-2A	1352-1452	NX	9	83	9.2
Boyles	DCA-3A	2980-4081	NX	62	1098	17.7
Boyles	DCA-3A	4157-4274	NX	a 14	123	8.8
Boyles	DCA-3A	4394-4454	NX	4	58	14.5
Boyles			-	537-1/2	9221	17.2 Average
Tonto	A-3	2978-6008	NX	120-1/4	3030	25.2
SLIDE BLOCK	S in Tw (S	chultze Grani	te and/o	or Pinal Schi	st, brecciated	
Boyles	M-1A	2920-2953	NC	6	50	8.3
Boyles	M-IA	2953-3108	NX	6	167	27.8
Boyles	DCA-3A	4081-4157	NX	7	69	9.9
Boyles	DCA-3A	4274-4394	NX	12	123	10.3
Boyles	AI-I	2800-3046	NC	34	252	7.4
Boyles	AI-1	3046-3238	NC	15	188	12.5
Boyles		J0 .0 J2 J0		80	<del>199</del> 849	10.6 Average
	·					
The second secon	ANITE	(575 (11)	4442	10	<b>-</b> /	7 (
Boyles	A-4	6575-6664	NX	10	76	7.6
Boyles	DCA-2A	1540-1676	NX	7	138	19.7
Boyles	DCA-2A	1804-1827	NX	2	40 26 2	20.0
Boyles	DCA-3A	4454-4809	. NX	2 26 45	<u>363</u>	14.0
Boyles				45	617	13.7 Average
Longyear	A-2	4079-4352	NX	21	273	13.0
Longyear	A-2W	4230-4327	NX NX	8	273 97	12.1
Longyear	A-2W A-2W	4865-4940	NX		75 	6.8
·	, A 4W	7007 7770	IIA	11 40		-
Longyear				40	445	ll.l Average

TABLE 1 — Continued

Rock Type Company	Hole Number	Depth Footage	Core Size	Number of Shifts	Footaga (in Shifa)	
FAULT ZONE						
Boyles	A-4	6571-6575	NX	2	8	4.14
SUPAI FORMAT	ION (red	beds)				•
Boyles	A-7	5610-5810	NX	6	183	
Boyles	M-1A	4898-5108	NX	<u>9</u> 15	179	
Boyles				15	367	
NACO LIMESTO	NE .					
Boyles	A-7	5810-6042	NX	17-1/2	242	13.3
Boyles	M-1A	5108-5322	NX NX	20	230	
Boyles	DCA-1A	4669-4998	NX	19	<u>335</u>	12.0
Boyles				56-1/2	807	The secretary
ESCABROSA LI	MESTONE					
Boyles	A-4	6484-6571	NX	9	89	
Boyles	DCA-1A	4998-5452	NX	52	451	
Boyles				<u>52</u> 61	540	6.9
MARTIN LIMES	TONE					
Boyles	DCA-1A	5452-5768	NX	29	338	***
TROY QUARTZI	TE					
Boyles	DCA-1A	5768-5813	NX	5	43	<b>4</b> , 6
SCHIST Brecc	ia					
Boyles	A-1	1374-1527	NC	17	190	
PINAL SCHIST	• * *	1505 0100				
Boyles	A-1 DCA-2A	1585-2129	NC	40	530 107	
Boyles Boyles	DCA-ZA	1452-1540 1676-1804	NX NX	4 6	107	Zb.
Boyles	DCA-2A	1827-2080	NX	11	116 244	49. % 22. %
Boyles	DCA-2A	2080-2422	BX	18-1/2	342	16.5
Boyles	DCA-3A	4809-5154	NX	27-1/2	341	
Boyles	AI-1	3238-3272	NC	7	32	
Boyles	AI-1	3272-3967	NX	<u>67</u>	695	15.4
Boyles				181	2407	13.3 Average
Longyear	A-2	4352-4513	NX	15	161	
Longyear	A-2W	4327-4865	NX	<u>53</u>	<u>5</u> _3	10.2
Longyear				68	699	lo.3 Averege

TABLE 2 — Coring Rates in Whitetail Units, Boyles vs. Tonto

Unit	Core Size	Company	Footage	Feet per Shift
Mudstone	NC equiv.	Boyles Tonto	478 1038	10.6 28.8
Pebble	NC	Boyles	46	15.3
Pebble	NX equiv.	Boyles Tonto	9175 3030	17.2 25.2
TOTAL		Boyles Tonto	9699 4068	16.7 Average 26.0 Average

TABLE 3 — Total Coring, by Hole,
Irregardless of Rock Type or Core Size

Company	Hole	Depth	Footage	Feet per Shift
Boyles	A-1	1309-2129	820	13.0
	A-4	3593-6664	3071	15.1
	A-7	3150-6042	2892	17.5
	M-1A	2402-5322	2920	15.7
	DCA-1A	4002-5813	1811	9.8
	DCA-2A	1352-2422	1070	18.6
	DCA-3A	2980-5154	2174	14.3
	AI-1	2800-3967	1167	9.5
Boyles	TOTAL		15,925	14.7 Average
Longyear	A-2	4079-4521	442	11.3
	A-2W	4230-4940	710	9.9
Longyear	TOTAL		1,152	10.4 Average
Tonto	A-3	1940-6008	4,068	26.0

TABLE 4 — Average Feet per Shift in Various Rock Types, by

Contractors, based on Depth with Calculated Footage.

Cost per Shift (8-hours).

Footage Depth	Company, Hole	Rock Type, Core Size	Average Ft/Shift	Contract Value/Ft.	\$/Shift (nearest \$1)
1300-1500	Boyles, A-1 Boyles, A-1 Boyles, DCA-2A Boyles, DCA-2A	Dacite, NC Schist Bx, NC Whitetail, NX Pinal, NX	18.0 11.2 9.2 26.8	\$14.10 14.10 12.60 12.60	\$254.00 158.00 116.00 338.00
1500-2000	Boyles, A-1 Boyles, A-1 Boyles, DCA-2A Boyles, DCA-2A	Whitetail, NC Pinal, NC Schultze, NX Pinal, NX	15.3 6.6 19.8 21.3	15.15 15.15 13.65 13.65	232.00 100.00 270.00 291.00
2000-2500	Boyles, M-1A Tonto, A-3 Boyles, A-1 Boyles, DCA-2A	Earlier Volcanics, NC Mudstone Tw, NC Pinal, NC Pinal, BX	5.7 26.6 16.0 18.5	16.45 19.95 16.45 16.45	94.00 531.00 263.00 304.00
2500-3000	Boyles, M-1A Tonto, A-3 Boyles, Ai-1 Boyles, M-1A	Mudstone Tw, NC Mudstone Tw, NC Slideblock, NC Slideblock, NC	10.6 32.0 7.4 8.3	18.00 21.75 18.00 18.00	191.00 696.00 133.00 149.00
3000-3500	Tonto, A-3 Boyles, A-7 Boyles, DCA-3A Boyles, AI-1 Boyles, M-1A Boyles, AI-1 Boyles, AI-1	Whitetail, NX Whitetail, NX Whitetail, NX Slideblock, NC Slideblock, NX Pinal, NC Pinal, NX	30.5 19.8 18.8 12.5 27.8 4.6 5.8	19.75 18.35 18.35 19.85 18.35 19.85 18.35	602.00 363.00 345.00 248.00 510.00 91.00
3500-4000	Tonto, A-3 Boyles, A-4 Boyles, A-7 Boyles, M-1A Boyles, DCA-3A Boyles, AI-1	Whitetail, NX Whitetail, NX Whitetail, NX Whitetail, NX Whitetail, NX Pinal, NX	16.2 20.4 26.3 16.0 18.7 16.7	23.00 20.75 20.75 20.75 20.75 20.75	373.00 423.00 546.00 332.00 388.00 347.00
4000-4500	Tonto, A-3 Boyles, A-4 Boyles, A-7 Boyles, M-1A Boyles, DCA-1A Boyles, DCA-3A Boyles, DCA-3A	Whitetail, NX Whitetail, NX Whitetail, NX Whitetail, NX Whitetail, NX Whitetail, NX Slideblock, NX	35.3 19.6 25.3 18.9 20.6 10.1	27.00 23.90 23.90 23.90 23.90 23.90 23.90	953.00 468.00 605.00 452.00 492.00 241.00
	Longyear, A-2 Longyear, A-2W Longyear, A-2W Longyear, A-2 Longyear, A-2W	Schultze, NX Schultze, NX Schultze-Pinal, NX Pinal, NX Pinal, NX	13.0 12.1 11.6 10.7 9.9	25.00 25.00 25.00 25.00 25.00	325.00 303.00 290.00 268.00 248.00

TABLE 4 - Continued

Footage Depth	Company, Hole	Rock Type, Core Size	Average Ft/Shift	Contract Value/Ft.	\$/Shift (nearest \$1)
4500-5000	Tonto, A-3	Whitetail, NX	31.7	\$32.00	\$1014.00
	Boyles, A-4	Whitetail, NX	16.0	28.10	450.00
	Boyles, A-7	Whitetail, NX	10.9	28.10	306.00
	Boyles, M-1A	Whitetail, NX	20.3	28.10	570.00
	Boyles, DCA-1A	Whitetail, NX	20.6	28.10	579.00
	Longyear, A-2W	Schultze, NX	6.8	29.00	197.00
	Boyles, DCA-3A	Schultze, NX	14.0	28.10	393.00
	Boyles, DCA-1A	Naco, NX	17.6	28.10	495.00
	Longyear, A-2W	Pinal, NX	9.9	29.00	287.00
	Boyles, DCA-3A	Pinal, NX	11.2	28.10	315.00
5000-5500	Tonto, A-3	Whitetail, NX	24.5	39.00	956.00
	Boyles, A-4	Whitetail, NX	15.1	31.85	481.00
	Boyles, A-7	Whitetail, NX	14.7	31.85	468.00
	Boyles, M-1A	Supai, NX	19.9	31.85	634.00
	Boyles, M-1A	Naco, NX	11.5	31.85	366.00
	Boyles, DCA-1A	Escabrosa, NX	8.7	31.85	277.00
	Boyles, DCA-3A	Pinal, NX	14.4	31.85	459.00
5500-6000	Tonto, A-3	Whitetail, NX	23.0	46.00	1058.00
	Boyles, A-4	Whitetail, NX	15.3	36.75	562.00
	Boyles, A-7	Whitetail, NX	18.3	36.75	673.00
	Boyles, A-7	Supai, NX	31.3	36.75	1150.00
	Boyles, A-7	Naco, NX	13.8	36.75	507.00
	Boyles, DCA-1A	Martin, NX	11.7	36.75	430.00
	Boyles, DCA-1A	Troy, NX	8.6	36.75	316.00
6000-6500	Boyles, A-4	Whitetail, NX	13.1	43.40	569.00
	Boyles, A-4	Escabrosa, NX	9.9	43.40	430.00
6500-7000	Boyles, A-4	Fault Zone, NX	4.0	49.50	198.00
	Boyles, A-4	Schultze, NX	7.6	49.50	376.00

TABLE 5 — Contract Cost per Foot by Contractor and Depth\*

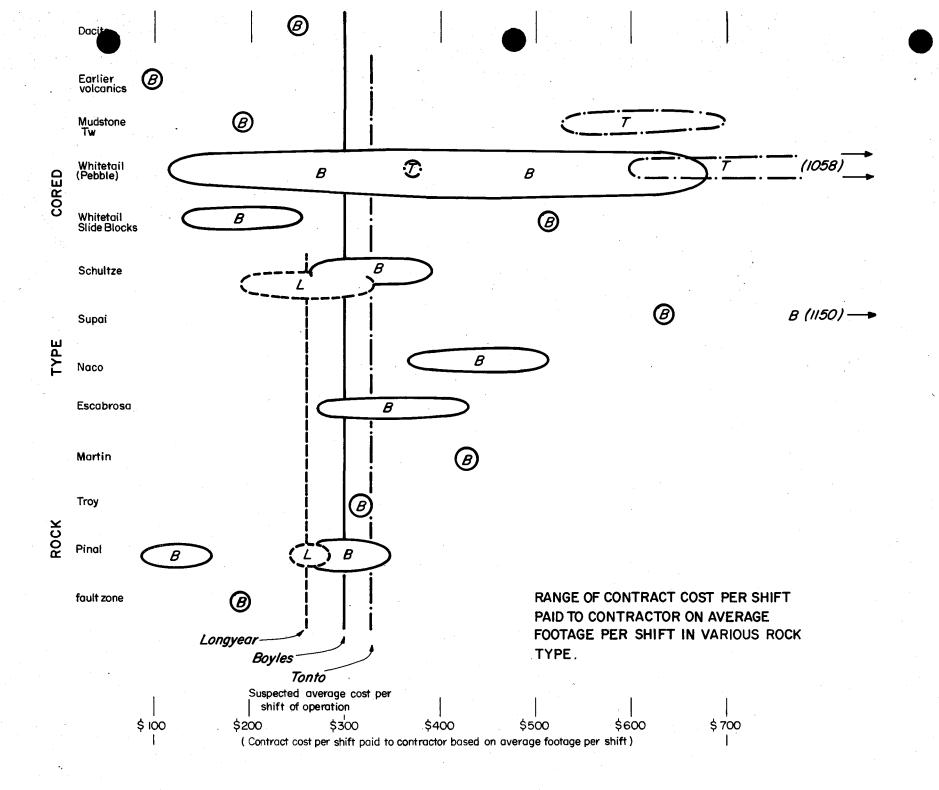
			Contr	actors		
Depth	Boyles	(12/74)	Longyear	(4/75)	Tonto	(8/75)
	NC	NX(BX)	NC	NX	NC	NX
1000-1500	\$14.10	\$12.60	\$15.25	\$	\$	\$
1500-2000	15.15	13.65	16.35		17.75	
2000-2500	16.45	14.95	17.65		19.95	
2500-3000	18.00	16.50	19.15		21.75	
3000-3500	19.85	18.35	20.95			19.75
3500-4000		20.75		23.50		23.00
4000-4500		23.90		25.00		27.00
4500-5000		28.10		29.00		32.00
5000-5500		31.85		34.00		39.00
5500-6000		36.75		40.00		46.00
6000-6500	."	43.40				54.50
6500-7000		49.50	*****			

<sup>\*</sup>Latest bid offer from Contractor. Boyles unable to furnish rig at this price for drilling in 1975.

TABLE 6 — Hourly Costs and Operating Shift Costs, by Company

Company	Hourly Rate	Calculated Shift Costs
Boyles	\$37.50	\$300.00
Longyear	\$32.75	\$262.00
Tonto	\$41.00	\$328.00

<sup>---</sup> No price quoted for interval-core size.



				2//3/16
	To: WLK			
			5 \$ 1	-1 1
	Fran: JOS		Mayor Explication	ture from EA
			request of A	puil 30, 1975
			Area of hold	A-3
2 · · · · · · · ·	126		•	
Budget A-	120,000	······································	Sugarior East	•
			Pinal Count	5, B
		· A 11		
	CMX Congany cleans	ing rolary hole &	Casury	\$ 8,805.61
	Torto mobilization, a Original Baroid s	-leaning coment	to bollner.	V 9,179.26
	1 - 1 2 - 1	. 1 . 1		
	Chighes Carold M	reid shigmen		V 2,351.24
•	Beyout ingraven Beyout road work	ent droad to	4-3	V 1,298.00
	R + Dense	of received S	= 1 11 9	
	Dugan road work	so pero ser se	= 0/17-6-	4,734.21
-	Tonto Toologe line	luke dulling, he	ourly moleral	?
	Hi .	third party change		
		•	ses renouseed	
	through touts			
99,438	Toute Footage	1940-4950	feet	V 77,205.63
75		•		
104	TA - 1		1150	
174,	Torto Footage	4950-6008	fæ/11.D.)	65,864,27
	Mollen-Hauer Su	mening Compres	Wad	1,379,50
	<i>,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,</i>	3-7	7	1/2:00
		· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	
				WS
			J	<b>Y</b>
· .				

JDS Coyottached 2-10-76 Supeast Can you work of a should of of pore Cest go round (this additional requested) We were to click A-3 and A-5 cuts Isoget and extelly only ded I will have to coul Dich Brown in can The advisory commette questions have only on hel (with overren) get dulled why two dodgated! Hears -5de < Clean act care Total geolog to Settern a. 779 Pouch A-3 " other 1949-4950 Footage (total Meject)
A950-6000

110,000 160,000 30,000 190,000

Serperior East Appropriation
for \$45,000°
EA-0010-11
approved February 18,1976 Overeen on A-3 etc. leaving & 10,000 for continued states.

Copy to all geol. + IJNS HMS: TCB

**Southwestern Exploration Division** 

August 23, 1976

F. T. G. AUG 2 3 1976

TO: F. T. Graybeal

FROM: N. P. Whaley

Diamond Coring Bits and Related Drill Hole Sizes

In response to your recent request for specifications of diamond coring bits and the nominal diameters of diamond drill holes, I'm attaching three sheets of dimension information: one for Longyear Company, one for Joy Manufacturing Company, and one for Boyles Bros. Drilling Company.

N. P. Whaley

N. P. Whaley

NPW:16 Atts.

### LONGYEAR - DIAMOND CORING BITS

### SERIES "Q" WIRE LINE DIAMOND BITS

		DIAMETER		DIAMETER ches)	HOLE VOLUME (gal. per
SIZE	Decimal	Fractional	Decimal	Fractional	100 ft.)
AQ, AQ-U	1.062	1-1/16	1.890	1-57/64	14.6
BQ, BQ-U	1.432	1-7/16	2.360	2-23/64	22.7
NQ, NQ-U	1.875	1-7/8	2.980	2-63/64	36.3
HQ	2.500	2-1/2	3.782	3-25/32	58.3
PQ	3.345	3-11/32	4.827	4-53/64	95.05
RWG*	.735	47/64	1.175	1-11/64	5.6
EWG, EWM, EWL*	.845	27/32	1.485	1-31/64	9.0
AWG, AWM, AWL*	1.185	1-3/16	1.890	1-57/64	14.6
BWG, BWM, BWL*	1.655	1-21/32	2.360	2-23/64	22.7
NWG, NWM, NWL*	2.155	2-5/32	2.980	2-63/64	36.3
HWG*	3.000	3	3.907	3-29/32	62.3
2-3/4. × 3-7/8	2.690	2-11/16	3.875	3-7/8	61.2
4 x 5-1/2	3.970	3-31/32	5.495	5-1/2	123.4
$6 \times 7 - 3/4$	5.970	5-31/32	7.750	7-3/4	245.1

\*DCDMA "W" sizes were formerly designated "X".
All dimensions, weights and volumes shown are nominal approximations in inches, pounds and U.S. Gallons

### JOY WIRELINE CORE BARREL & DRILL ROD SPECIFICATIONS

	AX .	· BX	NX	NC
Hole Diameter (Approx.)	1-7/8"	2-3/8"	3"	3-11/16"
Core Diameter (Approx.)	1-1/64"	1-7/16"	2"	2-13/32"
Reaming Shell - Set O.D.	1-55/64"	2-3/8"	2-63/64"	3-43/64"
Bit - Set O.D.	1-27/32"	2-23/64"	2-31/32"	3-21/32"
Bit - Set I.D.	1-1/64"	1-7/16"	2"	2-13/32"
Outer Tube - O.D.	1-3/4"	2-9/32"	2-27/32"	3-1/2"
Outer Tube - I.D.	1-27/32"	1-29/32"	2-15/32"	.3-1/16"
Inner Tube - O.D.	1-1/4"	1-3/4"	2~5/16" .	2-29/32"
Inner Tube - I.D.	1-1/16"	1-1/2"	2-5/64"	2-9/16"
Rod - 0.D.	1-3/411	2-1/4"	2-13/16"	3-1/2"
Rod - I.D.	1-11/32"	1-7/8"	2-7/16"	3-1/16"
Threads Per Inch	4" .	4"	4"	3"

ないかいがいかいがん

## DIMENSION TABLES COREBARRELS, CORE BITS, CASING BITS & SHOES, REAMING SHELLS

INCH DIMENSIONS ARE NOMINAL APPROXIMATIONS

MILLIMETRE EQUIVALENTS SHOWN IN PARENTHESIS

						DMIRAL APPRO			<del></del>	γ		ECOTVALE		1		
HOLE		COREB	ARREL	DESIGN	<b>I</b>	APPROX. HOLE	APPROX. CORE	CORI	BIT	COREBARREL REAMING SHELL	CASING SIZE &	CASII	NG BIT	CASIN	G SHOE	CASING REAMING SHELL
SIZE	WF	WG	WM	WT	WL	DIAMETER	DIAMETER	O.D. SET	I.D. SET	O.D. SET	DESIGN	O.D. SET	I.D. SET	O.D. SET	I.D. SET	O.D. SET
R				RWT		1-3/16 (30.2)	23/32 (18-3)	1.160 (29.5)	0.735 (18.7)	1.175 (29.8)	RX or RW	1.485 (37.7)	1.000 (25.4)	1.485 (37.7)	1.186 (30.1)	· <del></del>
E		, EWG	EWM			1-1/2	13/16 (20.6)	1.470	0.845 (21.5)	1.485	EX or EW	1.875	1.405	1 875	1.495	1.890
				EWT		. (38.1)	7/8 (22.2)	(37.3)	0.905 (23.0)	(37.7)	2.0.2.	(47.6)	(35.7)	(47.6)	(38.0)	(48.0)
		AWG	AWM			4.1 · · ·	1-3/16 (30.1)		1.185 (30.1)							
A				AWT		1-15/16 (49.2)	1-9/32 (32.5)	1.875 (47.6)	1.281 (32.5)	1.890 (48.0)	AX or AW	2.345 (59:6)	1.780 (45.2)	2.345 (59.6)	1.900	2.360 (59.9)
					AWL		1-1/16 (26.9)		1.062 (27.0)							
•		BWG	вwм				1-5/8 (41.3)		1.655 (42.0)							
8		. *		BWT		2-3/8 (60.3)	1-3/4 (44.4)	2.345 (59.6)	1.750 (44.5)	2.360 (59.9)	BX or BW	2.965 (75.3)	2.215 (56.3)	2.965 (75.3)	2.370 (60.2)	2.980 (75.7)
					BWL		1-7/16 (36.4)		1.433 (36.4)							
		NWG	NWM	i.			2-1/8 (54.0)		2.155 (54.7)							
N				NWT		3 (76.2)	, 2-5/16 (58.7)	2.965 (75.3)	2.313 (58.8)	2.980 (75.7)	NX or NW	3.615 (91.8)	2.840 (72.1)	3.615 (91.8)	2.992 (76.0)	3.630 (92.2)
					NWL		1-7/8 = (47.6)		1.875 (47.6)					<u> </u>	•	
	HWF	HWG				3-15/16	3 (76.2)	3.890	3.000 (76.2)	3.906						
н				HWT		(100.0)	3-3/16 (80.9)	(98.8)	3.187 (80.9)	(99.2)	HX or HW	4.625 (117.5)	3.777 (95.9)	4.625 (117.5)	3.925 (99.7)	
					HWL	3-51/64 (96.4)	2-1/2 (63.5)	3.762 (95.6)	2.500 (63.5)	3,782 (96.1)						
P	PWF					4-3/4 (120.6)	3-5/8 (92.1)	4.725 (120.0)	3.627 (92.1)	4.748 (120.6)	PX or PW	5.650 (143.5)	4.633 (117.7)	5.650 (143.5)	4.778 (121.4)	_
s	SWF					5-3/4 (146.0)	4-7/16 (112.7)	5.725 (145.4)	4.439 (112.8)	5.748 (146.0)	SX or SW	6.790 (172.5)	5.633 (143.1)	6.790 (172.5)	5.778 (146.8)	· ·
U	UWF					6-7/8 (174.6)	. 5-1/2 (139.7)	6.640 (173.7)	5.505 (139.6)	6.870 (174.5)	UX or UW	7.800 (193.1)	6.755 (171.6)	7.800 (198.1)	6.905 (175.4)	
Z	ZWF			•		7-7/8 (200.0)	6-1/2 (165.1)	7.840 (199.1)	6.505 (165.2)	7.870 (199.9)	ZX or ZW	8.810 (223.8)	7.755 (197.0)	8.810 (223.8)	7.905 (200 8)	

Note: Above table is for current international standards. Boyles also offers diamond products for previous standards such as AXT, AWX & AX, etc.



#### Southwestern Exploration Division

August 23, 1976

TO: F. T. Graybeal

FROM: J. D. Sell

Drill Hole A-3
Rotary Drilling Costs
Individual and Consolidated
State Lease Section 5
Superior East Project
Pinal County, Arizona

Drill hole A-3 was reentered by CXM Drilling Company in May 1975 to clean the hole and set casing for use by a diamond drill. The hole was originally drilled by Harness Drilling Company, using air to a depth of 1445 feet (see report dated March 19, 1974). The hole was reentered and deepened by Copper State Drilling (J.C.Tackett) using a DMX-1500 and a mud program. Copper State deepened the hole to 1949 feet and recapped the hole without installing any casing. Copper State costs and consolidated costs were reported in a memo dated February 18, 1975.

CXM Drilling Company reported washing to bottom at a depth of 1939 feet and drilled to 1940 feet for verification (this depth also verified by the core rig). See report by N.P. Whaley dated June 17, 1975. CXM installed casing and cemented the hole.

Tonto Drilling Company entered the hole for coring below the casing and found 730 feet of cement inside the casing. Direct drilling charges of \$7,430.76 were incurred during this period and have been charged to the rotary portion of the hole.

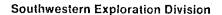
A comparison of the distribution of costs between the various contractors and the consolidation of the total hole is given in Table 1 based on the verified total rotary depth of 1940 feet.

James D. Sell

JDS:1b

 $\frac{\text{TABLE 1}}{\text{Final, restated, consolidated Rotary Drilling Costs of Hole A-3}}$ 

Contractor: Footage (restated):	Harness 1445'	Copper State 494'	CXM 1'	Tonto (730' of cement)	Total 1940'	
	\$/Ft.	\$/Ft.	\$	\$	\$	\$/Ft.
Drilling Charges:  A. Direct Drilling  B. Site Preparation  C. Field Administration	\$ 9.88 0.33	\$23.69 1.27	\$10,175.55	\$7,430.76 	\$43,579.73 \$ 1,109.20	22.46 0.57
1. Supervision & Geology 2. Samples & Assaying 3. Miscellaneous Drilling Charges Sub-Total:	0.43 0.10 <u>0.11</u> \$10.85	0.04  \$25.00	59.30  1,257.62 \$11,492.47	  \$7,430.76	674.27 166.44 <u>1,426.27</u> \$46,955.91 \$3	0.35 0.09 <u>0.74</u> 24.21
Project Charges:  D. General Administration  E. Legal Fees  F. Drill Road Access  G. Claim Work - Surveying  Project Charges Sub-Total:	\$ 0.29  4.35  \$ 4.64	\$ 0.55 1.33  \$ 1.88	\$ 791.06   \$ 791.06	\$	656.65 6,284.86	0.76 0.34 3.24 
Total Expenditures	\$15.49	\$26.88	\$12,283.53	\$7,430.76	\$55,381.96 \$	28.55





TO: F. T. Graybeal

FROM: J. D. Sell

Drill Hole A-3 Core Drilling Cost Summary State Lease Section 5 Superior East Project Pinal County, Arizona

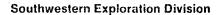
Core drilling was started on Sept. 21, 1975 by Tonto Drilling Company of Vancouver, B.C., Canada. Utilizing a CP-50 rig and pulling twenty-foot wireline core tubes, Tonto reentered the cased A-3 drill hole. Cement was found inside the casing for a distance of 730 feet above the bottom of the casing at 1940 feet and this footage cost has been transferred to the rotary portion. HQ core was taken from 1940 feet to 2978 feet with NX core continuing to the bottom at 6008 feet where the coring was terminated on December 1, 1975. Costs are prorated over the 4068 feet of core.

Core drilling costs are distributed as follows:

Drilling Charges:	\$ Cost	\$/Ft.
A. Direct Drilling B. Site Preparation C. Field Administration	\$153,493.72 211.04	\$37.73 0.05
<ul><li>l. Supervision &amp; Geology</li><li>2. Sampling &amp; Assaying</li><li>3. Miscellaneous</li></ul>	3,939.25 1,157.47 2,105.13	0.97 0.28 0.52
Drilling Charges Sub-Total:	\$160,906.61	\$39.55
Project Charges:		
D. General Administration E. Legal Fees F. Drill Road Access G. Claim Work, Surveying	\$ 3,352.68 608.48 1,898.00	\$ 0.82 0.15 0.47
Project Charges Sub-Total:	\$ 5,859.16	\$ 1.44
Total Expenditures:	\$166,765.77	\$40.99

James D. Sell

JDS:1b





TO: F. T. Graybeal

FROM: J. D. Sell

Total Cost
Drill Hole A-3
Rotary and Core
State Lease Section 5
Superior East Project
Pinal County, Arizona

Junes D. Sell

A consolidated cost of drill hole A-3 is compiled for the total footage. The hole was drilled in two stages by rotary drill equipment, a third rotary set the casing, which was then followed by the core drill to the terminal depth. Rotary drilling 1940 feet, core drilling 4068 feet, for a total of 6008 feet.

Drilling Charges:	\$ Cost	\$ Cost	\$/Ft.	\$/Ft.
A. Direct Drilling Rotary	\$ 43,579.73	•	\$22.46	
Core	153,493.72	\$197,073.45	37.73	\$32.80
B. Site Preparation Rotary	1,109.20		0.57	
Core	211.04	1,320.24	0.05	0.22
C. Field Administration				
I. Supervision & Geology Rotary	674.27	-	0.35	
Core	3,939.25	4,613.52	0.97	0.77
2. Sampling & Assaying	166.44		0.09	
Rotary Core	1,157.47	1,323.91	0.09	0.22
3. Miscellaneous .		,		
Rotary Core	1,426.27 2,105.13	3,531.40	0.74 0.52	0.59
Drilling Charges Sub-Total:	2,10,117	\$207,862.52		\$34.60
Project Charges:				•
D. General Administration	\$ 4,837.22		\$ 0.81	•
E. Legal Fees	1,265.13		0.21	: ' .
F. Drill Road Access G. Claim Work-Surveying	8,182.86		1.36	
Project Charges Sub-Total:		\$ 14,285.21		\$ 2.38
Total Expenditure:		\$222,147.73		\$36.98

JDS:1b





TO: F. T. Graybeal

FROM: J. D. Sell

Project Charges Seismic Survey Superior East Project Pinal County, Arizona

Since the cost summary report of February 1, 1975, a seismic survey has been conducted on a four-mile east-west line thru drill holes A-5 and A-7. The work was done by Cooksley Geophysics, Inc., under contract from the Asarco Geophysical Division, Salt Lake City.

Expenses incurred by this office during the survey were charged to the Superior East Authorization as follows:

Field Charges:	Cost
A. Direct Drilling	\$
B. Site Preparation	
C. Field Administration	•
1. Supervision	2,198.85
2. Sampling	135 <b>.3</b> 6
3. Miscellaneous	365.85
Project Charges:	
D. General Administration	651.79
E. Legal Fees	·
F. Drill Road Access	
G. Claim Work	
Total Expenditures	\$3,351.85

James D. Sell

James D. Sell

JDS:1b



### **Southwestern Exploration Division**

August 23, 1976

TO: F. T. Graybeal

FROM: J. D. Sell

Project Charges Margaret-Eder Claim Boundary Superior East Project Pinal County, Arizona

Since the cost summary report of February 1, 1975, project expenditures have been incurred in surveying along the Margaret-Eder boundary between Asarco and ICC. This boundary agreement has been signed.

Expenses incurred by this office during the survey were charged to the Superior East Authorization as follows:

Project Charges:	Cost
D. General Administration	\$ 300.00
E. Legal Fees	
F. Drill Road Access	
G. Claim Work, Surveying	3,731.32
Total Expenditures	\$4,031.32

James D. Sell

JDS:1b



TO: F. T. Graybeal

FROM: J. D. Sell

Project Charges Gravity Survey Superior East Project Pinal County, Arizona

Since the cost summary report of February 1, 1975, project charges have been incurred in acquiring Newmont data collected over Asarco claims, additional tie-in gravity station work by this office, and associated work during a four-line gravity survey by the Asarco Geophysical Division, Salt Lake City. The geophysical group conducted the survey over the Schultze granite-Pinal Schist contact east of the dacite, followed by one line along the dacite eastern edge.

Expenses incurred by this office during the survey were charged to the Superior East Authorization as follows:

Field Charges:	Cost
A. Direct Drilling	\$
B. Site Preparation	
C. Field Administration	
1. Supervision	1,174.56
2. Sampling	
3. Miscellaneous	799.39
Project Charges:	
D. General Administration	1,272.86
E. Legal Fees	24.00
F. Drill Road Access	
G. Surveying	493.20
Total Expenditures	\$3,764.01

James D. Sell

James D Se 20

JDS:16



TO: F. T. Graybeal

FROM: J. D. Sell

Project Charges Office & Storage Move Superior East Project Pinal County, Arizona

Since the cost summary report of February I, 1975, our office and storage lease was terminated. A building was found which necessitated considerable work for security purposes. The expenses incurred in extending our old lease, the yearly payment for the new lease, repair work, and the move of all the core and materials were charged to the Superior East Authorization as follows:

Field Charges:	Cost
A. Direct Drilling	\$
B. Site Preparation	
C. Field Administration	
1. Supervision	2,749.44
2. Sampling	-
3. Miscellaneous	8,476.50
Project Charges:	
D. General Administration	1,263.25
E. Legal Fees	265.00
F. Drill Road Access	
G. Claim Work, Surveying	
Total Expenditures	\$12,754.19

James D. Sell

JDS:1b



TO: F. T. Graybeal

FROM: J. D. Sell

Project Charges
Road Repair & Cleanup
Superior East Project
Pinal County, Arizona

Since the cost summary report of February 1, 1975, the main road into the east side of Devils Canyon has needed repair and cleanup for continued access into that area. As the road services all the sites east of the canyon, the cost in maintaining this road has been separated out and charged as a project cost to the Superior East Authorization as follows:

Field Charges:	Cost
A. Direct Drilling	\$
B. Site Preparation	
C. Field Administration	
<ol> <li>Supervision</li> </ol>	165.47
2. Sampling	
3. Miscellaneous	76.15
Project Charges:	
D. General Administration	66.31
E. Legal Fees	3.50
F. Drill Road Access	4,144.03
G. Claim Work, Surveying	
Total Expenditures	\$4,455.46

James D. Sell

James DS.D

JDS:1b

## TAB

DCA-2A



### Southwestern Exploration Division

August 30, 1976

TO: F. T. Graybeal

FROM: J. D. Sell

Daily Drill Data Unit Contacts
Drill Hole DCA-2A
Core Rig CP-50
Superior East Project
Pinal County, Arizona

Attached is a daily log of the coring of the reentered hole DCA-2A. The information given is the date, depth of hole at end of the day, footage cut during the day, hours charged to drilling, number of shifts involved, short comments on the delays involved, and the geologic units and contact footages. Drilling was both NX and BX wireline size.

Compiled from this daily data is a breakdown of the shifts and footage by a) depth bracket based on the Boyles footage rate contract and b) geologic units encountered.

Hole DCA-2A had originally been drilled by Technical Air Services for the Superior Oil-Miami Copper Joint Venture. They drilled from 7-3 to 7-12 in 1964 and deepened the hole from 6-27 to 7-24 in 1965. The hole size was 7-7/8" with 37 feet of 13-1/2" casing at the surface. The hole was reported to be 1772 feet deep with Pinal Schist and quartz monzonite bedrock, with minor exotic copper starting at 1525 feet.

James D. Sell

JDS: 1b Atts.

DRILL HOLE DCA-2A

Reentered, cleaned, and cored by Boyles Brothers, CP-50 rig

Date	Depth at End of Day	Footage	Drill Hours	_	Delays	Formation
1974	2.14 01 347	· ootago	110413	011.11.03	331373	· ormacron
10/24-10/25					2 crews; moving and setting up	
		•			equipment.	
10/26	(1450)	-	4	. 1	2 crews; 4 hrs. setting up; 4 hrs.	
					cleaning.	•
10/27	Sunday	•				
10/28	(1450)		'		2 crews; making up bottom wedge and	
					threadloc 1000 feet of 4" casing.	•
10/29				1	2 crews; completed casing to 1340	•
					ft., cementing bottom with 30 sacks.	
10/30					Rain delay of cement truck.	
10/31					2 crews; 8 hrs. cementing casing	
					annulus with 13 cubic yards of six-	
					sack cement and pea gravel; started	
					drilling out by wedge.	
11/01				2	8 hrs. drilling by wedge but kicked	
	Mary San San San San				back into old hole; 8 hrs. hauling	
				•	water and preparing to cement.	
11/02	1 352			1	2 crews cementing thru wedge.	1352
11/03	Sunday					, 1
11/04	1367	15	8	2	8 hrs. drilled cement and by wedge;	
		_			found rock at 1352 ft.	
11/05	1375	8	4	2	Kicked back into old hole; 12 hrs.	
					cementing.	_1
11/06	1397	22	8	3	4 hrs. waiting on cement to set;	Tw
					6 hrs. equipment repair; 6 hrs.	
					water haul and mud mix (jumped	
					cement, started new hole).	
11/07	1435	38	18	3	2 hrs. hauling fuel tank to location;	ļ
· · · · · · · · · · · · · · · · · · ·					4 hrs. bit change at 1424 feet.	1452
11/08	1519	84	24	3		p€pi .
11/09	1571	52	23	3	1 hr. pulling into casing.	1540

11/10				
11/10 11/11	Sunday 1627	56	21 3	2 hrs. fuel delay; 1 hr. going to Tsg bottom. 1676
11/12	1705	78	24 3	p€pi
11/13	1759	54	20 3	4 hrs. for bit change at 1740 ft. 1804
11/14	1816	57	24 3	Tsg
11/15	1878	62	24 3	1827
11/16	1932	54	22 3	2 hrs. pulling into casing.
11/17	Sunday			
11/18	2002	70	22 3	2 hrs. mix mud and getting to bottom.
11/19	2080	78	23 3	1 hr. started out for bit change
				but rods hung at 1930 feet.
11/20	2080		<sup>-</sup> 2	16 hrs. trying to free rods.
11/21			2	16 hrs. trying to free rods.
11/22		-	1	8 hrs. trying to free rods.
11/23			1/2	5 hrs. finding free point at 1600 ft.
11/24	Sunday			
11/25			1 1	2 crews, abandoned NX, prepared to reduce to BX.
11/26			1	2 crews, reduced to BX; 5 hrs. cementing.
11/27			1	2 crews cleaning hole and chopping 110' of cement. p€pi
11/28				(lost shift reports).
11/29	Taragan Jangga Palatan		3	2 hrs. mix mud; 20 hrs. drill cement 1592-1752.
11/30-12/01	Saturday & S	unday		
12/02				1/2 12 hrs. drilling cement 1752-1932; 8 hrs. trying to catch cave.
12/03	-		2	16 hrs. cementing (5 sacks), waiting on cement to set.
12/04			<del></del> 1	8 hrs. redoing cement job (9 sacks). Pressuring.
12/05			1	2 crews, 8 hrs. waiting on set, cleaned site.
12/06			3	24 hrs. drilling cement 1840-1991.
12/07			1/2	
12/08	Sunday			
12/09	2085	5	5 3	3 hrs. equip. repair; 11 hrs. drilling cement from 2009-2080; 5 hrs. mix mud.

12/10	2115	30 1	1 2-1/2	9 hrs. mix mud; clean tanks, refill with water.
12/11 12/12	2171 2248		8 3 0 3	4 hrs. mix mud; 2 hrs. equip. repair. 2 hrs. bit change at 2188; 1 hr.
				equip. repair; 1 hr. pulling back 10 rods.
12/13-12/15	Friday thru S			(end of 40 hr. week for 2 crew operation)
12/16	2312	64 2	2 3	2 hrs, mix mud.
12/17	2372	60 1	7 3	2 hrs. mix mud and equip. repair; 3 hrs. bit change at 2342; 1 hr. reaming.
12/18	2422	50 1	6 2-1/2	4 hrs. pumping lost circulation material; no luck. 2422
12/19	Terminated ho	ole.		

DCA-2A

### Drilling Time, by footage brackets, including down time (except as noted):

Depth	Shifts	Days	Footage	Ft/Shift	Troubles
1352-1497	11	4-2/3	145	13.2	3 shifts drilling cement,
1497-2002 2002-2422	25 21-1/2	8-1/3 7-1/2	505 420	20.2 19.5	<pre>l bit change. l bit change. 3 bit changes, rod stuck,</pre>
					reduced to BX, cemented, etc. (DOES NOT include 23-1/2 shifts [15-1/3 days]
1352-2422	<del></del>	20-1/2	1070	18.6	spent on reduction from NX to BX at 2080 feet).

#### Drilling Time, by Rock Type, including down time (except as noted):

Rock Unit	Depth	Shifts to	Depth	Footage	Ft/Shift
NX Whitetail Cgl.	1352-1452	9	1435	83	9.2
Pinal Schist	1452-1540	4	1542	107	26.8
Schultze Gr.	1540-1676	7	1680	138	19.7
Pinal Schist	1676-1804	6	1796	116	19.3
Schultze Gr.	1804-1827	2	1836	40	20.0
Pinal Schist	1827-2080	11	2080	244	22.2
BX Pinal Schist	2080-2422	18-1/2	2422	342	18.5
	1352-2422	57-1/2		1070	18.6

# TAB

DCA-3A



August 30, 1976

TO: F. T. Graybeal

FROM: J. D. Sell

Daily Drill Data Unit Contacts
Drill Hole DCA-3A
Core Rig, CP-50
Superior East Project
Pinal County, Arizona

The drill hole was originally drilled by C.C. Smith, for the Superior Oil-Miami Copper Joint Venture. The hole was taken to a reported depth of 3000 feet in May-June of 1965 and they abandoned the 5-5/8" hole without any casing.

Asarco reentered the hole early in the Superior East Project using Schlumberger to survey the hole. Schlumberger hit a bridge at 680 feet which they could not penetrate with their probe. In November 1971 Moss-Weber set up a churn drill to clean the hole but was also unable to get by a bridge or bend in the hole. A picture survey indicated either a deflection ledge and/or a hard rib extending into the hole at the problem area.

Shelton Drilling Company then set up a rotary rig and between 2/11 and 2/14/74 they successfully drilled by or knocked off the projection and cleaned and conditioned the hole to around 1995 feet, the capacity of the rig. Boyles Brothers then set up a rotary rig and successfully cleaned the hole and set 3-3/4" OD NX casing, cemented at the bottom, to a depth of 2980 feet, between 3/26 and 3/30/74. A Boyles Brothers CP-50 core rig was used to core below the casing.

Attached is a daily log of the coring of drill hole DCA-3A. The information given is the date, depth of the hole at the end of the day, footage cut during the day, hours charged to drilling, number of shifts involved, short comments on the delays involved, and the geologic units and contact footages. All drilling was by use of NX wireline.

Compiled from this daily data is a breakdown of the shifts and footage by a) depth bracket based on the Boyles footage rate contract and b) geologic units encountered.

James D. Sell

JDS:16

cc: NPWhaley

Drill Hole DCA-3A Coring Boyles Brothers CP-50 Rig

Date	Depth at End of Day	Footage		ling Shifts	Delays Formation
1974 7/01-7/02	2980				Moving on site and setting up over 2980
//0: //02	2300				cased hole.
7/03	2985	5	2	3	2 crews with 1 hr. equip. repair and
				-	7 hrs. making string up and working
					in hole. I crew pulling rods, put
					NX bit on and drilled out rubber plug.
7/04	Holiday		• • •		
7/05	3032	47	18	3	6 hrs. mix mud.
7/06	3091	59	. 23	3	l hr. pulling back into casing.
7/07	Sunday			_	
7/08	3142	51	18	3	1 hr. return to bottom; 5 hrs. bit
7/00	2000	(0	10		change at 3122.
7/09	3202	60	19	3	5 hrs. trip for mislatch.
7/10	3290	88	24	3	1
7/11	3340	50	18	3	1 hr. mix mud, 2 hrs. fuel delay, 3 hrs.
7/12	, 2200	50	10	•	equip. repair.
7/13	, 3390 3/153	62	19 21	3 3	5 hrs. trip for bit change at 3350.
כו וו	345 <b>2</b>	02	21	)	<pre>l hr. equip. repair; 2 hrs. pulling into casing.</pre>
7/14	Sunday				into casing.
7/15	3506	54	14	3	1 hr. returning to bottom; 8 hrs. Tw
(1,1)	5000	דע		)	mislatch; l hr. equip. repair.
7/16	3522	16	8	2	1 hr. equip. repair; 7 hrs. trip for
// 10	J)				bit change at 3506; 8 hrs. broken
					core spring replace.
7/17	3600	78	22	3	2 hrs. complete run to bottom.
7/18	3652	, o 52	18	3	6 hrs. mix mud.
7/19	3737	85	24	3	
7/20	3821	84	22	· 3	2 hrs. pulling into casing (high
					torque).
7/21	Sunday		* 12 - 1		
7/22	3842	21	7	3	8 hrs. equip. repair; 9 hrs. bit change
		and with the second of the sec	•		at 3821.
7/23	3931	89	24	3	
7/24	3970	39	12	3	12 hrs. equip. repair.
7/25	4010	40	15	3	8 hrs. equip. repair; 1 hr. going to
		the second of th			bottom.

7/26	4033	23	12	3	12 hrs. bit change at 4022.	
7/27	4074	41	22	3	2 hrs. pulling into casing.	
7/28 7/29	Sunday 4088	14	14	3	2 hrs. to bottom; lost water at 4084; 8 hrs. pull rods up.	4081
7/30	4088			3	12 hrs. rig repair; 12 hrs. geoseal plug.	
7/31	4088			3	8 hrs. cleaning cement to bottom; 16 hrs. bit change.	
8/01	4093	5	6	3	Lost mud again; 10 hrs. pulling for cement job at 320 ft.; 8 hrs. waiting on set; lowered rods, couldn't find cement.	Sc-qm SB
8/02	4093.	<b></b>		3	16 hrs. recemented and washed to 300'; 8 hrs. drilling to 370'.	
8/03 8/04	4093 \$unday			. 1	8 hrs. equip. repair; mix salt mud.	
8/05	4112	19	12	3	8 hrs. equip. repair; 4 hrs. lowering rods.	
8/06	4169	57	21	3	3 hrs. equip. repair.	4157-4159
8/07	4189	20	9	3	15 hrs. for bit change at 4189; broke wireline.	
8/08	4218	29	17	3	7 hrs. reaming from 4116-4189.	
8/09	4247	29	14	3	10 hrs. pulling mislatch; bit change at 4226.	Tw 
8/10	4266	19	8	3	16 hrs. pulling mislatch; bit change at 4266.	
8/11	Sunday			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		4274 429
8/12	4312	46	20	3	2 hrs. repair; 2 hrs. fuel delay.	
8/13	4338	26	12	3	12 hrs. working on stuck rods. No luck.	
8/14 thru						
8/16	4338	••	<b></b>	6	48 hrs. pumping diesel, pipelax, etc. No luck.	qm
8/17	4338			-	Sent for McCullough free point.	SB
8/18	Sunday					
8/19				2	4 hrs. free point at 4180; 4 hrs. chemical cut at 4148, pulled rods; 8 hrs. cementing with 10 sacks on top of cut.	

-1

					医二角膜 医动物 医二氏性多种毒性 医克勒氏性 医克拉氏 医克拉氏性 医克拉氏氏征 医克勒氏征
8/20				1	2 crews, clean cement, plugged rods, wet pull.
8/21				2	16 hrs. pulling rods, lowering and
8/22				3	washing to 4022. 22 hrs. coring cement 4022-4089;
9722				<b>)</b>	kicked off into wall at 4089; 2 hrs.
					mixed new mud.
8/23				2	
0/23			<del></del>	2	11 hrs. redrill 4089-4106; 5 hrs. mix mud and equip. repair.
8/24	Saturday	No crews	worked.		
8/25	Sunday				
8/26				3	2 hrs. going in hole; 19 hrs. redrill
					4106-4137; 3 hrs. equip. repair.
8/27	• • • • • • • • • • • • • • • • • • •			3	16 hrs. mud too heavy to pump, pulled
7.7					for bit change, ran rods in; 8 hrs.
					reaming 50' and redrill 4137-4146.
8/28				3	16 hrs. redrill 4146-4188; 8 hrs.
<b>0,2</b> 0					pulling core in rods.
8/29				3	24 hrs. redrill 4188-4222.
8/30				3	16 hrs. redrill 4222-4244, including
97 کو				3	mislatch pull; 8 hrs. fighting caving
	•				
0/21				2	ground, broke wireline.
8/31			,	2	16 hrs. pull rods and running in with rock bit.
9/01	Sunday				
9/02	Holiday		*		
9/03	·			3	8 hrs. cleaning hole; 10 hrs.
					cementing; 6 hrs. equip. repair.
9/04	<b></b>			3	8 hrs. equip. repair; 16 hrs.
					drilling cement 4059-4244.
9/05				3	8 hrs. flushed hole; 16 hrs. redrill
					4244-4264.
9/06				3	2 hrs. equip. repair; 14 hrs. round
					trip for mislatch; 5 hrs. redrilling
			•		4272-4287; 3 hrs. standby, broke oil
					line.
9/07	<b>.</b>			1	8 hrs. equip. repair, pulled rods
			•	• •	back, engine burned.
9/08 thru 9/	/17 Replaced	engine and	l miscell	aneous	
9/18	i/ hepiaceu (	and		3	8 hrs. equip. repair; 3 hrs. mix mud
				,	and delay; 5 hrs. redrill 4287-4301;
					8 hrs. pulling overshot and broke
					wireline.
					witeline.

- (3)

			VI - 1			
9/19	(4338)			3	4 hrs. running in hole; 8 hrs. redrill 4301-4315; 12 hrs. broke wireline,	ļ
					pump quit, pulling up.	qm
9/20	4362	24	10	3	4 hrs. equip. repair; 10 hrs. redrill 4315-4338.	SB 
9/21	4383	21	10	3	12 hrs. round trip mislatch; 2 hrs. equip. repair.	
9/22	Sunday					4394
9/23	4409	26	10	3	12 hrs. engine repair; 2 hrs. fuel haul.	l Tw
9/24	4450	41	18	3	6 hrs. equip. repair.	ï
9/25	4507	57	24	3	Whoopee.	4454
9/26	4554	47	22	3	l hr. equip. repair; l hr. elec.	יייכור
J/ 20		• • • • • • • • • • • • • • • • • • • •		<b>J</b>	storm delay.	
9/27	4599	45	24	3	Scorm acray r	
9/28	4611	12	8	3	16 hrs. bit change at 4611.	
9/29	Sunday	' <del>-</del>			To mis. Die change at 4011.	Ts g
9/30	4645	34	22	3	2 hrs. washing to bottom.	139
10/01	4692	47	23	3	1 hr. mud mix.	
10/02	4738	46	24	3	Title mad mix.	
10/03	4766	28	14	3	10 hrs. bit change at 4738.	
10/04	4832	66	23	3	1 hr. changing Bean 35 pump.	4809
10/05	4854	22	12	3	12 hrs. bit change at 4854.	נטסד
10/06	Sunday		12	٠,	12 ms. bit change at 4074.	
10/07	4888	34	15	3	9 hrs. unsticking rods at 4160.	
10/08	4920	32	15	3	9 hrs. round trip for mislatch.	
10/09	4958	38	22	3	2 hrs. pulling rods, high torque.	
10/10	4983	25	10	3	5 hrs. pulling rods - gauge shot;	
		27	10	,	3 hrs. finding 3-1/4" bit; 6 hrs.	
			* *		lower rods and drilling cave.	.
10/11	5025	42	24	3	(Graveyard driller dismissed for	
. 107 11	<b>J</b> 029	74	47	)	sleeping.)	<b>p</b> €p i
10/12	5025			1	2 hrs. pulling into casing; 6 hrs.	
10/12	<b>J</b> 02J		•			
10/13	Sunday				deviation and temp. survey.	
10/13	5071	46	17	2	7 has been the share	
				3	7 hrs. round trip for bit change at 5025.	
10/15	5129	58	24	3		]
10/16	5154	25	12	<b>3</b>	Bit "ringed" terminated hole. 12 hrs. clean up site and waiting for GP crew.	5154
	•		74			

10/17	2-1/2	6 hrs. lowering IP probe to 4800 ft
		stuck; 14 hrs. pulling rods to retrieve
10/18	1/2	probe. 4 hrs. running IP antenna wire to 4800;
10/19-10/20 Saturday and Sunday		capped hole.
10/21-10/22	2	16 hrs. tearing down for move.

Drilling Time, by footage brackets, includes down time (except as noted).

Depth	Shifts	Days	Footage	Ft/Shift	Troubles
2980-3506 3506-4010	28 27	9-1/3 9	526 504	18.8	2 bit changes, minor repair. 2 bit changes, 2 shifts hydraulic repair.
4010-4338	32	10-2/3	328	10.3	Does not include: 13 shifts (4-1/3 days) for grouting &
		(21)			cementing; 5 bit changes 21 days lost stuck rods, deviating hole, redrilling lost footage and changing
4338-4507	15	5	169	11.3	engine. No bit change, numerous problems.
4507-5002	40	13-1/3	495	12.4	4 bit changes, numerous
5002-5154 2980-5154	10-1/2 152-1/2	3-1/2 50-5/6	152 2174	14.5	problems. I bit change; hole survey.

#### Drilling Time, by Rock Type, including down time (except as noted).

Rock Unit	Depth	Shifts to [	)epth	Footage	Ft/Shift
Whitetail Cgl.	2980-4081	62	4077	1097	17.7
sc-qm SB	4081-4157	7*	4166	69	9.9
Whitetail Cgl.	4157-4274	14	4269	123	8.8
gm SB	4274-4394	12**	4392	123	10.3
Whitetail Cgl.	4394-4454	4	4450	58	14.5
Schultze Gr.	4454-4809	26	4813	363	14.0
Pinal Sc.	4809-5154	27-1/2	5154	341	12.4
	2980-5154	52-1/2		2174	14.3

<sup>\*</sup>Does not include 13 shifts down time for grouting and cementing.

\*\*Does not include 21 days down time, stuck rods, cementing, deviation of hole, redrilling lost footage, and changing out engine, etc.

# **ASARCO**

#### Southwestern Exploration Division

December 1, 1976

TO: F. T. Graybeal

FROM: N. P. Whaley

Superior East Project Pinal County, Arizona Directionally Controlled Re-drill of a Section: Hole A-8

Basic Factors and Assumptions:

a) BX wedge (1-1/2°):b) Joy Mfg. Co. rig time charge:

\$400.00

24.00/hr. (\$576.00/24 hr.dy.)

c) Dyna-Drill:

1) Rental (2 dy. min.) \$300.00/dy. 2) To-Fr/Longbeach Calif. 10.00/dy.

3) Service fee (operator) 200.00/dy.

\$510.00/dy.

4) Bits (w/40'-60'-100'/bit)

\$200.00-\$300.00

5) Advance: 3 ft./hr.±

- d) Interval to be redrilled: 3,800' to 4,500' (700' drilling).
- e) Joy Mfg. Co. average advance/24 hr. dy. during initial drilling of the intercept from 3,800' to 4,366' was 33.4'/dy. (say 30'/dy).
- II. Using these factors and assumptions, cost estimates for three re-drill options are presented below.
  - a) Wedging out of the original hole with a single, 1-1/2° unoriented wedge and re-coring a 750 ft. to 800 ft. intercept:

1) Cost of wedge = \$ 400.00 2) Rig time to set (est'd. 4 dys.

@ \$576.00/dy.) = \$ 2,304.00

3) Coring from 3,750 ft. to 4,500 ft. (750 ft. @ \$24.00/ft.) = \$18,000.00 Sub-total \$20,704.00

Sub-total \$20,704.00 4) Assaying = \$ 200.00

5) Overhead = \$\frac{1,000.00}{21,904.00}

b) Wedging out of the original hole with an oriented, 1-1/2° wedge, coring, and setting additional oriented, 1-1/2° wedges every 75 ft. (minimum interval suggested by Joy Mfg. Co.) throughout the 750 ft. to 800 ft. intercept:

11/2 wedge
(to 2.6 ft
erally per 100
theal"ft of hole

Tage the bearing and the control of the control of

1)	verall total for the first option	
	escribed above * \$21.904.00	
2)	ost of eight additional wedging	
	perations, including orientation	
	ees. $8 \times \$3,000 = \$24,000.00$	
	Overall Total \$45.900.00	

(This is obviously untenable, both economically and mechanically. The technique could be used only with a limited number of oriented wedges.)

c) Wedging out of the original hole with an oriented, l-1/2° wedge and using the Dyna-Drill to establish a drift and bearing for the re-coring of a 750 ft. to 800 ft. intercept:

1)	Original wedging operation		
	with orientation		= \$ 3,000.00
2)	Use of Dyna-Drill for drill	ing	
	100 ft.± intercept above re-	-core	
	zone to establish drift and		
	bearing:		
	2.5 dys. @ \$510.00/dy		= \$ 1,275.00
	2 bits @ \$250.00 ea.		= \$ 500.00
	Orientation charges		= \$ 500.00
3)	Drilling contractor rig time		
	during operation of Dyna-Dr		
	2.5 dys. @ \$576.00/dy.		= \$ 1,440.00
4)	Coring 700' @ \$24.00/ft.		= \$16,800.00
		Sub-total	\$23,515.00
	Assaying		= \$ 200.00
6)	Overhead		= \$ 1,000.00
		Overall Total	\$24,715.00

The second and third options contain so many variables that it is rather difficult to assign a reliability factor to them. Any technical or mechanical problems could escalate costs greatly.

N. P. Whaley

NPW:1b



February 1, 1977

Mr. F. T. Graybeal Tucson Office

#### Dyna-Drill

Last Saturday J. H. Courtright, J. C. Balla, and I interviewed Gary Heinemeyer who indicated good success with the dyna-drill at Questa. They have used the dyna-drill to obtain a 15° deviation -- continuing the hole with standard coring equipment.

Joy has proved the best contractor -- especially so because they have left-handed rods to take care of the twist-off problems.

Longest section drilled with dyna-drill was 300 feet. Cost averages about \$100 per foot.

A sufficient capacity mud pump is available to adequately run the dyna-drill.

Kerr-McGee has used the dyna-drill at Red Mountain.

Suggest N. P. Whaley thoroughly check into the presently demonstrated capabilities of the dyna-drill.

The dyna-drill might be capable of providing two or more penetrations at a sufficient horizontal distance from A-8 and A-9 to qualify as equivalent to a new hole drilled from surface. I believe Sell said he calculated the true width of the A-8 zone as 350 to 400 feet; therefore, a large horizontal offset is not needed to make an effective test.

W. L. Kurtz

WLK:1b

cc: TCOsborne
JHCourtright
JDSell
NPWhaley

# SUPERIOR EAST

A-8	3 - DRIL	LING ONLY		JOY MFG, Co,
Water S.		TOTAL DYS.	DRILL DYS.	CosT
		2.2	18	\$ 22,631.27
	<b>2</b>	31	27	18, 148, 34
		30	25	20, 296.43
in de la company	<b>3</b>	31	26	19, 948. 48
	<b>(5)</b>	30	<b>25</b>	14,647.09
	6	5	4	7,697.58
	TOTALS =	149	125	\$ 103,389,19

$$TD = 4907' \frac{4907'}{149} = 32.9'/DY \frac{4907'}{125} = 39.3'/DY$$

## Cost:

## SUPERIOR EAST A-8 COSTS

1. COST OF ROTARY PORTION:

HOLE COLLARED BY DIAMOND DRILL

2. COST OF DIAMOND DRILL PORTION

a.) Joy MFG. Co. 05115958 05116015 05116078

> 05116126 05116180

05116229

\$ 22,631.27 (0-1334')

18,168.34 (1334-2401') 20,296.43 (2401'-3478')

19,948.48 (3478'-4366')

14,647.09 (4366-4907' TD) 7,697.53

\$103,389.19 (4907')

b.) COST PER FT.

\$ 103,389.19 = \$ 21.07 4907'

3. TOTAL DRILL COST:

a.) ROTARY

b.) DIAMOND DRILL

\$ 103,389.19 TOTAL = \$ 103,389.19

C.) COST PER FT.

\$103,389,19 = \$21.07 4907'

4. DIRECTIONAL SURVEY:

\$ 1,149.70

5. ACCESS RD. AND DRILL SITE:

a. BRYANT CONS'T. Co. 5-20-75 \$ 4,621.21

7-28-76 6,257.29

TOTAL = \$ 10,881.50

## SUPERIOR EAST - A-8 COSTS ... (CONIT.)

e.) Cost PER FT.

$$\frac{$115,420.39}{4907'} = $23.52$$

NW 2-18-77

CC: FT GRAYBEAL

**Exploration Department** 

105ell =>

March 10th, 1977.

FILE MEMO

DRILLING-PERCUSSION
FOAMING and DE-FOAMING AGENTS

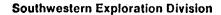
With sufficient air compressor capacity an accurate sample can be obtained in firm, fairly dry ground by percussion drilling; however, in wet and/or friable, caving ground, a foaming agent must be introduced to inhibit caving and to obtain full recovery of the heavy mineral fraction. The problem of handling large frothy samples has recently been overcome by the development of a de-foaming agent which is injected into the sample discharge pipe. This system should be applicable to sampling various mineral occurrences that require special techniques, particularly the colluvial cassiterite deposits of Spain.

Attached is Mr. Whaley's discussion with data obtained from a Paroid engineer.

J. H. Courtright

JHC:jlh attmt

c.c. T.C.Osborne, w/encis
R.B.Sprague, w/encis
J.J.Merz, w/encis
W.L.Kurtz, w/encis
N.P.Whaley, w/o





March 9, 1977

TO: J. H. Courtright

FROM: N. P. Whaley

Drilling - Percussion
Foaming and De-foaming Agents

The following memorandum will hopefully provide a convenient summary of our discussion with Dwaine Hussey, Drilling Fluids Engineer of Baroid Division, N L Industries, Inc. on February 25.

The problem presented was one of prospecting for placer cassiterite by a method which would provide a valid sample at an economically practicable cost for a large area. One such method to be considered would be the drilling of 5-inch to 6-1/2-inch holes with a pneumatically-operated, bottom-hole hammer utilizing a foam or foam slurry to facilitate the lifting of the high specific gravity materials (i.e., cassiterite).

Introducing or injecting a pre-mixed solution of water and a foaming agent into a formerly dry air-drilling system actually represents only one of a number of possibilities in a series of lifting media which, except for the energy requirements, can be considered as a de facto continuum ranging from what is commonly termed water mist ... through mud mist, and stiff foam ... into aerated mud, each stage characterized by an increased cuttings-carrying capability. Thus for any given hole it is theoretically possible to select an optimum medium within this continuum to effectively lift and discharge all cuttings. Modification of an initially selected medium or system can be made as down-hole conditions change (e.g., rate of penetration, change in water production from the formation, etc.). Rather than attempt a description of each of these systems, I am attaching copies of a few pages from a paper by Kinder Chambers (Attachment A), where each is briefly discussed. Quantitative statements in this paper often refer to large diameter, oil field holes. Our interest should be confined to the techniques and methodologies described.

Dwaine Hussey felt that for our drilling a good starting point in this continuum of systems would probably lie somewhere between water misting and stiff foam, utilizing a Baroid injection slurry known as Trol-Foam, containing a mixture of Quik-Trol and Quik-Foam (both are Baroid products). Attachment B is a copy of a table showing the mixing ratio for this and other slurries, foam concentration in 100 gallons of water for various quantitites of foam added, and average injection rates commonly used. A paper by James R. Youell, describing an application of a variation on the Trol-Foam slurry could also be of interest, and a copy is included as Attachment C.

Until a specific drilling system is adopted, it is impossible to prescribe or know exactly what the character of the discharge or sample will be, but if the assumption is made that this discharge will resemble something

between a concentrated froth and a stiff foam the consistency of an aerosol-can shaving cream, the probable need of a defoaming agent to kill the foam volume and facilitate the containerizing of the sample is suggested. A number of these agents are available, and a list of Baroid products is given below.

Product	DEFOAMING AGENTS Composition	Application	
Aluminum Stearate	Aluminum Stearate	Fresh Water Hard Water Mixed with oil	
FROBAN DEFOAMER 23 Monosulph Octyl Alcohol, SURFLO W300	Detergent Alkylaryl Sulfonate Sulfonated Castor Oil Long Chain Alcohol Sulfonated Castor Oil and Long Chain Alcohol	Fresh Water Salt Water Salt Water Fresh Water Fresh Water or Salt Water	

In practice, small quantities of these defoaming agents are put into solution in water or diesel oil (which also acts as a defoamer) and injected as a high-pressure mist into the discharge line ahead of the sample collection system.

Again, in considering our drilling, Dwaine Hussey felt that the most effective of these agents would probably be Aluminum Stearate if we could tolerate the diesel oil in which it has to be mixed. If the diesel should not be acceptable in the sample, his alternate recommendation was the W300 which can be mixed with water.

Baroid Division does have both sales and engineering representatives in Spain, and should we be interested in considering any of these systems it would certainly be wise to establish contact with them to discuss our requirements, assess available equipment and technology, and develop cost estimates.

The following names and telephone numbers were provided by Dwaine Hussey:

Sales Representative:

Kenneth Fread

Apt. 534

Tarragona, Spain

Tel. 2-07640

2-07744

TELEX 56485 (DRXL)

Sales Engineering Representative:
Gordon Skinner
c/o Prodipesa Fernandez
de La Hoz 40
Madrid 10, Spain

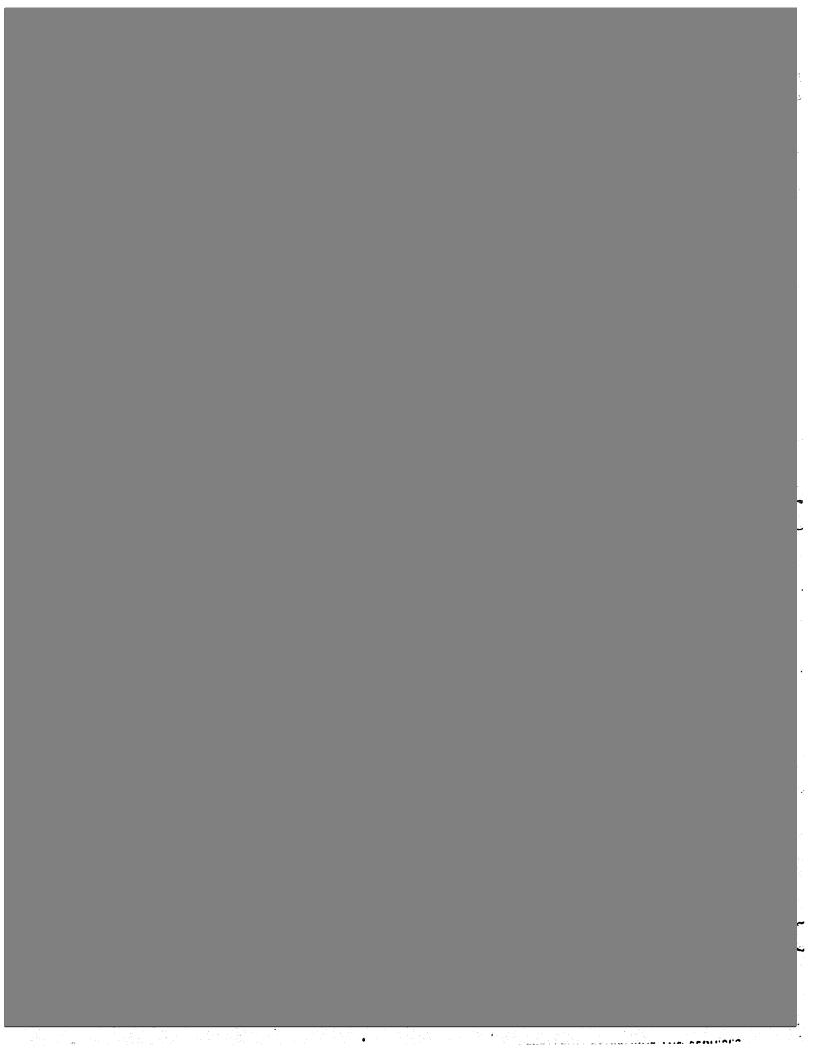
Gordon Skinner - Continued Tel. 011-341-0700 0704 0708

**TELEX 22672** 

Kenneth Fread was recommended as the initial contact.

N. P. Whaley
N. P. Whaley

NPW:1b Atts.



FIVE BASIC METHODS FOR USING AIR FOR DRILLING

18

MAY/JUNE 1967

### ROTARY DRILLING SYSTEMS

AIR DRILLING

WATER MISTING
FOAM DRILLING
MUD MISTING

GEL FOAM

AERATED MUD

LOW up hole VELOCITY
MUD

Injection Slurry	Water (gallons)	QUIK-GEL (pounds)	QUIK-TROL (pounds)	QUIK-FOAM (% by vol.)	
'A' - QUIK-FOAM	100			0.02 - 3.0	Increase as required to compensate for down hole water dilution etc.
'B' - TROL-FOAM	100		1/2-1	0.1 - 2.0	Mix well
'C' - MUD-MIST	100	25		0.3 - 1.0	Mix well Viscosity 32-40 sec/qt.
'D' - GEL-FOAM	100	12-15	1	0.3 - 1.0	Mix well Viscosity 32-40 sec/qt.

NOTE: Mix only in this sequence.

BAROID DIVISION



## FOAM CONCENTRATION

(In 100 gallons U.S. water)

%	Pints	OZ.
2.5	20	
1.25	10	
1.0	8	•
0.75	6	
0.50	4 .	
0.25	2	32
0.125	1	16
0.096	3/4	12
0.064	1/2	8
0.032	1/4	4
0.016	1/8	2

## INJECTION RATES (Av.)

Overburden (unconsolidated) - 7 - 10 g.p.m.

Rock (broken) - 5 - 7 g.p.m.

Rock (solid) - 3 - 5 g.p.m.

Dust control/water - ¼ - 2 g.p.m.

BAROID DIVISION



#### NEW TECHNIQUES IN FOAM DRILLING

by

#### JAMES R. YOUELL

The Arizona Highway Department had a need for subsurface soil information on the proposed route of the elevated Papago Freeway.

To get the information, it necessitated sampling a boulder and cobble bed that contained loose, dry, runny sand and silt lenses. Several methods were proposed: rotary drilling and casing holes, airtrack and mist, a Becker Hammerdrill (pile driver using reverse circulation air system). We chose a small diameter 3 1/2" bit on a Halco DD 325 Hammerdrill, operated from our Mobile Drill Model B-50.

To add to this combination, a Gel-Foam drilling fluid was metered into the air line at the rate of 7 to 10 gallons for every 15 lineal foot of 3 1/2" hole. Hole stability, penetration rate and sample recovery results were excellent. Penetration was at 20 to 30 feet per hour.

#### WHAT WAS OUR GEL-FOAM?

The Gel-Foam was a take-off from an old Baroid receipe:

Into a 50 gallon barrel of soft water, mix 25 lbs. of Quik-Gel thoroughly until smooth with a Jet mixer.

Blend in 1/2 to 3/4 lbs. of Quik-Trol, increasing the quantity in caving ground to achieve a higher Marsh funnel viscosity. The viscosity should be kept near 30 seconds per quart under normal ground conditions, increasing the viscosity between 40 - 50 for bad caving ground conditions.

After the desired viscosity is obtained in the batch, gently

Page -2new technique... by James R. Youell

fold in 1 pint of Quik-Foam until mixture is uniform.

Place in the air lift system for 10 - 12 seconds. Out of the hole will come the best transporting and cuttings moving device in the modern world.

Let stand for 90-180 minutes and the bubbles will disappear, leaving a crunchy pile of dry cuttings ready for sample sacking.

#### WHY IS THE QUIK-GEL AND QUIK-TROL USED?

The two additives increase the strength and transporting power of the bubble. They also promote the building of a very low water loss wall cake, that promotes hole stability.

#### WHAT METHOD OR TECHNIQUE WAS USED TO INJECT THE

#### GEL-FOAM INTO THE AIR SYSTEM?

A parallel receiver tank filled with Gel-Foam was placed so that pressure would be placed ahead of a fine needle valve. The small metered quantity of fluid was then drawn into the main air line by a Venturi. Quick shut-off valves were used at connection time as normal operating procedure. Liberal use of ball check valves to protect equipment is recommended; one above the Hammerdrill, one on each side of the Gel-Foam tank to guard the compressor from foam damage. See flow sheets for details.

### ARE THERE OTHER METHODS OF GETTING FOAM INTO THE

#### SYSTEM?

Yes, a positive displacement mud pump is often used at a very low gallonage. Calibration is necessary to achieve proper output. An alternate and ancient device known as a bucket is also used. It is filled to a predetermined mark and carefully poured down the drill pipe at connection time; this practice is known as sluging.

Page -3new technique... by James R. Youell

#### MHY DID WE USE THIS PARTICULAR EQUIPMENT SYSTEM?

The adaptability of the Mobile B-50s' all hydraulic speed and feed control allowed the flexibility necessary at low rotation speeds of 10-12 R.P.M. The 78" feed ram afforded 150 to 200 lbs. of smooth operation, one chuck change between 10 foot rod sections. The hydraulic control on this rig gave infinite adjustment which is necessary to put the Halco DD 325 Hammerdrill at optimum footage output. This appeared to be between 20-30 feet per hour in this ravely ground.

The Halco Hammerdrill was selected for its small size. It is able to drill through our Mobile hollow stem auger; another thought was that small, 3 1/2" holes are more economical to drill than larger Hammerdrills, made by other manufacturers.

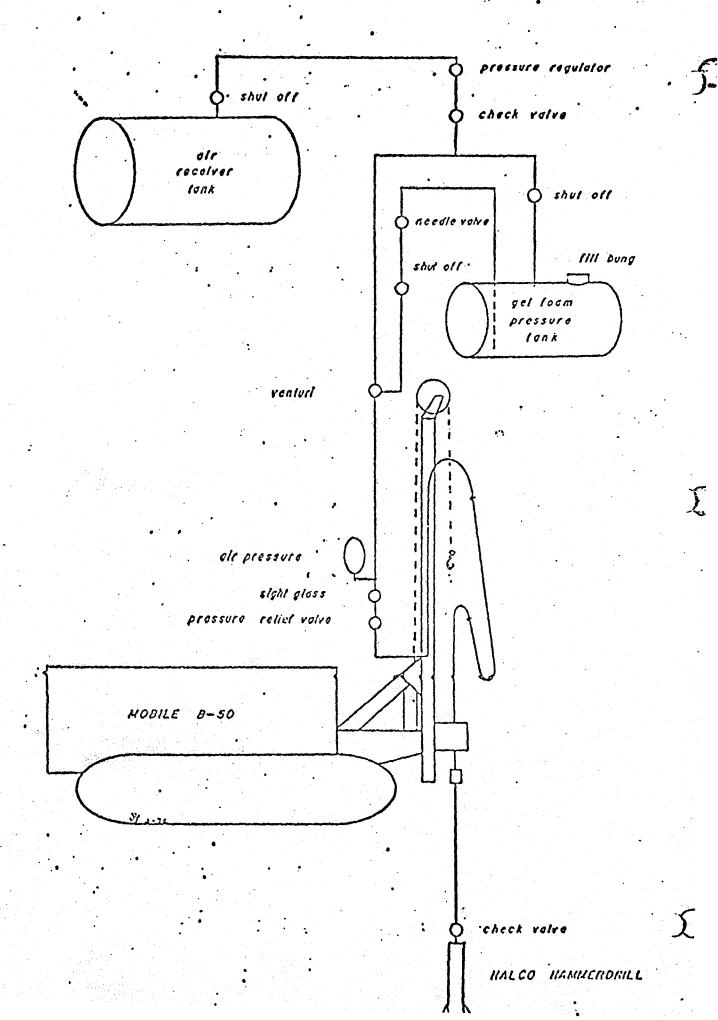
### HAVE WE USED GEL-FOAM IN APPLICATIONS OTHER THAN

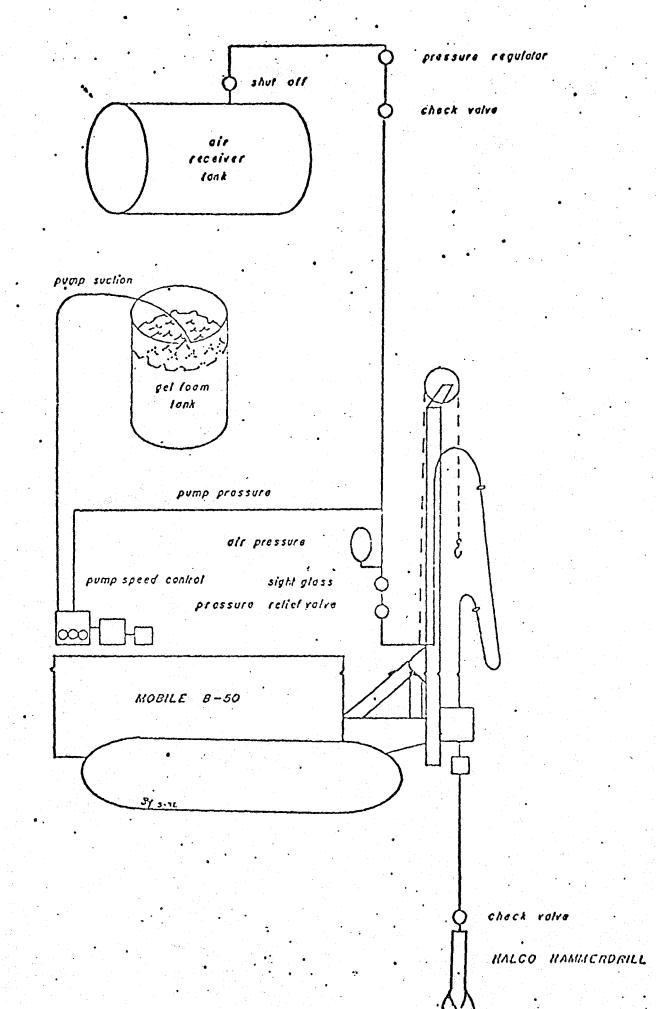
#### HAMMER DRILLING?

We have and are, quite impressed with the quality job provided in long hole rotary boring as well as vertical drilling. We held 180 foot horizontal 5 1/8" diameter bore holes using Gel-Foam in a weathered, steeply dipping slate. A control section was run without Gel-Foam; results: hole caved, re-drill required - no re-drill was necessary where Gel-Foam was used in the slate.

#### HOW DID WE DISCOVER GEL-FOAM AS A DRILLING SYSTEM?

Benjamin Franklin answered a similar question,
"How did you achieve such greatness?" His reply, "I'm
standing on the shoulders of great men." This must be
our reply also. Baroid's engineer, Lloyd Hill, was the
prime mover in mud chemical adaptation, while Doug Linsay,
Halco Western Hemisphere Manager and "Hank" Davis,
Vice-president of Mobile Drill Company and the organizations
behind these men, deserve much credit for our successful
use of Gel-Foam. It would be negligent to forget the
drill c::w of the Arizona Highway Department, headed by
Lavone Prince, who put these theories into practice.





#### MIJAUFINILIA

#### GLOSSARY

Baroid:

P. O. Box 1675, Houston, Texas 77001 Rep: Lloyd Hill. (602) 934-2004

\*Quik-Foam:

A biodegradable foaming agent producing a relatively uniform size bubble; used in foam drilling by itself or with other drilling agents.

\*Quik-Gel:

A high yield Bentonite. A 50 lb. bag will produce 200 gallons of 15 centipoise drilling mud.

\*Quik-Trol:

A nonfermenting organic compound used to stabilize swelling formation clay and to make a non-clay drilling fluid. Mix 1 lb. in 1 gallon Diesel, then stir into 50 gallons of water. It will produce a Marsh viscosity of 40 - 50 seconds.

Halco Hammerdrill:

D. W. Jaquays Company
1219 S. 19th Avenue, Phoenix, Arizona
Rep: Doug Linsay (602) 254-6494
The drill we operate is a DD 325,
2 7/8 O.D., 2' 10" long. Uses
125 C.F.M., at 80 p.s.i.
Weight w/o bit, 43 lbs. Bit sizes
3 1/4", 3 3/8", 3 1/2". This
Hammerdrill is adapted to either
NW or AQ drill rods.

Mist drilling:

Conventional air drilling in which very small quantities of water are injected to provide oust control. A light application of Quik-Foam is sometimes used. .03% - .06%.

Mobile Drill B-50:

Mobile Drill Company, Indianapolis, Indiana. Rep: "Hank" Davis, Aptos, Calif. (408) 688-6387. The B-50 we operate in Arizona is a crawler mounted full hydraulic combination auger, Hammerdrill and soil drive sampler that is capable of 1400 feet of AQ wire line core drilling, 800' of NQ wire line, as well as conventional rotary mud and Gel-Foam drilling.

<sup>\*</sup> Trademark of Baroid, Division of National Lead Company.



#### **Southwestern Exploration Division**

March 16, 1977

T0:

W. G. Kellogg

FROM: N. P. Whaley

Drill-hole casing -- Inventory account Transfer request for 4-inch pipe

At present we have a total of 4,851 feet of 4-inch (ID) black pipe, threaded and with API couplings, on the ground in the yard of Southwest Pipe and Supply Co. of Peoria, Arizona.

When you set up the inventory account for drill-hole casing I had mentioned only 4,011 feet of 4-inch pipe, that portion which had been previously charged to General Exploration, and not the 840 feet that represented a balance remaining from an order charged to the Superior East project a few years ago.

Please add this 840 feet of pipe to your inventory account total and credit the Superior East project with the equivalent dollars.

N. P. Whaley
N. P. Whaley

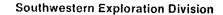
NPW:1b

cc: FTGraybeal

JDSell🗸

# TAB

A-8





March 30, 1977

TO: F.T. Graybeal

FROM: J.D. Sell

Daily Drill Data
Drill Hole A-8
Core Drilling
Superior East Project
Pinal County, Arizona

Attached is a daily log of the Joy Manufacturing Company's JOY-22 rigs during coring of hole A-8 from the surface. Two rigs were used: 1) a regular JOY-22 from the surface to the bottom of the NC core at 1971 feet and 2) a modified, Heavy Duty JOY-22 for completion of the hole to the depth of 4907 feet.

The information shown is the data, depth at end of the day, number of hours charged to drilling, the number of shifts involved (converted to 8-hour shifts), explanation of delays, size of hole, and the geologic formation.

Compiled from this data is a breakdown of the shifts and footage by a) depth bracket, b) geologic units encountered with core size, and c) a comparison with other contractors and rig types in the same general area.

James D. Sell

JDS:1b Atts. DRILL HOLE A-8, Core, JOY-22

Date	Depth at End of Day	Footage		ling . Shifts	Delays	Formation
	Note: Truck	Mounted	J0Y-22, (	unmodifie	d, cored from surface to bottom of NC core, modified, completed the hole to 4907 T.D.	(1975').
8-04-76 8-05	22	- 22	8-1/2	<del>-</del> 2	24 hrs. moving from Coolidge to Superior. 5 hrs. setting up with 2 crews, 6-3/4" rock bit to 11, surface casing; 3 hrs.	NC Core Dacite
8-06 8-07	225 275	203 50	23-1/2 6-1/2		standby. 1/2 hr. mix mud. 1/2 hr. mix mud; lost circl. at 258'; l hr cementing; l0 hrs. waiting on cement.	•
8-08 8-09	Sunday 325	50	7-1/2	3	1/2 hr. mix mud; l hr. drilling 20' cement 3 hrs. plugging (no luck); 5 hrs. cementin & wait; 7 hrs. drilling cement 258'-312'.	
8-10	422	97	18-1/2	3	I hr. drilling cement 312'-325'; 1/2 hr. mix mud; 4 hrs. for bit change at 392'. Lost circulation.	
8-11	426	4	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	3	2 hrs. plugging for lost circulation; 8 hrs. cementing twice; 13 hrs. drilling cement 290'-375'. Mislatch, started out.	
8-12	452	26	8	3	<pre>1 hr. mix mud; 5 hrs. drilling cement 373'-426'. 10 hrs. stuck rods, broke shear pin, wet pull, conditioned hole 4 times, got minor water back.</pre>	
8-13	481	29	9	3	I hr. mix mud; 6 hrs. cementing (415-481); 8 hrs. waiting on cement.	
8-14	563	82	19-1/2	3	2 hrs. washing soft cement (50 ft.) and drilling cement 455'-481'; 1/2 hr. mix	
8-15	Sunday				mud; 2 hrs. pulling rods & conditioning hole for bit change at 563'.	
8-16	578	15	4	3	8 hrs. going in, washed 180 ft. of hyseal and Quick-seal mud, got stuck, got loose; 8 hrs. cut wash rod & cleaned to bottom; 8 hrs. pulled rods and greased them.	
8-17	685	107	20	3	4 hrs. bit change at 606'; greased rods.	

8-18	803	118	20 .	3	4 hrs. bit change at 803'; static water level at 700 feet.	Dacite
8-19	913	110	22	3	2 hrs. running rods in; changed out water swivel at 813'.	
8-20	1003	90	20	3	<pre>1/2 hr. mix mud; 3 hrs. repair on clutch throw-out pressure plate on pump; 1/2</pre>	
8-21	1065	62	10	2	hr. repair on water swivel. 4 hrs. replaced bit at 1009'; 2 hrs. pulled to 200 ft. for weekend closedown.	
8-22	Sunday		•		puriou to 200 ft. for meekena crossaami.	
8-23	1155	90	21	2	3 hrs. delay moving parts from Tucson.	
8-24	1235	80	19	3 3	1/2 hr. mix mud; 1/2 hr. new double line	
			•		at 1185'; 4 hrs. bit change at 1200'.	
8-25	1334	99	21-1/2	3	<pre>1/2 hr. mix mud; 2 hrs. fishing rods snapped out at foot clamp, replaced rod.</pre>	
8-26	1406	72	19-1/2	3	1/2 hr. mix mud; 4 hrs. bit change at 1381'.	
8-27	1485	79	20	2	4 hrs. mislatch, pulled rods.	
8-28	1525	. 40	12	3		
0-20	1020	7 40 . 7 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	12	2	l hr. cleaned mud tanks, changed out kelly rod; 3 hrs. for bit change at	
0.00					1525'.	
8-29	Sunday					
8-30	1583	58	19	3	1/2 hr. mix mud; 2 hrs. running rods in; 2-1/2 hrs. freeing stuck rods.	1583
8-31	1636	53	23-1/2	3 -	1/2 hr. mix mud.	
9-01-76	1676	40	14-1/2	3	1/2 hr. mix mud; 3 hrs. twisted off	
	, . , .		· · · · · · · · · · · · · · · ·		rods at kelly rod (twice); 6 hrs.	
9-02	1715	39	14	3	freeing stuck rods. 10 hrs. retrieving rods, put on new bit at 1676'.	
9-03	1758	43	23-1/2	3	1/2 hr. mix mud.	
9-04	1795	37	18-1/2		1/2 hr. mix mud; 5 hrs. started rods	
J 04	,,,,	71	10 1/2	J	out, they stuck at 1500', they'll go	
9-05	د ما ما ما م				down but not up.	
9-05	Sunday	natia.				a.
9-06	Monday	• .				:
9-07	1814	19	12	3	4 hrs., rods not free so went to bottom and resumed drilling, ordered triple	
	•				line etc. from Tucson; 6 hrs., bit wouldn't cut, rods still won't come up; quit 2 hrs. early.	
					quit a tito cut iye	1

					- 3 -	
					$\sim 10^{-3}$	
9-08	1814			. 2	8 hrs. rods still stuck at 1535', triple line only a double so reordered; 2 hrs. E got rods loose, pulled for bit change Vo at 1814'. No GY.	arl lca
9-09	1825	11	7	2	8-1/2 hrs. going to Florence for round NCD barrel, ran in rods; 1/2 hr. mix mud. GY started drilling but swivel head	
9-10	1845	20	16-1/2	3	stripped off left rig after 2 hrs. 7 hrs. getting new swivel head & repair; 1/2 hr. mix mud.	
9-11 9-12	1892 1902	47 10	22-1/2 6	3	1-1/2 hrs. mix mud.  GY made up for 9-8-76. 2 hrs. pulled rods up to 1550' but they stuck again.	
9-13	1941	39	17	3	6 hrs. running rods, no helper on day; 1 hr. mix mud.	
9-14	1967	26	7-1/2	1	<pre>1/2 hr. unloading NX casing; l hr. waiting for afternoon shift no show.</pre>	N
9-15	1971	4	5	2	END of NC drilling; 3 hrs. breaking out NC rods; 8 hrs. finished pulling rods, ran 1025' of NX casing.	19 N
9-16	1971	<b></b>		2	8 hrs. finishing NX casing to 1971', drilled in 5", loaded out NC rods; 8 hrs. moving in Heavy Duty rig #60; ran in 600' of NX rods and corebarrel.	cc
9-17 9-18	1997 2053	2 <b>6</b> 56	10 14	2 2	6 hrs. running to bottom and mix mud. (Fast head hanging up down the hole). 2 hrs. pulling up for weekend.	
9-19 9-20	Sunday 2100	47	16	3	E 2 hrs. going to bottom, replaced wireline Vo motor, repaired wireline; 6 hrs. pulling	arl Ica
9-21	2131	31	11	3	for core tube, wire broke 3 times.  8 hrs. pulled rods to recover broken wireline; changed bit and shell at 2120';  5 hrs. reaming 1984-2120'.	-
9-22	2206	75	22	3	2 hrs. pulling for tube and overshot and	22
9-23	2263	57	18	3	6 hrs. pulling rods, retrieved tube, replaced 5000' of wireline, ran back into hole.	
9-24	2321	58	13	3	5 hrs. completed run in, cleaned tanks, losing circulation at 2301'.	-

. .

9-25	2401	80	21-1/2	3	1-1/2 hrs. delay for mud & supplies;	
			•		l hr. pulling into casing.	
9-26	Sunday					
9-27	2446	. 45	12	3	4 hrs. getting supplies; 8 hrs. getting	: .
	7			_	back to bottom, conditioning hole &	
					plugging hole.	·
9-28	2506	60	10	2		
7			19	3	5 hrs. for bit change at 2457'.	
9-29	2601	95	24	3		
9-30	2680	79	19	3	3 hrs. delay on supplies; 2 hrs. pulling	
			•		for bit change at 2680'.	
10-01-76	2740	60	16	3	8 hrs. completed bit change, cleaned	
					tanks.	
10-02	2810	70	20	3	2 hrs. repair, installed triple line;	
					2 hrs. pulled into casing.	
10-03	Sunday					Whitetail
10-04	2848	38	16-1/2	2	3-1/2 hrs. hauling rods, etc.; 1 hr.	Conglomerate
	2070 .	, , , ,	10 1/2	٠.		congromerate
					going in hole; 3 hrs. pulling for bit	
10.05	2020	70	17 1/0	_	change at 2848'.	
10-05	2920 •	72	17-1/2	3	6-1/2 hrs. delay, called for engine	
					repair, mixed mud, greased rods,	
					ran to bottom.	
10-06	2985	65	19 .	3	5 hrs. to recover tube; changed bit at	
					2935'.	
10-07	3030	45	13	3	ll hrs. tripping for bit change at 3014'.	
10-08	3078	48	14	3	I hr. injection pump repair, unloaded	
		* ***			BX casing & rods; 9 hrs. trip to	
					retrieve locked core tube.	
10-09	3131	53	18	3	4 hrs. cleaning tanks, mix mud, unload	
	2121	75		J .	rods, fishing broken kelly rod; 2 hrs.	
10-10	د				pulling into casing.	
	Sunday					1
10-11	3162	31	13	3	l hr. running rods & started drilling;	NX .
					10 hrs. tripping for bit change at 3139'.	core
10-12	3197	<b>3</b> 5	20	3	4 hrs. breaking out rods; END OF NX	3197
					CORE.	ВХ
10-13	3197	· .		3	8 hrs. breaking out NX rods, repair	core
				<del>-</del>	hydraulic head, making up BX casing.	1
					10 hrs. running 2025 of BX casing,	
					threads parted, dropped casing.	
	1.				circulas partieu, aroppeu casting.	
•					. •	1

					- 5 -	
10-14	3197	<b></b>		3 .	24 hrs. making up B rods to check hole,	
			•		ft. of BX casing out.	
10-15	3202	5	5	3	10 hrs. replacing bad joints, reran BX	Whitetail
					casing to 3197'; 9 hrs. running BX rods to bottom and started drilling.	Conglomerate
10-16	3216	14	6	3	18 hrs. tripping twice for stuck core	
10-17	Sunday				tube.	
10-18	3263	47	21	3	3 hrs. repair.	
10-19	3309	46	24	3	y 1113. Teputt.	— 3226 —
10-20	3329	20	9	. 3	15 hrs. tripping for bit change at 3329'.	1
10-21	3376	47	21	3	3 hrs. cleaning tanks and setting pump.	
10-22	3407	31	12-1/2	· 3	1-1/2 hrs. repair, replace 3 line with	
					2 line; 10 hrs. trip for bit change at 3402'.	
10-23	3440	33	14	2	2 hrs. pulling into casing; no GY.	
10-24	Sunday	<b>7</b> 2		-	z mot parting mes dasing, no dit	
10-25	3478	38	16	3	8 hrs. cleaning mud tanks, replacing with	
					new 3 line.	Slide
10-26	3525	47	23	3	l hr. delay, antifreeze in equipment.	Block
10-27	3572	47	24	3		of
10-28	3604	32	14	3	9 hrs. trip for bit change at 3572'; I hr. water swivel repair.	Schist &
10-29	3645	41	24	3		Granite
10-30	3681	36	20-1/2	3	<pre>l-1/2 hrs. cleaning mud tanks, mixed new; 2 hrs. pulling up into casing.</pre>	Aplite I
10-31	Sunday					
11-01-76	3681	MAR 450		2-1/2	8 hrs. delay, hauling rods & supplies,	
					repair pump; 8 hrs. tripping to bottom	
					& back up, changed bit at 3681'; GY	
					worked 4 hrs. hauling water, etc. no	
					helper.	
11-02	3713	32	14	3	8 hrs. delay hauling mud, etc., repair	
					on lights, etc.; 2 hrs. running to	
	•			* •	bottom.	
11-03	3765	<b>5</b> 2	24	3		3774
11-04	3798	33	16	3 3	8 hrs. tripping for bit change at	fault
	- 0 - 6			,	3777'; bit plugged, pulled tube.	3777
11-05	3858	60	24	3		

•

11-06 11-07	3906 Sunday	48	20	3	2 hrs. repair; 2 hrs. pulling up.
11-08	3931	25	17	. 3	5-1/2 hrs. bit change at 3909'; 1-1/2 hrs. pump repair.
11-09	3988	57	24	2	1-1/2 ms. pump repair.
11-10	4014	26	13	3	ll hrs. trip for bit change at 3995'.
11-11	4073	59	24	2	It his. trip for bit change at 3935.
11-12	4127	54	24	2	Cleaned mud tanks.
11-13	4167	40	22	3 3 3	I hr. water truck repair; I hr. pulling rods up.
11-14	Sunday				
11-15	4167			2	3 hrs. repair fuel pump; 13 hrs. spotting oil and freeing rods, pulled out for bit change at 4167'. No GY.
11-16	4188	21	12	2	12 hrs. completing bit change.
11-17	4215	27	19	3	5 hrs. pulling for bit change at 4215'.
11-18	4240	25	17	3 3 3	7 hrs. completing bit change, put on 5' barrel.
11-19	4280	40	24	3	J Barrett
11-20	4316	36	21	3	3 hrs. pulling into casing.
And the second s	Sunday		_ •		
11-22	4331	15	11	3	13 hrs. pulled & culled rods, new bit at 4316', running rods in.
11-23	4353	22	16	3	8 hrs. pulling bit change at 4353'.
11-24	4366	13	10	3	6 hrs. completing change, washing in; 8 hrs. pulling into casing & securing
					site.
11-25 & 26	Thanksgiving	Holiday	and exc	hange f	for Sunday the 28th.
11-27	4379	13	11	3	8 hrs. delay (no helper), serviced rig,
e ta e g					etc.; 5 hrs. running to bottom, no
•					circulation, pulled back, washed to bottom.
11-28	4400	21	18	3	6 hrs. started out helper quit!
11-29	4400		-	2	<pre>13 hrs. spotting EZ spot &amp; getting rods free, cleaned hole, &amp; pulled rods for</pre>
	11				bit change at 4400'. No GY.
11-30	4416	16	10-1/2	3	13-1/2 hrs. completed change, repaired hydraulic head, washed to bottom
12-01-76	4462	46	24	3	

Pinal Schist and Laramide Biotite Feldspar Porphyry

12-02	4470	8	7 : .	3	2 hrs. swivel repair; 6 hrs. trip for bit change at 4469'; 9 hrs. pulling for sheared pin in overshot & started back in.
12-03	4481	11	8	3	6-1/2 hrs. standby for deviation- temperature survey; 9-1/2 hrs. freeing stuck rods with EZ spot & washing hole.
12-04 12-05	4508 Sunday	27	18	3	6 hrs. pulling for bit change at 4508'.
12-06	4513	5	3	3	9 hrs. completing bit change; 12 hrs. tripping for stuck tube.
12-07	4556	43	23	3	l hr. packed swivel & replaced friction bands.
12-08	4583	27	17-1/2	3	1-1/2 hrs. cleaning tanks & replaced 1000' wireline; 5 hrs. pulling for bit change at 4583'.
12-09	4612	<b>2</b> 9	16	ત્ર ∞ .	8 hrs. completing change.
12-10	4650	38	24	3 3 3	ompreening change.
12-11	4654	4	6	2	7 has tripping for hit shapes at 46511.
12-12	Sunday	<b>4</b>		<b>)</b> .	7 hrs. tripping for bit change at 4651'; 7 hrs. delay, stuck tube at 3800'; 2 hrs. hydraulic line repair; 2 hrs. pulling into casing.
12-13	4667	1 2	1.0	2	10 has deleas someline from Torons
		13	12	3	12 hrs. delay, supplies from Tucson, changed out bad rods, changed bit at 4654', & getting back to bottom.
12-14	4701	34	17	3	2 hrs. swivel repair; 5 hrs. pulling for bit change at 4701.
12-15	4727	26	15	3	9 hrs. completing bit change, changed out drill line, flushed hole, cleaned tanks.
12-16	4767	40	24	3	
12-17	4781	14	8	3 3	16 hrs. tripping bit change at 47721.
12-18	4814	33	24	3	The state of the s
12-19	4833	19	11	3	13 hrs. pulling bit change at 4833'.
12-20	4855	22	14	3	I hr. completing change; 6 hrs. repair on swivel & hydraulic head; 3 hrs. pulling into casing.
12-21	4870	15	12	3	8 hrs. replacing hydraulic head; 4 hrs. running to bottom.
12-22	4886	16	14	3	10 hrs. tripping for bit change at 4870'.

-

12-23	4907	21	14-1/2	3 .	4-1/2 hrs. delay (rods broke 125 ft. below collar and dropped 15' to bottom,	
12-24, 25 & 26	Christmas	Holiday			fished OK; 5 hrs. pulling rods up 800'.	
12-27	4907	• • • • • • • • • • • • • • • • • • •		3	8 hrs. service rig, etc. (no helper); 12 hrs. tripping for bit change at 4907'; 4 hrs. delay.	
12-28	4907	***	· ·	3	24 hrs. washing hole, pressured up; no	4907 T.D.
12-29	Terminated	BX Core	& Hole	3	16 hrs. pulling BX rods out and moving to stockpile. 8 hrs. working on BX casing.	
12-30				3	24 hrs. working on stuck BX casing, cut casing at 2500' & 2300' still stuck.	
12-31-76 thru 1-02-77	New Years	Holidays				
1-03		- <b>-</b>		3	24 hrs; cutting at 2150', rods broke & dropped into hole; tapped in at 2075' and started out.	
1-04		·	,	3	24 hrs. fishing for rods and working casing.	
1-05			<b></b>	3	24 hrs. cutting BX casing; pulled BX rods and 2727 ft. of BX casing. Moved	
1-06		<b>200 00</b>		2	BX rods to stockpile. 16 hrs., recovered total of 2500 ft. of BX casing and worked on NX casing, recovered 1448 ft.; broke out all rods	
				-	& cleaned up.	

## Casing Summary -- Left in Hole

BX Casing: 2500-3197 feet (697 feet)
NX Casing: 1448-1971 feet (523 feet)
4" Surface Casing: 0-11 feet (11 feet)

# DRILL HOLE A-8, CORE

Drilling Time, by footage brackets, including down time.

DEPTH	SIZE	SHIFTS	DAYS	FOOTAGE	FT/SHIFT	TROUBLES
0-508	NC	24	8-1/3+1	508	21.2	l day moving on site lost circulation, cementing, drilling
508-1003	NC	17	5-2/3	495	29.1	out; I bit change. Cementing; 3 bit changes.
1003-1485	· NC	17	6	482	28.4	Repair; 3 bit changes.
1485-1971	NC	40	16	486	12.2	
						Stuck rods; 3 bit changes.
1971-1997	ИX	2	l + l casing	26	13.0	2 shifts running NX casing; moving in Heavy Duty Rig.
1997-2506	NX	26	9	509	19.6	Broken wireline; 2 bit changes.
2506-2985	ИX	21	.7	479	22.8	Minor repair; 3 bit changes.
2985-3197	NX	15	•/ .	212	14.1	
			9 9 / 9 .			Minor repair; 2 bit changes.
3197-3492	ВХ	25	8-2/3 + 2-2/3 casin	295 a	11.9	<pre>8 shifts running BX casing; 2 bit changes.</pre>
_3492-3999	ВХ	39-1/2	13-1/3	5 507	12.8	Minor repair; 5 bit changes.
8999-4505	BX	58	20	506	8.7	Stuck rods (2); 6 bit changes;
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	DX	, ,		700	9.7	l shift deviation-temperature
						survey.
4505-4907	BX	. 58	19-1/3	402	6.9	Repair; 9 bit changes.
T.D.			+ 6 recover	У	•	17 shifts recovering stuck
	•	enrethista nationalista validade	tombile tida. automora nely, augustus	****	-	casing, stacking rods.
Totals: 0-4907		342-1/2	119-1/3 + 10-2/3	4907	14.3 ave	erage
* -			•			

DRILL HOLE A-8, CORE

ROCK UNIT	INTERVAL	SIZE	SHIFTS TO	DEPTH	FOOTAGE	FT/SHIFT
Dacite	0-1583	NC	63	1583	1583	25.1*
Earlier Volcanics	1583-1971	NC	35	1971	388	11.1
Earlier Volcanics	1971-2213	NX	14	2215	244	17.4**
Whitetail Cgl.	2213-3197	NX	50	3197	982	19.6
Whitetail Cgl.	3197-3226	BX	5	3220	23	4.6***
Slide Block of sc-Lga						
and fault (3 ft.)	3226-3777	BX	43-1/2	3777	557	12.8
Pinal Schist	3777-4008	BX	17	4014	237	13.9
biotite porphyry	4008-4176	BX	13	4173	159	12,2
Pinal Schist	4176-4612	BX	57	4612	439	7.7
schist and porphyry	4612-49 <b>0</b> 7	ВХ	45	4907	295	6.6
TOTAL	0-4907		342-1/2	•	4907	14.3 average

<sup>\*</sup> does not include 3 shifts setting up.
\*\* does not include 2 shifts running casing.
\*\*\* does not include 8 shifts running casing; also does not include 17 shifts to recover casing, rods, etc.

## Feet per Shift Comparison of Core Drilling by Joy, Longyear, and Boyles Brothers in Similar Rock in Same General Area

Contractor - Rig →	Joy-22	Longye	ar-44	Boyles,	CP-50
Hole Number	A-8	A-2	A-2W	DCA-3A	AI-1
Rock Unit					
Dacite	25.1 NC				
Earlier Volcanics	11.1 NC				
	17.4 NX	***		<b></b>	
Whitetail Conglomerate	19.6 NX			17.7 NX	
				8.8 NX	
	-			14.5 NX	
	4.6 BX				
Slide Block Material			-		7.4 NC
					12.5 NC
		13.0 NX		9.9 NX	
			-	10.3 NX	-
•	12.8 BX				
Pinal Schist			<del></del> -		4.6 NC
		10.7 NX	9.9 NX	12.4 NX	10.4 NX
	13.9 BX				
	7.7 BX		-		
Porphyry or Granite			12.1 NX	14.0 NX	
			6.8 NX		
	12.2 BX		***		
Mixed Schist/Porphyry	was mak		11.6 NX		
	6.6 BX				, <b></b>

Hole Number	Starting Depth	Terminal Depth	Number of Shifts	Average Ft/Shift
A-8	Surface	4907	342-1/2	14.3
A-2	4079	4521	39	11.3
A-2W	4230	4940	72	9.9
DCA-3A	2980	5154	152-1/2	14.3
A1-1	2800	3967	123	9.5

# TAB

A-9





June 8, 1977

TO: F. T. Graybeal

FROM: J. D. Sell

Daily Drill Data
Drill Hole A-9
Core Drilling
Superior East Project
Pinal County, Arizona

Attached is a daily log of the Joy Manufacturing Company's modified, Heavy Duty, Joy-22 which completed hole A-9 to a depth of 4903 feet.

The information shown is the date, depth at end of the day, number of hours charged to drilling, the number of shifts involved (converted to 8-hour shifts), explanation of delays, size of hole, and the geologic formation.

Compiled from this data is a breakdown of the shifts and footage by a) depth bracket and b) geologic units and core size.

Hole A-9 was drilled by the same crews which cored the bulk of A-8. The two holes bottomed within four feet of the same depth. Hole A-9 averaged 17.8 feet per shift of coring time compared to hole A-8 averaging 14.3 feet per shift of coring time. Better time in A-9 was during coring of the Earlier Volcanic unit and in the sulfide intercept zone.

James D. Sell

JDS:1b Atts.

DRILL HOLE A-9, Core, Joy HD-22 Rig

Date	Depth at End of Day	Footage	Dril Hours	ling Shifts	Delays	Forma and Core	
1/07/77	<b></b> -	<b></b>	20	2-1/2	Moving and setting-up. (Double day shift).	Daci NC Co	
1/07/77	10	10	5	1/2	6-1/4" Rock bit, cementing in 4" collar pipe.		
1/07/77 1/08 1/09	24 38 91	14 14 53	5 5 8	1	Start of NC core. 3 hrs. delay.		
1/10	152	61	16	3	8 hrs. plugging for lost circulation (109-133).		•
1/11 1/12 1/13	188 202 202	36 14	10 4-1/2	3 3 3	14 hrs. cementing and delays (109-152) 19-1/2 hrs. cementing and cleaning (80-120) 24 hrs. cementing and cleaning (73-145).		•
1/14	202			3	24 hrs. cementing and cleaning (131-162).		
1/15 1/16	202 Sunday	, ' .		3	24 hrs. cementing and cleaning (115-152).		
1/17 1/18	202 202			2	16 hrs. cementing and cleaning (131-151).		
1/19	202			2 2	16 hrs. cementing and cleaning (113-158). 16 hrs. cementing and cleaning (61-151).		
1/20	220	18	4	2	12 hrs. cementing and cleaning (135-181); requested to proceed blind.		
1/21	291	71	16	2			
1/22 1/23	357 Sunday	66	15	2	l hr. pulling for bit change at 357'.		
1/24 1/25	471	114	23 24	3	l hr. going in hole.		
1/25	596 756	125 160	24 24	3 3			
1/27	897	141	24	3	Placing soluble oil to cut mud rings.		
1/28	1022	125	22	3	2 hrs. bit change at 901'.		
1/29 1/30	1096 Sunday	74	16	2	No GY shift.		
1/31	1216	120	23	3	l hr. running string in hole.		
2/01	1296	80	19-1/2	3	1/2 hr. setting pump; 3 hr. rd. trip for bi change at 1246.	t	
2/02	1395	99	13	2-1/2	7 hrs. recovering tube, unloading casing an rods. No GY shift.	d Daci	
2/03	1512	117	24	3	rous. No ur sillic.	14/	

esta de la composición dela composición de la composición de la composición de la composición dela composición dela composición dela composición de la composición de la composición dela composición de la composición dela composición del						
	and the second s					
2/04	1555	43	16	3	3 hrs. bit change at 1521'; 5 hrs. repairs.	
2/05	1619	64	23	3	l hr. pulling rods up.	Volcanics
2/06 2/07	Sunday 1704	85	21	2	2 hrs. soing in and alconing	NC Core
2/08	1749	45	17	3	3 hrs. going in and cleaning. 6 hrs. bit change at 1744'; 1 hr. repair.	
2/09	1822	73	18	3	6 hrs. pulling broken shear pin.	
2/10	1959	137	24	3		
2/11	2073	114	24	3		
2/12	2133	60	15	3	7 hrs. bit change at 2073'; 2 hrs. pulling	
2/13	C. mada. s			• 1	back.	
2/13	Sunday 2187	54	13	3	3 hrs. misc. delays; 8 hrs. tripping to	
_,	2107	<b>,</b>	1,5	,	recover core.	<u> </u>
2/15	2305	118	24	3		Whitetail
2/16	2357	.52	13	3	ll hrs. pulling rods and breaking out,	Conglomerate
0/17	2266	•	•		starting NX casing in.	2357
2/17	2366	9	2	3	22 hrs. completing casing and running NX rods in hole.	NX Core
2/18	2452	86	23	3	l hr. water pump repair.	
2/19	2515	63	17-1/2	3	4-1/2 hrs. pump repair; 2 hrs. pulling	
					back.	
2/20	Sunday		. 0			
2/21 2/22	2592 2680	77 88	18 24	3	6 hrs. rd. trip bit change at 2515'.	
2/22	2772	92	24	3		
2/24	2847	75 .	20	3	4 hrs. oil pump delay and moving casing.	Whitetail
2/25	2902	55	16	3	8 hrs. replacing drill motor.	Conglomerate
2/26	2961	59	19	3	5 hrs. bit change at 2961'.	
2/27	Sunday					
2/28 3/01	3011 3062	50 51	16 22-1/2	3	8 hrs. running to bottom.	
3/02	3067	5	4-1/2	3 3	1-1/2 hrs. converting mud program. 8 hrs. bit change at 3065'; 11-1/2 hrs.	
	5007		1 1/2		mix mud, cleaning hole.	
3/03	3110	43	18	3	6 hrs. pulling for core.	1 1 1 1
3/04	3152	42	15	3	9 hrs. culling rods.	
3/05	3202	50	18	3	6 hrs. misc. and pulling back.	
3/06 3/07	Sunday 3275	73	23	<b>ર</b> .	l hr. returning to bottom.	<del> 3275</del>
3/08	3345	73 70	20	3	4 hrs. bit change at 3345'.	M-1A, SB
3/09	3400	55	20	3	4 hrs. running in hole.	3337
3/10	3484	84	24	3		A-2, SB

•

. 🤟

-	3	2

3/11 3/12	3523 3577	39 54	14 19	3 3	10 hrs. bit change at 3523'. 2 hrs. complete run in and replaced friction bands; 3 hrs. pulling back to casing.	
3/13	Sunday					
3/14	3617	40	18	3	6 hrs. hauling supplies from Tucson, unloading truck and getting to bottom (1 hr.).	NX Core
3/15	3624	7	2	3	22 hrs. pulling rods and running in BX	3624
					casing.	BX Core
3/16	3628	4	2	3	22 hrs. running casing, making up and running in BX rods.	A-2, SB
3/17	3669	41	22-1/2	3	1-1/2 hrs. wire line repair.	, 2, 35
3/18	3717	48	24	3	. 172 mo. wite time reputit.	basal fault
3/19	3732	15	8	3	12 hrs. bit change at 3722'; 4 hrs.	3686
				,	mix mud, pulling into casing.	oxidized capping
3/20	Sunday					Pinal Schist
3/21	3756	24	15	3	9 hrs. repair replacing drum, bands,	8
					brake system, and cable of wireline unit.	quartz monzonite porphyry
3/22	3792	36	24	3		ροιρ,,,
3/23	3827	35	17	3	7 hrs. bit change at 38021.	
3/24	3875	48	24	3	(lost water at 3838').	
3/25	3897	22	11-1/2	3	2-1/2 hrs. repair (thrust-bearings) and	
<i>3,</i> – <i>3</i>			,, ,,,		loading out NXE rods; 10 hrs. bit change at 3892'.	
3/26	3900	3	2	. 1	6 hrs. delay, snowing like all get-out.	
		_	· <del>-</del>	•	Closed down; no afternoon nor GY shifts.	
3/27	Sunday			•	orosea down, no diferincon noi di sirres.	
3/28	3936	36	23	3	I hr. returning to bottom.	
3/29	3964	28	16-1/2	3.	3-1/2 hrs. moving pump to lower pond;	
			, _		4 hrs. pulling bit change at 3964'.	
3/30	3991	27	15	3	9 hrs. completing bit change and	
J. J.	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	-/	• • •	,	washing hole.	BX core
3/31	4005	34	18	3	6 hrs. repair on head bearing and	oxidized capping
		<b>J</b> •			pulling back.	4044
4/01	4049	24	15	2	No AM shift; O'Dell moving trailer;	sulfides
		<b>-</b> ·		_	1 hr. going to bottom.	Pinal Schist
4/02	4049			2	16 hrs. tripping in snow for bit	Final Schist
					change at 4049'. No GY shift.	biotite feldspar
4/03	Sunday					porphyry
				•		BX core
					· ·	<b></b>

4/04	4083	34	14	3	10 hrs. hauling fuel, grease, mix mud, etc., going to bottom.
4/05	4134	51	24	3	, go, i.g
4/06	4155	21	9-1/2	3	2-1/2 hrs. repair swivel; 12 hrs. bit change at 4149'.
4/07	4213	58	24	3	
4/08	4268	55	24	3	
4/09	4292	24	10	2	6 hrs. tripping out bit change at 4292';
-		<b>ب</b>	10	2	no GY shift.
4/10	Sunday			_	
4/11	4331	39	18	3	6 hrs. rig service and going in hole.
4/12	4379	48	24	3	
4/13	4437	58	24	3	(put on friction bands).
4/14	4452	15	8	3	16 hrs. wet pull for bit change at 4452'; drilling out cave on return.
4/15	4458	6	4	3	4 hrs. getting to bottom; 16 hrs. bit change at 4458'.
4/16	4502	44	22	3	2 hrs. pulling back for weekend.
4/17	Sunday	71-7	,22	ر	2 ms. parring back for weekend.
4/18	4533	31	16	3	6 has dolor material from Tueson, 2 has
4710	CCC	)	10	2	6 hrs. delay, material from Tucson; 2 hrs.
1.710	1.500	0.7	1.1.		repair wireline.
4/19	4560	27	14	3 3 3	10 hrs. trip bit change at 4543'.
4/20	4594	34	22	3	2 hrs. bit change at 4594'.
4/21	4594	<b></b>	***	3	8 hrs. completing change; started in, rods parted; 16 hrs. recovering string and
1. 100	1.606	1.0	<b>.</b>		getting to bottom.
4/22	4636	42	24	3	
4/23	4645	9	6	3	3 hrs. replace broken kelly rod; 15 hrs. bit change at 4645'.
4/24	Sunday				
4/25	4684	39	21	3	3 hrs. installing starter switch and getting to bottom.
4/26	472 <b>7</b>	43	23	2	l hr. service rig, clean tanks.
4/27	4766		24 24	3	t Mr. Service rig, Clean Lanks.
4/28		39		3	0.6
4/20 4/29	4797 1.029	31	15	3	9 hrs. bit change at 4767'.
	4838	41	24	3	
4/30	4853	15	7	3	17 hrs. bit change at 4847' and culling bad rods.
5/01	Sunday				
5/02	4892	39	18	3	6 hrs. repair oil line and cleaning rig.

5/03	4903 11	9	2-1/2	9 hrs. bit change at 4903'; broken pinion
5/04			3	gear; went home. 8-1/2 hrs. repair pinion gear; 4-1/2 hrs. tempdeviation survey; 11 hrs. breaking
5/05			1	out rods. 2 hrs. standby for GP crew; 6 hrs.
				dismantle for move.

End of hole.
Casing left in hole for stability.
Geophysical crews to run probes and surveys.

BX core 4903 T.D.

## DRILL HOLE A-9, Core

Drilling time by rock units, including down time

ROCK UNIT	INTERVAL	SIZE	SHIFTS to	DEPTH	FOOTAGE	FT/SHIFT
Dacite	0-1478	NC	60	1481	1471	24.5 *
Earlier Volcanics	1479-2194	NC	28	2187 ·	706	25.2
Whitetail Congl.	2194-2357	NC	5	2357	170	34.0
Whitetail Congl.	2357-3275	NX	45	3275	918	20.4 **
M-1A type Slide Block	3275-3337	NX	2	3335	60	30.0
A-2 type Slide Block	3337-3624	NX	17	3624	289	17.0
A-2 type Slide Block	3624-3686	ВХ	5	3686	62	12.4 ***
and basal fault						
Pinal Schist & porp.	3686-4044	ВХ	35	4049	363	10.4
oxidized capping						
Pinal Schist & porp.	4044-4903	вх	78-1/2	4903	854	10.9
sulfides				•		
TOTALS	10-4903	•	275-1/2		4893	17.8 average

<sup>\*</sup>Does not include 3 shifts set-up, 10' of rock bit & cementing 10' surface casing.

<sup>\*\*</sup>Does not include 4 shifts running casing in change from NC to NX.

<sup>\*\*\*</sup>Does not include 4 shifts running casing in change from NX to BX.

Also does not include 4 shifts for survey and moving off.

DRILL HOLE A-9, Core

Drilling time by footage brackets, including down time

DEPTH	SIZE	SHIFTS	DAYS	FOOTAGE	FT/SHIFT	TROUBLES
0-10	6-1/4" R.B.	1/2	1	10	20.0	20 hrs. moving & setting up; 2 hrs. cementing 4" collar pipe.
10-506	NC	36-1/2	15-1/2	496	13.6	173-1/2 hrs. (22 shifts) of lost circulation problems, cementing, etc.; 1 bit change.
506-1022	NC	11	3-2/3	516	46.9	1 bit change.
1022-1512	NC	13-1/2	4-2/3	490	36.3	1 bit change.
1512-1998	NC	19	6-1/3	486	25.6	2 bit changes, minor repair.
1998-2357	NC	13	4-1/3	359	27.6	l bit change.
	-	$\tilde{4}$	1-1/3			Change from NC to NX.
2357-2490	NX	5	1-2/3	133	27.5	Replaced pump engine.
2490-3011	NX	22	7-1/3	521	23.7	2 bit changes.
3011-3504	NX	28	9-1/3	493	17.6	2 bit changes.
3504-3624	NX	9	3	120	13.3	l bit change, minor repair.
		Žį	1-1/3			Change from NX to BX.
3624-4005	вх	36	12-2/3	381	10.7	4 bit changes, minor repair.
4005-4502	BX	41	14-2/3	497	12.1	5 bit changes, minor repair.
4502-4903	BX	41-1/2	14	401	9.8	6 bit changes, minor repair;
		,, =				deviation-temperature survey.
	-	4	1-1/3			Repair pinion gear, standby for
		•	, ,			GP crew, pull rods, dismantle
						rig.
		~				
TOTALS:						
10-4903		275-1/2	-	489 <b>3</b>	17.8	Core drilling only.
0-4903		288	102-1/6	4903	17.0	Total incl. surf. & casing time.

6/24,1977

FROM: F. T. GRAYBEAL

To: JDGEP SUPERIOR E

794-2931 or 2981 gr 2593
Please arrange w. Lack

Lloyd (Loy) to see the site

87 A-8 and same typical

core so he can get in a

bid. Pho arrange w. Paul

Bryant to fix road, Would

like to be dilling by Ang 15.

Let NPW know d) your

progress

| See Arrange of the

#### INCHES

## DIAMOND CORE DRILLING **DIMENSIONS, WEIGHTS** and VOLUMES



Bombay 1 India

JAPAN: No. 7, 3 Chome, Kol Chivodasku, Tokyo, Japan PRANCE: Place de la Gare 76 La Verriera

3100 Celle
NETHERLANDS: Nijverheldss
Etten Luer
KOREA: I.P.O. 1085
Seoul, Korea
PHILIPPINES: P. O. Box 308
Makati, Rizel, Philippines

#### DRILL RODS AND CASING

DRILL RODS

		1 / 7				
SIZE	O.D. (inches)	1.D. (inches)	W7. (lbs, per 10 ft.)	COUPLING (in.)	THREADS per inch	CONTENT (gal. per 100 feet)
E*	1.5/16	27/32	28	7/16	3	2.9
A+	1-5/8	1-1/8	38	9/16	3 -	5.2
В :	1-29/32	1-13/32	46	5/8	5	8.1
N .	2-3/8	2	49	1	4	16.3
RW*	1-3/32	23/32	19	13/32	4	2.1
EW•	1.3/8	7/8	31	1/2	3	3.1
AW*	1-3/4	1-7/32	44	5/8	3 3	6.1
BW	2-1/8	1-3/4	42	3/4	3	12.5
NW	2-5/8	2-1/4	54	1.3/8	3	20.7
HW	3-1/2	3-1/16	85	2.3/8	3	38.3

Parallel Wall FLUSH-COUPLED CASING

SIZE	O.D. (inches)	I.D. (inches)	WT. (lbs. per 10 ft.)	COUPLING I.D. (in.)		CONTENT (gal. per 100 feet)
EX AX BX NX HX	1.7/16 1.13/16 2.1/4 2.7/8 3.1/2 4.1/2	1-3/16 1-5/8 2 2-9/16 3-3/16 4-1/8	18 18 29 47 60 90	1-3/16 1-1/2 1-29/32 2-3/8 3 3-15/16	8	5.7 10.8 16.3 26.7 41.4 69.4

\*\*Formerly XRT FLUSH-JOINT CASING

SIZE	O.D. (inches)	).D. (inches)	WEIGHT (lbs. per 10 ft.)		CONTENT (gal per 100 feet)
RW	1-7/16	1-3/16	18	5	5.7
EW	1-13/16		28	- 4	9.2
AW	2.1/4	1.29/32	38	4	14.8
BW	2-7/8	2.3/8	70	4	23.0
NW	3-1/2	3	86	4	36.7
HW	4-1/2	4	113	4	65.2

All dimensions, weights and volumes shown are nom approximations in inches, pounds and U.S. gallons.

WIRE LINE DRILL RODS

.cs "Q" WIRE LINE "WEDG-LOK" DRILL RODS

SIZE	O. B. (inches)	i. D. (inches)	WT. (lbs. per 10 ft.)	THREADS per inch	CONTENT (gal. per 100 feet)
AQ	1-3/4	1-3/8	31	4	7.7
BQ	2-3/16	1.13/16	40	3	13.4
NQ	2.3/4	2-3/8	51	3	23.0
HQ	3-1/2	3-1/16	77	3	38.2
_PQ	4-5/8*	4-1/16	103**	3	67.4

\*\*With Coupling

#### **DIAMOND CORING BITS** SERIES "Q" WIRE LINE DIAMOND BITS

SIZE		NAMETER	HOLE D	HOLE VOLUME (gal. per	
	Decimal	Fractional	Decimal	Fractional	100 ft.)
AQ, AQ-U	1.062	1-1/16	1.890	1-57/64	14,6
BQ, BQ-U	1.432	1-7/16	2.360	2-23/64	22.7
NQ, NQ-U	1.875	1.7/8	2.980	2-63/64	36.3
HQ	2.500	2.1/2	3.782	3 25/32	58.3
PQ	3.345	3-11/32	4.827	4-53/64	95.05

SIZE*		IAMETER	HOLE I	VOLUME (gal. per	
	Decimal	Fractional	Decimal	Fractional	100 ft.)
RWG	.735	47/64	1.175	1-11/64	5.6
EWG.EWM.EWL	.845	27/32	1.485	1-31/64	9.0
AWG.AWM.AWL	1.185	1-3/16	1.890	1.57/64	14.6
BWG,BWM,BWL	1.655	1-21/32	2.360	2-23/64	22.7
NWG.NWM.NWL	2.155	2-5/32	2.980	2-63/64	36.3
HWG	3.000	3	3.907	3-29/32	62.3
2-3/4 x 3-7/8	2.690	2-11/16	3.875	3.7/8	61.2
4 x 5-1/2	3.970	3-31/32	5.495	5-1/2	123.4
6 x 7-3/4	5.970	5-31/32	7.750	7-3/4	245.1

\*DCDMA "W" sizes were formerly designated "X" All dimensions, weights and volumes shown are nominal approximations in inches, pounds and U. S. Gallons

## millimeters

## DRILL RODS AND CASING

DRILL BODS

			DIGIE	r won-		
SIZE	O.D.	1.D. (mm)	WT. (kg per 10 ft.)	COUPLING 1.D. (mm)	THREADS per inch	CONTENT (liters per 190 feet)
E* A* B	33.3 41.3 48.4 60.3	21.4 28.6 35.7 50.8	12.7 17.2 20.8 22.2	11.1 14.3 15.9 25.4	3 3 5 4	11.0 19.5 30.5 61.7
RW* EW* AW* BW NW HW	27.8 34.9 44.4 54.0 66.7 88.9	18.2 22.2 30.9 44.5 57.2 77.8	8.6 14.0 19.9 19.0 24.5 38.6	10.3 12.7 15.9 19.0 34.9 60.3	4 3 3 3 3 3	7.9 11.7 22.9 47.3 78.3 145.0

Parallel Wall

		FLL		PLED CA		
SIZE	Q.D. (mm)	1.D. (mm)	WT. (kg per 10 ft.)	COUPLING I.D. (mm)	THREADS per inch	CONTENT (liters per 100 feet)
RX** EX AX BX NX	36.5 46.0 57.1 73.0 88.9	30.2 41.3 50.8 65.1 80.9 104.8	8.2 8.2 13.1 21.3 27.2 40.8	30.2 38.1 48.4 60.3 76.2	8 8 8 8 5	21.6 40.9 61.7 101.1 156.7 262.7

\*\*Formerly XRT

FLUSH-JOINT CASING

		4F0311-			
SIZE	O.D.	I.D.	WEIGHT (kg per 10 ft.)		per 100 feet)
RW EW AW BW NW	(mm) (mm) ( 36.5 30.2 46.0 38.1 57.1 48.4 73.0 60.3 88.9 76.2	8.2 12.7 17.2 31.8 39.0 51.3	5 4 4 4 4 4	21.6 34.7 56.1 87.1 138.9 247.0	

All dimensions, weights and volumes are nominal approximations

#### WIRE LINE DRILL RODS

SERIES "Q" WIRE LINE "WEDG-LOK" DRILL RODS

SIZE	O. D. (milli- meters)	j. D. (milli- meters)	WT. (kg. per 10 H.)	THREADS per inch	(liters per 100 ft.)
AQ	44.5	34.9	14.1	- 4	29.2
BQ	55.6	46.0	18.2	3	50.7
NQ	69.9	60.3	23.1	3	87.1
HQ	88.9	77.8	34.9	3	144.6
PO	117.5*	103.2	46.5**	3	255.0

DIAMOND CORING BITS
SERIES "Q" WIRE LINE DIAMOND BITS

SIZE	CORE DIAMETER (millimeters)	HOLE DIAMETER (millimeters)	HOLE VOLUME (liters per 100 ft.)
AQ, AQ-U	27.0	48.0	55.2
BO, BO-U	3 <b>6</b> .5	60.0	86.0
NO, NO-U	47.6	75.7	137.5
но	63.5	96.0	220.8
PQ	85.0	122.6	359.8

OTHER DIAMOND CORING BITS

SIZE*	CORE DIAMETER (millimeters)	HOLE DIAMETER (millimeters)	HOLE VOLUME (liters per 100 fr.
RWG	18.7	29.8	21.2
EWG. EWM. EWL	21.5	37,7	34.0
AWG, AWM, AWL	30.1	48.0	55.2
BWG, BWM, BWL	42.0	60.0	86.0
NWG, NWM, NWL	54.7	75.7	137.5
HWG	76.2	99.2	235.8
2-3/4 x 3-7/8	68.3	98.4	231.8
4 x 5-1/2	100.8	139.6	467.0
6 x 7-3/4	151.6	196.9	927.6

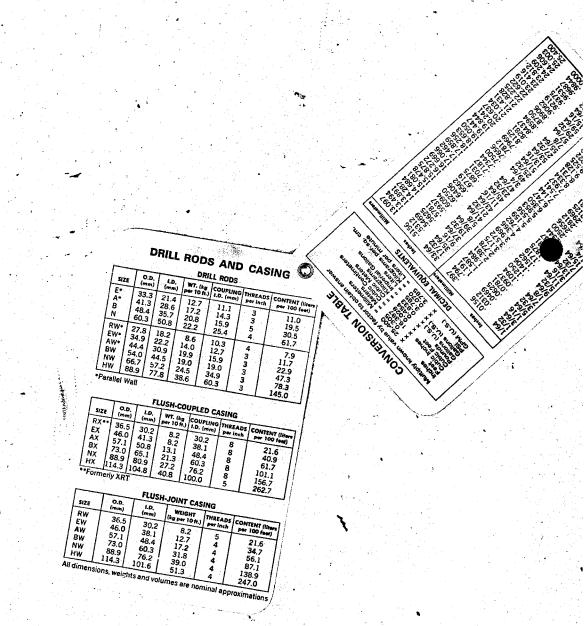
\*DCDMA "W" sizes were formerly designated "X"
All dimensions, weights and volumes are nominal approximations

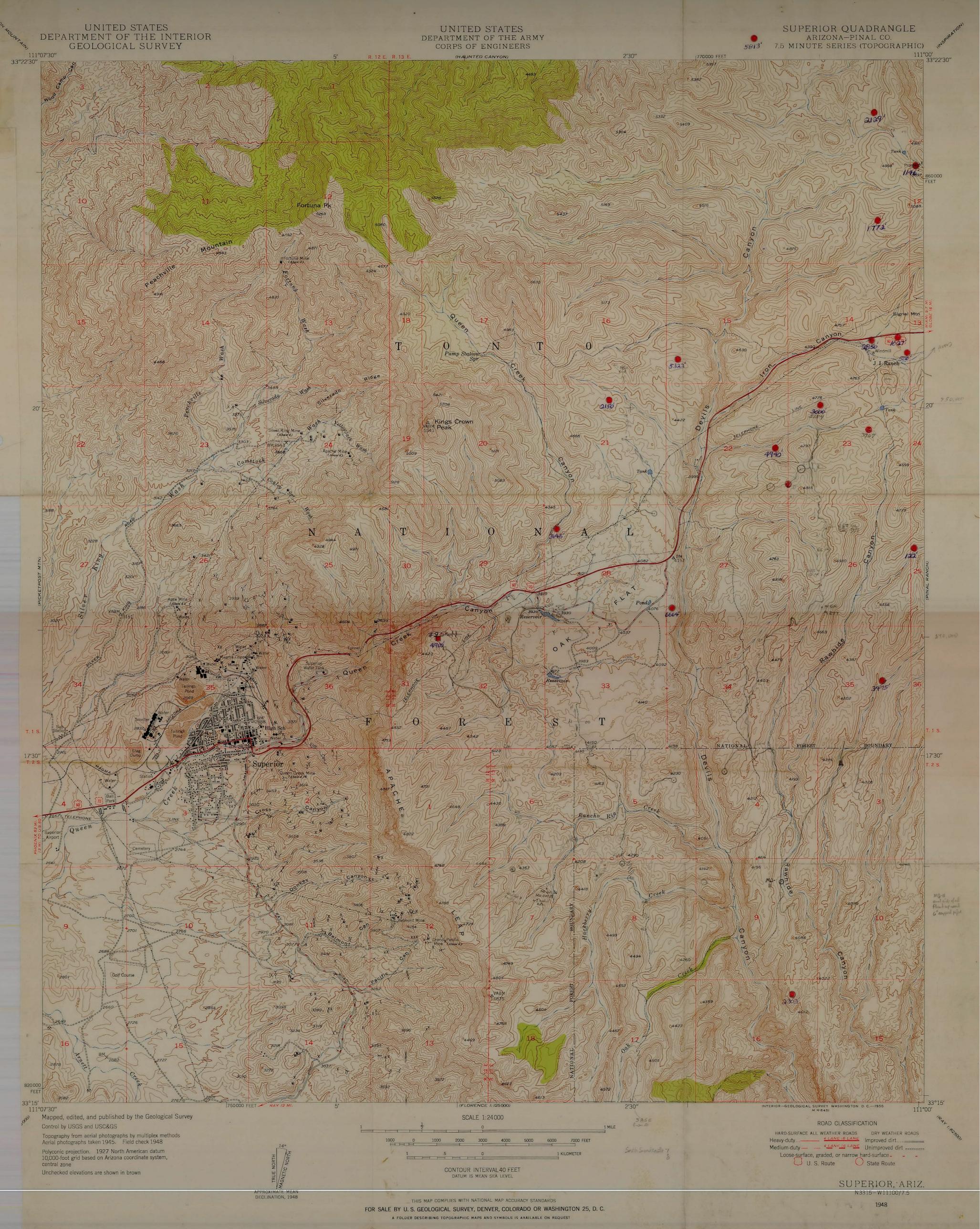
#### **CONVERSION TABLE**

Multiply known value by factor to obtain answer hinches × 25.400 • Millimeters
Feet × 0.305 • Meters
Cubic Inches × 16.387 • Cubic Centimeters
Cubic Feet × 0.028 • Cubic Meters
Cubic Feet × 0.028 • Cubic Meters
Gallons (U.S.) × 0.023 • Imperial Gallons
Gallons (U.S.) × 3.735 • Liters per minute
GPM (U.S.) × 3.785 • Liters per minute

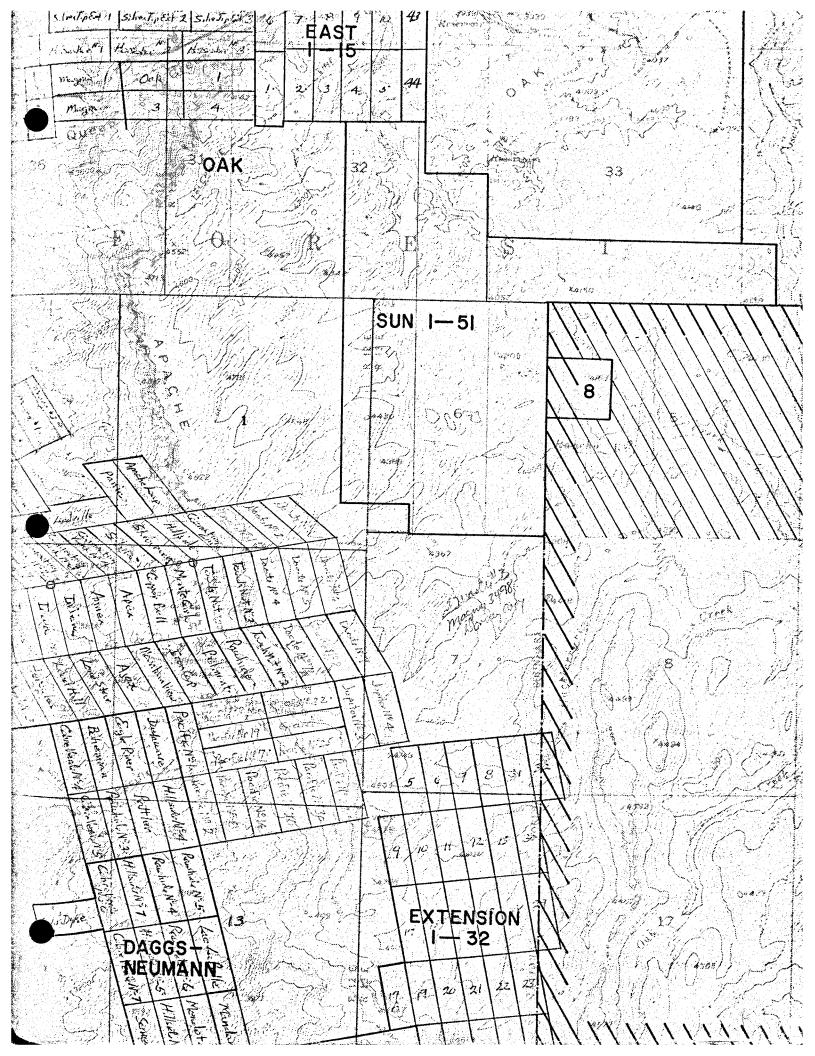
DECIMAL EQUIVALENTS

	sches .	Millimeters	- 1	nches	Millimeters
1/64	.0156	.397	33/64	.5156	13.097
1/32	.0312	.794	17/32	.5312	13,494
3/64	.0469	1.191	35/64	.5469	13.891
1/16	.0625	1.587	9/16	.5625	14.287
5/64	.0781	1.984	37/64	.5781	14.684
3/32	.0937	2.381	19/32	.5937	15.081
7/64	.1094	2.778	39/64	.6094	15.478
1/8	.1250	3.175	5/8	.6250	15.875
9/64	.1406	3.572	41/64	.6406	16.272
5/32	.1562	3.969	21/32	. <b>6</b> 562	16.669
11/64	.1719	4.366	43/64	.6719	17.066
3/16	.1875	4.762	11/16	.6875	17.462
13/64	.2031	5.159	45/64	.7031	17.859
7/32	.2187	5.556	23/32	.7187	18.256
15/64	.2344	5.953	47/64	.7344	18.653
1/4	.2500	6.350	3/4	.7500	19.050
17/64	.2656	6.747	49/64	.7656	19.447
9/32	.2812	7.144	25/32	.7812	19.844
19/64	.2969	7.541	51/64	.7969	20.241
5/16	.3125	7.937	13/16	.8125	20.637
21/64	.3281	8.334	53/64	.8281	21.034
11/32	.3437	8.731	27/32	.8437	21.431
23/64	.3594	9.128	55/64	.8594	21.828
3/8	.3750	9.525	7/8	.8750	22.225
25/64	.3906	9.922	57/64	.8906	22.622
13/32	.4062	10.319	29/32	.9062	23.019
27/64	.4219	10.716	59/64	.9219	23.416
7/16	.4375	11.112	15/16	.9375	23.812
29/64	.4531	11.509	61/64	.9531	24.209
15/32	.4687	11.906	31/32	.9687	24.606
31/64	.4844	12.303	63/64	.9844	25.003
1/2	.5000	12.700	1	1.0000	25,400





							to agree access and captures and opening			Maria san Dara sa sa Sa	elas a la l	ing wijes opskis	The Alle Species and	
						50			1					
	>	8			2,5	<i>8</i> 2	191	201		* 7E1	prof.	h21		
	K/4.	13 E				22	de la calaba de la		SU	1.81	£71 *	× 721		
					17	42	16		751 -	× 721	121	a21		
			641	21/		77	36	75	181	081	311	811		
/ε			-141 25	<i>h h h h</i>	65	77	SE	66	िरा	821 128	۲۱۱	711		
			541	271	25	2.5	16	725	L71	771	31	<b>Þ</b> 11		
			737	Ohl	.5.5	25	48	76						720-7
			22	77	45	04	18	38	L = 5 50 SQ					47:
			- 50	- 72		32		7.9	V X					
18 50 149 0			£Z.	175	-15	98	F-3	1.8	9 to 50 50					
7007	ソン		15	72	દદ	hE	1-8	73	3,7,30	2				-
		7 600 1 4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	L)	07	18	₹€	64	26						
			21		63	25	24	<i>\$2</i> _		3 3				
ંદ			57	31	5 01	11.21	54	94		4	7			
	particular and the second seco	h.F	***	bi	311	70	£r.	hZ						
	19	7.9		<i>3</i>	201	201	14	72						
	6,3			01	601	01	<b>b</b> 7	· VZ						
	18	XK	41 1	8	111	-211	1 1150	9150						-
	3 h	47 h	9	9	1	કુદ1	650	8 40						
	\$h	àh	2	*	50	,shi								
	15	zb	C1000-1	و دو یا مخابطه معامله میشود میشود در در وی را در مود	<i>5</i> .1	a.s	51 50							
<b>6</b> 1	表示意	<b>,</b>			1.41	び	£ 72			77				
	The way of	52 27 ( 50 : 50	12 mtc.	31 81 E	€41	1.2	71 50		3					
	And franchis		المراجع المسابع			<u> </u>								ATA Skar
	M Costs 12	X 2 4 John 11 A	<del>-  </del>	2	1 11 11 17 7 7 7 7 8 0 50									
	0 th	J. Hamma			10 80	Wobs W.								eriot Northead





July 11, 1977

T0:

F. T. Graybeal

FROM: J. D. Sell

Addendum Daily Drill Data Drill Hole A-9 Superior East Project Pinal County, Arizona

Casing had been left in drill hole A-9 to aid in the geophysical probe of the hole. After completion of the Gp work and after setting NX casing in hole A-10, the drill rig was moved to A-9 to pull casing.

Attached is a daily drill data log on the casing pull.

Table One below summarizes the casing and recovery of hole A-9.

### TABLE ONE - Casing in Hole A-9

Size →		4:1	N.	X	ВХ
Casing In		10'		57'	36241
Casing Recover	ed	Zero	<u> 189</u>	<u>93'</u>	30381
Casing Left In		10'	4(	<b>54</b> 1	586'
Depth Left In		face-101	1893-	2357' 30	381-36241

James D. Sell

JDS:1b Att.

wcc: NPWhaley - w/att.

## DRILL HOLE A-9, Core, Joy HD-22 RIg Casing Recovery Operations

	Casing	Recovery	
Date	Hours	Shifts	Remarks
6/11/77	16	2	4 hrs. setting up drill; 6 hrs. working on stuck casing; 6 hrs. hauling BX rods from stockpile and making up 1945 with cutter.
6/12	Sunday		
6/13	24	<b>3</b> 7	2 hrs. hauling water tank and set; 2 hrs. hauling BX rods and making up; 10 hrs. running in and cutting at 3365', 3270', and 3160'; 6 hrs. pulling out to check cutter; 4 hrs. running 2745' back in.
6/14	24	3	4 hrs. running to 3050 and cut casing and worked it loose; 8 hrs. breaking out BX rods and hauling to stockpile; 5 hrs. pulling 3038 ft. of BX casing recovered; 7 hrs. working on NX casing and running in to cut.
6/15	13	2	2 hrs. cutting at 2307 and 2222; 6 hrs. pulling to replace cutter; 1 hr. working on casing, broke at 920; 3 hrs. pulling out and stacking; 1 hr. moving new drill rig to A-10 site.
6/16	24	3	3-1/2 hrs. delay waiting on left-handed rods, culled and made up rods; 4-1/2 hrs. backing out broken casing; 3 hrs. lowering 936' of NX casing and hooking up; 4 hrs. lowering cutters and cutting at 2000', rods twisted off at 450';
			4 hrs. making up BX rods and going in with tap; 5 hrs. pulling 2780 ft. of BX rods.
6/17	24	3	8 hrs. fishing out rods that broke while cutting casing, rods out to 2810; 4 hrs. lowering 1530; of BX rods with tap and fishing out 230; of rods and cutter; 8 hrs. lowering rods and cutter back in with cuts at 2000; and 1900; casing loose at 1900; 4 hrs. pulling BX rods and cutters.
6/18	22	3	10 hrs. breaking out and hauling right and left- handed rods used to cut and fish out casing; 6 hrs. pulling 1893 of NX casing (recovered); 2 hrs. dismantling rig; 4 hrs. changing equipment and moving equipment back to A-10.

July 29, 1977

TO: F. T. Graybeal

FROM: J. D. Sell

Drill Hole A-8 Core Drilling Cost Summary Superior East Project Pinal County, Arizona

Core drilling was initiated from the surface by Joy Manufacturing on August 4, 1976. They cored NC to a depth of 1971 feet and set casing with an unmodified Joy 22 drill. A modified Joy 22 Heavy Duty rig was moved on site and took the hole to the terminal depth of 4907 feet, ending on January 6, 1977. NX core was taken from 1971 feet to 3197 feet with BX core continuing to 4907 T.D.

Core drilling costs for the entire 4907 feet are distributed as follows:

Drilling Charges:  A. Direct Drilling  B. Site Preparation  C. Field Administration	\$ Cost \$105,270.50 1,714.52	\$/Foot \$21.45 0.35
1. Supervision & Geology 2. Sampling & Assaying 3. Miscellaneous	6,907.13 4,733.65 850.31	1.41 0.97 0.17
Drilling Charges Sub-Total:	\$119,476.11	\$24.35
Project Charges:		
D. General Administration E. Legal Fees	\$ 3,537.16	\$ 0.72
F. Drill Road Access G. Claim Work, Surveying	4,413.97	0.90
Project Charges Sub-Total:	\$ 7,951.13	\$ 1.62
Total Expenditures	\$127,427.24	\$25.97

James D. Sell

JDS:1b



July 29, 1977

TO: F. T. Graybeal

FROM: J. D. Sell

Drill Hole A-9
Core Drilling Cost Summary
Superior East Project
Pinal County, Arizona

Drill hole A-9 was cored from the surface using the modified Joy 22 rig. The hole was taken NC to 2357 feet, then NX from 2357 to 3624, and BX from 3624 to 4903 T.D. The hole was started on January 7, 1977 and terminated on May 5, 1977. Later a week was taken to pull the casing left in the hole to aid in the geophysical probe test.

Core drilling costs over the 4903-foot hole were distributed as follows:

Drilling Charges:	\$ Cost	\$/Foot
A. Direct Drilling	\$109,943.13	\$22.43
B. Site Preparation	2,141.66	0.44
C. Field Administration		
1. Supervision & Geology	4,083.01	0.83
<ol><li>Sampling &amp; Assaying</li></ol>	2,955.88	0.60
<ol><li>Miscellaneous</li></ol>	254.72	0.05
Drilling Charges Sub-Total:	\$119,378.40	\$24.35
Project Charges:		
D. General Administration	\$ 3,520.02	\$ 0.72
E. Legal Fees	100.00	0.02
F. Drill Road Access		-
G. Claim Work, Surveying		
Project Charges Sub-Total:	\$ 3,620.02	\$ 0.74
Total Expenditures	\$122,998.42	\$25.09

James D. Sell

JDS:1b



July 29, 1977

TO: F. T. Graybeal

FROM: J. D. Sell

Project Charges
Office/Storage, Gate/Road,
& State PP
Superior East Project
Pinal County, Arizona

Several additional items have been separated out and charged since the individual memos on Project Charges dated August 23, 1976.

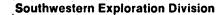
At the office/storage the costs included the yearly rent (\$1500.00) and the installing of electric circuits/heaters (\$448.89) at a total cost of \$1948.89.

The new gate and approach road work going east out of Devils Canyon was charged as was the State Prospecting Permit fees for Section 5, as Project Charges. The cost summary is as follows:

		Costs	
Project Charges:	Office/Storage	Gate/Road	State PP
D. General Administration	\$1948.89		
E. Legal Fees			\$573.28
F. Drill Road Access	<sup>-</sup>	\$3,554.83	
G. Claim Work, Surveying			
Project Charges Sub-Total:	\$1948.89	\$3,554.83	\$573.28

James D. Sell

JDS:1b





August 22, 1977

To: F. T. Graybeal

FROM: J. D. Sell

Incomplete
Drill Hole A-10
Core Drilling Costs
thru July 31, 1977
Superior East Project
Pinal County, Arizona

Carres D. Sell James D. Sell

Core drilling was initiated on May 5, 1977 and carried to the depth of 3571 feet. At that point the rig was removed from the site to initiate a hole in another project. This interim (incomplete) report is submitted on the accounting costs thru July 31, 1977 as a memo to be used in the Cost Summary through July 31 of the Superior East Project. Final figures will be submitted upon termination of the hole.

\*Core drilling costs are distributed as follows:

Drilling Charges:	\$ Cost	\$/Ft.
A. Direct Drilling	\$55,365.72	\$15.50
B. Site Preparation C. Field Administration	2,924.54	0.82
<ol> <li>Supervision &amp; Geology</li> <li>Sampling &amp; Assaying</li> </ol>	4,307.57	1.21
3. Miscellaneous	173.59	0.05
Drilling Charges Sub-Total	\$62,771.42	\$17.58
Project Charges:		
D. General Administration E. Legal Fees	\$ 1,535.46	\$ 0.43
F. Drill Road Access G. Claim Work, Surveying	4,305.50	1.20
Project Charges Sub-Total	\$ 5,840.96	\$ 1.63
Total Expenditures	\$68,612.38	\$19.21

JDS:1b

cc: NPWhaley

EXPLORATION AUTHORIZATION NO. 0010-14

SUPERIOR EAST PROJECT PINAL COUNTY, ARIZONA TUCSON OFFICE

-			/	
ccount		This	This	Total
0.	Item	Month	Year	to Date
06-950	Kental Layments - Other		\$	13
21-100	Surface Drilling - Salaries	1.64.00	451,00	2
21-200	- Add. Labor	31.72	888	0
21-400	- Supplies	otana ( )	1 3	3
21600	- Traveling			
21-750	- Services	13352 14	54835,0	4
21-800	- Taxes		0	<i>(</i>
30-100	Geology - Salaries	1252.00	18780	0
30200	- Add. Labor	168 47	· · · · · · · · · · · · · · · · · · ·	
30-400	- Supplies	3.66		
30-600 .	- Traveling	99 71	1119	2
30-800	- "axes		and the factor	<u> </u>
+0-100	Sampling, Assaying, Lab Salaries			
40-150	- Wages	***************************************		***************************************
10-200	- Add. Labor	والمروا والمال والمستعموم		
10-400	- Supplies	The state of the s		are an a designation of the state of the sta
10-600	- Traveling	and the second s		
+0 <del>-</del> 750	- Services PB	1-12	<	
003-04	and the second s	508 00		
70-100	Engineering - Salaries	1.60	.5	
70-200	- Add. Labor	The second secon	29 12	
70-400			5 04	•
70-600	- Supplies			
70 <b>-</b> 000 70 <b>-</b> 750	- Traveling - Services			
70-700 30-400		energy and the second of the second	1628.90	7
	Temporary Construction - Supplies			
0 <del>-</del> 750	Construction - Services - Taxes  PB Program	2172 80	2172 86	)
008-0		Les 81,	6581	
10-400	Field Administration - Supplies	***************************************	410	to distance, or all timescale, dies stronger is, is quick, or or one
10-500	- Communications	21.59	5248	
0-750	- Services		1500 00	
LO-780	- Fuel, Power, Water	11.44	22.89	7
10 <b>-</b> 800.	- Taxes		16	
20-100	General Administration - Salaries	21100	54900	
20-150	- Wages	······································	5 20	
50~500	- Add. Labor	40108	106 16	
20-400	- Supplies	4068	105 4	<u></u>
20-750	- Services			
003-0	- Taxes	5 7/	63	3
0-950	- Other			er i de de la company de la co
1-400	Distributable Accounts Auto - Supplies	1/392	29504	
1-800	- Taxes	58	292	
				-
ė.				
		\$10370 00	#1 1170000	)
		\$18320 00	467123,00	distance between address of describerations of the second
thorize	at a second of the second of t	•		40
pended	nexpended NOTE: A-10 has been month in report dolor also put on 4th Seems	0010		\$125000
Pended	NOTE: A-10 has N	1 This		64723
A conserve M	many to and	g ine		
rance 0	nexpended summarged to follow	1) Auc 22, 19	<i>777.</i>	\$ 60276
	month in regar cour	ong !	$\mathcal{A}$	- Min
ig:	Do not on 4 - Jeems	udey report	<b>7</b>	
10:	ace pu	/ "		

SOUT	HWESTERN EXP		VISION	26th July	thru , 197_
Superior Est EA-0010	Project,	Pinal		AZ	•
		(Count	у)	(State)	
DIRECT DRILLING (Acct. 521-)				Name of the second	
ONTRACTORS' CHARGES					
Invoiced during month covering	current mont	this work			
	carrent mon				• •
Contractors' Services			Statement Ar	mt.	
					•
Estimated balance of contracto	rs! charges o	covering wo	rk through e	end of current m	ion th
Contractors' Services	•		<b>Esti</b> mated Co		· · · · · · · · · · · · · · · · · · ·
CONTRACTORS SELVICES			LSCIMATED	23.6	
		•			
Supplies and Freight		•			
Field Trailer Rental					
Water Purchases (Drilling)					•
			•		**************************************
ITE PREPARATION (Acct. 580-)					
ONTRACTORS' CHARGES					
invoiced during month covering	current mont	ch's work			
Contractors' Services			Statement Am	nt.	
Bugant Construction Spille	ury on Biglonic	<u>))                                   </u>	468.	28	
Estimated balance of contracto	re! charges o	overing wo	rk through o	and of current m	onth
	is charges c				onen .
Contractors' Services  Begget Construction (Cleans	out & Rig Ray Be	Soul Est	Estimated Co		
				annytourbustusta	and the state of t
Supplies and Freight		•		•	
					• .

No. of Straight Time Hours During Month  Charge or Estimated Expense for Assaying Performed During Month  LAIM STAKING, VALIDATION (Acct. 507-) Invoiced during month covering current month's work  Contractors' Services  Statement Amt.  Stimated balance of contractors' charges covering work through end of current month  Contractors' Services  Estimated Cost  No. of Straight Time Hours During Month  No. of Overtime Hours Hours During Month  During Month  During Month  During Month  During Month  DIHER (Itemize any other major expenses not covered above or by invoice.)	ges (Temporary Help)			
Assayer  Charge or Estimated Expense for Assaying Performed During Month  LAIM STAKING, VALIDATION (Acct. 507-) Invoiced during month covering current month's work  Contractors' Services  Statement Amt.  Stimated balance of contractors' charges covering work through end of current month  Contractors' Services  Estimated Cost  No. of Straight Time Hours During Month Hours During Month	Vame.			
Assayer  Charge or Estimated Expense for Assaying Performed During Month  AIM STAKING, VALIDATION (Acct. 507-)  Avoiced during month covering current month's work  Contractors' Services  Statement Amt.  Stimated balance of contractors' charges covering work through end of current month  Contractors' Services  Estimated Cost  No. of Straight Time Hours During Month Month				
Expense for Assaying Performed During Month  AIM STAKING, VALIDATION (Acct. 507-)  Avoiced during month covering current month's work  Contractors' Services  Statement Amt.  Stimated balance of contractors' charges covering work through end of current month  Contractors' Services  Estimated Cost  No. of Straight Time Hours Hours During Month  Month	saying			
Contractors' Services  Statement Amt.  Stateme	Assayer	Expen	se for Assaying	
Contractors' Services  Statement Amt.  Citimated balance of contractors' charges covering work through end of current month  Contractors' Services  Estimated Cost  No. of Straight Time Hours Hours During Month  During Month  Month	ALM STAKING VALIDATION (Acct. 5	507-)	•	
Contractors' Services  Contractors' Services  Estimated Cost  Services  No. of Straight No. of Overtime Time Hours Hours During During Month  Month				
Contractors' Services  Estimated Cost  ages  No. of Straight No. of Overtime Time Hours Hours During During Month  Month		rent month's work		
Contractors' Services  Estimated Cost  Ages  No. of Straight No. of Overtime Time Hours Hours During During Month  Month	voiced during month covering cur	rent month's work	ement Amt.	
No. of Straight No. of Overtime Time Hours Hours During During Month  Month	voiced during month covering cur	rent month's work State		
No. of Straight No. of Overtime  Time Hours Hours During  During Month	voiced during month covering cur	rent month's work State		ent month
No. of Straight No. of Overtime  Time Hours Hours During  During Month	voiced during month covering cur Contractors' Services stimated balance of contractors'	rent month's work  State  charges covering wo	k through end of curre	ent month
THER (Itemize any other major expenses not covered above or by invoice.)	Contractors' Services  timated balance of contractors'  Contractors' Services	rent month's work  State  charges covering wo	k through end of curre	ent month
THER (Itemize any other major expenses not covered association)	Contractors' Services  stimated balance of contractors'  Contractors' Services	charges covering work  No. of Straight Time Hours	No. of Overtime	ent month
Item Cost	Contractors' Services  Stimated balance of contractors' Contractors' Services  Mame	charges covering wo  Estin  No. of Straight Time Hours During Month	No. of Overtime Hours During	ent month
Travich Gant - Surveying Survine June 27. 1, 628:90	Contractors' Services  Stimated balance of contractors' Contractors' Services  Mame	charges covering wo  Estin  No. of Straight Time Hours During Month	No. of Overtime Hours During Month bove or by invoice.)	ent month

# BRYANT CONSTRUCTION CO.

GENERAL CONTRACTORS — LIC. NO. A-43332 843 SPRAY STREET SUPERIOR, ARIZONA 85273 PHONE 689-2627

1827

			ISTOMER'	S ORDER	
Sold To -	ASARCO Incorporated		SALESA	MAN	
•	Box 5747	<del></del>	TERA	AS	<del></del>
	Tucson, Arizona 85703	*	F.O	.8.	
Shipped To	Superior East Project		SHIPPE	D VIA	
			Since mar exect to		en en en en Som Ordens
	Raise Spillway 2 feet with concrere dams: lft.X32ftX24ft.			4	
	4 yds concrete			\$128	00
	Travel & Stand-by Time on Truck	2 hrs		40	00
				\$300	00
	Labor & Material			18	72
	4% State Tax			<b>\$</b> 468	72
	Total				
					1
					-
					+-
_					
					-
					-
	Lonatreation - Permanent #590-400		<u> </u>		-
					<u> </u>
					-

Rediform

7\$ 737 Poly Pak (50 sets) 7P737 INVOICE

THE PROPERTY OF THE PROPERTY O

July Estimate for Cleaning Big Ponch. Equipment & Loba: Lorder @ #3500/h - 24 hous = 840.00 Tuck @ 25 hi - 20 hours = 50000 : 62.50 Lence installation, blooklay \$ 1402,50 Rig-rap & cleanup of spillway and \_\_\_\_\_ 20000\_ 1,402,50 L-STIMATE Day \$1400.00 Construction-Permanent #590-350

MAILING ADDRESS: P.O. BOX 943 GLOBE, ARIZONA 85501 PHONE: 425-6131 • 110 BLAZER DR., GLOBE, ARIZONA

### STATEMENT

June 27, 1977

Job No. 77017

American Smelting & Refining Co. P. O. Box 5747 Tucson, Arizona 85703

Attn: Mr. James D. Sell

Geologist

RE: J-I Ranch area

Survey Control

For professional surveying services rendered during the period May 31 thru June 16, 1977, establishing survey control for a portion of your holdings in the J-I Ranch area in Sections 22, 23, 26, and 27, T. 1 S., R. 13 E., G. & S. R. M., Pinal County, Arizona, we now present our request for payment. We also enclose a copy of our Job Charge Sheet showing the daily accumulation of fees earned and giving a short history of each day's progress.

### Time and Material Charges:

Professional surveyor's services:	30	hrs.	@	12.50	=	375.00
Three-man Survey Crew:	29	hrs.	@	30.00	=	870.00
Technical Aide's services:	15	hrs.	@	9.00	===	135.00
Electronic Distance-Meter:	14	hrs.	@	10.00	=	140.00
Electronic Computer:	9	hrs.	@	6.00	==	54.00
Transportation: 4-wheel-drive:	166	mi.	6	0.25	=	41.50
Materials: Printing, etc.					==	13.40

Total Amount Earned & Requested Herein

\$ 1,628.90

Offer Sayment Superior East Project # 570-750 (dernes D. Sell

CLIENT: American Smelting & Refining Co.

Job Number 77017

JOB DESCRIPTION: Superior-East -- "J-I" Ranch area Sheet\_ of. Establishing Survey-Control Net and Drill-Hole Ties DATE TYPE OF CHARGE **HOURS** AMOUNT CUMUL. AMT 1977: Rec'd telephone call from James D. Sell, asking for a crew to begin a small Mon. triangulation job in the vicinity of the J-I Ranch in northeastern Pinal 5/23 County. Promised crew by June 1. Conference with Jim Sell in my office: He left a copy of ASARCO's 2000-scale Thur. contour map showing approximate positions of triangulation stations which are 5/26 being installed by company personnel. There appear to be 16 stations, plus an external reference station that will have to be occupied. Horizontal and vertical control are to be established and six drill-holes are ready for survey ties to ascertain location with respect to section lines. Mr. Sell was here from 2 PM to 2:45. Office work by T.L.Gant, engineer: Prepared maps, instruction sheet, Sun. 12.50 5/29 triangulation schedule for crew to use Tues. 2<del>1</del> 31.25 31.25 Three-man survey crew, equipped with 1-sec. theodolite and Hewlett-Packard Tues. 3800 E.D.M. met with Jim Sell on jobsite at the J-I Ranch "back-road". Work 5/31 ing under the on-site direction of Mr. Sell, crew occupied and made horizontal and vertical measurements and EDM ties (according to schedule) from Tri. Stas. #15, #26, #5, and #6. Crew: 7:00 to 3:30 8 30.00 240.00 5 10.00 50.00 Use of E.D.M. equipment (Hourly rate w/ max = 6) 41 mi. .25 10.25 331.50 Transportation: 4-wh-drive truck Three-man survey crew: Continued triangulation and E.D.M. work; a 4th man Weds. was furnished by the client. Occupied Tri. Stas. #1, #2, and #AI-10 6/1 survey ties to three drill-holes. 8 30.00 240.60 6 10.00 60.00 Use of E.D.M. equipment 41 mi. 10.25 641.75 .25 Transportation: Three-man survey crew: Occupied Tri. Stas. #9, #10 (Not Al-10), #AI-11, and Thurs. #3 and made complete angular ties from each. T.L.Cant, with crew early A.M. to review the job and to work out details for finishing triangulation. 6/2 240,00 8 30.00 Crew hours: 7 to 3:30 2 12.50 25.00 Prof. Engr. Use of E.D.M. equipment 3 10.00 30.00 44 mi. 11.00 947.75 .25 Transportation: #28, #4, Three-man survey crew: All angular work today, occupying Tri. Stas. Fri. and PR-1 for ref. bearing and elevation control. Finished field work at 6/3 noon and returned to Globe. 30.00 150.00 40 mi. 10.00 1,107.75 .25 Transportation: T.L.Gant, office: Computation of coordinates and elevations of entire Sat.,  $6\sqrt{11}$ Sun., 6/12triangulation network; plotting same at scale of 1" = 200 ft. as requested by J.D. Sell; calculation of location and collar elevations of b drill-Mon., 6/13 holes. Adding previously determined section-corner and section-line in 306.25 1,414.00 12.50 formation to map with ties from Tri. Stas. 243 1,468.00 6.00 54.00 Used electronic computer, -- 3-day total Tue.,  $6\sqrt{14}$ Drafting: Preparation of mylar original for Network Map, tracing 99.00 1,567.00 from 200-scale work sheet. 11 hr. 9.00 Wed., 6/15 Draftsman: After obtaining information RE title for drawing from Mr. Crist, Thur. added this to mylar; completed lettering. Made prints and sepias for mail-6/16 36.00 ing to ASARCO's Tucson office. ш 9.00 12.50 12.50 Prof. Engr.: Reviewing and proofing final mylar: 13.40 1,628.90 Printing expense; + mailing.

	UTHWESTERN EXPLOR		th <u>JUNE</u> thru th <u>JULY</u> , 1977
	MONTHLY COST		
SUPERIOR EAST	Project,	PINAL (County)	ARZ. (State)
IRECT DRILLING (Acct. 521-)	ingeneral production of the contract of the co		
ONTRACTORS' CHARGES	Specifical Committee Commi		
invoiced during month Goveri	ng current month!	s-work	
Contractors' Services  Jey M.Fa. Co.		Statement Amt.	_
ASARCO EST. FOR JUNE 101	95 LOW: BALANCE DI	1E \$ 422,60	
			<u>\$ 422.60</u>
Estimated balance of contrac	tors' charges cove		of current month
Joy M.F.C., Co.		Estimated Cost	[2] : 1 : 1 : 1 : 1 : 1 : 1 : 1 : 1 : 1 :
a.) DRILLING A-10 24	47'-3417'	14,000.00	2
			- \$ 14,000.00
Supplies and Freight			- \$ 14,000.00
Supplies and Freight			- \$ 14,000.00 - X
Supplies and Freight Field Trailer Rental			- \$ 14,000.00 - X - X
			= \frac{\dagger{\dagger}{\dagger} \dagger{\dagger{\dagger}{\dagger} \dagger{\dagger{\dagger{\dagger}{\dagger} \dagger{\dagger{\dagger}{\dagger{\dagger}{\dagger} \dagger{\dagger{\dagger{\dagger}{\dagger} \dagger{\dagger{\dagger{\dagger}{\dagger} \dagger{\dagger{\dagger{\dagger{\dagger}{\dagger} \dagger{\dagger{\dagger{\dagger{\dagger{\dagger}{\dagger} \dagger{\dagger
Field Trailer Rental			- \$ 14,000.00 - X - X - X
Field Trailer Rental Water Purchases (Drilling)			- \\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
Field Trailer Rental Water Purchases (Drilling) ITE PREPARATION (Acct. 580-)	ng current month's	s work	7 \$ 14,000.00 2 X X
Field Trailer Rental  Water Purchases (Drilling)  ITE PREPARATION (Acct. 580-)  ONTRACTORS' CHARGES  Invoiced during month covering  Contractors' Services		Statement Amt.	- X X X
Field Trailer Rental  Water Purchases (Drilling)  ITE PREPARATION (Acct. 580-)  ONTRACTORS' CHARGES  Invoiced during month covering  Contractors' Services  SEE SUPPLEMENTAL E  (BRYANT CONS'T.CO.)	EST BY JD SEL NYOICE 1827)	Statement Amt.  5 468.72	
Field Trailer Rental  Water Purchases (Drilling)  ITE PREPARATION (Acct. 580-)  ONTRACTORS' CHARGES  Invoiced during month covering  Contractors' Services  SEE SUPPLEMENTAL E  (SPILLWAY ON PIG FOND: I  (BRYANT CONS'T.Co.)  Estimated balance of contract	EST BY JD SEL NYOICE 1827)	Statement Amt.  \$ 468.28 \$ 468.72  ering work through end	
Field Trailer Rental  Water Purchases (Drilling)  ITE PREPARATION (Acct. 580-)  ONTRACTORS' CHARGES  Invoiced during month covering  Contractors' Services  SEE SUPPLEMENTAL E  (BRYANT CONS'T.CO.)	EST. BY JD SEL NYOICE 1827) tors' charges cove	Statement Amt.  448.28 448.72  ering work through end  Estimated Cost	

	PREPARATION, ASSAYING (Acct	>	
(Temporary Help)			
Name	No. of Straight Time Hours During Month	No. of Overtime Hours During Month	
aying			
Assayer	Exper	ge or Estimated use for Assaying ormed During Month	\
IM STAKING, VALIDATION (	Acct 507-)		
oiced during month cover			
Contractors' Services		ment Amt.	500 s.a.
CONTRACTORS SERVICES		merc Aure,	
	<u> </u>		Δ
imated balance of contra	ctors' charges covering wor	k through end of current mont	<u>h</u>
Contractors' Services		k through end of current mont	<u>h</u>
			<u>h</u>
Contractors' Services			<u>h</u> X
Contractors' Services			<u>X</u>
Contractors' Services	No. of Straight Time Hours	No. of Overtime Hours During	<u>X</u>
Contractors' Services  ges Name	No. of Straight Time Hours During Month	No. of Overtime Hours During Month	<u>X</u>
Contractors' Services  Mame  HER (Itemize any other ma	No. of Straight Time Hours	No. of Overtime Hours During Month  ove or by invoice.)	<u>X</u>
Contractors' Services  Jes Name  IER (Itemize any other magnitude)  Item SEE SUPPLEMENTAL	No. of Straight Time Hours During Month  jor expenses not covered ab	No. of Overtime Hours During Month  Love or by invoice.)	<u>X</u>
Contractors' Services  Jes Name  HER (Itemize any other magnitude)  Item SEE SUPPLEMENTAL	No. of Straight Time Hours During Month  jor expenses not covered ab	No. of Overtime Hours During Month  ove or by invoice.)	X
Contractors' Services  ges  Name  HER (Itemize any other magnitude)  Item  SFE SUPPLEMENTAL	No. of Straight Time Hours During Month  jor expenses not covered ab	No. of Overtime Hours During Month  Love or by invoice.)	<b>X</b>
Contractors' Services  ges  Name  HER (Itemize any other magnitude)  Item  SEE SUPPLEMENTAL	No. of Straight Time Hours During Month  jor expenses not covered ab	No. of Overtime Hours During Month  Love or by invoice.)	<b>X</b>
Contractors' Services  ges  Name  HER (Itemize any other magnitude)  Item  SFE SUPPLEMENTAL	No. of Straight Time Hours During Month  jor expenses not covered ab	No. of Overtime Hours During Month  Love or by invoice.)	<b>X</b>
Contractors' Services  ges  Name  HER (Itemize any other magnitude)  Item  SEE SUPPLEMENTAL	No. of Straight Time Hours During Month  jor expenses not covered ab	No. of Overtime Hours During Month  Cost  \$ 1,628.90	X 22,



Southwestern Exploration Division

August 22, 1977

TO: F. T. Graybeal

FROM: J. D. Sell

Project Cost Distribution Summary
February 1, 1975-July 31, 1977
Superior East Project
Pinal County, Arizona

Project charges which are not applicable to drill hole distributions have been separated out and reported in separate memos. The attached is a summary compilation of the individual memos covering project cost distribution as charged to the Superior East Authorization.

James D. Sell

JDS:1b Att.

cc: NPWhaley - w/att.

PROJECT COST DISTRIBUTION SUMMARY February 1, 1975-July 31, 1977 SUPERIOR EAST PROJECT Pinal County, Arizona

Project Area —	Seismic Survey	Margaret-Eder Claim Boundary \$ Cost	Gravity Survey \$ Cost	Office-Storage Move \$ Cost	Road Repair & Cleanup \$ Cost	Office/Storage \$ Cost	Gate/Road \$ Cost	State Lease \$ Cost	Pond Cleanout \$ Cost	Triangulation Net \$ Cost	Sub-Total Charges § Cost
Field Charges:  A. Direct Drilling  B. Site Preparation	\$	\$	\$	\$ ===	\$	\$	\$	\$	\$	\$	\$
C. Field Administration 1. Supervision 2. Sampling 3. Miscellaneous	2,198.85 135.36 365.85	  	1,174.56  799.39	2,749.44  8,476.50	165.47  76.15	 					6,288.32 135.36 9,717.89
Project Charges:  D. General Administration E. Legal Fees F. Drill Road Access G. Claim Work, Surveying	651.79	300.00  3,731.32	1,272.86 24.00  493.20	1,263.25 265.00 	66.31 3.50 4,144.03	1,948.89	3,554.83	573.28	2,238.61	3,376.19	5,503.10 865.78 9,937.47 7,600.71
Expenditures Sub-total	\$3,351.85	\$4,031.32	\$3,764.01	\$12,754.19	\$4,455.46	\$1,948.89	\$3,554.83	\$573.28	\$2,238.61 TOTAL EXPE	\$3,376.19 INDITURES	\$40,048.63

.



August 22, 1977

TO: F. T. Graybeal

FROM: J. D. Sell

Project Charges
Road Cleanout & Triangulation
Net
Superior East Project
Pinal County, Arizona

During the Spring-Summer of 1977, two project charges were accrued: 1)

the cleaning of the big pond in Section 23 for road stabilization and
reseeding material with improved water storage for drill hole use, and
2) the surveying of a triangulation net and the drill hole in the porphyry
copper target area.

The cost summary and distribution are as follows:

Project Charges:	Pond Cleanout Triangulation Net				
D. General Administration					
E. Legal Fees					
F. Drill Road Access	\$2,238.61				
G. Claim Work, Surveying	<u></u> \$ <u>3,376.19</u>				
Expendi ture	\$2,238.61 \$3,376.19				

James D. Sell

Cost

JDS:1b

September 7, 1977

TO: F. T. Graybeal

FROM: J. D. Sell

Cost Summary as of July 31, 1977 Superior East Project Pinal County, Arizona

This report is the fourth cost summation report on the Superior East Project and covers the period February 1, 1975 thru July 31, 1977. The previous reports were dated September 28, 1972; March 19, 1974; and February 27, 1975.

Fourteen authorizations have been secured for the Project. As of July 31, 1977, the project had an unexpended balance of \$60,276.70 from the total authorization of \$1,815,000.00, as shown in Table 1.

TABLE 1 — Authorizations and Expenditures

Number	Authorization	Expended	Unexpended
As of Februa	ry 1, 1975 (see p	revious reports):	
MA-0010-0			
thru			
MA-0010-7	\$1,045,000.00	\$1,045,000.00	\$ Zero
EA-0010-8	220,000.00	164,156.57	55,843.43
As of July 3	81, 1977 (this rep		
EA-0010-8	as above	55,843.43	Zero
EA-0010-9	JI Ranch - Not	Applicable	
EA-0010-10	110,000.00	110,000.00	Zero
EA-0010-11	45,000.00	45,000.00	Zero
EA-0010-12	120,000.00	120,000.00	Zero
EA-0010-13	150,000.00	150,000.00	Zero
EA-0010-14	125,000.00	64,723.30	60,276.70
TOTAL	\$1,815,000.00	\$1,754,723.30	\$60,276.70
Expended	this period:	\$ 545,566.73	

Covering this reporting period, individual memos on various project charges and the drill holes have been submitted dated August 23, 1976; July 29, 1977; and August 22, 1977. Expended during this period, as shown above, was \$545,566.73. A summary of these costs is given in Table 2.

### TABLE 2 — Activity Expenditures

End of Report, February 1, 1975	
(remainder of EA-0010-08)	(+)\$55,843.43
EA-0010-09 (Not applicable)	0.00
EA-0010-10	(+)110,000.00
EA-0010-11	(+) 45,000.00
Drill Hole A-3 (reentry and complete)	(-)186,480.06
Sub-total	(+) 24,363.37

Table 2 - Continued:

EA-0010-12 Drill Hole A-8	(+)120,000.00 (-)127,427.24
	ub-total (+) 16,936.13
EA-0010-13	(+) 150,000.00
Drill Hole A-9	(-)122,998.42
Project-Seismic, Road, Survey	ing, etc. (-) 40,048.63
	ub-total (+) 3,889.08
EA-0010-14	(+) 125,000.00
Drill Hole A-10 (Incomplete)	(-)_68,612.38
UNEXPENDED as of July 31,	1977 (+)\$60,276.70
(Expended during this peri	od: \$545,566.73)

Table 3 (attached) is a synopsis of the above activity costs by categories for the individual drill holes and the consolidated project costs for the reporting period. Also included is the cost per foot of drilling prorated on the activity charge. Note that for Drill Hole A-3 the charges and cost per foot are not for the complete hole but only for that portion drilled during this reporting period. See the detailed, consolidated, individual report submitted previously. Table 3 shows that for the total of 19,389 feet of rotary and core drilling accomplished during this report period, the drilling charge sub-total amounted to \$24.83 per foot, while the project charge sub-total amounted to \$3.31 per foot, for a total charge of \$28.14 per foot. This increased cost over the previous report period was the result of a) deeper drill holes, b) increased drill rates, & c) longer drill access road development plus outside contractor services such as seismic, gravity, office move, road building, and a triangulation net. A memo detailing these last expenditures was submitted and dated August 22, 1977.

Table 4 below lists the percentage of individual account costs incurred during this report period and is compared to similar figures of the three previous reports of 1975, 1974, and 1972.

TABLE 4 — Percentage of Individual Account Costs

	1977 Repo	rt	1975	1974	1972
Segment	Cost	%	%	%	%
Direct Drilling (A)	\$441,679.38	81.0	83.7	72.9	75.8
Field Overhead (B,C)	39,776.39	7.3	7.9	5.9	14.2
Project (D,E,F,G)	64,110.96	11.7	8.4	21.2	10.0
Total	\$545,566.73	100%	100%	100%	100%

Table 5 lists the drill holes covered in the total project. Some holes had been rotary drilled and abandoned by previous companies and two holes were wedged from previous holes (A-2W from our A-2 and DCA-2A from a previous rotary hole). The total depth is the current figure obtained in our drilling.

TABLE 5 — Drill Hole Footages and Total Depth

	Previous	Superio	r East Dril	ling
Drill Hole	Rotary	Rotary	Core	Total
Number	Depth	Footage	Footage	Depth
A-1		1,309	820	2,129
A-2	~ ~	4,079	442	4,521
A-2W (wedge)			710	4,940
A-3		1,940	4,068	6,008
A-4		3,593	3,071	6,664
A-5 (incomplete)		3,145		3,145
A-6 (incomplete)	** <b></b>	1,665		1,665
A-7	-	3,150	2,892	6,042
A-8			4,907	4,907
A-9	· ~ ~		4,903	4,903
A-10			3,571	3,571
M-1A	2,402		2,920	5,322
DCA-1A	4,002		1,811	5,813
DCA-2A (wedge)	1,772		1,070	2,422
DCA-3A	2,980		2,174	5,154
14 holes & 1 wedge		18,881	33,359	

Total Superior East

52,240 feet

The cost distribution for the entire authorization to date is shown in Table 6, based on the total Superior East drilling of 52,240 feet.

<u>TABLE 6</u> — Authorizations, Activities, Costs, and Percentage

Authorizations	Amount	Expended			
MA-0010-00 thru EA-0010-14	\$1,815,000.00	\$1,754,723.30			
Activity	Cost	\$/Ft.	Percentage		
Direct Charges:					
A. Direct Drilling	\$1,363,626.92	\$26.10	77.7%		
B-C. Site Prep. & Field Superv.	181,026.61	3.47	10.3		
Drilling Sub-Total	\$1,544,653.53	\$29.57	88.0%		
Project Charges:					
D. thru G. Project Sub-Total	\$ 210,069.77	\$ 4.02	12.0%		
Total Expenditures: Total Footage: 52,240 feet	\$1,754,723.30	\$33.59	100.0%		

JDS:1b

cc: NPWhaley

TABLE 3 - Summary of Activities, Drill Holes and Project -- Categories and Costs

Category					Activity						
FOOTAGE: Rotary Core	Drill Hole A-3* 1940 ft. 4068 ft.	\$/Ft.	Drill Hole A-8 None 4907 ft.	\$/Ft.	Orill Hole A- None 4903 ft.	9 \$/Ft.	(Incomplete) Drill Hole A-10  None 3571 ft.	\$/Ft.	Project-seismic, road, survey, etc.	TOTALS 1,940 ft. 17,449 ft. (19,389' total)	\$/FT.
DRILLING CHARGES:										(13,313	
A. Direct Drilling Rotary	\$ 17,606.31	\$ 9.08	·	s	è	\$	\$	\$	\$	6 17 606 21	¢ 0 00
Core	153,493.72	37.73	105,270.50	21.45	109,943.13	22.43	55,365.72	15.50	ş	\$ 17,606.31 424,073.07	\$ 9.08 24.30
B. Site Preparation	100,700.72	37.73	105,270.50	21117	100,010,10	22.13	55,505.72	17.70		424,075.07	27.30
Core	211.04	0.05	1,714.52	0.35	2,141.66	0.44	2,924.54	0.82		6,991.76	0.40
C. Field Administration											
1. Supervision & Geology	50.00										
Rotary	59.30	0.03	( 007 12	1.41	l 002 01	0.00	h 207 57			. 59.30	0.03
Core 2. Assaying	3,939.25	0.97	6,907.13	1.41	4,083.01	0.83	4,307.57	1.21		19,236.96	1.10
Core	1,157.47	0.28	4,733.65	0.97	2,955.88	0.60				8,847.00	0.51
3. Miscellaneous	.,,	****	.,,,,,,,,,	٠.,,	_,,,,,,,,,	••••				,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
Rotary	1,257.62	0.65					'			1,257.62	0.65
Core	2,105.13	0.52	850.31	0.17	254.72	0.05	173.59	0.05		3,383.75	0.19
Drilling Charges Sub-Total	\$179,829.84	\$29.93	\$119,476.11	\$24.35	\$119,378.40	\$24.35	\$62,771.42	\$17.58	•	\$481,455.77	\$24.83
PROJECT CHARGES:								·			
D. General Administration	\$ 4,143.74	\$ 0.69	\$ 3,537.16	\$ 0.72	\$ 3,520.02	\$ 0.72	\$ 1,535.46	\$ 0.43	\$21,644.67**	\$ 34,381.05	\$ 1.78
E. Legal Fees	608.48	0.10			100.00	0.02			865.78	1,574.26	0.08
F. Drill Road Access	1,898.00	0.32	4,413.97	0.90			4,305.50	1,20	9,937.47	20,554.94	1.06
G. Claim Work, Surveying					, · <b></b>				7,600.71	7,600.71	0.39
Project Charges Sub-Total	\$ 6,650.22	\$ 1.11	\$ 7,951.13	\$ 1.62	\$ 3,620.02	\$ 0.74	\$ 5,840.96	\$ 1.63	\$40,048.63	\$ 64,110.96	\$ 3.31
TOTAL EXPENDITURES:	\$186,480.06	\$31.04	\$127,427.24	\$25.97	\$122,998.42	\$25.09	\$68,612.38	\$19.21	\$40,048.63	\$545,566.73	\$28.14
						•.					

<sup>\*</sup>Values for this report period only. See Memo dated Aug. 23, 1976 for Total Cost Summary.

\*\*Field Administration charges consolidated with General Administration Charges. See Memo dated August 22, 1977 for individual breakdown.

# TAB

A-10



April 7, 1978

TO: F. T. Graybeal

FROM: J. D. Sell

Daily Drill Data
Drill Hole A-10
Core Drilling
Superior East Project
Pinal County, Arizona

Attached is a daily log of the Joy Manufacturing Company's modified Heavy Duty, Joy-22 which completed hole A-10 to the depth of 4282 feet.

The information shown is the date, depth at end of the day, number of hours charged to drilling, the number of shifts involved (converted to 8-hour shifts), explanation of delays, size of hole, and the geologic formation.

Compiled from this data is a breakdown of the shifts and footage by a) depth bracket and b) geologic units and core size.

Hole A-10 was drilled by essentially the same crews and comparable rigs which drilled hole A-8 and A-10. Comparison of the core time and total elapsed time follows:

Hole		Core	Time	Total El	apsed Time			
Number	Depth	Shifts	Ft/Shift	Days	Ft/Shift			
A-8	49071	342-1/2	14.3	130	13.1			
A-9	49031	275-1/2	17.8	109-1/6	16.0			
A-10	42821	236-1/2	18.1	114-2/3	14.0			

James D. Sell

JDS:1b / Att.

cc: NPWhaley - w/att.

DRILL HOLE A-10
Joy Manufacturing Co.; Joy 22HD, Truck Mounted

	Depth At End		Dri11	ina		Core	
Date	Of Day	Footage	Hrs.	Shifts	Remarks	Size	Formation
1977 5/5	0	0	0	1	4-1/2 hrs. setting up rig & equipment; 1 hr. hauling timbers, etc.		Surface
5/6	73	73	16-1/2	3	9 hrs. completing move & set-up; 3 hrs. drilling 6-1/4" rock bit to 11 ft; 1 hr. placing 11 ft. of 4-1/2" surface pipe, 2-1/2 hrs. cementing casing in.	6-1/4" RB -11- NC	Dacite
5/7 5/8	194 Sunday	121	24	3	Adding jellyflake & manure for water loss (20%).		
5/9 5/10	295 444	101 149	19-1/2 18-1/2	3	3-1/2 hrs. repair; 1 hr. bit change at 286'. 5-1/2 hrs. plugging for water loss at 367' & 418'. No luck.		
5/11	444	0	0	3	16 hrs. plugging for water loss; 6 hrs. washing to bottom; 2 hrs. placing 2-1/2 sacks of Calseal.		
5/12	444	0	<b>0</b>	3	2 hrs. delay for mud engineer; 22 hrs. placing lost circulation squeeze, letting it set, and drilling out 217-444. Still no circulation so		
5/13	529	85	17	3	mixed another squeeze plug and pumped in. 7 hrs. washing out and cleaning mud tanks, no return, pumped in 1 tank of mud.		
5/14	564	35	10	3	14 hrs. plugging, setting, and drilling it out. Still no return.		
5/15 5/16	Sunday 650	86	16	3	8 hrs. delay resetting drill; getting lost circulation material, making up rods. Tube		
5/17	751	101	16	3	plugged with material wet pull. 8 hrs. for two separate pulls to clean tube and recover core.		
5/18	875	124	21	3	2 hrs. to recover core lifter; 1 hr. pull for stuck tube.		
5/19	995	120	17	3	7 hrs. lower rods and recovering hung tube and return.		
5/20	1112	117	20	3	2 hrs. hauling fuel; 2 hrs. broke wireline & bit change at 1112'.		
5/21	1218	106	19	3	2 hrs. returning to bottom; 3 hrs. pulling for stuck tube.		
5/22	Sunday				TO SCHOOL CUDG.	1	1

		4				
5/23	1391	173	22	3	2 hrs. returning to bottom.	
5/24	1497	106	18	3	2 hrs. bit change at 1413; 2 hrs. delay;	1
		:			2 hrs. returning to bottom.	Dacite
5/25	1598	101	20-1/2	3	1-1/2 hrs. moving pump to pond; 2 hrs. pulling	<u> </u>
					for core and returning.	Earlier
5/26	1624	26	5	3	19 hrs. pulling for broken shear pin; bit change	Volcanics
	•				at 1611'; cleaned tanks, repulled for stuck	
					tube, and washing in hole.	
5/27	1707	83	24	3		
5/28	1777	70	21	3	i hr. fishing broken wireline; 2 hrs. pulling	
<b>3</b> , ==		, -	-•.		up for long weekend holiday.	
5/29	Sunday					
5/30	Holiday					
5/31	1816	39	10	3	14 hrs. washing down; rods don't turn; drilled	
					on down from 1727; trouble with swivel rod.	
	er en				(Note: Power's father-in-law ill, other crews	
					working 12-hr. shifts.)	
6/1	1904	88	24	3	(drill engine getting hot)	
6/2	1994	90	24	3	(pumped 2 tanks of mud in hole)	
6/3	2076	82	20	3	3 hrs. repair, new radiator & water pump; 1 hr.	
					hauling soluble oil.	- A
6/4	2124	48	18	3	3 hrs. fishing wireline; 3 hrs. bit change at	Earlier
					2124'.	Volcanics
6/5	Sunday			in district the second		<u> — 2138 — </u>
6/6	2192	68	17	3	7 hrs. greasing rods & lowering them; cleaned	Whitetail
					32' cave.	Cg1.
6/7	2274	82	23	3	1 hr. repair (Powers back to work).	
6/8	2361	87	23	3	1 hr. replacing 2000' of new wireline.	
6/9	2429	68	19	3	7 hrs. bit change at 2385'.	
6/10	2437	8	2	1	6 hrs. recovering tube & core. End of NC. 2437	
	2437	0	0	2	16 hrs. completing pull; running in casing. NX	
6/11	2437	0	• 0	1	8 hrs. completing casing to 2437'. Broke out	
* * * * * * * * * * * * * * * * * * * *					rods. (Note: The rig was moved on the after-	
					noon of 6/11 to hole A-9 where the casing was	
					removed. The rig then returned to A-10 on	
	_				6/18, graveyard shift.)	
6/19	Sunday		_	_		.
6/20	2437	0	0	2	2 hrs. moving from A-9; 5 hrs. getting rig	1
					ready to move to Tucson. 9 hrs. setting up	
					new hydraulic rig, making up drill string, etc.	
					and the state of the	•

6/21	2437	0	0	3	10 hrs. taking old drill to Tucson, picked up
					Forest Service entry permit; 16 hrs. running
6/22	2481	44	16	2-1/2	rods in hole and washing out old mud.  2 hrs. repair chuck jaws, 2 hrs. plugging hole
0, 22	2,0,			- 1/-	at 2473'. (Note: FS closed area except by
					special permit; England on vacation, other
					crews working evening and night.)
6/23	2533	52	16	2	(95% water return)
6/24	2592	59	16	2	
6/25 6/26	2647 Sunday	55	15	2	l hr. pulling up for weekend.
6/27	Sunday 2697	50	13-1/2	2	2-1/2 hrs. repair wireline motor and hydraulic
0/2/	2031	<b>)</b> 0	151/2		feed valve.
6/28	2748	51	15	2	l hr. pulling for bit change at 2748'.
6/29	2777	29	8	2	8 hrs. completing pull, bit change, & return.
6/30	2837	60	16	2	
7/1	2896	59	16	2	
7/2 7/3	2915 Sunday	19	5	2	11 hrs. bit change at 2915'.
7/4	Holiday				
7/5	2952	37	- 11	2	8 hrs. delay getting helper & parts, etc. 1 hr.
					getting to bottom. Forest Service restrictions
					lifted in PM.
7/6	3008	56	17	3	7 hrs. pulling for bit change at 3008'.
7/7	3013	5	2	3	8 hrs. running in new bit, cleaned tanks, new
					mud. 14 hrs. stuck tube, pulled, cleaned, new bit at 3013'.
7/8	3052	39	16	3	8 hrs. cleaned mud tanks, new mud, cleaned
,,,	J. J.	برر			33' of cave.
7/9	3122	70	23	3	1 hr. pulling rods up into casing.
7/10	Sunday				
7/11	3125	3	• 5	3	2 hrs. delay, 3 hrs. repair; 14 hrs. bit change
7/10	2101		o.l.	_	& wash in at 3123'.
7/12 7/13	3191 3213	66 22	24 9	3	2 hws loading out NV sesing 5 1U wads, 1 hw
// 13	1217	22	,	,	2 hrs. loading out NX casing & LH rods; 1 hr. delay, elect. storm; 12 hrs. bit change and
					wash in at 3201'.
7/14	3252	39	15	2	No GY shift; 1 hr. pulling back into casing.
7/15	3292	40	15	2	I hr. getting to bottom and pulling up.
7/16	3330	38	14	2	Lost 9-1/2' core; 2 hrs. pulling for bit change
					at 3330'.

Whitetail Cgi.

NX

7/18 7/19 7/20	Sunday 3330	0	0	2	16 hrs completed bit shares as at 20001 s	
7/19 7/20	•	0	0	2	16 hrs completed bit shares as a 20001 s	]
7/20	2221			· <b>L</b>	16 hrs. completed bit change; cave at 3000' & 3165'.	Whitetal
7/20	3331	1	8	3	3 hrs. hauling mud; 13 hrs. bit change at 3331'.	Cg1.
	3373	42	22	3 3	2 hrs. water tank repair & getting to bottom.	3375 -
	3382	9	4	3	2 hrs. changed wireline motor; 18 hrs. pulling	M-1A SE
					& running in 2-5/16" RB to clean hole.	
7/22	3384	2	1	3	16 hrs. cleaned 105', pulled for bit change at	
					3382'; 7 hrs. cleaning in, broke wireline,	1
						ıx 3406
7/23	3417	33	19	3		117 A-2 SB
						3X }
7/24	Sunday					,
7/25	3417	0	0	3	8 hrs. no helper, picked up hydraulic hoses &	
			•		BX casing; 16 hrs. cleaning cave, put on RB to	
					clean hole.	
7/26	3417	0	0	3	10 hrs. cleaning hole for casing; 14 hrs.	
					pulling rods and breaking out; hauled to stock-	
					pile. End of NX core. Brought BX casing to	
					site.	
7/27	3417	0	0	3 - 7	16 hrs. completing BX casing; 8 hrs. hauling	
					BX rods.	
7/28	3417	0	0	1 .	8 hrs. cleaning hole; electric short in	
		· <u>1</u>			engine, no A or GY shifts.	
7/29	3434	17	10	3	3 hrs. waiting on mechanic; 5 hrs. repair; 6	
<b>3</b> /00	-1.0-				hrs. cleaning hole.	
7/30	3483	49	18	3	6 hrs. cleaning mud tanks and bit change at	
					3440'.	
	Sunday					
	3526	43	16	3	8 hrs. checking on new site for drill (QDC).	
8/2	3571	45	15	3	9 hrs. breaking out rods for move. Temporary	
0./2			•		bottom.	
8/3				2	16 hrs. dismantling, capping hole, hauling	
					rods, etc.	
					(Note: From GY of 8/3 to GY of 11/14/77, the	
11/15	2571				rig was on another project [see QDC-5]).	
11/15	3571		<del></del>	3	17 hrs. hauling rods from Tucson & setting up;	
11/16	3581	10	r	2	14 hrs. starting in hole.	
	3641	10 60	5 24	3	19 hrs. making up BX rods & cleaning hole.	
	3693	52	24	3		
	3714	21	15	) 2	7 hrs. hit change at 26021. 2 hrs11:	
11/13	J/17	21	בו	)	7 hrs. bit change at 3693'; 2 hrs. pulling into casing.	

11/20	Sunday					
11/21	3760	46	21-1/2	3	1-1/2 hrs. new wireline; 1 hr. getting rods loose.	
11/22	3797	37	16-1/2	3	1-1/2 hrs. repair; 6 hrs. bit change at 37971.	A-2
11/23	3846	49	20-1/2	3	2 hrs. completed bit change; 1/2 hr. hoist	SB
					cable repair; I hr. pulling into casing.	<del></del>
11/24	Thanksgi	ving Ho	liday			Pinal
11/25	3900	54	21	3	3 hrs. repair, new suction line & drill line.	Schist
11/26	39 39	39	15	2	<pre>1/2 hr. new wireline; 1/2 hr. pulling into casing; no GY.</pre>	with Lqfp
11/27	Sunday					blk.porp.
11/28	3949	10	5	2	7 hrs. pulling to break circulation; 4 hrs. pulling bit change at 3949'.	dikes and
11/29	3968	19	10	2	5 hrs. complete bit change; 1 hr. pull recover tube.	sills
11/30	3968	0	0	, <u>2</u>	4 hrs. started in; checked tube; brake backed	
					off and rods fell through chuck; parted at	
					3352'. 12 hrs. making up LH rods and speared	
	2260				345' of BX rods; started after remainder.	
12/1	3968	O	0	2	16 hrs. fishing; picked up more LH rods; ran	
					in 973' and backed off 60' of BX rods; ran	
					back in 1020' and connected up. No circula-	
12/2	3968	0	0	•	2/ has released Applies around 275 released	
12/2	2200	U	U	3	24 hrs. cleaned tanks, pumped 375 gals. diesel;	
12/3	3968	0	0	1	rods still stuck; worked rods.	
12/)	3300	U	U	1	8 hrs. pumped oil around; changed oil in motors	
					& gearboxes. (Afternoon pulled double yester-	
12/4	Sunday				A. day.) 100 (A )	
12/5	3968	0	0	3	24 hrs. working stuck rods; broke at 610',	
14/5	5500	U.	U	<b>)</b> .	165', and 150'; backed them off, pulled etc.	
12/6	3968	0	0	3	16 hrs. working on stuck rods; speared BX at	1
12/0		• •	•		150' and backed off to 420'; cleared out and	вх
					ran in 586' BX to connect back-up. 8 hrs.	3968
					making up AX preparing to reduce hole.	AX
12/7	3968	0	0	3	1 hr. repair; 23 hrs. making up AX rods &	$\widehat{}$
	<b>7</b> ,500	•		,	preparing to drill thru BX bit.	
12/8	3971	. 3	5	3	19 hrs. getting to bottom and pulling after	
	22,.				drilling thru bit and working on BX rods.	
12/9	3971	0	0	3	24 hrs. working on rods.	
12/10	3976	5	6	3	14 hrs. working on rods; 4 hrs. pulling for	
		<b>-</b> ,			bit change (AX) at 3976'.	

12/11	Sunday			•	
12/12	4000	24	13	3	11 hrs. breaking out LH rods and loading for
			_		Tucson; running in hole.
12/13	4037	37	18	3	6 hrs. for bit change at 4073'.
12/14	4078	41	18	3	6 hrs. running in hole.
12/15	4101	23	14-1/2	3	8 hrs. bit change at 4084'; 1-1/2 hrs. drill
12/15	4101	23	14-1/2	2	
10/16	1.106	0.5	16	•	motor repair.
12/16	4126	25	16	3	8 hrs. bit change at 4124'.
12/17	4144	18	, 11	3	7 hrs. plugging for water loss at 4125'; 6 hrs.
					wet pull.
12/18	4146	2	. 1	3	17 hrs. completing wet pull.
12/19	4169	23	22	3	2 hrs. pulling for bit change at 4169'.
12/20	4189	20	14	3	10 hrs. pulling rods and going back in because
				to the same of the	of high winds.
12/21	4225	36	24	3	(20-25% circulation return)
12/22	4244	19	13	3	8 hrs. bit change at 4230'; 3 hrs. delay on
					hole survey.
12/23	4259	15	6	3	5 hrs. hole survey; 12 hrs. in with bit change
					at 4244'; 1 hr. into casing.
12/247	A				
12/26	Christmas	Holiday			
12/27	4282	23	13	3	8 hrs. cleaning hole; 3 hrs. pulling for bit 4282
, _,	,,	,_,			change at 42821. Decided to close hole down. TD
					T.D.
12/28				3	3 hrs. standby; 8 hrs. pump repair, pumping
12/20				ر	
					mud and completing rod pull; 13 hrs. delay
12/20	18 <u>18</u> 18 18 18			•	running in cutter at 3900', not free.
12/29			. <b></b>	3	24 hrs. delay; cut at 3800', 2700', & 2600'.
10 (00					Still stuck.
12/30				3	3 hrs. delay on stuck truck; 21 hrs. delay
					cutting at 3600' and 3400'.
12/31		e Halid	214		
1/2/78	New leat	2 110110	ау		
<u> 1978</u>			•		
173		,		. 2	16 hrs. delay; cut BXWL rods at 3380'; broke
					out AX rods.
1/4				2	14 hrs. delay loading AX for Tucson and
					pulling BX rods; 5 hrs. casing time running
					in and cutting BX casing at 3195'.
1/5				2	16 hrs. pulling & loading out casing.
* * *					Left 222 of BX casing in hole.
					and the second s

1/6	 		2	16 hrs. loading out casing and running in to
				cut NX casing.
1/7	 		2	16 hrs. cutting NX casing at 2296' and
1.40				pulling.
1/8		<b>-</b>	<b>1</b>	4 hrs. recovering NX casing; 4 hrs. dismantling rig.

Casing left in hole:
11' of 4-1/2". Surface-11'
141' of NX. 2296'-2437'
222' of BX. 3195'-3417'
Also: BX rods from 3380' to 3968'

DRILL HOLE A-10, Core

Drilling time by footage brackets, including down time.

Depth	Size	Shifts	Days	Footage	Ft/Shift	Troubles
0-11	6-1/4"R.B.	2	1-1/3	11	5.5	14-1/2 hrs. set-up; 6-1/2
						hrs. drilling setting
11 500	NO	10	( ) ()	l.00	06 0	4"ID casing & cementing.
11-509	NC	19	6-1/3	498	26.2	54-1/2 hrs. (7 shifts) of
		2				lost circulation problems,
						calseal, etc., 1 bit change.
509-995	NC .	16	5-1/3	486	30.4	Stuck tube & plugging
707 777	140	10	כ /ו	400	50.4	problems.
995-1497	NC	12	4:	502	41.8	2 bit changes.
1497-1994	NC	21	7	497	23.7	19 hrs. broken shear pin
1.57 .55 .			,		-5-7	loss; I bit change.
1994-2437	NC	19	7	443	23.3	2 bit changes.
		6	3-1/3	<del>-</del> -		Change from NC to NX;
			J J			changed rigs.
2437-2506	NX	5-1/2	2	69	12.5	Fire closure area except
- 15, -500	****	J 17 =	-		,	for special permit.
2506-3006	NX	21	10	500	23.8	2 bit changes, closure
	• • • • • • • • • • • • • • • • • • • •		• •		-3.0	lifted.
3006-3417	NX	42	15	411	9.8	7 bit changes.
			3			Change from NX to BX.
3417-3505	вх	9 9 3 8	3-2/3	88	9.8	Misc. repair;   bit change.
3505-3571	ВХ	3	1	66	22.0	,
	es eu	8	3			Rig moved to another hole,
						later moved back on.
3571-3968	ВХ	28	10-1/3	397	14.2	3 bit changes, minor
7						repair.
		23	9			Working on stuck rods;
			-			drilled AX thru bit.
3968-4000	AX	6	2	32	5.3	l bit change; loading out
						material.
4000-4282T	D AX	35	12	282	8.1	7 bit changes.
(at 4244)		1	0-1/3		***	Hole survey.
		20	9			Recovering BX rods, BX &
						NX casing, and start of
						dismantle.
			4			
TOTALS:					- 0	
11-4282		236-1/2		4271	18.1	Core drilling only.
0-4282		305-1/2	114-2/3	4282	14.0	Total including surface,
						casing time, stuck rods,
						recovery, etc.

## DRILL HOLE A-10, Core

Drilling time by rock units, including down time.

Rock Unit	Interval	Size	Shifts to	Depth	Footage	Ft/Shift
Dacite Earlier Volcanics Whitetail Cgl. Whitetail Cgl. M-1A Type SB A-2 Type SB A-2 Type SB	0-1599 1599-2138 2138-2437 2437-3375 3375-3406 3406-3417 3417-3859 3859-3953	NC NC NC NX NX NX NX BX	50 25-1/2 11-1/2 59-1/2 8 1 32	1598 2133 2437 3373 3406 3417 3856 3955	1587 535 304 936 33 11 439	31.7 * 21.0 26.4 15.7 ** 4.1 11.0 13.7 ***
Pinal Schist & porp., oxidized capping Pinal Schist & porp., sulfides Pinal Schist & porp., sulfides	3953-3968 3968-4282	BX AX	1 41	3968 4282	13 <u>314</u>	13.0 7.7 ****
TOTALS	11-4282		236-1/2		4271	18.1 average

\*Does not include 2 shifts set-up, 11' of rock bit and cementing 11' of surface casing.

\*\*Does not include 3 shifts running casing in change from NC to NX, nor 3 shifts in changing rigs when moved to A-9 to pull casing.

\*\*\*Does not include 9 shifts running casing in change from NX to BX, nor 8 shifts moving rig to another hole, then back on.

\*\*\*\*Does not include 23 shifts working on stuck rods; decided to drill thru BX bit with AX, nor 1 shift on hole survey.

Also does note include 20 shifts recovering BX rods, BX & NX casing, and start of dismantle.

# TAB

A-11

A-11

Units:

Td. Senface- 1458

Tev. 1458-2215

Tw. 2215-3492

pepi SB 3492-4085

pepi 4665-

Hold Sign
6'14" rock list 0-12, ### record # 137'@ 6'14"RB)

NC core 12-2580 (lotte record # 137'@ 6'14"RB)

NX Core 2580-3772

BX Core 3772-4857

AX Core 4057-

	Hole	A-11		W
May		Hom		Cone Suje
Shift	Tootage	Willing	Welceys.	Sometin
7/31/78 \$			this set-up; this hauling supplies	Td
- 8/1 D			The set-up; This supplies; This regain	
8/2 D	12/12	4	This delay, This casing (4")	614"KB.
marin direction and the second and t	22/34			NC
sat-Sun D	38 72	i julijani ja		
8/3 D	45 117	8	(lastall circulation 101).	may may cantalant i handa e sam men yunin caas ayuna gegaranda.
18 D	20 137	3	The duggers; 3 her comenting a land	The state of the s
			The dugging; 11/2 his delay; The reaging; from 12'-22', The reaging 22'-106'.	resembly research in house, my subsumes
_110 D		<u>.</u>	from 12'-22', 100'	
			5 hes reasing 166'-137'; 3hu casing (4").	4" casein to 137".
/12 D	64 201	s		Mag Ming Salah di Afrikasi Anton Managara, ang
Sen				e et a l'imperiment a montre a montre agent de sur lege vive page vive de l'imperiment à débu
8/14 D			8 his cenerating bottom of casing	halmandashaan kanan da ka
/15 D	14 215	5	3 his dulling out coment.	and the second second section of the second
D	34 249			Carcharlastic, il effectes i ricitare i e il per e figure e il periodici
	27 274	6	2 his delay.	ing in the health and the first fact to the state of the
/18 D	ران <sup>د —</sup> ی تی	8	Contract to the contract of th	en mentaturemen ola ini sen suenasiah, hi entres
Sat-Seen				an andronia diveningia antono antono a visina, mini ili liganaga di
8/21 D	45 354	8		
122 D	50 40G	7	The regain	
	40 446	6	The weiling upin; the recove tolo	The State of the S
124 D	39 485	8	the state of the s	
8/25 D	19 (504)	)	2 hes Dkey.	Balledudina spillungspulaugus da ghyss asgan sangli gʻ
/24 D	40 544	6	zhes bit change 504'.	and the second second to the second s
- Seen		A COLUMN AND A COL		* 1 deliting and the property of the second
8/28 D	30 574	6	This recover take; newboring inhead	تشفيد للمشارك و بين مامير بن الوقائق ويوميانا أن الميدانية بين
8/29 D	39 40	3	, rew powers anday	_
	The Mathematical State Company of the State	and the second s	properties in the contract of	Ta

	Hole	A-11		
Nay		Hom		Come Segie
Shift.	Tootage	Willing	Delays.	Sometin
8/30 D	47 440	8		(NC)Td
8/31 D	37 497	8		i in alle male der lift oppgeten er til store der liger for i den ble store store en
9/1 D	19 714	4	This pulling for bit change o 716:	
Sal-Sun	a a principal parameter parameter to the control of	was feed as the contraction of the state of		Constitution (Constitution Constitution Cons
9/4 D	ded no	of work		ina tan suhadhal n 1886 s iannach suht sain s sha stais sinh s
9/5 D	27 743	4	1/2 his delay; 1/2 returning to bottom	na darif a san hidakamasaan nadaban ja alamanga nada, handindapada.
9/6 D	38 m	8		- The second of the second
/7 D	35 814	8		
/8 D	15 831	2	The for bit clayer 831; the regain.	
19 D	29 840	4	2/2 hrs plugging; 1/2 hrs polling for walson	
Seen		The Control of the Co		
9/10 D	19 ,79	3	1/2 hrs region; 2 hrs plussing; 1/2 clooning	
/12 D	26 905	8		
/B D	15 920	4	This bit change 913.	and the later to t
/14 D	27 947	5-	This bit charge this oil change.	
/15 D	40 987	8	The polling cog.	
Sat-Seen				
9/18 D	30 1017	7	The going to bottom.	
/19 D	30 1041	8		
/20 D	30 (017	8		
/zi D	29 1104		The bit change 1031	
/22 D	32 1138	and the second s	The bt change.	
/23 D	29 1147	7	This polling ug.	
Sun	and the contract of assumptions and a state of the contract of	ar		
9/25 D	38 (1208	7	The going to bottom.	To age from the control of the contr
/26 D	30 1235	8		
/27 D	5 1240	/	The bitchange 1235; 3he regain.	78
	10 ×		A	ar gan niana biyong diaganding pasispikan pangaga samo po ngkangkini kangga

•	Hole	A-11		3
May		Hom		Cone Suje
Shift	Pootage	Dulling	Walays.	Sometin
				Paris Luguros a religion de Constante Constante de Consta
9/28 D	30 1270	7	The return to bottom.	(NC) Ta
	29 1299	8		
Saf-Sun				
10/2 D	8 1367		This tripped for hit change o 1300.	
10/3 D	28 1335	8		an men Sundage and Helens select season as of making Sungapora (MA).
/4 D	2/ 1354	4	1/2 straightening wrielin; 11/2 hs water in dep.	
	25 011	8		
/G D	0 381	0	6/2 he bilchaus @ 1301 o return Truck.	
/7 D	20 1401	7	The seeling up.	
Serv				
10/9. I	26 1427	7	The returning to bottom.	
/10 \$		8		од содуже при отношения вой посторую 30°
	9 (146)	2	2/2 hipolling let @ 1462; 3 1/2 his regain	1458
/12 I	10 1972	2	Chis recovery core; new lit; rotum to hot	
//3 7	18 1490	3	5 his evel pull, broken wiereling.	
Set-Seen		an i shakaan ya shi ya kafa kafa kafa kafa i Shaka ka ya ya ka aya kafa kafa ka kafa k		
10/16 I	> 7 1497	4	Thes returning to bottom; Thes were line	
	19 1514	8		
/18 D	27 150	8		
	14 1557	6	This tryping to recove core of letter	
A	5 1542	2	This tropping to recove core of letter This tropping; This dulling out 5 core.	
120	15 15771	6 1/2	2/2 his regain on dill engine.	
A	10 1517	2	2/2 his regain on diel engine.  The pulling rods; sheard per let down he should being out in to diel out crown	<b>4</b> .
/21 D	Ø 1577		This straightening out in to down out crown	1.
A	6 1593	6	The dilling out but crown.	
Seen				Section of the sectio
	3 1594		The tugged for bit closer o 1596'.	Tev
		and the second s	The second secon	and the state of t

· · · · · · · · · · · · · · · · · · ·	Hole	A-11		7
May		Hom		Cone Suje
Shift	Footage	Willing	Welays.	Sometin
			mady eng zhu for 10/20 A.	Ter
10/23 A	18 1414	5	5 hes returning to bottom Then on Vocation	
/24 D	10 1424	<b>#</b> 5	3 hes delay - motor wouldn't start.	a Carlonia anno di supra di successo di Sangara
/25 D	16 1440	8		and the second s
126 D	20 1440	<i>x x x x x x x x x x</i>	American de Caracteria (1) and a 18 10 (18 Caracteria (1) Caracter	
/27 D	14 1676	Similar di Silar di Santa da S	The delay section have upair o willis	an sa makali afan sa
Sat-Seen				
10/30 D	14 1690	6	The regain on startes (diel engine)	
10/31 D	14 1704	8		
11/1 D	21 1725	6		
11/2 D	5 1730	- Anna Anna Anna Anna Anna Anna Anna Ann	7 hes bit change o 1730; unlooded Tusm	
/3 D	11 1781	6	This returning to bottom.	ang di nga manang mang manang manang manang manang
	12 1753	I	The pulling of.	
Seeu	( <del>3 1133</del>	in commence and a second	8 test charge 1753 good hungten	organizati standan nadajinakish kal troppadalakiya
11/6 D	0 1753	0	she hetchayo 1753; pulled lock for hem the	go. Lughamashadir Flagging Torthinianthis gliadagai
	17 1770 <del>2 1793</del>	<b>3</b> 7	The returning to bottom.	Commence of the control of the contr
= B A	20 1790	8	or and the contract of the contract and the contract of the co	on may where he industrial and the many
9	1001	8		
11/8 D	15- 1816	8	lifter event up table - lift s'con in hole.	
A	14 1830	8	(recovered 5'of left core).	
5	10 1240	8	taly hung erg.	TO CATOLOGIC CONTROL OF LIVE OF LAND OF LIVE O
11/9 D	0 1240	0	She wet pull o roturning.	en er entstelle de
A	12 1852	3	5 hes spluming i cleaning 10' cave.	n, iii dhahar dhahan dhahar ay ka
9	9 1861	3	5 hes pulling rods for core.	allen eusen Jahrjain hand vanet eilem, ein delteksims sons de
11/10 1	9 1270	3	5 hes greasing rats & getting as bottom	The state of the s
A	20 1090	8		
9	9 1299	3	5 he seeling back for weekend.	Teo
Sot-Lein				
To apply the Secretary	1	1	•	ſ

	The second secon		H	ble	A-11		
		Nay	Property.		Hom		Cone Suje
	ل	hift.	12	otage	Nulling .	Walays.	Sometin
						10 hrs Shope	
	13	D	10	1909	2 \{	This going tobother; the delay our glad.	(NC) Too
		A	23	1932	10		
	4	D	30	1962	3	2 he delay pickens up sugglies	77 CANADA
Martin and Color State of the Color of the C	hander open die war bie war	_A_	49	2011	10		
	<u>)                                    </u>	D	40	2051	10		The control of the co
		A	29	2080	10		the first state of the second state of the sec
	16	D	30	2110	8	The regain of first pick ag	The state of the s
		A_	30	2140	10	J. J	
	17	D	18	2158	8		
		A	n	2177	7	The polling back for waken	
Sal	-Seen				The second control of the second	and the second s	
	120	D	10	2187	4	the raping osersby pickers	And the same of th
NEC security company to the first section and the section of the s	o a militar immelaporas manyananya	A	24	2213	8	the second secon	Tev-
THE STREET WAS A ST	6	<b></b>	30	2243	8	(make ap slift for 11/24/18)	7w
same anni anni anni anni all'	/21	D	30	2273	8	the second secon	Pri anni lähkulluudi ettämäätettäänen kunettian tiiruttaili
		A	20	2293	8	The second secon	***************************************
		6	//	2304	3	make up shift for 11/24/78) She lipping for hit change 2304'	re germinettsveget vardenderstaverskepine
	/22	D	20	2,824	7	The resair water severed	
		A	18	2312	7	The pull book for weekend.	and Commission Control of Commission (Control of Control of Contro
Thus-	Li-Sa	I Seen				Thankszining Holiday.	
	/27	D				. State of the sta	de en interesse til 1800 te de legen kresternesse ble under tipe
				,	Anthorities (A. M. A.	The second section of the second section sec	ting a committee and a trademic transport of the terms regard
1845) political processor of filter basis from any recognition to continue to the					er sammen vertiligen de sammen forte volge for de vertilier de vertilier en groen de d'utilitée à de la deux d	The Act of	
							te a mandalahan kungapulan mandan di promosil
	alla a Viji Par			artin' ant art gar hydrificant a garage a ang			- conservation and conservations proper manages
	and the second of the second	يواد الكاميناني بالدين ويوساني والماقات المائية والمائية والمائية والمائية والمائية والمائية والمائية والمائية		Care Of the Agent Pales (All Specimens ) Land	- viewedenfertit it films i treg giberen betrik beleft i dele de de eller en de eller en eller eller eller elle B		Parameter and Control of the Control
	1 1			· corre areas in ring Superbon, i	radioa fraide managang shiping da		a - The state of t
The state of the s	un Ministra		1	The state of the s	a Prince de la Prince production de la communicación de la communi		en andre en sales pares especially in miles and a

#### **Southwestern Exploration Division**



April 6, 1979

TO: F. T. Graybeal

FROM: J. D. Sell

Dyna-drill use Kerr-McGee Patagonia Mountains Santa Cruz, Arizona

In a telephone conversation with Jim Quinlan (Kerr-McGee, Oklahoma City, phone [405]-270-3336), he passed on the following comments concerning the use of the Dyna-drill at the Red Mountain Project, Patagonia, in mid-1976.

They used the Dyna-drill on three separate holes, with one hole having multiple turn-offs. One hole was operated by Mollen-hauer, the remainder by Christensen out of Salt Lake City. Jim believed that Mollen-hauer did the best job.

The deepest wedge was at a depth of 4700 feet with a subsequent 150 feet Dyna-drilled. A bearing of 40° was turned in the hole with an increase of 10°-12° off of vertical.

A representative hole by Christensen was as follows: A pre-existing NX hole was cleaned and a NX wedge placed at a depth of 2361 feet, where the hole was 1/2 degree from vertical. The NX wedge was oriented, cemented in, then cleaned, and an additional 35 feet cored conventionally in a total of of 5-1/2 days. About half of this time was charged to cementing, as several problems arose. Jim thought that normal time should have been 3-1/2 to 4 days.

The Dyna-drill was then moved on, oriented, and drilled 106 feet, i.e., from 2396 to 2502 feet, in 3-1/2 days. In that distance the hole was turned 25° to the right and the drift angle increased an additional 6° off of vertical. The Dyna-drill averaged 1.23 feet per hour.

Prorated costs as follows:

Joy wedge (NX)	\$ 600.00
Joy rig time (\$30/hr.) for	
setting wedge, cementing,	
& drilling out 35 feet	3,900.00
Joy rig time on Dyna-drill	2,600.00
Dyna-drill tool rental	1,750.00
Dyna-drill Engineer services	1,250.00
Mollen-hauer Surveys (2)	1,000.00
	\$11,100.00

Mollen-hauer says the general set-up on surveying is 1) to orient the wedge using at least two shots and 2) orienting the Dyna-drill at the start using at least two shots. This could be counted as one survey if the time interval is short enough.

Quinlan expressed that the Dyna-drill operated on bottom about 30-50% of the time with the remainder in surveys, changing bits, and normal non-productive work.

He also mentioned that his impression is that the Dyna-drill is excellent in soft or sericitic altered rock, while being a poor operational unit in hard, uniform, or potassic altered rock where the unit tended to spin and polish the diamonds thus giving poor penetration rate and increased number of bit changes (i.e., rod pulling time and reorientation of Dyna-drill tool upon returning to bottom of hole).

James D. Sell

JDS:1b



April 6, 1979

FILE MEMORANDUM

Deviation of Drill Holes Superior East Project Pinal County, Arizona

Of the four drill holes cored in the vicinity of the quartz-sulfide vein zone, three have deviated strongly to the north shortly after starting BX coring. The three holes are A-8, A-9, and A-11 as shown in plan on Figure One. Hole A-10 continued to deviate to the southwest on a line similar to the deviation throughout the hole.

Table One contains the depths of the drill holes to the base of the NC core, NX core, Whitetail Conglomerate, base of the basal fault, and notes on the areas of strongest deviation into the north quadrant. Table Two expands this last point and recaps the change in deviation through the lower portions of the holes.

As reported previously, I feel the quartz-sulfide vein zone strikes north-easterly and dips 60° to the northwest. If so, then the northward deviation of the BX portion of the hole is subparallel to the dip -- opposite what drill holes normally do, that is, turn in perpendicular to the structures cut. However, experience has indicated that if the angle of incident between the drill hole and the structure is small (30° or less?), then the hole will not turn into the structure but will turn parallel to the structural fabric. Most of our holes appear to be in the latter status, assuming a northwesterly dip to the quartz-sulfide structures.

in the Superior East drilling, other rock types may be a contributing factor in drill hole deviation. One would be the change from Whitetail Conglomerate into the highly broken and brecciated units below. In A-8, this contact is shortly below the start of BX coring and deviation had already commenced before the contact was reached. In A-9 and A-11, several hundred feet of unit below the Whitetail was cored NX and this portion of the hole maintained the deviation of the NX hole trend. Thus it would appear that the base of the Whitetail did not influence the northward deviation situation.

Another rock factor would be the change from the broken, brecciated schist and porphyry (p $\in$ scbx) into the planar and sheeted schist and porphyry (p $\in$ sc) which is cut by a multitude of high-angled shears, faults, and vein structures. This contact is marked on the map and tables as "b" and "b flt" for "basal fault" as logged.

In both holes A-8 and A-11, this basal zone was far (500-700 feet) below the start of the BX coring and it can be noted that the strong northward deviation had previously been initiated. In A-9, the basal zone was cut shortly after starting BX coring and deviation started shortly thereafter. Thus it appears that entering the planar and sheeted schist (irregardless of its dip direction) did not initiate the deviation but perhaps strongly influenced a northward deviation continuing to the bottom of the hole.

The one common denominator in all three holes for the strong deviation to the north is the change from NX to BX core size.

If it is determined that the quartz-sulfide vein structure dips to the north-west in this area, then future drill holes should consider placing an NX wedge or two near the bottom of NX drilling so as to impart a strong kick of the hole into a south or southeast quadrant trend in order to secure a more favorable angle of incident and hence penetrate the vein system at a more cross-cutting angle and thus gain better evaluation of the vein structure in the BX coring.

James D. Sell

JDS:1b Atts.

Table One - Depth of holes to various parameters

	base of NC core	base of NX core	base of Whitetail Cgl	base of basal fault	Point of strong deviation to north quad.
A-8	1971	3197	3226	3777	initial 3200-3300 secondary 3600-3700
A-9	2357	3624	3275	3693	initial 3600-3900 secondary 4100-4400
A-11	2580	3772	3492	4262	initial 3700-3800 secondary 4000-4200

Table Two - Depth, deviation, and unit contact data

<u>Hole</u>	Depth	Drift Angle	Drift Direction	North Quad. Differential Curvature	Unit Contact
A-8	3000 ft.	2-1/2°	S20E		
	3100	2-1/2	S24E	4°	NX
	3200	2-1/2	\$32E	8	3197 BX Tw
	3300	2-1/4	S64E	32	3226 p€scbx
	3400	2	S75E	11	
	3500	1-1/4	\$85E	10	
	3600	3/4	\$88E	3	
				55	<b>-6</b> -chu
	3700	1/2	N37E	8	pescbx 3777 bflt
	3800	3/4	N29E	37	p€sc
	3900	3/4	N8W	<b>-3</b>	
	4000	1	NIIW	30	
	4100	1-3/4	N19E	-8	
	4200	1-3/4	N27E	9	
	4300	2-3/4	N18E	11	
	4400	3-1/4	N7E	-2	
	(4430)T.D.	3-1/2	N9E	<b>-2</b>	
<b>A-O</b>	3100 ft.	3°	s18w		
A-9				-4	
	3200	3	S14W	0	Tw 3275
	3300	2-3/4	\$14W	8	p€scbx
	3400	4	S22W	1	
	3500	3-3/4	\$23W	-15	
	3600	3-1/4	s8w		NX
	3700	3-3/4	\$17W	9	3624 p€scbx BX 3693 bflt
	3800	3-3/4	\$34W	17	p€sc
	3900	4	\$57W	23	
	• 1			5	

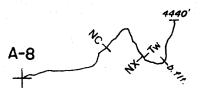
T. 2.

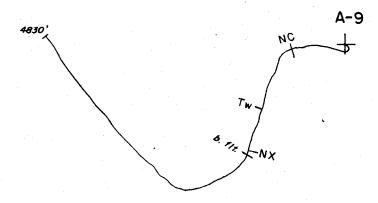
	4000	4-3/4	S62W	• • • • • • • • • • • • • • • • • • •	
	4100	4-3/4	S69W	7	
	4200	4-3/4	W88N	23	
	4300	5-3/4	N62W	26	
	4400	7-1/4	N45W	17	
	4500	9-3/4	N42W	3	
	4600	10	N42W	0	
	4700	11-3/4	N40W	2	
	4800	13-3/4	N32W	8	
	(4830) T.D.	13-1/4	N32W	0	
A-11	3200 ft.	2-3/4°	\$51W	-00	
•	3300	2-3/4	S28W	-23 -8	
	3400	3-1/4	\$20W		TW 3492
	3500	3-3/4	S25W	5	p€scbx
	3600	4	S13W	-12	
	3700	2-1/2	S6E	-19	NX
	3800	1/4	N69W	117	3772 BX
	3900	1	N35W	341	
	4000	1-1/2	N71W	<del>-</del> 36	
	4100	2-3/4	N55W	16	
	4200	4-1/4	N36W	19	p€scbx
	4300	6-1/4	N43W	-7	4262 bf1t p€sc
	4400	7	N46W	<b>-3</b>	

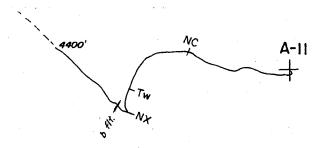
TO ACCOMPANY Bile Pressor

DATED 4/6/49

BY G. B. Sue







#### EXPLANATION

Collar of Hole With Number

NC Base of NC Core

NX Base of NX Core

Tw Base of Whitetail Conglomerate

b.f/t. Basal Fault

Plan of Deviation
of Drill Holes

# SUPERIOR EAST PROJECT

GILA & PINAL COUNTIES
ARIZONA

J.D. Sell April, 1979



April 10, 1979

TO: F. T. Graybeal

FROM: J. D. Sell

Deviation Charts
Eastman Whipstock

Mr. Al Knodel of Eastman Whipstock (Denver, Colorado [303] 623-7151) heard of our problem at Superior East and the thought of setting a wedge and moving off into a new direction. He called 4/3/79 and has sent a packet of information. Although Al pointed out that little of his equipment will fit inside a NX (±3") hole and that Eastman is slightly more expensive, his folder of information is of interest (folder is in N.P. Whaley's bookcase).

The section on "Directional Drilling" has a series of charts (attached) which plot the deviation per hundred feet of hole at 1 thru 5 degrees of uniform drift increase. Note that the charts are tabulated in hundreds of feet whereas the plot is at thousands of feet.

Also, reproduced page 3 is their rule-of-thumb on deviation tendencies.

Eastman's mining division work is handled by Cliff Ellis and Howard Pitt out of Long Beach, California (213) 426-3921, and they were contacted by Mr. Knodel and they should also be in contact with us shortly.

James D. Sell

JDS:1b Atts.

cc: NPWhaley

Lois las originals

Н	0	L	Ε	Α-	11

And the all the Charles of Management of	- Contractor			Depth	
				End of	
Date/Sh	nift	Footage	e (Cum)	Shift	Remarks
1979	-	***************************************	-	4470	BX Core
3/14	D	15		4485	Ten-capa-conspirational-systems action
	А	24		4509	
	GΥ	16	(55)	4525	
3/15	D	10		4535	Pulling for bit change @ 4535'.
	Α	<u>L</u> į		4539	Finishing tripping rods; washed & drilled 2' cave.
Ŷ	GY	15	(29)	4554	
3/16	D	4		4558	6 hrs. surveying hole; cleaned tanks.
	A	12	(16)	4570	Pulled back to casing & put things away for weekend.
	GY	No	Work		
Saturda	зу				
Sunday					
3/19	D	7		4577	2 hrs. delay shipped bits & got parts.
	Α	10	,	4587	
	GΥ	7	(24)	4594	(2 runs) Rods stuck while chasing tube down.
3/20	D ·	0			8 hrs. hauling oil, pumping oil & EZ spot, working rods.
	Α	0			8 hrs. working on stuck rods; 15 gal. EZ spot, 55 gal. diesel, 1 mud gel.
	GΥ	0		4594	8 hrs. working on stuck rods; 55 gal. diesel oil.
3/21	D	Ó			8 hrs. working to free stuck rods.
	A	. 0			8 hrs. working on stuck rods - some return; 110 gal. diesel.
	GY	0		4594	8 hrs. working on stuck rods.
3/22	D	0	•		8 hrs. called office to discuss problem. Hauled diesel and black oil;
					put down 2 bbl. blk. oil & 1 bbl. diesel.
	Α	0			8 hrs. working on stuck rods.
	GY	0		4594	8 hrs. working on stuck rods.
3/23	D	0			8 hrs. worked rods free; pulled back 16 stands, washing out hole.
	Α	1		4595	(8 hrs.) washed down 240' of rods; 9' of cave in bottom.
	GΥ	6	(7)	4601	Pulled for bit change @ 4601'; 2' cave in each run.
3/24	D	0		4601	8 hrs. ran rods in hole, washing down; 30' of cave and fill.
•	Α	. 2		4603	Drilled out 25' cave; high water pressure; backed off to relieve pressure.
	GΥ	12	(14)	4615	Cutting 2-5' of fill per run (3); pulled rods into casing.
Sunday	_				
3/26	D	. 3		4618	2 hrs. delay, hauled fuel & greased rods; ran in & washed from 4600';
				16	5' of fill-up.
	A	. 7	71	4625	(2 runs) Mislatch, pulled rods for core.
	GY	0	(10)	4625	8 hrs. changed bit and lowered rods, 55' cave, washed 5 ft; changed oil & in-line filters on drill.

July 13, 1979

HOLE A-11 - Continued	Н	01	E	Α	11	-	Con	ıt.	in	ued
-----------------------	---	----	---	---	----	---	-----	-----	----	-----

HOLE A	-11 - (	Contin	ued		
3/27	D	0		4625	8 hrs. washed down to 12' of bottom, very little return.
	Α	0			(5 hrs. pulled rods to recover sanded tube) 3 hrs. repair, new triple li
	GY	0	(0)	4625	8 hrs. made up ribbed core barrel with new bit. Lowered rods to 4040',
				,	tried to pull tube - tube stuck.
3/28	D	0			8 hrs. delay, no helper, raining hard, removed sanded innertube, pulled
<b>J</b> ,	-				back to casing, got gas, etc.
	Α	0	(0)	4625	Washed and reamed 180' of hole, 300' off bottom, pulled for bit change.
	ĠΥ	_	work?	-1025	(No report)
3/29	, D	0	NOTE:		Getting mud formula and chemical, washing out hole, 480' of sand and ca
3123	, <b>U</b>	U			cleaned mud tanks.
	Α	0			
	^	U			Finished pulling rods, lowered in and drilled 2 bridges and washed in 2 about 280' off bottom.
	GY	0	(0)	1,600	
	GΥ	U	(0)	4625	Lowered rods with new bit; drilled out cave bridge @ 3938'; 450' of cav
2/20					in hole.
3/30	D	0	•		Pulled rods into casing, went for reaming bits to clean and condition he
	۸	<b>A.</b> 1			Started rods on out of hole.
	A	*	report	1.605	1/201
0 /01	GY	0	(0)	4625	Washed and drilled out cave to 4612'.
3/31	D	0			Washed and cleaning out hole to 4622'. Pulling rods to put in core bar
	A	0		<i>.</i>	Finished pulling rods. Lowered in with new bit and washed down to 4500
		_			26' of cave.
	GY	0	(0)	4625	29' of cave start of shift; drilled down 10' and pulled up to mix mud.
				* *	5' more cave came in, drilled down again 11', pulled up to mix mud, 8' i
					cave came in. Pumped 2 tanks mud to mud area; pulled into casing.
Sunday					
4/02	D	0			Running rods from casing and washing down; 27' of sand and cave.
	Α	0			Hole caves 7-10' every time rods are pulled to mix mud.
	GY	0	(0)	4625	Redrilling hole trying to drill out cave.
4/03	D	. 0			Washing and conditioning hole to hold back sand; pulling rods to check
					shell and core barrel.
	Α	0			Finished pulling rods, changed bit and shell; greased rods and lowered
					bottom of casing.
	GY	4	(4)	4629	Finished lowering rods, washed and drilled 22' of cave.
4/04	D	.9		4638	
	Α	7		4645	(Slow flat faced bit)
	GY	11	(27)	4656	
4/05	D :	13		4669	
	Α	. 3		4672	Pulled rods and changed bit and core barrel @ 4672'.
	GY	Ō	(16)	4672	Lowered new bit, washed 4 bridges from 4600-4669'.
				•	

HOLE	A-11	مفد	Cont	inued

4/06	D	6	4678	Changed oil and filters, cleaned mud tanks, hauled mud, bit wiped out.
.,	Ā	0	4678	Pulled rods and changed bit @ 4678', lowered 2760 in hole.
	GY	5 (1		Finished lowering rods in; washed and cut 3' of cave.
4/07	D.	13	4696	rinished lowering rods in, washed and cat y or cave.
4/0/				Dullad usda haste take assign, but susmithing susu.
	A	10 / (2)	3) 4706	Pulled rods back into casing; put everything away.
	GY	No work.		
Sunday				
4/09	D	0	4706	Hauled mud and chemicals, ran rods in, washed and drilled bridges @ 4654'; 5' of cave.
	Α	13	4719	
	GY	9 (22	2) 4728	
4/10	D	14	4742	Raining, blowing, sleeting, and snowing.
-	Α	4	4746	Mislatch; pulled rods, put on new bit @ 4746', started in.
•	GY	0 (18		Finished lowering rods. Started washing down 420' from bottom, started
		, , ,	.,	drilling cave at 4649. (i.e., 97' off bottom).
4/11	D	0	4746	Washed from 4649-4742, cleaned and mopped tanks.
17 1 1	A	8	4754	Drilled 7' of cave from bottom of hole.
	GY	7 (1:		Pulled 30' of rods to put on new seal in swivel and had 4-1/2' of cave to
	G T	/ (1:	2) 4/01	
1. /3.0		•		drill out.
4/12	D	0		Unable to make bit penetrate; conditioned hole for 3 hrs., pulled for bit change @ 4761'.
	Α	0		Lowered in new bit, washing and drilling cave 165' from bottom.
	GY .	0 (0)	4761	Drilled out cave 107' from bottom, redrilled some areas several times before
		, ,	•	rods could be added. Put new mud valve.
4/13	D	0		Cleaned mud tanks, washed and drilled to bottom - bit shot, conditioning
.,				hole before pulling.
	Α	0		Washed I-1/2 hrs. prior to pulling, bit change, lowered 3700' in.
	ĠΥ	· 0 (0)	4761	Worked 2 hrs. putting everything away.
Saturd		<b>O</b> (O,	, -,,,,	worked 2 mis. putting everything away.
	•			
Sunday		0		D
4/16	D	0		Ran rods from 3700-4600', washed from 4600' to 4651'.
	Α	0 (0)	4761	Washed and drilled rods down from 4651 to 4685. Outside gauge gone - pulled and changed bit, shell and barrel.
	GY	No shift		Farton and offender and an arrivation
4/17	D	0		Ran rods in to 4220', started for tube, messed up wireline, 2-1/2 hrs.
• • • • • • • • • • • • • • • • • • • •	_	•		straightening it up; ran rods to 4640, couldn't break circulation, pulling
				back.
	Α	0 (0)	4761	
	GY.		, <del>, 1</del> /01	Pulled back 60' and washed and drilled cave to 4712', pulled into casing.
	u I	No shift		

	_				
4/18	D	1		4762	Ran rods in to 4660', drilled and washed to bottom.
	Α	15		4777	(2' setting in on each run [3]).
	GY	12	(28)	4789	
4/19	D	10		4799	2 hrs. surveying hole.
	Α	0		4799	2-1/2 hrs. surveying hole; pulled rods for bit change @ 4799'.
	GY	0	(10)	4799	Greased and lowered rods; drilling and washing cave at 4672'.
4/20	D	3		4802	Washed in from 4724-4799, clay and sand in walls; some cave on bottom.
	Α	12		4814	(cleaning on drill).
>	GY	9	(24)	4823	(slow, short runs).
4/21	D	7		4830	
	Α	0		4830	Bit wouldn't go pulled and changed bit and shell @ 4830'.
	GY	0	(7)	4830	Greased and lowered to 3700'; cleaned up and locked up for weekend.
Sunday		_	.,,		
4/23	D	0		4830	Lowered to 4685', reamed and cleaned to 4802'.
	Α	10		4840	Drilled out 20' of cave in bottom.
	GY	5	(15)	4845	Made 5' run; couldn't latch on tube, put on brass coupling still
			(.,,		couldn't latch, started pulling out, rods broke at 283' from top, tried
					to tap in.
4/24	D	0		4845	Tapped in, removed broken rod, pulled tube, washing in.
.,	Ā	Ŏ		4845	Drilled and washed 17' of cave, bit was shot, pulled for bit change.
	GY	Ö	(0)	4845	Greased and lowered to 4640', washed to 4729' and drilled cave to 4731'.
4/25	D.	ő	(0)	4845	Washing in to 4840' with new bit.
-1/23	A	10		4855	Drilled 5' of cave to bottom.
	GΥ	2	(12)	4857	(3-1/2 hrs. drilling) Bit stopped. Reduced to AXWL by leaving 4857' of
	Q I	4	(12)	40J/	rods, core barrel, shell, and bit in hole. (3-1/2 hrs. 'casing')
					(1 hr. cleaning mud tanks).
4/26	D				8 hrs. casing; unloaded truck from yard; made up AX.
47 20	A				8 hrs. casing; made up 3550' AX for total 4586'.
•	GY -	0		4857	8 hrs. lowering rods and cleaning out inside casing.
4/27	D	0		4857	8 hrs. delay, pulled rods to make sure of count OK, running rods
7/4/	U	U		402/	in hole.
	٨	· 4		4861	
1	A GY	6	(10)	4867	5 hrs. delay lowered 2900' and drilled thru BX bit. (short runs) Put everything away for weekend.
Saturda		. 0	(10)	400/	(Short runs) but everything away for weekend.
	<b>∃y</b>				
Sunday	n	^		4867	Unable to store much arrive. Changed storter didn't work. Called Tussen
4/30	D	0		400/	Unable to start pump engine. Changed starter, didn't work. Called Tucson
	Λ.			1.072	and got heavy duty starter. OK.
	Α	6		4873	2 hrs. delay waiting on starter for pump engine; 1/2 hr. repair putting it
	ΛV	^	(6)	1.072	On.
	GY	0	(6)	4873	Tried making run. Pulled for bit change @ 4873', started in greasing rods.

HOLE A	4-11 -	Continue	d
--------	--------	----------	---

5/01	D	4		4877	Ran in 2680' of rods, circulated to equalize, lost core in rods.
	Α	0		4877	Pulled rods to recover core, changed bit and shell, lowered 1050'. back
					in hole.
	GY	8	(12)	4885	Lowered 3800' after bit change @ 4277'.
5/02	D	13		4898	(recov. 5' of 13').
	Α	6		4904	Chased tube down at start of shift, made 3-1/2' run but no core; chased
		•			2nd run of 2-1/2', still no core. Started pulling.
	GY	0	(19)	4904	Pulled 3100' for mislatch, lowered with new bit.
5/03	D	0.		4904	Called warehouse for stuff - met truck from Tucson; repaired wireline,
					pulled tube, lowered 80' to bottom, put tube in.
	A	7		4911	(Chasing tube every run [3]).
	GY	9	(16)	4920	
5/04	D	2	•	4922	Sand coming in at 4922', tube sanded in, couldn't pump. Pulled rods.
					Cleaned wireline and added.
	Α	4		4926	Tube was down at start of shift but not latched. Pulled rods to get core,
					changed bit (recov. 0.2' of 4').
	GY	4	(10)	4930	Greased and lowered rods, washed and cut 5' of cave.
5/05	D	3		4933	(Replaced wear ring and packing in swivel).
	Α	3 2		4935	Chased tube 2nd time, couldn't get circulation. Pulled tube out.
					Cleaned hole with new mud.
	GY	3	(8)	4938	Chased tube and made 3' core run, no core, pulled rods and recovered
					1/2' of core.
Sunday					
5/07	D	0		4938	3-1/2 hrs. delay hauling mud, chemicals, and grease (no helper).
				4	4-1/2 hrs. repair starter (drill), friction bands, service rig.
	Α	0		4938	Lowered rods, hit bridge at 4885', drilled and washed to 4930'.
	GY	1	(1)	4939	Drilled and washed 29-1/2' of cave to bottom. Had to redrill bottom 10'
					three times (sand coming in).
5/08	D	0			Pumping hole, tube sanded in. Unable to hold tube. Contacted all
					changing mud to LoLoss System.
	Α	0			Started pulling wet stands, cleaned mud tanks.
	GY	0	(0)	4939	Lowered 3870', pumped new mud. Raining all shift.
5/09	D	0			Conditioning hole got to 62' of bottom.
	Α	. 0			Wouldn't go past bridge, pulled, put on barrel and lowered in 4700'.
	GY	0	(0)	4939	Lowered to 4900', washed and drilled cave to 4929'.
5/10	D	0		,	Washed and drilled to 4939', one spot still coming in, reamed several times
		-			with 5-6' fill.
	Α	0			Wouldn't circulate on bottom. Pulled into casing and washed to 4930'.
					Waiting on wedge.
	GY	0	(0)	4939	Drilled and washed cave from 4930 to 4939. Pulled up 3 times, hole appeared
		-	\- <i>\</i>	.,,,,	to stay open each time.

H/H = A - H = A - A - A	1100
HOLE A-11 - Contin	ucu

5/11	D A	0 4939 0	2 hrs. survey time, 3 hrs. delay for wedge. (3 hrs) Ran in hole. 4 hrs. survey time and setting wedge (at 4930±). 1 bag Aluminite
			Cement, pressured up, set-up in rods.
	GY	0 (0) 4939	Pulled wet stands; cement in 270' of rods. Cleaned out 20 ft.
Saturd	ay		
Sunday	·		
5/14	D	0	8 hrs. delay. Called Tucson, decided to wash out and cement again; cleaned cement from 20 - 10' rods. Started in hole.
7	Α	0 (0) (4909)	Finished lowering rods and washed from 4870 to 4909 10 ft. above top of wedge.
	GY	No shift called in	
5/15	D	0 (4920±)	
	Α	0 (0)	Finished pumping cement down pulled rods out.
	GY	No shift crew.	
5/16	D	0	Waiting on cement to set. Cleaned cement from 5 rods; ran 2280 rods in hole and washed.
	Α	0 (0)	Lowered and washed (in 75-' jumps) to 4330'.
	GY	No shift crew.	
5/17	D	0	Washed rods down to 4784'. Hit some cement at 4657-4784; not hard, not solid.
	Α	0 (0)	Washed out cement bridges 4784 to 4847. 10' up from bottom of casing.
	GY	No shift crew.	
5/18	D	0	Cleaning mud tanks, waiting for cement to set, washing out hole.
	A.	0 (0)	4-1/2 hrs. worked waiting on cement to set.
	GY	No shift crew.	
Saturd	•		
Sunday		•	
5/21	D	0	Drilled out cement from casing (4957 to 4874' [17']).
	Α	0	Drilled out cement from 4874 to 4896 (221).
	GY	0 (0) (4923)	Drilled out cement from 4896 to 4923 (4' along side of wedge).
		Use this point as new	
5/22	· D	0	Cleaned drill tanks, mixed new mud, pulled for shell and bit change. Ran 2250 in hole.
•	Α	5 (4928)	Finished lowering rods, drilled 9' of cave; made two runs, recovered 3-1/2' of core from 4924-4928.
	GY	2 (7) (4930)	Made 2' run, got 2" core, water pressure high, couldn't make 2nd run, pulled tube out, pumped thin mud.
5/23	D	4 4934	Drilling by wedge.
	A	6 4940	
	GY	6 (16) 4946	Pulled 3300' out for bit change @ 4946'.

A 6 4952 Drilled 7' of cave from bottom plus 2-3' per run (3).  GY 0 (6) 4952 2 hrs. pulling into casing no helper.  Cleaned tanks, unable to penetrate before blocking.  A 7 (9) 4961 Pulled rods back to casing.  GY Driller sick no shift.  5/26 D 3 4964 Takes 2 runs to clean out hole each morning.  A 5 (8) 4969 Pulled rods back to casing and put things away.  GY No shift.  Sunday Holiday  5/29 D 5 4974  A 1 (6) 4975 Pulled for bit change @ 4975', lowered 2550' back in.  GY No shift.  5/30 D 5 4980 Completed bit change; 2' sand and sludge; 8" cave.  A 11 (16) 4991 Chasing tube every run, pulled up into casing.  GY No shift.  5/31 D 6 4997 Cleaned tanks, pulled for bit change @ 4997'.  A 0 (6) 4997 Finished bit change and ran in to bottom of casing.  GY No shift.  6/01 D 6 5003 Put rods on bottom, 2' sand, 10" cave.  GY No shift.  6/02 D 6 5021  A 5 (11) 5026 Pulled into casing for weekend.  GY No shift.  Sunday  6/04 D 0 5026 Pulled rods for bit change @ 5026, ran in 3450'.					
A	5/24	D	0	4946	Pulled 1650' rods, changed bit, rebuilt innertube head, lowered rods.
GY			6		Drilled 7' of cave from bottom plus 2-3' per run (3).
5/25         D         2         4954 by 4961 yelled rods back to casing.         Cleaned tanks, unable to penetrate before blocking.           5/26         D         3         4964 yelled rods back to casing.           5/26         D         3         4964 yelled rods back to casing and put things away.           6         A         5 (8) yelled rods back to casing and put things away.           8         Completed back to casing and put things away.           8         1 (6) yelled rods back to casing and put things away.           8         1 (6) yelled rods back to casing and put things away.           8         1 (6) yelled rods back to casing and put things away.           8         1 (6) yelled rods back to casing and put things away.           8         1 (6) yelled rods back to casing and put things away.           8         1 (6) yelled rods back to casing and put things away.           8         1 (6) yelled rods back to casing and put things away.           8         1 (1) yelled rods back to casing and put things away.           8         1 (1) yelled rods back to casing and put things away.           9         4975         Pulled rods back to casing and put things away.           9         4975         Pulled rods back to casing and put things away.           1 (1) yelled rods back to casing and put things away.					
A	5/25				
Symbol   S	J J				
5/26 D 3					
A 5 (8) 4969 Pulled rods back to casing and put things away.  Sunday Holiday 5/29 D 5 4974 A 1 (6) 4975 Pulled for bit change @ 4975', lowered 2550' back in.  GY No shift.  5/30 D 5 4980 Completed bit change; 2' sand and sludge; 8" cave. A 11 (16) 4991 Chasing tube every run, pulled up into casing.  GY No shift.  5/31 D 6 4997 Cleaned tanks, pulled for bit change @ 4997'. A 0 (6) 4997 Finished bit change and ran in to bottom of casing.  GY No shift.  6/01 D 6 5003 Put rods on bottom, 2' sand, 10" cave. CY No shift.  6/02 D 6 5021 A 5 (11) 5026 Pulled into casing for weekend.  GY No shift.  Sunday  6/04 D 0 5026 Pulled rods for bit change @ 5026, ran in 3450'. Finished lowering. Had to clean cave out of wedge! plon bottom.  Chasing tube every time.  6/05 D 9 5047 A 12 5059 GY 8 (29) 5067 Chasing tube every time.  6/06 D 7 5074 Pulling for bit change @ 5074'. A 12 5085 Serviced rig, cleaned tanks, trying to hold out sand. A 9 5085 Serviced rig, cleaned tanks, trying to hold out sand. A 9 5094 (3 runs).	5/26		3		
Sunday Holiday   Sund	J1 20		5 (8)		
Sunday Holiday 5/29 D 5 4974 A 1 (6) 4975 Pulled for bit change @ 4975', lowered 2550' back in. GY No shift.  5/30 D 5 4980 Completed bit change; 2' sand and sludge; 8" cave. A 11 (16) 4991 Chasing tube every run, pulled up into casing. GY No shift.  5/31 D 6 4997 Cleaned tanks, pulled for bit change @ 4997'. A 0 (6) 4997 Finished bit change and ran into bottom of casing. GY No shift.  6/01 D 6 5003 Put rods on bottom, 2' sand, 10" cave. A 12 (18) 5015 Chasing tube every time. GY No shift.  6/02 D 6 5021 A 5 (11) 5026 Pulled into casing for weekend. GY No shift.  Sunday 6/04 D 0 5026 Pulled rods for bit change @ 5026, ran in 3450'. Finished lowering. Had to clean cave out of wedge! pl on bottom.  GY 8 (12) 5038 Chasing tube every time.  6/05 D 9 5047 A 12 5059 GY 8 (29) 5067 Chasing tube every time.  6/06 D 7 5074 Pulling for bit change @ 5074'. A 0 5074 1-1/2 hr. repair; 6-1/2 hrs. completing bit change and GY 3 (10) 5077 Drilled past bad spot @ 4933', drilled 11' cave at bot Serviced rig, cleaned tanks, trying to hold out sand. A 9 5085 Serviced rig, cleaned tanks, trying to hold out sand. GY 8 (25) 5102 (3 runs).				עטער	ruried rods back to casing and put things away.
Holiday 5/29 D 5 4974 A 1 (6) 4975 Pulled for bit change @ 4975', lowered 2550' back in. GY No shift. 5/30 D 5 4980 Completed bit change; 2' sand and sludge; 8" cave. A 11 (16) 4991 Chasing tube every run, pulled up into casing. GY No shift. 5/31 D 6 4997 Cleaned tanks, pulled for bit change @ 4997'. A 0 (6) 4997 Finished bit change and ran in to bottom of casing. GY No shift. 6/01 D 6 5003 Put rods on bottom, 2' sand, 10" cave. Chasing tube every time. GY No shift. 6/02 D 6 5011 A 5 (11) 5026 Pulled into casing for weekend. GY No shift.  Sunday 6/04 D 0 5026 Pulled rods for bit change @ 5026, ran in 3450'. Finished lowering. Had to clean cave out of wedgel pl on bottom.  GY 8 (12) 5038 Chasing tube every time. 6/05 D 9 5047 A 12 5059 GY 8 (29) 5067 Chasing tube every time. 6/06 D 7 5074 Pulling for bit change @ 5074'. A 12 5059 GY 8 (29) 5067 Chasing tube every time. 6/07 D 8 5085 Serviced rig, cleaned tanks, trying to hold out sand. A 9 5094 (3 runs). GY 8 (25) 5102 (3 runs).	Sunday	G.	MO SHILL		
5/29 D 5 4974 A 1 (6) 4975 Pulled for bit change @ 4975', lowered 2550' back in.  GY No shift.  5/30 D 5 4980 Completed bit change; 2' sand and sludge; 8" cave. A 11 (16) 4991 Chasing tube every run, pulled up into casing. GY No shift.  5/31 D 6 4997 Cleaned tanks, pulled for bit change @ 4997'. A 0 (6) 4997 Finished bit change and ran in to bottom of casing. GY No shift.  6/01 D 6 5003 Put rods on bottom, 2' sand, 10" cave. Chasing tube every time.  GY No shift.  6/02 D 6 5021 A 5 (11) 5026 Pulled into casing for weekend. GY No shift.  Sunday 6/04 D 0 5026 Pulled rods for bit change @ 5026, ran in 3450'. Finished lowering. Had to clean cave out of wedge! plon bottom.  GY 8 (12) 5038 Finished lowering. Had to clean cave out of wedge! plon bottom.  GY 8 (29) 5067 Chasing tube every time.  6/06 D 7 5074 Pulling for bit change @ 5074'. A 12 5059 GY 8 (29) 5067 Chasing tube every time.  6/07 D 8 5085 Serviced rig, cleaned tanks, trying to hold out sand. A 9 5094 (3 runs). GY 8 (25) 5102 (3 runs).	_				
A 1 (6) 4975 Pulled for bit change @ 4975', lowered 2550' back in.  GY No shift.  5/30 D 5 4980 Completed bit change; 2' sand and sludge; 8" cave. A 11 (16) 4991 Chasing tube every run, pulled up into casing.  GY No shift.  5/31 D 6 4997 Cleaned tanks, pulled for bit change @ 4997'. A 0 (6) 4997 Finished bit change and ran in to bottom of casing.  GY No shift.  6/01 D 6 5003 Put rods on bottom, 2' sand, 10" cave.  CY No shift.  GY No shift.  GY No shift.  5/31 D 6 4997 Cleaned tanks, pulled for bit change @ 4997'.  Finished bit change and ran in to bottom of casing.  Chasing tube every time.  Chasing tube every time.  Fulled rods for bit change @ 5026, ran in 3450'.  Finished lowering. Had to clean cave out of wedge! plon bottom.  GY 8 (12) 5038 Chasing tube every time.  GY 8 (29) 5067 Chasing tube every time.  6/05 D 9 5047  A 12 5059  GY 8 (29) 5067 Chasing tube every time.  6/06 D 7 5074 Pulling for bit change @ 5074'.  A 0 5074 Pulling for bit change @ 5074'.  A 0 5074 Pulling for bit change @ 5074'.  A 0 5074 Pulling for bit change @ 5074'.  A 0 5074 Pulling for bit change @ 5074'.  A 0 5074 Pulling for bit change @ 5074'.  A 0 5074 Pulling for bit change @ 5074'.  A 0 5074 Pulling for bit change @ 5074'.  A 0 5074 Pulling for bit change @ 5074'.  A 0 5074 Pulling for bit change @ 5074'.  A 0 5074 Pulling for bit change @ 5074'.  A 0 5074 Pulling for bit change @ 5074'.  A 0 5074 Pulling for bit change @ 5074'.  A 0 5074 Pulling for bit change @ 5074'.  A 0 5074 Pulling for bit change @ 5074'.  A 0 5074 Pulling for bit change @ 5074'.  A 0 5074 Pulling for bit change @ 5074'.  A 0 5074 Pulling for bit change @ 5074'.  A 0 5074 Pulling for bit change @ 5074'.  B 0 5085 Pulled rods for bit change @ 5074'.  B 0 5086 Pulled rods for bit change @ 5074'.  B 0 5086 Pulled rods for bit change @ 5074'.  B 0 5086 Pulled rods for bit change @ 5074'.  B 0 5086 Pulled rods for bit change @ 5074'.  B 0 5086 Pulled rods for bit change @ 5086 Pulled rods for bit change @ 5086 Pulled rods for bit change @ 5086 Pulled rods	•	_	E	1,071,	
GY No shift.  5/30 D 5 4980 Completed bit change; 2' sand and sludge; 8" cave. A 11 (16) 4991 Chasing tube every run, pulled up into casing. GY No shift.  5/31 D 6 4997 Cleaned tanks, pulled for bit change @ 4997'. A 0 (6) 4997 Finished bit change and ran in to bottom of casing. GY No shift.  6/01 D 6 5003 Put rods on bottom, 2' sand, 10" cave. A 12 (18) 5015 Chasing tube every time.  6/02 D 6 5021 A 5 (11) 5026 Pulled into casing for weekend. GY No shift.  Sunday 6/04 D 0 5026 Pulled rods for bit change @ 5026, ran in 3450'. Finished lowering. Had to clean cave out of wedge! pl on bottom.  GY 8 (12) 5038 Chasing tube every time.  6/05 D 9 5047 A 12 5059 GY 8 (29) 5067 Chasing tube every time.  6/06 D 7 5074 Pulling for bit change @ 5074'. A 0 5074 Pulling for bit change @ 5074'. A 0 5074 Pulling for bit change @ 5074'. A 0 5074 Pulling for bit change @ 5074'. A 0 5074 Pulling for bit change @ 5074'. A 0 5074 Pulling for bit change @ 5074'. A 0 5074 Pulling for bit change @ 5074'. A 0 5074 Pulling for bit change @ 5074'. A 0 5074 Pulling for bit change @ 5074'. A 0 5074 Pulling for bit change @ 5074'. A 0 5074 Pulling for bit change @ 5074'. A 0 5074 Pulling for bit change @ 5074'. A 0 5074 Pulling for bit change @ 5074'. A 0 5074 Pulling for bit change @ 5074'. A 0 5085 Serviced rig, cleaned tanks, trying to hold out sand. A 9 5094 (3 runs).	37 43		1 (6)		Pulled for hit change @ 1975! lowered 2550! hack in
5/30 D 5				43/3	ruited for bit change @ 43/5 , towered 2550 back in.
A 11 (16) 4991 Chasing tube every run, pulled up into casing.  5/31 D 6 4997 Cleaned tanks, pulled for bit change @ 4997'.  A 0 (6) 4997 Finished bit change and ran in to bottom of casing.  GY No shift.  6/01 D 6 5003 Put rods on bottom, 2' sand, 10" cave.  A 12 (18) 5015 Chasing tube every time.  GY No shift.  6/02 D 6 5021  A 5 (11) 5026 Pulled into casing for weekend.  GY No shift.  Sunday  6/04 D 0 5026 Pulled rods for bit change @ 5026, ran in 3450'.  A 12 5030 Finished lowering. Had to clean cave out of wedge! plon bottom.  GY 8 (12) 5038 Chasing tube every time.  6/05 D 9 5047  A 12 5059  GY 8 (29) 5067 Chasing tube every time.  6/06 D 7 5074 Pulling for bit change @ 5074'.  A 0 5074 I-1/2 hr. repair; 6-1/2 hrs. completing bit change and GY 3 (10) 5077 Drilled past bad spot @ 4933', drilled 11' cave at bot 607 D 8 5085 Serviced rig, cleaned tanks, trying to hold out sand.  A 9 5094 (3 runs).	E /20			1.000	
GY No shift.  5/31 D 6 4997 Cleaned tanks, pulled for bit change @ 4997'.  A 0 (6) 4997 Finished bit change and ran in to bottom of casing.  GY No shift.  6/01 D 6 5003 Put rods on bottom, 2' sand, 10" cave.  A 12 (18) 5015 Chasing tube every time.  GY No shift.  6/02 D 6 5021  A 5 (11) 5026 Pulled into casing for weekend.  GY No shift.  Sunday  6/04 D 0 5026 Pulled rods for bit change @ 5026, ran in 3450'.  Finished lowering. Had to clean cave out of wedge! plon bottom.  GY 8 (12) 5038 Chasing tube every time.  6/05 D 9 5047  A 12 5059  GY 8 (29) 5067 Chasing tube every time.  6/06 D 7 5074 Pulling for bit change @ 5074'.  A 0 5074 1-1/2 hr. repair; 6-1/2 hrs. completing bit change and GY 3 (10) 5077 Drilled past bad spot @ 4933', drilled 11' cave at bot 6/07 D 8 5085 Serviced rig, cleaned tanks, trying to hold out sand.  A 9 5084 (3 runs).  GY 8 (25) 5102 (3 runs).	5/30	_		-	
5/31 D 6 4997 Cleaned tanks, pulled for bit change @ 4997'. A 0 (6) 4997 Finished bit change and ran in to bottom of casing.  6/01 D 6 5003 Put rods on bottom, 2' sand, 10" cave. A 12 (18) 5015 Chasing tube every time.  6/02 D 6 5021 A 5 (11) 5026 Pulled into casing for weekend.  Sunday 6/04 D 0 5026 Pulled rods for bit change @ 5026, ran in 3450'.  A 4 5030 Finished lowering. Had to clean cave out of wedge! plon bottom.  GY 8 (12) 5038 Chasing tube every time.  6/05 D 9 5047 A 12 5059 GY 8 (29) 5067 Chasing tube every time.  6/06 D 7 5074 Pulling for bit change @ 5074'. A 0 5074 Pulling for bit change @ 5074'. A 0 5074 Pulling for bit change @ 5074'. A 0 5074 Pulling for bit change @ 5074'. A 0 5074 Pulling for bit change @ 5074'. A 0 5074 Pulling for bit change @ 5074'. A 0 5074 Pulling for bit change @ 5074'. A 0 5075 Pulling for bit change @ 5074'. A 0 5076 Pulling for bit change @ 5074'. A 0 5077 Pulling for bit change @ 5074'. A 0 5085 Serviced rig, cleaned tanks, trying to hold out sand. A 9 5094 (3 runs). GY 8 (25) 5102 (3 runs).				4991	thasing tube every run, pulled up into casing.
A 0 (6) 4997 Finished bit change and ran in to bottom of casing.  GY No shift.  6/01 D 6 5003 Put rods on bottom, 2' sand, 10" cave.  A 12 (18) 5015 Chasing tube every time.  GY No shift.  6/02 D 6 5021  A 5 (11) 5026 Pulled into casing for weekend.  GY No shift.  Sunday  6/04 D 0 5026 Pulled rods for bit change @ 5026, ran in 3450'.  A 4 5030 Finished lowering. Had to clean cave out of wedge! plon bottom.  GY 8 (12) 5038 Chasing tube every time.  6/05 D 9 5047  A 12 5059  GY 8 (29) 5067 Chasing tube every time.  6/06 D 7 5074 Pulling for bit change @ 5074'.  A 0 5074 Pulling for bit change @ 5074'.  A 0 5074 Pulling for bit change @ 5074'.  A 0 5074 Pulling for bit change @ 5074'.  A 0 5074 Pulling for bit change @ 5074'.  A 0 5074 Pulling for bit change @ 5074'.  A 0 5074 Pulling for bit change @ 5074'.  A 0 5074 Pulling for bit change @ 5074'.  A 0 5074 Pulling for bit change @ 5074'.  A 0 5074 Pulling for bit change @ 5074'.  A 0 5074 Pulling for bit change @ 5074'.  A 0 5074 Pulling for bit change @ 5074'.  A 0 5074 Pulling for bit change @ 5074'.  A 0 5074 Pulling for bit change @ 5074'.  A 0 5085 Serviced rig, cleaned tanks, trying to hold out sand.  A 9 5094 (3 runs).  GY 8 (25) 5102 (3 runs).				100-	
GY No shift.  6/01 D 6 5003 Put rods on bottom, 2' sand, 10" cave. A 12 (18) 5015 Chasing tube every time.  GY No shift.  6/02 D 6 5021 A 5 (11) 5026 Pulled into casing for weekend.  GY No shift.  Sunday 6/04 D 0 5026 Pulled rods for bit change @ 5026, ran in 3450'. A 4 5030 Finished lowering. Had to clean cave out of wedgel plon bottom.  GY 8 (12) 5038 Chasing tube every time.  6/05 D 9 5047 A 12 5059 GY 8 (29) 5067 Chasing tube every time.  6/06 D 7 5074 Pulling for bit change @ 5074'. A 0 5074 1-1/2 hr. repair; 6-1/2 hrs. completing bit change and GY 3 (10) 5077 D 11-1/2 hr. repair; 6-1/2 hrs. completing bit change and GY 3 (10) 5077 D 1-1/2 hr. repair; 6-1/2 hrs. completing bit change and GY 3 (10) 5077 D 1-1/2 hr. repair; 6-1/2 hrs. completing bit change and GY 3 (10) 5077 D 1-1/2 hr. repair; 6-1/2 hrs. completing bit change and GY 3 (10) 5077 D 1-1/2 hr. repair; 6-1/2 hrs. completing bit change and GY 3 (10) 5077 D 1-1/2 hr. repair; 6-1/2 hrs. completing bit change and GY 3 (10) 5077 D 1-1/2 hr. repair; 6-1/2 hrs. completing bit change and GY 3 (10) 5077 D 1-1/2 hr. repair; 6-1/2 hrs. completing bit change and GY 3 (10) 5077 D 1-1/2 hr. repair; 6-1/2 hrs. completing bit change and GY 3 (10) 5077 D 1-1/2 hr. repair; 6-1/2 hrs. completing bit change and GY 3 (10) 5077 D 1-1/2 hr. repair; 6-1/2 hrs. completing bit change and GY 3 (10) 5077 D 1-1/2 hr. repair; 6-1/2 hrs. completing bit change and GY 3 (10) 5077 D 1-1/2 hr. repair; 6-1/2 hrs. completing bit change and GY 3 (10) 5077 D 1-1/2 hr. repair; 6-1/2 hrs. completing bit change and GY 3 (10) 5077 D 1-1/2 hr. repair; 6-1/2 hrs. completing bit change and GY 3 (10) 5077 D 1-1/2 hr. repair; 6-1/2 hrs. completing bit change and GY 3 (10) 5077 D 1-1/2 hr. repair; 6-1/2 hrs. completing bit change and GY 3 (10) 5077 D 1-1/2 hr. repair; 6-1/2 hrs. completing bit change and GY 3 (10) 5077 D 1-1/2 hr. repair; 6-1/2 hrs. completing bit change and GY 3 (10) 5077 D 1-1/2 hr. repair; 6-1/2 hrs. repair; 6-1/2 hrs. completing bit change and GY 3 (10) 5077 D 1-1/2 hrs. r	5/31				
6/01 D 6				4997	Finished bit change and ran in to bottom of casing.
A 12 (18) 5015 Chasing tube every time.  GY No shift.  6/02 D 6 5021 A 5 (11) 5026 Pulled into casing for weekend.  GY No shift.  Sunday  6/04 D 0 5026 Pulled rods for bit change @ 5026, ran in 3450'. A 4 5030 Finished lowering. Had to clean cave out of wedge! plon bottom.  GY 8 (12) 5038 Chasing tube every time.  6/05 D 9 5047 A 12 5059 GY 8 (29) 5067 Chasing tube every time.  6/06 D 7 5074 Pulling for bit change @ 5074'.  A 0 5074 I-1/2 hr. repair; 6-1/2 hrs. completing bit change and GY 3 (10) 5077 Drilled past bad spot @ 4933', drilled 11' cave at bot 5085 Serviced rig, cleaned tanks, trying to hold out sand.  A 9 5094 (3 runs).  GY 8 (25) 5102 (3 runs).			_		
GY No shift.  6/02 D 6 5021 A 5 (11) 5026 Pulled into casing for weekend. GY No shift.  Sunday 6/04 D 0 5026 Pulled rods for bit change @ 5026, ran in 3450'. A 4 5030 Finished lowering. Had to clean cave out of wedge! plon bottom.  GY 8 (12) 5038 Chasing tube every time.  6/05 D 9 5047 A 12 5059 GY 8 (29) 5067 Chasing tube every time.  6/06 D 7 5074 Pulling for bit change @ 5074'. A 0 5074 1-1/2 hr. repair; 6-1/2 hrs. completing bit change and GY 3 (10) 5077 Drilled past bad spot @ 4933', drilled 11' cave at bot 5085 Serviced rig, cleaned tanks, trying to hold out sand. A 9 5094 (3 runs). GY 8 (25) 5102 (3 runs).	6/01	D	<del>-</del>		Put rods on bottom, 2' sand, 10" cave.
6/02 D 6 5021 A 5 (11) 5026 Pulled into casing for weekend.  GY No shift.  Sunday 6/04 D 0 5026 Pulled rods for bit change @ 5026, ran in 3450'. A 4 5030 Finished lowering. Had to clean cave out of wedge! plon bottom.  GY 8 (12) 5038 Chasing tube every time.  6/05 D 9 5047 A 12 5059 GY 8 (29) 5067 Chasing tube every time.  6/06 D 7 5074 Pulling for bit change @ 5074'. A 0 5074 1-1/2 hr. repair; 6-1/2 hrs. completing bit change and GY 3 (10) 5077 Drilled past bad spot @ 4933', drilled 11' cave at bot Serviced rig, cleaned tanks, trying to hold out sand.  A 9 5094 (3 runs).  GY 8 (25) 5102 (3 runs).		Α	12 (18)	5015	Chasing tube every time.
A 5 (11) 5026 Pulled into casing for weekend.  Sunday 6/04 D 0 5026 Pulled rods for bit change @ 5026, ran in 3450'.  A 4 5030 Finished lowering. Had to clean cave out of wedge! plon bottom.  GY 8 (12) 5038 Chasing tube every time.  6/05 D 9 5047  A 12 5059  GY 8 (29) 5067 Chasing tube every time.  6/06 D 7 5074 Pulling for bit change @ 5074'.  A 0 5074 1-1/2 hr. repair; 6-1/2 hrs. completing bit change and GY 3 (10) 5077 Drilled past bad spot @ 4933', drilled 11' cave at bot 5085 Serviced rig, cleaned tanks, trying to hold out sand.  A 9 5094 (3 runs).  GY 8 (25) 5102 (3 runs).		GY ·	No shift.		
GY No shift.  Sunday 6/04 D 0 5026 Pulled rods for bit change @ 5026, ran in 3450'.  A 4 5030 Finished lowering. Had to clean cave out of wedge! pl on bottom.  GY 8 (12) 5038 Chasing tube every time.  6/05 D 9 5047  A 12 5059  GY 8 (29) 5067 Chasing tube every time.  6/06 D 7 5074 Pulling for bit change @ 5074'.  A 0 5074 1-1/2 hr. repair; 6-1/2 hrs. completing bit change and GY 3 (10) 5077 Drilled past bad spot @ 4933', drilled 11' cave at bot 6/07 D 8 5085 Serviced rig, cleaned tanks, trying to hold out sand.  A 9 5094 (3 runs).  GY 8 (25) 5102 (3 runs).	6/02	D	6	5021	
Sunday 6/04 D 0 5026 Pulled rods for bit change @ 5026, ran in 3450'.  A 4 5030 Finished lowering. Had to clean cave out of wedge! plon bottom.  GY 8 (12) 5038 Chasing tube every time.  6/05 D 9 5047  A 12 5059  GY 8 (29) 5067 Chasing tube every time.  6/06 D 7 5074 Pulling for bit change @ 5074'.  A 0 5074 1-1/2 hr. repair; 6-1/2 hrs. completing bit change and GY 3 (10) 5077 Drilled past bad spot @ 4933', drilled 11' cave at bot 5085 Serviced rig, cleaned tanks, trying to hold out sand.  A 9 5094 (3 runs).  GY 8 (25) 5102 (3 runs).		Α	5 (11)	5026	Pulled into casing for weekend.
6/04 D 0 5026 Pulled rods for bit change @ 5026, ran in 3450'.  A 4 5030 Finished lowering. Had to clean cave out of wedgel plon bottom.  GY 8 (12) 5038 Chasing tube every time.  6/05 D 9 5047  A 12 5059  GY 8 (29) 5067 Chasing tube every time.  6/06 D 7 5074 Pulling for bit change @ 5074'.  A 0 5074 1-1/2 hr. repair; 6-1/2 hrs. completing bit change and GY 3 (10) 5077 Drilled past bad spot @ 4933', drilled 11' cave at bot 5085 Serviced rig, cleaned tanks, trying to hold out sand.  A 9 (25) 5102 (3 runs).		GY	No shift.		
A 4 5030 Finished lowering. Had to clean cave out of wedge! plean bottom.  GY 8 (12) 5038 Chasing tube every time.  6/05 D 9 5047 A 12 5059 GY 8 (29) 5067 Chasing tube every time.  6/06 D 7 5074 Pulling for bit change @ 5074'.  A 0 5074 I-1/2 hr. repair; 6-1/2 hrs. completing bit change and GY 3 (10) 5077 Drilled past bad spot @ 4933', drilled 11' cave at bot 5085 Serviced rig, cleaned tanks, trying to hold out sand.  A 9 (25) 5102 (3 runs).	Sunday				
A 4 5030 Finished lowering. Had to clean cave out of wedge! plean bottom.  GY 8 (12) 5038 Chasing tube every time.  6/05 D 9 5047 A 12 5059 GY 8 (29) 5067 Chasing tube every time.  6/06 D 7 5074 Pulling for bit change @ 5074'.  A 0 5074 I-1/2 hr. repair; 6-1/2 hrs. completing bit change and GY 3 (10) 5077 Drilled past bad spot @ 4933', drilled 11' cave at bot 5085 Serviced rig, cleaned tanks, trying to hold out sand.  A 9 (25) 5102 (3 runs).	6/04	D	0	5026	Pulled rods for bit change @ 5026, ran in 3450'.
on bottom.  GY 8 (12) 5038 Chasing tube every time.  6/05 D 9 5047  A 12 5059  GY 8 (29) 5067 Chasing tube every time.  6/06 D 7 5074 Pulling for bit change @ 5074'.  A 0 5074 1-1/2 hr. repair; 6-1/2 hrs. completing bit change and GY 3 (10) 5077 Drilled past bad spot @ 4933', drilled 11' cave at bot 5085 Serviced rig, cleaned tanks, trying to hold out sand.  A 9 5094 (3 runs).  GY 8 (25) 5102 (3 runs).		A	4		Finished lowering. Had to clean cave out of wedge! plus 14' of cave
GY 8 (12) 5038 Chasing tube every time.  6/05 D 9 5047 A 12 5059 GY 8 (29) 5067 Chasing tube every time.  6/06 D 7 5074 Pulling for bit change @ 5074'.  A 0 5074 1-1/2 hr. repair; 6-1/2 hrs. completing bit change and GY 3 (10) 5077 Drilled past bad spot @ 4933', drilled 11' cave at bot 5085 Serviced rig, cleaned tanks, trying to hold out sand.  A 9 (25) 5102 (3 runs).					
6/05 D 9 5047 A 12 5059 GY 8 (29) 5067 Chasing tube every time. 6/06 D 7 5074 Pulling for bit change @ 5074'. A 0 5074 1-1/2 hr. repair; 6-1/2 hrs. completing bit change and GY 3 (10) 5077 Drilled past bad spot @ 4933', drilled 11' cave at bot 5085 Serviced rig, cleaned tanks, trying to hold out sand. A 9 (3 runs). GY 8 (25) 5102 (3 runs).		GY	8 (12)	5038	
A 12 5059 GY 8 (29) 5067 Chasing tube every time. 6/06 D 7 5074 Pulling for bit change @ 5074'. A 0 5074 1-1/2 hr. repair; 6-1/2 hrs. completing bit change and GY 3 (10) 5077 Drilled past bad spot @ 4933', drilled 11' cave at bot 5085 Serviced rig, cleaned tanks, trying to hold out sand. A 9 (3 runs). GY 8 (25) 5102 (3 runs).	.6/05				
GY 8 (29) 5067 Chasing tube every time.  6/06 D 7 5074 Pulling for bit change @ 5074'.  A 0 5074 1-1/2 hr. repair; 6-1/2 hrs. completing bit change and GY 3 (10) 5077 Drilled past bad spot @ 4933', drilled 11' cave at bot Serviced rig, cleaned tanks, trying to hold out sand.  A 9 (3 runs).  GY 8 (25) 5102 (3 runs).		_			
6/06 D 7 5074 Pulling for bit change @ 5074'.  A 0 5074 1-1/2 hr. repair; 6-1/2 hrs. completing bit change and GY 3 (10) 5077 Drilled past bad spot @ 4933', drilled 11' cave at bot 5085 Serviced rig, cleaned tanks, trying to hold out sand.  A 9 (3 runs).  GY 8 (25) 5102 (3 runs).					Chasing tube every time.
A 0 5074 1-1/2 hr. repair; 6-1/2 hrs. completing bit change and GY 3 (10) 5077 Drilled past bad spot @ 4933', drilled 11' cave at bot 6/07 D 8 5085 Serviced rig, cleaned tanks, trying to hold out sand. A 9 (3 runs).  GY 8 (25) 5102 (3 runs).	6/06				
GY 3 (10) 5077 Drilled past bad spot @ 4933', drilled 11' cave at bot 6/07 D 8 5085 Serviced rig, cleaned tanks, trying to hold out sand. A 9 (3 runs). GY 8 (25) 5102 (3 runs).					
6/07 D 8 5085 Serviced rig, cleaned tanks, trying to hold out sand. A 9 5094 (3 runs). GY 8 (25) 5102 (3 runs).					
A 9 5094 (3 runs). GY 8 (25) 5102 (3 runs).	6/07		8		
GY 8 (25) 5102 (3 runs).	<b>4</b> 1,41				
O/OO O J JIE \Z tuis/.	6708				
A 9 5120 (3 runs).	0/40				
			, ,		
GY 7 (25) 5127 Pulled rods in casing for weekend.		GY	/ (45)	214/	rulled lods in casing for weekend.

Saturda	•			
Sunday				
6/11	D A	1	5128 5129	3 hrs. delay hauling fuel; washed bridges and drilled @ 4927 to 5047'.
	Α .	1 /2		Pulled rods for bit change @ 5129'.
	GY	1 (3		Completed change; drilled to bridge and 2' cave from 4905'.
6/12	D	3	5133	Mixed tank new mud. Trouble with sludge and hi pressure.
	Α	7	5140	(2 runs, chasing tube every run).
	GY	8 (1	8) 5148	(3 runs).
6/13 -	D	5	5153	Pulling for bit change @ 5133'.
	A	Ó.	5153	Complete change, started in hole.
	GY	3 (8		Drilled 4 bridges and 7' of fill to bottom.
6/11				
6/14	D	3	5159	4 hrs. delay, new swivel. Cleaned tanks.
	Α	0	5159	Finished pumping new mud in hole. Pulled to recover core in bit; changed bit @ 5159'.
	GY	1 (4	) 5160	Lowered rods, cut 4 bridges and 5 ft. of fill.
6/15		8	5168	Lowered rods, cut 4 bridges and 5 ft. or fift.
0/12	D.			3000 // 33 1 4 1
	Α	2	5170	Water pressure 1000#; pulled tube and tried another run no go; washing heavy mud from hole.
	GY	5 (1	5) 5175	Pulled for bit change @ 5175'.
6/16	D	ó	J, J.72	I hr. repair; finished change and started in.
0,10	A	ŏ		Washed sand and cave from 5137'; bad spot at 5143' drilled area 4
	^ .	U		times.
•	GY	0	5175	Tried to drill out 1' of cave to bottom, would not go. Pulled for bit
	۵.	· ·	2172	change at 5175' No crown on bit.
Sunday				change at Jijj No Crown on bit.
•		•		
6/18	D	0		Running rods in hole to recover lost crown.
	Α	0		Slow head sanded up; drilled four bridges from 5136'. Pulled rods for
				bit change.
	GY	0	5175	Started drilling sand & cave @ 5117'; got within 6' of bottom.
6/19	D	0		2-1/2 hrs. repair; cut out and recovered part of lost bit.
	Α .	0		Cut l' of cave on bottom; bit wouldn't go; pulled for survey tomorrow.
	GY	. 0	5175	Lowered rods with open rod for survey; washing cave from 4870-4918'.
6/20	D.	Ö	5175	T.D. Hole. 8 hrs. washing to 5169 to survey hole.
0/20		Ų	21/2	
	A			12 hrs. surveying hole; had to replace mud with water to get tool in.
	GY	No GY shi		
6/21	D		injector lin t down in 0	e; broke out 60' of AX; washed out inside casing; stood 4800' in tower,
	Α			casing, tried to circulate no go; lowered cutter to 4790, would not
	7.		arted out.	casting, titled to circulate the go, lowered cutter to 4/30, would not
	· rv	•		
( 100	GY	No GY shi		l dead
6/22	D		•	ned and greased cutters; returned to 4100'.
	Α	Lowered i		blade wouldn't come out of cutter. Pulled rods, cleaned out cutter; got
	GY	No GY shi		
	u i	110 G1 3111	1 6 4	

# HOLE A-11 - Continued

Saturda Sunday	У	
6/25	D	(double crews) Running rods in hole; rods slipped but caught on foot clamp. Lead driller to
		Tucson warehouse for parts and AX tap; had to cut down drum and hooked up rods.
6/26	D	(double crews) Ran rods in and made cut (where?); no go; pulled to check cutter.
6/27	D	Finished checking cutter; running rods back in hole; but 1680' slipped through clamps; going
		down to connect up.
	Α	Ran 240' of rods in hole; touched top of rods; tried to screw in but rods and cutter pushed on down hole more; pulled to check treads, started back in.
6/28	D	2-1/2 hrs. repair; fished for dropped rods; hooked up and started out.
	Α	Pulled 1710' of rods, broke out 300'; cleaned cutter' running back in hole for another cut.
6/29	D	Attempted cuts at 4650, 4590, and 4580. Casing won't move; pulling rods to check cutters.
	Α	4-1/2 hours. Finished pulling rods and cutter; working on casing with cable; had casing setting
		in foot clamp with 4 feet of stretch when it pulled in two at 97' down.
6/30	D ·	Went after LH rods; made up string; fished out broken pipe; layed down LH rods; made up casing
	·	and connected up. Running in cutters to 3040'.
	Α	Finished running in and tried cutters at 4460 and 4400. Pulling up AX rods.
Sunday		
7/02	D	3 hrs. repair; completed pulling AX rods; pulled on casing and broke it 20' down. Fished it out
	•	and connected up. Running rods in for another cut.
	Α	8 hrs. finished running rods in; tried a cut at 4300, 4200, 4000, and 3770. No luck.
7/03	D	8 hrs. pulling on casing, not loose; rod coupling broke and rods fell to 4920'; made up enough rods to tap in successfully, and pulling rods up.
	A	3 hrs. finished pulling rods, cleaned cutter. Driller sick, went home early.
Holiday		
7/05	D	8 hrs. ran rods in with cutter; cut casing (BX rods) at 3760', worked on them, then cut at 3710 and 3660; pulled, no luck; cut at 3610', no luck, "casings are grouted together".
	Α	8 hrs. made cut at 3610', worked casing with hydraulic; made cut at 3560', worked casing again; tried to break circulation, no luck.
7/06	D	8 hrs. working on stuck casing, got some circulation, put down 45 gal. oil. Broke casing joint,
7700	<b>D</b> .	fished out and hooked up. Pumping.
	Α	8 hrs. circulating thru AX casing (BX rods).
Saturda		o mas chiculating this AA casing (DA Lous).
Sunday	7	
7/09	D	5 hrs. delay waiting on McCullough Services; 3 hrs. finding free-point (3767'), shooting joint and unscrewed at 3755'.
	A	8 hrs. pulling BX drill rods, broke out 2250' in 15's.
	••	a mar parting an artir rode; broke out and the ry of

	Hole	A	1-//	<b>A</b> . <b>I</b>	
	Late/Sh	ft.	Toodage	Lest l	Remarks
	7/10	D	41/2 hrs rea	overing	1505 BX rods used for Ax casing. Total
			reone	375	5 Bx rods. Left inhele 1095 (ie 3755
			plus B	aux but,	shell, outer band, and lately coupling (to 485;
		<del></del>			el of for Tuesas will BXWL rads, breating
			out A)	rods	en 10's.
	The state of the s	A	she brea	leting ou	1 2590 Ax reds.
	7/11	D	This break	in dor	in 1200 Ax rode; Shis loading truck & moving
			load to Tue	SUM	
Proposition of the state of the		A.	3 hes buc	hein out	loot of rods; 5 his helping load out & preprin
			is f	l _	4
	7/12	D			uch for move; getting permit, cleaning
					. (2 crews)
	7/13	D			truck or equipment to Tucson (zcrows).
				1	
be the state of th	Not	2	Left -	n Ho	lo: (to be recovered):
					137' of 4" casing
	A CONTRACTOR AND A CONT				2580 of NX casing a / diamond shoe
	The second secon				3772 of Bx casing with no shoe.
					<del></del>
The state of the s					
A manage and a second of the s					
t part part mayor agree a					



December 26, 1979

TO: F. T. Graybeal

FROM: J. D. Sell

Complete
Drill Hole A-10
Core Drilling Costs
Superior East Project
Pinal County, Arizona

Core drilling was initiated from the surface on May 5, 1977 and carried to the depth of 3571 feet. At this point the rige was removed from the site to initiate a hole on another project. An interim (incomplete) report on costs was submitted for this work on August 22, 1977. The casing had been left in the hole and was rented from August 3 until November 15, 1977, when the hole was reentered and carried to a terminal depth of 4282 feet.

Core drilling costs are distributed as follows covering the completed hole to 4282 feet.

Drilling Charges:	\$ Cost	\$/ft.
A. Direct Drilling	\$ 85,963.72	\$20.08
B. Site Preparation C. Field Administration	3,229.62	0.76
1. Supervision and Geology	12,430.11	2.90
<ol><li>Sampling and Assaying</li></ol>	2,785.93	0.65
<ol><li>Miscellaneous</li></ol>	<u>529.07</u>	0.12
Drilling Charges Sub-Total	\$104,938.45	\$24.51
Project Charges:		
D. General Administration	\$ 5,554.03	\$ 1.30
E. Legal Fees	40.00	0.01
F. Drill Road Access G. Claim Work Surveying	4,305.50	1.00
Project Charges Sub-Total	\$ 9,899.53	\$ 2.31
Total Expenditures	\$114,837.98	\$26.82

James D. Sell

JDS:1b

cc: NPWhaley



#### **Southwestern Exploration Division**

December 26, 1979

T0:

F. T. Graybeal

FROM: J. D. Sell

Project Cost Distribution Aug. 1, 1977 - July 1, 1978 Superior East Project

Pinal County, Arizona

A project charge which is not applicable to drill hole distribution during this period has been separated out as follows:

Rental on Storage-Core Building in Miami, Arizona

\$1,500

James D. Sell

JDS:1b

cc: NPWhaley



February 28, 1980

FILE MEMORANDUM

Superior East Project Pinal County, Arizona

Numerous severe problems have occurred since we began Dyna-drilling A-12 to the extent that the directional drill contractor has been judged incompetent and will be dismissed from the project by NPW. There is at the moment only one other experienced directional drill contractor operating in the West and he is busy for the next few months with Getty at the Pine Grove Mo discovery in Utah.

We wish to keep the Joy 36 rig currently on the project so a decision has been made to move to site P-6 and begin a vertical hole. At such time as the other directional drill contractor becomes available we will move the 36 rig back to A-12 and complete P-6 with a smaller drill. Funds are presently available in the authorization to allow for this move and collaring of a vertical hole. Originally we had planned to collar the first 1000-2000 ft. with an air-hammer rig to reduce costs of drilling in the dacite, but at the moment retention of the 36 rig is considered more important and the air-hammer will still be used where future scheduling allows.

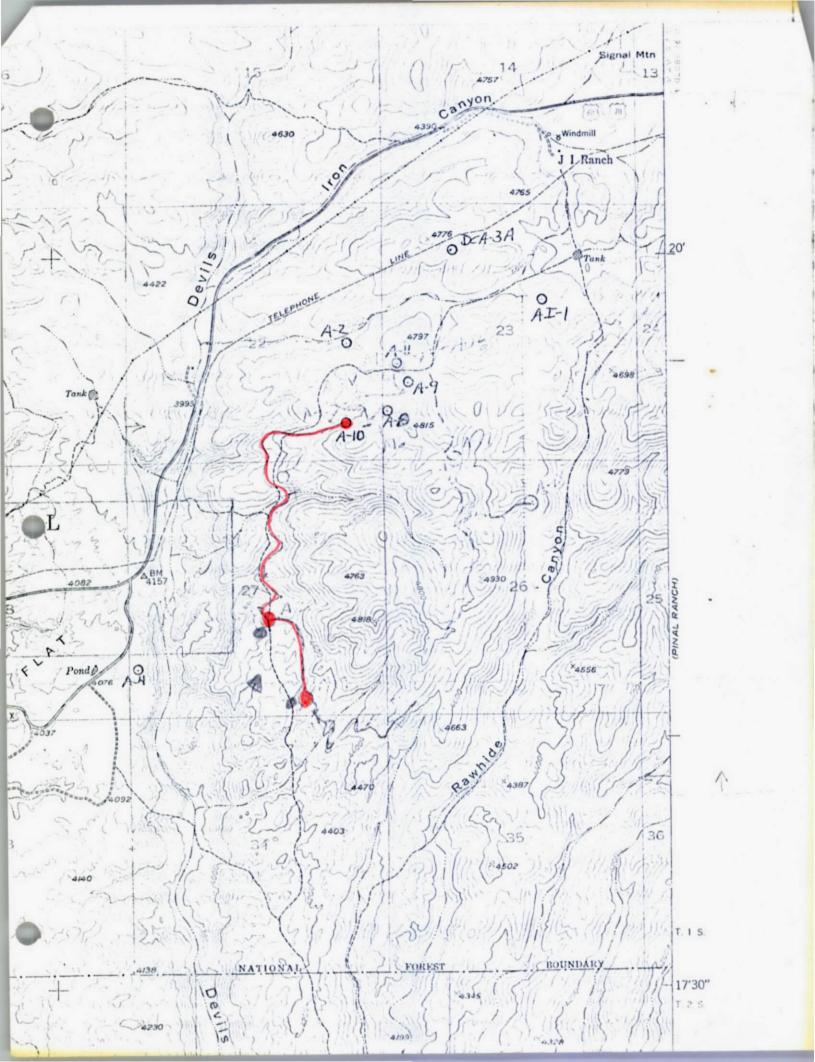
Paul Bryant should be notified by NPW that we want roads and sites completed as fast as possible. The USFS progress on road permit applications should be followed by RBC and any delays brought to my attention. At least one new site should be available by the time diamond drilling at Florence Pediment is complete so that rig can be moved directly to Superior East. NPW should notify Joy of our intent to keep the Florence Pediment rig with Verne England as lead driller and should follow Bryant's road construction progress to insure that sites will be available by the time Florence Pediment is completed. Any problems in this regard should be brought to my attention immediately.

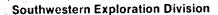
The various directional drill problems which led to this change in plans are too numerous to describe, but were sufficient to occupy NPW and JDS on a full-time basis ultimately leading to the postponement of JDS trip to Tintic with Mr. Olson. The potential for this delay was noted in my letter to Mr. Olson of Jan. 15, 1980 with copies to appropriate offices.

J.T. Stayles F. T. Graybeal

FTG:1b

cc: TCOsborne
WLKurtz
JDSell
RBCrist
NPWhaley







April 14, 1980

TO: F. T. Graybeal

FROM: J. D. Sell

Drill Hole A-11 Core Drilling Costs Superior East Project Pinal County, Arizona

Core drilling was initiated from the surface on August 2, 1978 and carried to the terminal depth of 5,175 feet on June 20, 1979. From this date the casing left in the hole in the event to do further drilling was rented through January 1980 and this rental fee (\$3,242.33) has been included in these figures.

Core drilling costs are distributed as follows covering the completed hole to 5,175 feet.

Drilling Charges:	\$ Cost	\$/ft.
A. Direct Drilling	\$160,331.66	\$30.98
B. Site Preparation C. Field Administration	16,802.89	3.25
<ol> <li>Supervision &amp; Geology</li> </ol>	9,550.35	1.84.
<ol><li>Sampling and Assaying</li></ol>	2,429.42	0.47
3. Miscellaneous	603.40	0.12
Drilling Charges Sub-Total	\$189,717.72	\$36.66
Project Charges:		
D. General Administration E. Legal Fees F. Drill Road Access G. Claim Work, Surveying	\$ 8,780.87 85.00 2,287.26	\$ 1.70 0.02 0.44
Project Charges Sub-Total	\$ <u>11,153.13</u>	\$ 2.16
Total Expenditures	\$200,870.85	\$38.82

James D. Sell

JDS:1b

cc: NPWhaley



#### Southwestern Exploration Division

April 15, 1980

TO: F. T. Graybeal

FROM: J. D. Sell

Project Cost Distribution July 1, 1978 Dec. 31, 1979 Superior East Project Pinal County, Arizona

Project charges which are not applicable to drill hole distribution during this period have been separated out as follows:

Rental on Storage-Core Building in Miami, AZ

\$1,500.00 103.65

Window repair on above storage

\$1,603.65

James D. Sell

Total

JDS:1b

cc: NPWhaley

ASARCO

JDS: You don't havetodo this. We have all the data from accounting.

Southwestern Exploration Division

April 16, 1980

V, V

TO: F. T. Graybeal

FROM: J. D. Sell

Cost Summary as of January 1, 1980 Superior East Project Pinal County, Arizona

This report is the fifth cost summation on the Superior East Project and covers the period August 1, 1977 through December 31, 1979. The last report (4th) was dated September 7, 1977.

Fifteen authorizations have been secured for the Project for a total authorization of \$1,961,000.00. As of December 31, 1979, the project had a deficit of \$40,681.07, plus a January 1980 deficit for casing rental charged to drill hole A-11 of \$3,242.33; a total deficit of \$43,923.40.

The total authorization of \$1,961,000.00 plus the added deficit of \$43,923.40 results in a total expenditure of \$2,004,923.40 for this report period as shown in Table 1.

TABLE 1. Authorizations and Expenditures

As of July 31, 1977 (see previous reports): MA-0010-0 thru	
of thru has been been also been also the control of	
	. 4
EA-0010-13 \$1,690,000.00 \$1,690,000.00 Zero	
EA-0010-14 125,000.00 64,723.30 \$60,276.7	)
As of January 1, 1980 (this report):	
EA-0010-14 as above 60,276.70 Zero	
EA-0010-15 146,000.00 186,681.07 (40,681.0	)
(thru Dec. 31, 1979)	
EA-0010-15 as above 3,242.33 (3,242.3	3)
(part of Jan. 1980 -	1
casing rental A-11)	
TOTAL \$1,961,000.00 \$2,004,923.40 (\$43,923.40	)
Expended this period \$250,200.10	,

Covering this report period, individual memos on various project charges and the drill holes have been submitted. These are dated August 22, 1977 (Incomplete Drill Hole A-10, used in last summation); December 26, 1979 (Complete Drill Hole A-10) (Note: the difference between the two is used in this report.); December 26, 1979 (Project Costs); April 14, 1980 (Drill Hole A-11); and April 14, 1980 (Project Costs). Expended during this period, as shown above, was \$250,200.10. A summary of these costs is given in Table 2.

#### Southwestern Exploration Division



April 16, 1980

TO: F. T. Graybeal

FROM: J. D. Sell

Cost Summary as of January 1, 1980 Superior East Project Pinal County, Arizona

This report is the fifth cost summation on the Superior East Project and covers the period August 1, 1977 through December 31, 1979. The last report (4th) was dated September 7, 1977.

Fifteen authorizations have been secured for the Project for a total authorization of \$1,961,000.00. As of December 31, 1979, the project had a deficit of \$40,681.07, plus a January 1980 deficit for casing rental charged to drill hole A-11 of \$3,242.33; a total deficit of \$43,923.40.

The total authorization of \$1,961,000.00 plus the added deficit of \$43,923.40 results in a total expenditure of \$2,004,923.40 for this report period as shown in Table 1.

TABLE 1. Authorizations and Expenditures

Number Authorization	Expended	Unexpended
As of July 31, 1977 (see previous	ous reports):	
MA-0010-0 thru		
EA-0010-13 \$1,690,000.00	\$1,690,000.00	Zero
EA-0010-14 125,000.00	64,723.30	\$60,276.70
As of January 1, 1980 (this rep		
EA-0010-14 as above	60,276.70	Zero
EA-0010-15 146,000.00	186,681.07	(40,681.07)
(thru Dec. 31, 1979)		
EA-0010-15 as above	3,242.33	(3,242.33)
(part of Jan. 1980 -		
casing rental A-11)		
TOTAL \$1,961,000.00 Expended this period	\$2,004,923.40 \$250,200.10	(\$43,923.40)

Covering this report period, individual memos on various project charges and the drill holes have been submitted. These are dated August 22, 1977 (Incomplete Drill Hole A-10, used in last summation); December 26, 1979 (Complete Drill Hole A-10) (Note: the difference between the two is used in this report.); December 26, 1979 (Project Costs); April 14, 1980 (Drill Hole A-11); and April 14, 1980 (Project Costs). Expended during this period, as shown above, was \$250,200.10. A summary of these costs is given in Table 2.

### TABLE 2. Activity Expenditures

End of Report, September 7, 1977	
(remainder of EA-0010-14)	(+)\$ 60,276.70
EA-0010-15	(+) <u>146,000.00</u>
Sub-Total	(+)\$206,276.70
Completion of Hole A-10	(-) 46,225.60
Project Costs (Storage rental & repairs)	(-) 3,103.65
Drill Hole A-11 (thru casing	
as of January 1980)	(-) <u>200,870.85</u>
Sub-Total Expenditures	(-)\$250,200.10
DEFICIT as of Dec. 31, 1979 (and	
including casing rental thru Jan. 1980)	(-)\$ 43,923.40

Table 3 (attached) is a synopsis of the above activities and costs by categories for the individual drill holes and the consolidated project costs for the report period.

James D. Sell

JDS:1b

cc: NPWhaley - w/att.

TABLE 3. Summation of Activities, Drill Holes, and Project -- Categories and Costs

Category					Activity				
	Drill Hole A-10 (incomplete)	Drill Hole A-10 (complete)	Drill Hole A-10 (THIS REPORT)	\$/Ft.	Drill Hole A-ll*	\$/Ft.	Project Storage Rental & Repair	TOTALS	\$ <u>\$/Ft.</u>
FOOTAGE Core	3571	4282	711		5175			5,886 feet	
DRILLING CHARGES  A. Direct Drilling B. Site Preparation C. Field Administration	\$55,365.72 2,924.54	\$ 85,963.72 3,229.62	\$30,598.00 305.08	\$43.03 0.43	\$160,331.66 16,802.89	\$30.98 3.25		\$190,929.66 17,107.97	\$32.4 <sup>1</sup> 2.91
1. Supervision & Geology 2. Assaying 3. Miscellaneous Drilling Charges Sub-Total	4,307.57  173.59 \$62,771.42	12,430.11 2,785.93 529.07 \$104,938.45	8,122.54 2,785.93 355.48 \$42,167.03	11.42 3.92 0.50 \$59.30	9,550.35 2,429.42 603.40 \$189,717.72	1.84 0.47 0.12 \$36.66		17,672.89 5,215.35 958.88 \$231,884.75	3.00 0.89 0.16 \$39.40
PROJECT CHARGES  D. General Administration E. Legal Fees F. Drill Road Access G. Claim Work, Surveying Project Charges Sub-Total	\$ 1,535.46 4,305.50 \$ 5,840.96	\$ 5,554.03 40.00 4,305.50  \$ 9,899.53	\$ 4,018.57 40.00  \$ 4,058.57	\$ 5.65 0.06  \$ 5.71	\$ 8,780.87 85.00 2,287.26  \$ 11,153.13	\$ 1.70 0.02 0.44  \$ 2.16	\$3,103.65  \$ <u>3,103.65</u>	\$ 15,903.09 125.00 2,287.26  \$ 18,315.35	\$ 2.70 0.02 0.39  \$ 3.11
TOTAL EXPENDITURES	\$68,612.38	\$114,837.98	\$46,225.60	\$65.01	\$200,870.85	\$32.82	\$3,103.65	\$250,200.10	\$42.51

\*Note: The direct drilling charge includes \$3,242.33 as casing rental costs which are in (and hence to be subtracted from) the January 1980 Monthly Cost Distribution Sheet.

# **ASARCO**

#### Southwestern Exploration Division

January 8, 1982

TO: W.D. Payne

FROM: F.R. Koutz

AR Kong

Performance/Cost Summary
Navi-drill Operations (2912-3270')
TCH-2A (EA-0200-02)
Trench Project
Santa Cruz County, Arizona

Between August 31 and September 16, 1981, the offset drill-out to TCH-2: TCH-2A was completed between 2912 feet (kick-off point) and 3270 feet depth (resumption of continuous coring operations). Between August 10 and 18 an NX packer, manufactured by Van Ruth Products, Kalgoorlie, W. Australia and supplied by Boyles, had been set at 3002' in TCH-2 through NX rods, the hole flushed with detergent and cemented with a 7/1 Portland/CaCl<sub>2</sub> mixture through BX rods to about 2851'. After six days of curing, the cement was drilled out to 2912'. TCH-2 is cased with NC rods from 0-2502'.

Navi-drilling using Boyles Bros. tools and technician and Joy Manufacturing crews and 22HD rig on a 2 X 12 hour shift basis was commenced on August 31, after Boyles mobilization from Salt Lake City on August 29. We had planned to build up a 15° drift angle at 5°/100' over 300 feet of Navi-drilling in a S75°W direction and retain the Navi-drill on standby for several days after continuous coring resumed to correct any significant deviation from 15°.

We Navi-drilled 345' out of 358' traversed. Three diamond set and five diamond impregnated NX bits were used on the Navi-drill with bit changes at 2943', 2983', 3022', 3076', 3121', 3189', 3237'. Spot cores (with reaming to gauge) were taken at 2943-45', 3022-3023', 3122-3123', and 3261-3270'. By 2943', after 31 of Navi-drilling, TCH-2A was out of the cement filling TCH-2. Some problems were encountered in getting TCH-2A to kick-out initially to S75°W (TCH-2 was 2 3/4° S32W at 2900') and to build up drift angle at a full 5°/100'. Consequently, after progressing 358' to 3270' we had built up only 13½° of drift angle in a S68°W direction. At 3270' on Sept. 16, we decided to resume continuous NX coring since the inner radial bearing of the Navi-drill motor had worn out and shipping and installation of new parts would take at least a day. By 3440' on September 19, the drift angle during NX coring had increased somewhat to about 14° so the Navi-drill was demobilized after two full days of standby time. Navi-drill demobilization was completed September 22. 327 drilling hours (including rigging, tripping, survey, spot coring, and Joy standby) were used to advance the 358' (1.09'/hour). (Sept. 7, 19 and 20 were not worked by pre-arrangement.) This was only slightly better than the 21'/day average for the Superior East A-12 drill-out from March to June, in spite of much better rock coring conditions in TCH-2 and TCH-2A vs. A-11 and A-12.

Some of the Navi-drill problems with TCH-2A were due to spotty disseminated magnetite in the rock which gave slightly erroneous drift direction readings on the Eastman camera used to orient the Navi-drill and measure progress.

A confirmatory gyro survey by Mollen-Hauer on September 21 showed that at 3425 feet the actual hole was 14°, S67°W, about 12 feet SSE of the Eastman survey which had a series of built-up westerly errors and indicated S79°W. These slightly erroneous readings caused more Navi-drill footage to be used "maintaining" a more westerly component of drift rather than building drift angle.

The tendency for TCH-2A to drift to the SSW rather than WSW during Navidrilling is probably in part due to the natural tendency of the drill to turn into the dip of the volcanics, suspected to be about 30° NNE. Also, Don Harwood, the Boyles Bros. technician, suspected that the clamps on the drill rods maintaining the Navi-drill orientation during the kick-off and initial few tens of feet of Navi-drilling may have slipped and been replaced by the night-shift driller without informing Harwood so that the drill could be re-oriented. Apparently, it is much harder to swing the drift bearing after a significant drift angle had been built up. However, in all, the performance of the Navi-drill, the technician and Joy crews during the project was very good.

DIRECT NAVI-DRILLING COSTS FOR 358' BETWEEN 2912' AND 3270' (NOT INCLUDING ASARCO SUPERVISORY TIME) ARE SUMMARIZED AS FOLLOWS:

Joy Manufacturing	<u>Total</u>	Cost/Foot
<ul> <li>a. Cementing (hourly, cement, packer [\$127.10</li> <li>b. Rig Standby (August 19-31)</li> <li>c. Hourly @ \$56 - 327 hours + 6 hours survey @ \$46 per hour</li> <li>d. Premium overtime due to lack of 3rd shift</li> <li>e. Water truck + mileage: cementing + Navi-dr</li> <li>f. Soluble oil (no mud used in drilling fluid</li> </ul>	900.00 18,588.00 1,608.00 ill 766.90	\$ 6.23 2.51 51.92 4.49 2.14 1.58
Subtotal for items a through f  Boyles Brothers	\$24,658.38	\$68.88
<ul> <li>g. Navi-drill, pump, equipment + standby</li> <li>h. Technician + standby + mileage</li> <li>i. Eastman camera</li> <li>j. Diamond bits (8)</li> <li>k. Navi-drill repairs and maintenance</li> <li>l. Gyro survey (direct from Mollen-Hauer)</li> </ul>	9,434.75 9,365.40 1,377.13 6,313.60 1,601.15 542.05	
Subtotal for items g through 1 GRAND TOTAL	$\frac{$28,634.08}{$53,292.46}$	\$79.98 \$148.86

For comparison, it cost \$83,459.00 to drill TCH-2 to 3270 feet or \$25.52/foot, including site preparation costs. If TCH-2A Nav-drill total costs were distributed over 3270 feet the equivalent cost per foot for a new hole would have been \$16.30. The equivalent saving is \$9.22/foot, 2 months time and a fairly accurately placed hole using the Navi-drill.

Items b and d of the previous page were due to particular circumstances of this project. The unavailability of the Navi-drill when TCH-2 drilling and cementing were finished in August due to prior commitments by Boyles. The premium overtime of \$6/hour was due to the lack of a third shift from Joy since drilling was taking place at the end of the assessment year. Since equipment was rented from Boyles on a daily basis, a 24 hour operation was necessary by Joy. Other savings could have been made on tighter control of Boyles time and standy. If a gyro survey camera were used during Navi-drilling problems with magnetite then resurvey costs would be eliminated.

We had estimated the cost of Navi-drilling at \$25,000.00 in the EA-0200-02 budget. Costs were over twice that. Causes were the additional Navi-drill footage and time and the many additional charges that Boyles added on that were not fully appreciated when the drill-out was planned in July. Since we are presently setting up TCH-2 for a second drill-out, the above figures should allow costs to be estimated much more accurately.

#### FRK/m1m

c: W.L. Kurtz

T.C. Benavidez

S.A. Catlin

J.D. Sell

N.P. Whaley



#### JOY MACHINERY COMPANY

707 BOYD BOULEVARD
P. O. DRAWER 489
LaPORTE, INDIANA 46350
Phone: (219) 362-2191

February 9, 1983

Mr. J. D. Sell ASARCO, Incorporated P. O. Box 5747 Tucson, Arizona 85703

Dear Jim:

Enclosed is signed Order No. T-46-3 for the work at Superior East.

Also enclosed is a Certificate of Insurance.

Thanks for awarding this work to Joy.

Yours very truly,

JOY MANUFACTURING COMPANY

J. H. Koontz

General Manager

Contract Core Drill Division

JHK/js

Enclosures

RECEIVED

FEB 1 1 1983

S. W. U. S. EXPL. DIV.

*	A .
ASARCO	PD 1 '
REVISED	1/1/58

### PURCHASE ORDER

DATE	February 3, 1983
ORDER	NO. T-46-3

PLANT JOB NO.		

## American Smelting And Refining Co.

1150 NORTH 7TH AVENUE TUCSON, ARIZONA 85703

REQUISITION NO.

To: J. H. Koontz, General Manager Contract Core Drill Division Joy Manufacturing Company

P. O. Drawer 489 La Porte, IN 46350

DATE REQUIRED AT DESTINATION:

SHIPPING INTERVAL PROMISED

SELLER WILL SHIP BEFORE:

TUCSON OFFICE

P. O. BOX 5747

POINT OF SHIPMENT

TERMS:

				÷
CONSIGNMENT	SELLER WIL	L SHIF	- 10	
CONSIGNMENT	SELLER WIL	L SHII	- 10	*
CONSIGNMENT	SELLER WIL	L SHIF	- 10	

FINAL DESTINATION - PLEASE NOTE CONSIGNMENT BELOW

F.O.B. POINT				RENDER BILLS AS PER A	TTACHED SHIPPIN	IG INST	RUCTIONS —
QUANTITY	UNIT	SPECIFI	CA	TIONS		NO.	UNIT PRIC
at ASARC the loca at the j TRACTOR' attached CONTRACT ary equ	O Inco tion a obsite s lett and c OR wil ipment	ing Company (CONTRACTOR) will do rporated's (ASARCO's) Superior in a depth of which will be specificated. Payment for work performed wer of proposal dated January 18 constitutes a part of this order. I provide a drill and water true, or may install a water line in a contractor.	East fied ill   , 19 ck co	Project, Pinal Count by ASARCO's represer be in accordance with 83, a copy of which i omplete with crews ar eu of the water truck	ty, AZ, ntative(s) n CON- is nd ancil-		URING COMPANY  CES M CAS,  CONTRACT OF ILL OIV.  Title
February It is un work in standard	15, 1 dersto a dili drill	• •	the	at CONTRACTOR will pe accordance with reco	gnized		JOY MANUFACTURING
the natu systems any gove jurisdic	ral en which rnment tion c	his personnel will make every evironment, and drill crews will are acceptable to ASARCO and whagency whether federal, state, ver the site area, including fire	est ich cou re s	ablish and maintain s comply with standards nty, or municipal whi afety and containment	sanitation s set by ich has t faciliti	. :	ACCEPTED FOR:
order. will sub Laws of	Before mit ac the St	ttention is called to Clause Ele entering upon ASARCO's property ceptable evidence of compliance ate of Arizona, and, on ASARCO's dence of other required insurance	to with	perform this work, ( h the Workmen's Compe	CONTRACTOR ensation		A B

#### 

Orig: Joy Manufacturing Co.

cc: Joy Manufacturing Co., for acceptance TCBenavidez, WLKurtz, AJRobles, JDSell HMStone, Acctg. Dept., File

PLEASE ENTER OUR ORDER FOR THE ITEMS SPECIFIED ABOVE, SUB-JECT TO ALL INSTRUCTIONS AND PROVISIONS ON REVERSE SIDE.

Southwestern Exploration Division



JOY MANUFACTURING COMPANY 707 BOYD BOULEVARD P. O. DRAWER 489 LaPORTE, INDIANA 46350 Phone: (219) 362-2191

January 18, 1983

Mr. Jim Sell ASARCO Incorporated P. O. Box 5747 Tucson, Arizona 85703

Dear Mr. Sell:

We appreciated receiving the invitation to bid on your Superior East Project. We understand you want to start a new hole from surface.

Please consider the following:

Mobilization (NC hole to 3,000 feet)	\$500.00/rig
Demobilization (NC hole to 3,000 feet)	\$500.00/rig
Extra Road Truck Trips if and when hole reduction is required	\$150.00/round trip
Rotary Drilling Through Overburden	\$56.00/hour + materials used

*Core Drilling	NC Wireline	NX Wireline	BX Wireline
0 to 500 feet 500 to 1000 feet 1000 to 1500 feet 1500 to 2000 feet 2000 to 2500 feet 2500 to 3000 feet 3000 to 3500 feet 3500 to 4000 feet 4000 to 4500 feet 4500 to 5000 feet 5000 to 5500 feet	\$17.40/ft. \$18.20/ft. \$19.20/ft. \$20.50/ft. \$22.20/ft. \$23.40/ft.	\$15.90/ft. \$16.70/ft. \$17.70/ft. \$19.00/ft. \$20.70/ft. \$22.90/ft. \$25.70/ft. \$29.20/ft. \$33.50/ft. \$38.90/ft.	\$15.70/ft. \$16.50/ft. \$17.50/ft. \$18.80/ft. \$20.50/ft. \$22.70/ft. \$25.50/ft. \$29.00/ft. \$33.30/ft. \$38.70/ft. \$45.10/ft.

\*Bad Rock Clause at Depths Below 3500 Feet - If footage drilled per shift (excluding chargeable time) times the appropriate footage rate drops below \$368 per eight-hour shift revenue for five or more consecutive shifts, drilling prices will revert from a per-foot rate to an hourly rate of \$46.00 per hour plus bit and other in-hole supplies at actual cost.

RECEIVED

JAN 21 1983

S

If Joy should elect to invoke the above bad rock clause, it is understood by both parties that it will be only under conditions of around-the-clock operation by competent drilling crews. ASARCO will be notified by mail or telephone before any hourly charges are accrued under this clause, and ASARCO reserves the right to terminate the drilling at any time after such notification.

### Rig Time & Hourly Work

	Setting and Pulling Casing and Pipe		\$46.00/hour + materials used
	Cementing and/or Plugging Drill Holes		\$46.00/hour + materials used
	Reaming, if necessary		\$46.00/hour + materials used
,	Survey		\$46.00/hour + customer supplies instrument
	Standby Time for your Convenience		\$30.00/hour
	Overtime Premium in Excess of 88 Hours per Two-Week Period		\$6.00/man hour
S	upplies		
	Casing Ordered Left in Place	NC NX BX	\$9.00/foot \$8.00/foot \$6.50/foot
	Casing Lost through Normal Drilling Operations		At 70% of list price
	Diamond Bit Loss in Excess of \$2.50/ft.		At Actual Cost
	Drilling Mud & Additives		At Jobsite Cost + 20%
	Weather-treated Core Boxes which hold ten feet of core		<b>\$2.25</b> each

# Water Pumping or Hauling

Water Truck Usage

\$600.00/month

Mileage

\$.75/mile

Water Truck Driver (if required)

\$2,000.00/month

The above prices are firm if accepted within 60 days and will remain in effect until 9/25/83.

We understand ASARCO will build and maintain all-weather or passable access roads, level drill sites, dig mud pits and provide water, on surface, free of cost to Joy. We further understand that ASARCO will provide all rights of ingress and egress to all lands that may be required to enable Joy to carry out the specified work.

We would look forward to working with you on this project.

Yours very truly,

JOY MANUFACTURING COMPANY

J. H. Koontz

General Manager

Contract Core Drill Division

JHK/js

James & Company Street , NY 10041	SHISSUEDEASEALMATTERFOREINFORMATIONS INFORMATION OF NEW York, Inc.	COMP		\$4115.CO.TO.E033.CO.GO	2015	
Street , NY 10041	of New York, Inc.		INIES AFFORDI	NG COVERAGES		•
, NY 10041		COLIDANIA			Insurance	Company
	Fred S. James & Company of New York, Inc.  Water Street New York, NY 10041  NAME AND ADDRESS OF INSURED JOY Manufacturing Company 301 Grant Street Pittshurgh, PA 15219  This is to certify that policies of insurance listed below have been issued to the insured no of any contract or other document with respect to which this certificate may be issued terms, exclusions and conditions of such policies.  COMPANY LETTER  GENERAL LIABILITY A  AUTOMOBILE LIABILITY  AUTOMOBILE LIABILITY  AUTOMOBILE LIABILITY  AUTOMOBILE LIABILITY  AUTOMOBILE LIABILITY		COMPANY A National Union Fire Insurance Company			
		COMPANY LETTER	В			
ess of Insured facturing Compai	ny	COMPANY LETTER	C		•	
facturing Compart Street		COMPAN' LETTER	D		•	
gn, FR 15219		COMPAN				
y that policies of insurance liste	ed below have been issued to the insured nar	LETTER	-days in favor at this	time. Notwithstanding ar	ny requirement, to	erm or condition
t or other document with resp	sect to which this certificate may be issued in	Of may perc	and the made of		ity in Thousar	
TYPE OF INSURANCE	POLICY NUMBER		EXPIRATION DATE		EACH OCCURRENCE	AGGREGATE
SENERAL LIABILITY	CLA 1260620		1/1/84	BODILY INJURY	,1,000	,1,000
COMPREHENSIVE FORM PREMISES—OPERATIONS	ULM 120002U		1/1/04	PROPERTY DAMAGE	\$1,000	,1,000
EXPLOSION AND COLLAPSE HAZARD						<u> </u>
UNDERGROUND HAZARD PRODUCTS/COMPLETED OPERATIONS HAZARD				BODILY INJURY AND		
CONTRACTUAL INSURANCE BROAD FORM PROPERTY				PROPERTY DAMAGE COMBINED	2	\$.
DAMAGE INDEPENDENT CONTRACTORS				DCCCO.	u II IBV	\$1,000
PERSONAL INJURY			-		1 .	1,000
	DA 1452750		/1/84	(EACH PERSON)		
OWNED	BA 1452/50		71704	(EACH ACCIDENT)	s 300	
HIRED NON-OWNED				BODILY INJURY AND PROPERTY DAMAGE	\$	
EXCESS LIABILITY				COMBINED  RODILY IN HIRY AND		
UMBRELLA FORM				PROPERTY DAMAGE	s	s
OTHER THAN UMBRELLA FORM	r e e			COMBINED		
			1/1/84	STATUTORY		
MPLOYERS' LIABILITY	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		17 17 04		100	(EACH ACCID
OTHER						
			e de la companya de		a waterdaya	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$
	TYPE OF INSURANCE  TYPE OF INSURANCE  EENERAL LIABILITY  COMPREHENSIVE FORM PREMISES—OPERATIONS EXPLOSION AND COLLAPSE HAZARD UNDERGROUND HAZARD PRODUCTS/COMPLETED OPERATIONS HAZARD CONTRACTUAL INSURANCE BROAD FORM PROPERTY DAMAGE INDEPENDENT CONTRACTORS PERSONAL INJURY  ITOMOBILE LIABILITY  COMPREHENSIVE FORM OWNED HIRED NON-OWNED  EXCESS LIABILITY  UMBRELLA FORM OTHER THAN UMBRELLA FORM RKERS' COMPENSATION  and MPLOYERS' LIABILITY  OTHER	That policies of insurance listed below have been issued to the insured nation of other document with respect to which this certificate may be issued and conditions of such policies.  TYPE OF INSURANCE  TYPE OF INSURANCE  ENERAL LIABILITY COMPREHENSIVE FORM PREMISES—OPERATIONS EXPLOSION AND COLLAPSE HAZARO UNDERGROUND HAZARD PRODUCTS/COMPLETED OPERATIONS HAZARD CONTRACTUAL INSURANCE BROAD FORM PROPERTY DAMAGE INDEPENDENT CONTRACTORS PERSONAL INJURY  STOMOBILE LIABILITY COMPREHENSIVE FORM OWNED HIRED NON-OWNED  EXCESS LIABILITY UMBRELLA FORM OTHER THAN UMBRELLA FORM  RKERS' COMPENSATION and MPLOYERS' LIABILITY  WC 9554381  MPLOYERS' LIABILITY	COMPANY Compan	THAT POLICY  I that policies of insurance listed below have been issued to the insured named above and are in force at this or of other document with respect to which this certificate may be issued or may pertain, the insurance affers as and conditions of such policies.  TYPE OF INSURANCE  TYPE OF INSURANCE  FOLICY NUMBER  POLICY NUMBER  POLICY NUMBER  POLICY EXPIRATION DATE  EXPERSIVE FORM  ORDER LIABILITY  COMPREHENSIVE FORM OPERATIONS EXPLOSION AND COLLAPSE HAZARD OPERATIONS HAZARD OPERATIONS HAZARD OPERATIONS HAZARD OPERATIONS HAZARD  OPERATIONS HAZARD  TOMOBILE LIABILITY  COMPREHENSIVE FORM OWNED HIRED NON-OWNED  EXCESS LIABILITY  UMBRELLA FORM OTHER THAN UM	COMPANY E  COMPANY E	COMPANY E  That policies of insurance listed below have been issued to the insured named above and are in force at this time. Notwithstanding any requirement, to or other document with respect to which this certificate may be issued or may pertain, the insurance afforded by the policies described herein is a single and an accordance of the policies.  TYPE OF INSURANCE  TYPE OF INSURANCE  POLICY NUMBER  POLICY NUMBER  EXPIRATION DATE  CEACH OCCUMENNEE  PROPERTY DAMAGE  STATUTORY  BODILY INJURY  \$1,000  PROPERTY DAMAGE  COMBINED  PROPERTY DAMAGE  COMBINED  \$1,000  \$1,000  PROPERTY DAMAGE  COMBINED  \$1,000  \$1



JOY MANUFACTURING COMPANY

707 BOYD BOULEVARD P. O. DRAWER 489 LaPORTE, INDIANA 46350 Phone: (219) 362-2191

March 16, 1984

Mr. James D. Sell ASARCO Incorporated P. O. Box 5747 Tucson, AZ 85703

Dear Jim:

Attached are the signed Acknowledgement copies of orders T-81-4 (Thunder Mountain), T-82-4 (Ventura) and T-83-4 (Superior East).

Also attached is a Certificate of Insurance applicable to all three projects.

Since Joy qualified for our DWR Driller's License (see copy attached), we have received neither the first license (7-1-82 to 6-30-83) nor our current license renewal (7-1-83 to 6-30-84). I talked with the DWR today, and they confirmed we do hold a current, valid license number 75. Further, they do confirm that an Arizona Contractors License is no longer required for drilling in Arizona except for residential well drilling. I requested again for the DWR to send Jack a license document. If we get it, we will forward a copy to you.

Jack Lloyd will instruct all crews to note information required by the Arizona DWR on the daily drill reports. The DWR driller's reports for each hole will be prepared in LaPorte. If I have all the necessary information, I will mail the DWR driller's reports directly to the DWR with copy to you. If I am short any information, I will forward the DWR driller's reports to you for completion and submission to the DWR.

Thanks for awarding this work to Joy.

Yours very truly,

YOY MANUFACTURING COMPANY

J. H. Koontz

General Manager

Contract Drill Division

RECEIVED

MAR 1 9 1984

S. W. U. S. EXPL 40%.

JHK/js

Attachments

ASARCO Copy to Plansing
Wiker Rocky Mountain
Exploration Divis

**Exploration Division** 

October 24, 1984

T0: D. M. Smith, Jr.

FROM: D. I. Fletcher

Cost-Performance Summary ARK-3 DDH, Ark Project Lake County, Colorado

Summary, ARK-3 DDH Core drilled by Longyear Drilling, June 20 to July 26, 1984. TD 13761 Supervised by D.I.Fletcher and T.C.Benavidez 0-930' HQ; 930-1252' NQ; 1252-1376' BQ Cased 0-30' with 5" pipe; 30-130' with 4" pipe

#### Cost Summary

1.	Drilling related costs		
	Diamond drilling*		\$63,545.35
	Roads, site, pits		985.55
	Toilet rental		171.00
	Supervision (T.C.B.)		3,813.72
	Geology (D.1.F.)		115.20
	Misc. (supplies, service)		1,369.35
		Total	\$70,000.17
		Total cost per foot	\$ 50.87

Indirect project costs Property taxes State Lease

\$956.60 -not yet paid-

\* The following is a more detailed breakdown of direct diamond drilling costs for the ARK-3 DDH.

<u>    tem</u>	Cost	Cost per foot	
Core drilling	\$29,062.14	\$21.12	
Casing	5,664.00	4.12	
Hole conditioning	4,342.00	3.16 ←	
Reaming	960.00	0.70	أنالي م
Packing & cementing	3,904.00	2.84	RECEIVED
Delay/standby	1,150.00	0.84	زياد ك إران
Rigging up/down	975.00	0.71	2 Maria Land 1 files
Additives & transport.	12,228.21	8.89 ←	TO A Cala
Per Diem	2,260.00	1.64	RECEIVED
Mobiliz./Demobiliz.	3,000.00	2.18	
Total	\$63,545.35	\$46.20	OCT 2 9 1984
		$\frac{-21,12}{02000}$	CYDICOATION DEPARTMENT

Darly I Fhetch Darby I. Fletcher

DIF: 1b



JDS

MAY 3 1 1985

EXPLORATION DEPARTMENT

**CORPORATE OFFICE** 

JOY MANUFACTURING COMPANY ONE OXFORD CENTRE

301 GRANT STREET PITTSBURGH, PENNSYLVANIA 15219 Phone: (412) 562-4500



If you currently are using core drilling services or plan to soon, you'll find the enclosed brochure worth your attention. It describes the full range of services offered by the JOY Contract Core Drill Division.

We have supported the industry with exploratory and developmental core drilling services for over 100 years now. Our reputation has been built on a record of efficient service and absolute client confidentiality.

We would welcome the chance to submit a competitive bid on your next project. We also would be more than happy to develop a project estimate for your budget requirements.

If either of these needs should arise in the future, please complete the enclosed self-mailing bid card and return it to us. Rest assured, we will respond promptly.

Sincerely,

Jim Koontz

General Manager

Contract Drill Division

Please fill in as much of the information you have available **HOLE INFORMATION** so that we can evaluate your project and prepare a quotation. Inclination □ Vertical ☐ Flat □ Angle From \_\_\_ \_\_ Degrees to \_\_\_\_\_ Degrees Core Size (Diameter) □ NCWL (2-7/16") □ BXWL (1-7/16") □ NXWL (2") □ AXWL (1") Telephone (Home) \_\_\_\_\_\_ WATER SUPPLY (Office) \_\_\_\_\_ Distance from Drilling Site \_\_\_\_\_\_ Feet \_\_\_\_\_ or Miles □ Stream ☐ Pond or Lake □ Other Company Name \_\_\_\_\_\_ Maximum Elevation Difference from Water Supply Mailing Address \_\_\_\_\_ to Drill Sites \_\_\_ . Feet Is Water Source □ Uphill □ Downhill from Site **WORK SCHEDULE** Shifts Per Day \_\_\_ **PROJECT LOCATION** ☐ 5 or 6 Days Per Week ☐ 10 Days On—4 Days Off Nearest Town \_\_\_\_\_ □ Other \_\_ How many miles to site \_\_\_\_\_\_ Direction\_\_\_\_\_ Desired Starting Date \_\_\_\_\_ Project Site Elevation \_\_\_\_ Desired Completion Date (if any) PREVIOUS DRILLING DATA (if any) State \_\_\_\_ Total Footage Drilled..... ☐ Flat ☐ Rolling Average Bit Life \_\_\_\_ Terrain □ Mountainous Minimum Hole Depth Footage \_\_\_\_\_ Access Road Condition \_\_\_ Maximum Hole Depth Footage\_\_\_\_ Is access road difficult when wet? ☐ Yes ☐ No Average Footage Drilled Per 8-Hour Shift \_\_\_\_\_ Will a dozer be available? ☐ Yes ☐ No **OTHER PROJECT DESCRIPTION** Please provide any other important information (Hole Surveying? Soil Sampling? Etc.) Purpose of Drilling \_\_\_\_\_ Overburden Description \_\_\_\_\_ Overburden Depth \_\_\_\_\_ Rock/Formation to Maximum Drill Depth Total Project Footage \_\_\_\_\_ Number of Holes\_\_\_ Hole Depth in Feet **MY REQUIREMENTS** Minimum\_\_\_\_\_ Average\_\_\_\_\_ ☐ Estimate for Information or Budgeting Distance Between Holes ☐ Firm Bid—Can We Arrange A Site Visit ☐ Yes ☐ No Minimum. Feet or Miles ☐ Project is Confidential—Desire Telephone Call Maximum \_\_\_\_\_ Feet or \_\_\_\_\_

Signature

շաքցան	Joy Manufacturing Co
ι	Contract Drill Division
	707 Boyd Boulevard
	LaPorte, IN 46350

Postage will be paid by Addressee

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

Pittsburgh, PA

First Class

BUSINESS REPLY CARD Permit No. 5980



# CONTRACT CORE DRILLING



#### Confidential service. Guaranteed results.

Joy Manufacturing Company offers exploratory and developmental contract core drilling services for metallic and non-metallic minerals, including copper, zinc, lead, iron, clay, limestone, potash, gypsum, asbestos, coal and marble; for investigation of dam sites and underground gas storage formations; and for foundation testing.

When you engage Joy contract core drilling services you gain the benefits of unsurpassed experience. As a result of continuous involvement in the industry since 1884, Joy personnel have a comprehensive knowledge of proven vertical and angle hole core drilling techniques and access to the latest drilling technology. They also appreciate the importance of the strictest confidentiality. Experience also allows Joy to offer clients important assurances: guaranteed quotations, and guaranteed satisfactory core recovery.

Joy Contract Core Drill Division is headquartered in LaPorte, Indiana and serves clients nationwide from four strategically located warehouses.

#### Confidentiality

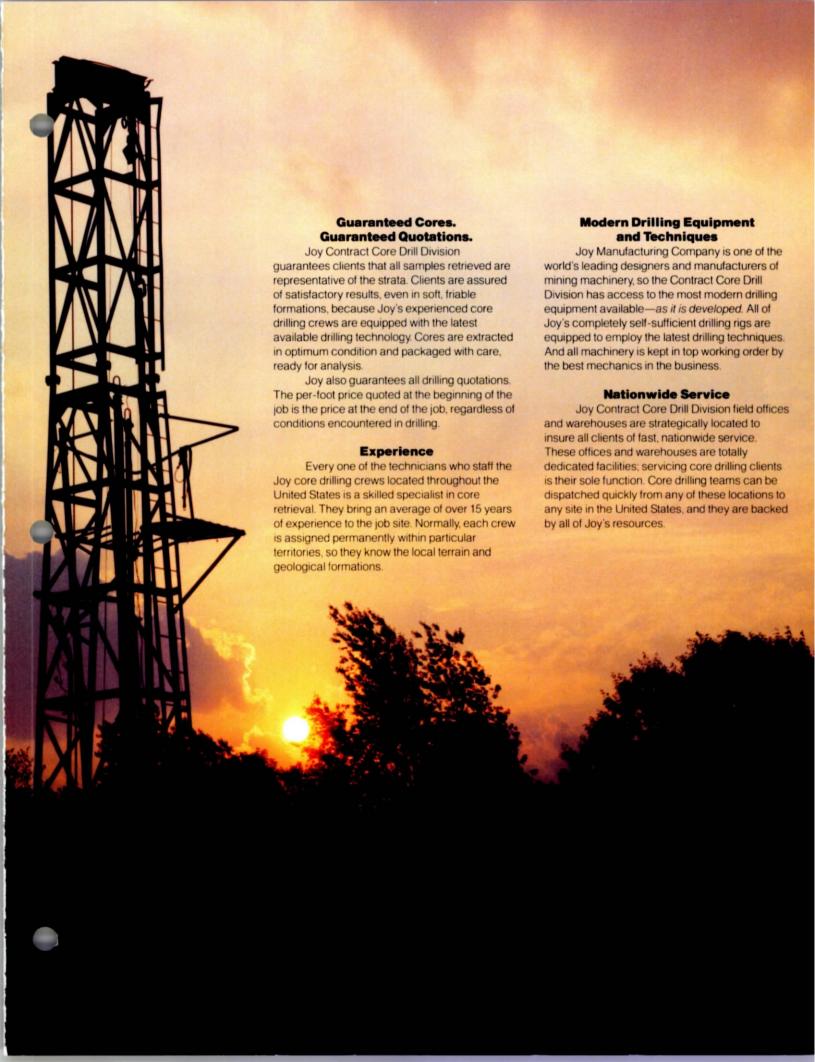
Any firm engaged in contract core drilling strives to achieve a reputation for confidential service. With Joy, clients are assured that extracted cores are treated as valuable and restricted information. This assurance is backed by the reputation of one of the world's largest manufacturers of mining machinery.











#### **Economy**

When you contract Joy core drilling services, you receive the benefits of significant economies.

- Maximum core recovery for maximum analysis
- Use of the best equipment and crews available without large capital outlays
- Guaranteed satisfactory results and a guaranteed footage at a stipulated price per-foot

For more information on Joy Contract Core Drill Division services, or for a quotation, call (800) 458-1115 outside Pennsylvania and (800) 458-1116 within Pennsylvania or write:

> Joy Manufacturing Company Contract Core Drill Division Marketing Services 301 Grant Street Pittsburgh, Pennsylvania 15219

Joy Manufacturing Company Contract Core Drill Division 1631 Carolina Avenue Bessemer, Alabama 35020

Telephone: (205) 425-3767

Joy Manufacturing Company Contract Core Drill Division Perkins & Associates Drilling 5468 Leestown Road Lexington, Kentucky 40511

Telephone: (606) 255-2154

Joy Manufacturing Company Contract Core Drill Division 1012 S. Burnett Street Jefferson City, Tennessee 37760

Telephone: (615) 475-2751

Joy Manufacturing Company Contract Core Drill Division 750 E. Evans Boulevard Tucson, Arizona 85713

Telephone: (602) 884-5866



Joy Manufacturing Company Contract Core Drill Division Headquarters 707 Boyd Boulevard LaPorte, Indiana 46350

Telephone: (219) 362-2191

# **BRYANT CONSTRUCTION COMPANY**

General Contractors Lic. #A-4332 843 Spray St. SUPERIOR, ARIZONA 85273 Phone 689-2629

# INVOICE

002079

DATE: July 8, 1985

					DATE: OULJ	0, 1907	
D E	SARCO Inc Exporation	n Dept. 5747			S H I P T O		
10 1	ucson, A	z 85703	Attn:	T+ m C-77	Pag	e 2 of 2	
CUST. ORDER NO.	DATE SHIPPED	SHIPPED VIA	AUUII:	Jim Sell	I SALESMAN	F.O.B.	Tour order no.
CUST. ORDER NO.	DATE SHIPPED	SHIPPED VIA		I ENWS	SAELSMAIY	1.0.5.	John Order Ho.
						1	
QUANTITY		D E	SCRIP	TION		UNIT PRICE	AMOUNT
	Devi	ils Canyon	Sur	perior East	Project		
	discourse seems and a seem	and the second section is a second		The first control of the control of	and the second s		a comment
in and the second	1 0	550.00 pe	-8 ho	ir dav	lling & Blas	ring edurbi	nent
				•			
			erroller etterske flere menskelt i				
6-4-85	8 hrs	Drill and	blast	new road			550,00
6-5-85 6-6-85	8 hrs	11 11	11	11 11			550.00
_6-7-85	8 hrs						550,00 550,00
-10-85	8 hrs	11 11	11	tt i tt i			550.00
6-11-85	8 hrs				anne de la company de la compa		550.00
6-12-85	6 hrs	Drill new		• • • • • • • • • • • • • • • • • • •			412.50
6-14-85 6-17-85	8 hrs 8 hrs	Drill and	blast	new road			550,00
6-18-85	8 hrs						550; 00 550; 00
6-19-85	8 hrs	11 11	11	11			550.00
6-20-85	8 hrs				or a real region and regional control of the property of the control of the contr		550.00
6-21-85 6-24-85	8 hrs	Drill and	blast	drill site			550,00
6-25-85	3 hrs	- 11 11	11	11 11			550,00
6-26-85		Drill hump	s on r	road-drill	site and bla	st !	206 <b>.</b> 25 618 <b>.</b> 75
		en Managarata angga at atawa a japan at at at a ga at a a a		Total 2nd	page		8387 50
	and the second contract of the second	one reconstruction and the second sec	there were the characters of the species	Total 1st	page		3600.00
					Total		11,987,50
and the control of th	Company of the Compan	and the second of the second o	Contraction of the Contraction	3.6	5% tax		431, 55
			Mobil	ization on			
and approximately control and advantage		The second secon		sting suppl			540,00 1360,55
and the second second		والمنع فيرجان عيسا الرابطات رايبا والسيا			e e como a ser escarente esperante en esperante en el composition de la composition della composition		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
				Total due			14,319,60
The state of the s		aran da Maria da Aran da Aran Aran da Aran d		السم المقد سي الله المحادث الم المحادث المحادث المحاد		The same of the same	
		FOR PAYMENT	10		The state of the s		
T I	v: <u>Len</u>		4				
	(Sie	mature),	egae	0010	er en		
			EA-	0010			
(Ennis) INV 751.2	<del></del>					<del></del>	/

### **BRYANT CONSTRUCTION COMPANY**

General Contractors Lic. #A-4332 843 Spray St. SUPERIOR, ARIZONA 85273 Phone 689-2629 INVOICE

002078

DATE: July 8, 1985

ASARCO Inc. Exploration Dept. P.O. Box 5747 Tucson, Az 85703 Page 1 of 2 Jim Sell Attn: OUR ORDER NO. TERMS SALESMAN F.O.B. DATE SHIPPED SHIPPED VIA CUST. ORDER NO. DESCRIPTION UNIT PRICE AMOUNT SQUANTITY 🐇 Superior East Project Devils Canyon D-8-H Dozer and ripper @ 100.00 per hr Move dozer to job site-start new road Level shot and build new road 6001 00 6-3-85 6 hrs 300,00 6-5-85 3 hrs 6-6-85 2 hrs 200,00 6-7-85 2 hrs 200 100 6-10-85 3 hrs 300,00 200,00 2 hrs 6-11-85 300 **¦**00 12-85 3 hrs 17-85 2 hrs 200,00 6-18-85 100,00 1 hr 11 11 11 100.00 l hr Work on drill site 100,00 1 hr 2 hrs 200,00 6-24-85 2 hrs 200,00 6-25-85 2 hrs 200.00 Drill site and roads 6-26-85 4 hrs Drill site new road and repair water bars 400,00 3600 100 Total page 1 Ennis) INV 751-3