



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.

(Letter to be sent individually to:
 Boyles Bros.
 Joy Mfg. Co.
 Sprague & Henwood)

MISSION UNIT
 Request for Bid
Diamond Core Drilling

Dear Mr. _____:

We are planning a diamond drilling program at our Mission Unit, 15 miles south of Tucson, and invite your company to submit a bid on the job.

Rather than a flat rate per foot of drilling, we expect to use a system wherein the contractor is paid a base rate per foot of hole drilled plus a bonus of \$3.00 per foot of core recovered. This bonus payment would be calculated for each individual core run. In runs showing less than 50% recovery no bonus would be paid. Under this system your bid would be on the base rate per foot of drilling.

Past experience in the Mission area has shown that core recoveries averaging around 90% can be expected. The bonus payment would amount to \$2.70 per foot of drilling if core recovery averaged 90% with no individual runs below 50%.

Attached is a set of specifications relative to this drilling program. These specifications will be included, although not necessarily verbatim, in a contract to be written after receipt of bids.

Please quote on the following:

Guaranteed minimum footage: 10,000 ft.

<u>Depths</u>			<u>NX</u>	<u>BX</u>	<u>AX</u>
_____ to _____	Base rate, \$/ft. hole		_____	_____	_____
_____ to _____	" " " "		_____	_____	_____
_____ to _____	" " " "		_____	_____	_____

Overburden rotary drilling, \$/ft. hole _____

Rate per shift:

Reaming \$ _____

Casing, cementing, or
delays not caused by
Contractor \$ _____

We will appreciate an early reply.

Yours very truly,

SPECIFICATIONS FOR DRILLING IN THE
MISSION AREA, Pima County, Arizona

1. Hole depths will range within 300 and 1500'.
2. Gravel overburden, amounting to approximately 200', will be drilled by tri-cone rotary using mud circulation.
3. Rotary holes will be cased and diamond drilling in bedrock will be started NX size, with subsequent reduction in sizes being made only at the option of Asarco personnel.
4. Mud circulation will be used in the diamond drilling unless otherwise authorized by ASARCO personnel. The cost of mud ingredients, and the time of mixing, if drilling is thereby delayed, will be chargeable to ASARCO. ASARCO may elect to supply the mixed ingredients itself.
5. Wire Line equipment will be used. Specify approximate core diameter for your equipment.
6. ASARCO will determine core recovery by specific gravity measurement which will be checked by linear measurement.
7. Two truck-mounted, hydraulic feed drill rigs operating one shift per day, six days per week will be required at the beginning of the program. subsequently, additional shifts may be required.
8. Access roads and drill sites will be prepared by ASARCO.
9. Water will be supplied by ASARCO at a point within the mine area, from which the contractor will haul to the drill rig a maximum of two miles.
- 10.. In the event of hole caving or loss of core, such remedial procedures as cementing, reaming or casing will be undertaken only at the discretion of ASARCO personnel.
11. ASARCO will pay for, at cost, all materials, such as cement, used up, lost or destroyed, excepting such equipment as bits and reaming shells.

All casing used up, lost, or ordered left in place will be invoiced to ASARCO at cost.

12. It is expected that a competent driller-foreman would always be on the job. Copies of the contract driller's logs would be filed daily with ASARCO personnel.
13. ASARCO would have its own sampler designated to receive the core from the core barrel, to check all drill hole footage measurements, and to report all information related to drilling performance.
14. Billing period should be for the calendar month, and all charge items should be segregated according to individual holes. Bills should be rendered not later than the 5th of the following month.
15. Contractor will agree to cover its employees with Workmen's Compensation Insurance under the State Laws of Arizona and to complete an ASARCO Insurance certificate as evidence of such coverage.
16. Please specify earliest date equipment would be on the job and ready to go.

J. M. F. P. : "Diamond Drill Contract" 1110 translation

WORKING CONTRACT CELEBRATED BETWEEN ASARCO MEXICANA, S.A. WHICH IN THE COURSE OF THIS CONTRACT WILL BE "ASARCO-MEX" AND BOYLES BROS DRILLING OF MEXICO, S.A. OF C.V., THAT WILL BE CALLED "THE CONTRACTOR" ACCORDING TO THE FOLLOWING

ARTICLES:

FIRST: By this contract, the Contractor accepts and engages to make a diamond drilling program that Asarco-Mex has requested and that will take place in a site known as La Caridad, near Nacozari de Garcia, Sonora with the purpose of finding productive mineral substances.

SECOND: The Contractor or Asarco-Mex, either one, will furnish the complete diamond drilling equipment capable of drilling to a depth of 328 meters. The drillings will be started at a size NX and will be terminated at a size NX, BX, NXWL, or BXWL, in good working conditions that the Contractor agrees to maintain and keep all through this contract. The Contractor will also use all the equipment, accessories and necessary materials to obtain the maximum core recovery.

THIRD: The Contractor agrees to put into operation the equipment that Asarco-Mex will supply within a week from its arrival at La Caridad, if the stations are ready, and initiate the drilling with their own equipment during the second part of August of this year. They should have an output, every 30 days, of at least 225 meters of drilling for each operating machine.

FOURTH: Asarco-Mex will maintain permanently, at his own account, one representative in the exploration site. This man will give the sites, inclination and direction of the drill holes. He will also decide when a drill has reached enough depth. The Contractor agrees to follow the orders of Asarco-Mex's representative, which will be directed to a better core recovery.

The representative of Asarco-Mex will receive the core in the site of each drill hole and he will provide boxes for the core.

FIFTH: The Contractor will make every effort to obtain a better core recovery. When the average core recovery for any drill hole is less than 85% in all its length (except in the first 5 meters) the price offered to in Articles 7 and 8 will be reduced \$22.00(pesos) per meter. When the total average of core recovery for any drill hole is more than 95%, except the first 5 meters, the price offered in Article 7 will be increased \$22.00 (pesos) per meter for that drill hole.

SIXTH: Asarco-Mex guarantees a minimum of 2000 meters of drilling in holes that will be close to 225 meters in depth each; but under no circumstances they will be more than 328 meters deep. For this figure, it will be considered the sum of the drillings given with the equipment of the Contractor or from Asarco-Mex.

SEVENTH: When the Contractor furnishes the drilling equipment, the payment that Asarco-Mex will have to give him for the drilling that this contract refers to, will be as follows (Mexican currency per linear meters in vertical position)

Diamond drills with recovery of	<u>NXWL</u>	<u>BXWL</u>
A.- First 3000 meters		
For drill hole from 0 - 164 L.M.	369.00	342.00
For drill hole from 164 - 328 L.M.	395.00	369.00
B.- From 3000 to 6000 meters		
For drill hole from 0 - 164 L.M.	354.00	327.00
For drill hole from 164 - 328 L.M.	380.00	354.00
C.- From 6000 on		
For drill hole from 0 - 164 L.M.	339.00	312.00
For drill hole from 164 - 328 L.M.	365.00	339.00

<u>Drill holes without core recovery</u>	<u>NXWL</u>	<u>BXWL</u>
D.- With "hammer drill of 4" "		
For a drill hole from 0 - 100 L.M.	246.00	
Besides, the following payments should be made:		
E.- Rimmed (if necessary)	246.00/meter	
F.- Cementation at \$156.00 (Pesos) per hour plus cement, mud and chemical additives.		
G.- The loss of time of Asarco-Mex and the time spent in changing the machinery and equipment from one drill site to another shall be \$156.00 per hour.		
H.- Asarco-Mex will pay for the transfer of the equipment to and from Nacozari to La Caridad, Sonora at a price of \$18,750.00 per each complete drilling equipment (machinery, pumps, etc.)		

EIGHTH: When Asarco-Mex furnishes the drilling equipment, except the one that is referred to in some of the articles of this contract, which will be furnished by the Contractor, the payment that Asarco-Mex will have to give to the Contractor for the drilling this contract refers to, will be as follows (Mexican currency per linear meters in vertical position):

Drills with core recovery:	<u>NXWL</u>	<u>BXWL</u>
A.- First 3000 meters		
For one drill hole from 0 - 164 L.M.	287.00	261.00
For one drill hole from 164-328 L.M.	313.00	287.00
B.- From 3000 to 6000 meters		
For one drill hole from 0 - 164 L.M.	276.00	250.00
For one drill hole from 164 - 328 L.M.	302.00	276.00
C.- From 6000 meters on		
For one drill hole from 0 - 164 L.M.	265.00	239.00
For one drill hole from 164 - 328 L.M.	302.00	276.00

Drill holes without core recovery:NXWLBXWL

D.- With 4" down the hole hammer

For one drill hole from 0 - 100 L.M. 164.00

Besides, the following payments should be made:

E.- Rimmed (if necessary) 164.00

F.- Cementation at \$150.00 (pesos) per hour, plus cement, mud and chemical additives.

G.- The loss of time of Asarco-Mex and the time spent in changing the machinery and equipment (furnished by Asarco-Mex) from one drill hole to another shall be \$150.00 per hour.

H.- Asarco-Mex will pay for the actual cost of transportation of equipment and personnel.

NINTH: For payments in Article 7, it must be understood that the Contractor will furnish and pay for the maintenance of all the machinery and drilling equipment, except for the water, which he only agrees to furnish 328 meters of plastic pipe and pumps to supply water up to that distance and with a 8 Kg/cm² pressure, Asarco-Mex having to pay for the rest of the water used under any other condition.

TENTH: For payments in Article 8, it must be understood that Asarco-Mex will furnish all the machinery and drilling equipment except: drilling bits, spare parts for repairing sample tanks, deposits for fuel and lubricants, spare parts in general for fixing of the necessary equipment and machinery furnished by Asarco-Mex, such as drilling machines, pumps, shank, etc., lubricant pumps, vehicles, accessories such as extinguishers, hose for mud mixers, cable, canvas, rope, pipe connections, diamond bits and tools, which will be furnished by the Contractor and in case Asarco-Mex supplies them, they will be deducted from the payments made to the Contractor.

Besides, the Contractor will supply the fuel and lubricants necessary for the operation of the machinery and equipment. If the water should

be supplied by the Contractor, he will be reimbursed for the cost of installation, pipes, pumps or carrying the water in "pipes".

ELEVENTH: For the development of this contract, it will be understood that a drill hole is vertical when it reaches an inclination of -20° , measured with the vertical.

TWELFTH: Asarco-Mex will assume all the expense involved in the installation of stations for the drillers and the access roads that will be necessary for the transportation of the equipment.

THIRTEENTH: All the material lost in the drill holes will be for the account of the Contractor, except pipes left in the bits by instructions of the representative of Asarco-Mex.

FOURTEENTH: Asarco-Mex will furnish the camping equipment for the Contractor's personnel without charge to them; furniture and food will be supplied by the Contractor.

FIFTEENTH: After having drilled 2000 meters, with either one equipment, Asarco-Mex can terminate this contract by given written notice to the Contractor. This notice can be given by anyone of the representatives of Asarco-Mex in charge of the exploration site. The same way, the Contractor can terminate this contract.

SIXTEENTH: The Contractor will employ all the necessary personnel to carry out the terms of this contract and therefore he will assume all the related labor obligations, such as payment of ordinary and extraordinary salaries, all kinds of compensations, tax withholdings, etc., Asarco-Mex will not have any obligation or responsibility in this subject.

SEVENTEENTH: The Contractor will hand to Asarco-Mex all the executed bills covering everyone of the payments Asarco-Mex makes to the Contractor.

EIGHTEENTH: Billing and payments will be made every month. All the bills must be approved by Asarco-Mex's representative before making the payments in the General Offices of Asarco-Mex.

NINETEENTH: It is agreed that payment of revenue taxes will be made by Asarco-Mex and payment of any other taxes will be for the Contractor's account.

TWENTIETH: It is agreed upon that Asarco-Mex can transfer this contract to any of its subsidiaries the only requirement being to give a written notice to the Contractor; in which case the transferee will acquire all the rights and assume all the obligations of Asarco-Mex, according to the conditions of this contract, with which the Contractor is in agreement.

TWENTY-FIRST: All the notifications that the parties should have should be sent to the following addresses:

TO: Asarco-Mex
Reforma No. 76 - 1602
Mexico 6, D.F.

TO: The Contractor (El Contratista)
Reforma No. 403-1106
Mexico 5, D.F.

TWENTY-SECOND: The parties agree that any controversy that may arise regarding the application or interpretation of this contract will be submitted to the jurisdiction of the Competent Courts of Mexico City and according to the Laws in force in the Distrito Federal.

This contract is being triplicated and signed by Asarco-Mex in Mexico, D.F. the 15th of August, 1968 and by the Contractor in Mexico, D.F., the 15th of August, 1968

ASARCO MEXICANA S.A.
R.F.C. - AME-650717-001

BOYLES BROS., DRILLING DE
MEXICO, S.A. DE C.V.
R.F.C. BBD-670318-001

C.W. Campbell

Bryan F. Sorensen

3/20/64

SUPPLEMENTAL AGREEMENT made the 20th day of March, 1964, by and between BOYLES BRCS, DRILLING COMPANY, a Utah corporation (hereinafter called the "contractor"), and AMERICAN SMELTING AND REFINING COMPANY, a New Jersey corporation (hereinafter called the "Owner").

W i t n e s s e t h :

This supplemental agreement amends as set forth below, the parties' agreement dated February 28, 1963, covering drilling at the Owner's Michiquilla mineral prospect in Peru, (hereinafter referred to as the "Principal Agreement").

It is mutually agreed as follows:

1. The Contractor shall perform an additional 12,000 meters of drilling beyond the total of 20,000 meters provided for in Section 10 of the Principal Agreement. Until such additional 12,000 meters of drilling has been done, Owner agrees not to exercise its right to terminate the Principal Agreement without cause under Section 20 of the Principal Agreement.

2. The compensation payable to Contractor by Owner for said additional 12,000 meters of drilling and all work connected therewith shall be at the same rates set forth in the Principal Agreement under Sections 4, 5, 6, 7 and 8, with the following modifications:

(a) The bonus for core recovery, provided for in Section 7 of the Principal Agreement, will be paid for the entire footage of a hole drilled in the case of any hole for which footage of core recovered, determined as set forth in said Section 7, averages at least 90% of the entire footage drilled.

(b) The bonus rate of \$3.50 per foot of core recovered shall be increased by \$2 to a total of \$5.50 per foot of core recovered, but beginning with the week of April 13, 1964 such increase shall be paid only on compliance with the following condition, namely, that during the week of such core recovery the Contractor had the requisite personnel and equipment available in Peru for performing a minimum of 84 driller shifts of work per week with adequate supervision. Compliance with the foregoing condition to the increase in bonus rate shall be waived during any periods when non-compliance with such condition is due, in the judgment of the Owner (which shall be conclusive if determined in good faith), to causes beyond the control of Contractor and which it was not reasonable to expect the Contractor to provide against. Owner's representative shall confer with and give consideration to the views of Contractor's men at the job, in case any difference should arise whether any such non-compliance should be

excused as aforesaid. It is the intent of the parties that compliance with the foregoing condition should enable the Contractor to operate 5 drillrigs, 3 shifts per day, 6 days per week - a rate of drilling which the Owner desires to have maintained and which the Contractor will use reasonable efforts to maintain.

3. Owner shall promptly after the execution hereof, advance to Contractor the sum of forty thousand dollars (\$40,000.), and such sum shall be repaid Owner by Owner deducting from the moneys payable to Contractor sums at the rate of one dollar (\$1.) per foot of hole drilled by Contractor, and the balance, if any, to be due and payable to Owner by Contractor upon termination of the Principal Agreement as amended, whether such termination be by full performance thereof or otherwise.

4. Owner shall purchase from Contractor the casing at Contractor's list prices F.O.B. Salt Lake City, Utah, as follows:

2000 feet of 4" flush joint casing:	
200 x 10' @ \$41.35 per length	\$8,270.00
4000 feet of NX casing:	
200 x 10' @ \$29.20 per length	5,840.00
100 x 10' @ 38.90 " "	3,890.00
3000 feet of BX casing:	
75 x 20' @ \$29.80 per length	2,235.00
150 x 10' @ 21.55 " "	3,232.50
	<u>\$23,467.50</u>

Contractor shall promptly prepare and ship the foregoing material to the job site, with freight costs for Owner's account. Said material shall constitute additions to the inventory and is being supplied by the Owner for use in connection with the work hereunder, and any such material remaining at the end of the work shall continue to be the property of the Owner. It is understood that Owner plans to request of Contractor an occasional deep hole to be drilled and a proportion greater than previously of the larger core sizes in the holes drilled. This will require greater inventory at the job site, of the larger sized casing and drill rods, and Contractor shall maintain the necessary inventory to avoid delays.

5. In Contractor's performance of the additional 12,000 meters of drilling,

(a) Owner will furnish without cost to the Contractor, the fuel required for the drilling operations;

(b) During the period of such additional drilling, Owner will assume for its account the cost of camp and equipment guards.

(c) To the extent additional drillers are initially required for the increase in the rate of drilling beyond that mentioned in the Principal Agreement, and for replacements of drillers whose employment contracts expire with the completion of the first 20,000 meters of drilling and who leave on such

expiration, Owner will pay for Contractor's cost of transportation for such personnel in accordance with Section 2-10 of the Principal Agreement.

(d) During the period thereof, Contractor may elect to charge Owner at cost plus 10% thereof for meals for Owner's staff and employees, pursuant to Section 9 of the Principal Agreement. It is contemplated that Contractor will determine its method of charging Owner therefor (i.e., the stated flat rate or cost plus 10%) after about 2000 meters of such additional drilling has been completed and Contractor's boarding house costs during such period can be reviewed by both parties, but Contractor shall have the sole right to determine by which method to charge Owner for the foregoing.

6. In accordance with understanding reached at conference in Lima on February 3, 1964 by representatives of Owner and Contractor, it is agreed:

(a) Effective November 26, 1963 the invoice stamp tax in Peru was increased. Owner agrees to reimburse Contractor for the increase in such tax paid by Contractor.

(b) Owner will reimburse Contractor for any purchases made after said February 3, 1964, of miscellaneous camp supplies other than foodstuffs; where appropriate Owner will pay suppliers directly for such items. After said February 3, 1964, freight charges on all bit shipments to and from the job site will be for account of Owner and paid by it.

7. The Principal Agreement as modified herein shall continue in full force and effect, and shall apply to all the matters of this Supplemental Agreement above set forth in determining the rights and obligations of the parties.

IN WITNESS WHEREOF, the parties have executed this supplemental agreement as of the day and year first above written.

BOYLES BROS. DRILLING COMPANY

ATTEST:

(Sgd.) J. H. Stansfield
Assistant Secretary

By (Sgd.) A. F. Goldsworthy
President

AMERICAN SMELTING AND REFINING
COMPANY

ATTEST:

(Seal)

(Sgd.) Harold Howe
Secretary

By (Sgd.) C. P. Pollock
Vice President

Copy for

INTER OFFICE

Coolbaugh
J.H.C. for [signature]

Doc 102
MAY 23 1969

To: A. F. Goldsworthy

Core Recovery by
Specific Gravity

From: A. K. Guad

READ AND RETURN _____

PREPARE ANSWERS _____ HANDLE _____

JUN 5 - 1969
W.E.S.
JUN 5 1969

Re. contractual drilling jobs as follows: A.S. & R. - Silver Bell Job No. 6-225 at Silver Bell, Arizona, and A.S. & R. Michiquillay job No. 61-1 at Cajamarca, Peru.

On January 7, 1965, you draw my attention to a clause in the contract with A.S. & R. and specifically to Hole No. L-198, of the latter job, drilled from 1,248.2 feet to 1,612.5 feet, a total of 364.3 feet of which A.S. & R. gave a recovery figure of 89.917 percent.

The clause is as follows:

"Bonus for core recovery:

7-1. The Contractor will be paid the above base rates per foot of hole drilled plus a bonus of X dollars per foot of core recovered. Footage of core recovered and percentage of core recovery will be determined by the Owner by weighing all the core recovered from each run, making a specific gravity measurement by water immersion of a representative piece of core from such run, and thereupon computing the footage recovered and the percentage of recovery; such figures in turn to be tested for mechanical or arithmetical error by actual linear measurement of the core recovered."

There are a number of clear-cut reasons why the lineal footage of core recovery cannot be determined by the above loosely stated formula:

1. The diameter of the core, a function of its length, is, in this case, not a constant but a strongly variable quantity, as will be shown below.
2. It is not specified in the above clause how the core diameter is to be determined. It must, therefore, be pointed out that the listed ID of the bit size used is not necessarily at any time the diameter of the core and that the true average diameter is always a considerably lesser quantity. The core length is consequently diminished in proportion to the diameter increase as follows:

If the listed diameter of an NX size bit, 1.875", is used and the actual average diameter is 1.800" then in the formula $v = \bar{n}r^2h$, $r = .9$, when $h = 10"$, $v = 25.4496$ cubic inches.

Now retain $v = 25.4496$ cu. in. with the larger diameter in the same formula. $25.4496 = \bar{n}r^2h$ and h becomes 9.216 inches. The difference $10 - 9.216 = 0.784"$ is 7.84%.

Similarly in another 10-inch long core if the assumed diameter is 1.875" and the actual average diameter determined by caliper measurements is 1.700" the 10-inch length = *bricks* to 8.220444" or 17.8 percent.

out. The average difference in NX core diameters may be greater than the above 17.3% *7.1%* but if we apply the lesser percentage 7.84 percent the revised "Recovery Bonus" sheet changes as follows:

would apply to all sizes of core

Core Recovery Bonus for the Month of December, 1964

Recovery increased by 7.84%

Hole	From	To	Total	Recovery	Bonus/foot		101	%
					\$5.50 or	\$3.50		
J-23B	591.4	841.5	250.1	84.21	5.50 x	84.21	1,375.55	90.81
L-18B	920.0	1,304.9	384.9	91.21	5.50 x	100.0	2,116.95	
L 19B	1,248.2	1,612.5	364.3	89.91	5.50 x	89.91	2,003.65	96.90
N-20	812.4	1,249.8	437.4	95.84	5.50 x	100.0	2,405.70	
P-19	686.1	1,004.5	318.4	92.82	5.50 x	100.0	1,751.20	
Nov. 30 to Dec. 5								
I-21B	61.0	167.5	106.5	90.44	5.50 x	100.0	585.75	
J-23B	841.5	1,187.0	345.5	91.41	5.50 x	100.0	1,900.25	
K-18B	350.8	660.3	317.5	93.54	5.50 x	100.0	1,746.25	
L-18B	1,304.9	1,635.2	330.3	86.14	5.50 x	86.14	1,816.65	92.89
L-19B	1,612.5	1,706.6	94.1	92.32	5.50 x	100.0	517.55	
N-20	1,249.8	1,324.7	74.9	96.61	5.50 x	100.0	411.95	
P-19	1,004.5	1,228.9	224.4	85.26	5.50 x	85.26	1,234.20	91.94
Dec. 7 to Dec. 13								
I-21B	167.5	656.4	488.9	93.83	5.50 x	100.0	2,688.95	
K-18B	668.3	1,359.9	691.6	93.42	5.50 x	100.0	3,803.80	
K-22D	390.0	738.7	348.7	85.48	5.50 x	85.48	1,917.85	92.18
K-23	292.5	596.2	303.7	90.72	5.50 x	100.0	1,670.35	
L-18B	1,635.2	1,645.2	10.0	82.81	5.50 x	82.81	49.12	89.3
Dec. 14 to Dec. 20								
I-21B	656.4	820.0	163.6	81.53	3.50 x	81.53	503.43	87.92
K-18B	1,359.9	1,473.1	113.2	89.79	3.50 x	89.29	396.20	96.83
K-22D	738.7	936.0	197.3	95.10	3.50 x	100.0	690.55	
K-23	596.2	607.9	11.7	83.52	3.50 x	83.52	40.93	90.87
							<u>\$29,626.85</u>	
<u>Difference</u>								<u>\$1,219.15</u>

The method of determining specific gravity is subject to grave error. A small fragment out of a run varying in length from one to ten feet is not representative merely because the selector says so, nor because he thinks so; for a specimen representative, in the sense that it gives the average specific gravity of a run, cannot be selected by mere visual inspection.

typical specifications
The following excerpts pertinent to this matter from pages one and two of the A.S. & R. specifications for the job comprises all the information submitted about the nature of the ground we are now drilling on the Michtquillay job.

"From: Northern Peru Mining Corporation
For: Bid on Diamond Drilling in Northern Peru

This information is presented in requesting bids for diamond drilling of a disseminated copper prospect in Northern Peru, South America.

"In the initial program it is intended to core the oxidized bedrock overlying the sulphide zone but in subsequent drilling it may be decided to drill to the top of sulphides with non-coring roller bits. A price for this should be given.

Nature of Rock to be Cored:

The bulk of the coring will be in a typical porphyry copper deposit with pervasive quartz-sericite clay alteration. Around the periphery of the porphyry some mineralized quartzite and limestone will be encountered.

Specifications:

The initial program is for exploratory drilling with spacing of 400 meters (1,312 feet) between holes over the area of a mineralized and altered porphyry intrusive. The objective is, however, sampling for grade of mineralization and a high core recovery is essential.

Overburden:

Part of the holes will start in weathered outcrop or in shallow soil cover. A few will be collared in iron-oxide cemented talus material. An unknown number, perhaps as many as one-quarter, will be started in coarse glacial debris. The thickness of this material may be up to as much as 100 or 200 feet and it is contemplated to drill through this material to bedrock with the rotary rig."

In selecting the specimens for sp. gr. testing it isn't known that a crystal or bleb of a heavy mineral is not totally enclosed within the specimen.

If we examine the core of a typical copper-bearing porphyry intrusive in an average run, we may find three segments averaging a half inch each which carry nearly massive chalcopyrite or some other metallic sulphide, pyrite, etc. It is clear that none of the three segments will be representative of the sp. gr. of the run, and it is impossible to determine by inspection how much of the heavy mineral should be split along with the average rock in order to procure a specimen of average specific gravity for the full run.

In recent years a major mining corporation, in search of copper, drilled several thousand feet in an intrusive porphyry in the far northwest. Not until the project and all the holdings were dropped did they learn they had drilled a valuable scheelite deposit. If the presence of scheelite can be totally missed in thousands of feet of core, this mineral, along with other heavy minerals present in an average core run, may likewise easily be overlooked.

In most any average core specimen of a length equal to its diameter it is possible to split the specimen into approximate equal parts in such a way that distinct differences in the separate specific gravities of the halves is demonstrated.

Even if inch by inch specific gravity tests are accompanied by caliper measurements determining core diameter to the nearest ten thousandth of an inch the method does not work for an average ore exploration core.

3. Supporting evidence for this statement is related to the factors which combine to make a drill hole deviate from its aimed direction and causes the core diameter to become a variable length.

The basic causes and effects relating back to both heading one and two above will be developed hereunder.

That an advancing drill string deviates from its aimed direction is common knowledge. The nature and amount of departure in various formations has been observed in countless holes. The reason for this meander may not be so clearly understood.

A rotating extended steel rod is subject to the laws of the modulus of elasticity, thermal expansion and the state of its rotary balance. The latter, in the case of numerous assembled drill rods, is affected by wrench gashes, etc. on individual rods. Aside from its purely mechanical behaviour, derived from composite vibrations, the amount and direction of deviation from target is controlled by structural and other variable qualities inherent in the rock formations. The controlled run and rate of advance of the rotating drill stem may be used, to some extent, to minimize or accentuate this deviation; but the guiding force is largely inherent to a multiplicity of variations within the rock and its structural attitude.

Some of the common contributing factors are:

(a) Angular relationship of hole direction to direction of strike and dip of formation planes present in schistosity, gneissic structure, bedding, jointing, shearing and faulting.

(b) Directional change in these plane from depth to depth due to faulting, folding, or the presence of unconformities.

(c) Change of density from one kind of rock to another due to faulting, intrusion, volcanic flows, or deposition of a sedimentary series.

If a drill stem penetrates a uniform rock formation of constant strike and dip angular to the drill hole direction the deviation will lie along a segment of a circle. If the strike and dip of the formation is reversed by faulting the bit will travel in the opposite direction. Thus the hole may trend from side to side or advance, more or less, along a cork screw pattern.

The deviation of the drill stem may cause vibrations varying in intensity from

low order to a wild whipping action. The diameter of the core is consequently reduced by frictional wear. The low order vibration tends to induce a uniform circular wear; but the whipping action results in reducing the core's circularity to a more or less oval shape. Aside from diameter reduction assignable to a vibratory origin the slight projection of a single diamond will reduce the initial diameter by the amount of its projection.

It follows that not only must inch by inch specific gravities be determined but the accompanying average diameter, a factor in the computations, must be determined to the nearest ten thousandths of an inch.

Some ground conditions makes it quite impossible to apply a specific gravity measuring method.

A gouge zone may be successfully penetrated with 100% recovery but a specific gravity test, due to the nature of the material, is rarely possible because the solids tend to disintegrate when submerged for the test.

In drilling through a breccia zone a series of varying conditions may be encountered. If an active underground water flow is present the drill bit may push through the zone without any essential recovery. The problem of penetration is aggravated by the strength of the water flow. It may be necessary to cement and redrill the hole a number of times, and if all fragments both loose and those entrapped in the cement were added the recovery might well be in excess of 100 percent.

Again the breccia zone may contain a water pocket under hydrostatic pressure giving rise to an upsurge into the hole. It may be necessary to make numerous runs into the hole before the pressure is reduced to where cementing is possible. The recovery of fragmented and crushed rock matter could thus be many times the actual zone width even before cementing and final penetration is made.

A diminishing water flow in a breccia zone is commonly accompanied by a drop in pressure and temperature whereby cementing matter carried by the water is liberated to form, a time controlled, wide range of various stages of breccia cementation. The resultant rock may acquire a honeycomb structure, it may be vuggy, or it may contain irregular elongated caves many inches in cross-section.

Penetrating such a cave may have an incidental ruinous effect upon the diamond bit; for it is commonly lined with projecting quartz crystals, at times studded with pyrite crystals.

Additional crystal matter knocked loose by the rotating bit may actually be recovered in the core barrel to give more than 100% recovery and still be shown as a core loss.

Many other cases, arising from penetrating fault and fissure zones, could be similarly detailed to show that the specific gravity method of measuring core recovery really has no overall practical application.

If this method has any application at all it must be limited to the absolutely uniform

rock segments rarely found in ore exploration drilling; for the cost of measuring and running enough specimens to make the method meaningful is prohibitive.

A. K. Guard

Salt Lake City, Utah
January 11, 1965

J. H. C.

FEB 25 1963

K. R.

MAR 1 1963

AIRMAIL

February 21, 1963

Mr. R. F. Durfee, Asst. Mgr., Drilling Div.
Boyles Bros.
1624 Pioneer Rd.
Salt Lake City 10, Utah

Dear Mr. Durfee:

I am enclosing for your approval and signature three copies of revised draft of February 19th modifying draft of February 6th in connection with the Michiquillay drilling program. Mr. Smith changed the February 6th draft in accordance with decisions mutually agreed upon with Mr. Goldsworthy during discussions with him here Monday, the 18th, at which we reviewed certain language changes proposed in the draft prepared by your lawyer.

Principal revisions include:

- (1) Owner's option under 2-1, pg. 1 and 2, to purchase items of equipment in Peru at the fair value price in Salt Lake City in order to effect savings in transportation expenses in returning the equipment at the conclusion of the contract.
- (2) There is no commitment by the Contractor in the rate per foot under #10, pg. 7, beyond 20,000 meters. If drilling continues after a total of 20,000 meters is completed, the new rate is to be agreed upon between the parties, giving due consideration to previous costs.
- (3) The short paragraph covering Owner's Termination for Cause, #19, pg. 10 of your draft eliminating surrender of Contractor's equipment, etc. has been substituted for our longer paragraph 19.

I believe the revised draft enclosed is in accordance with modifications agreed upon in the discussions with Mr. Goldsworthy. If the contract is now satisfactory, please have all three copies executed on behalf of Boyles Bros. and forward them to me

Mr. R. F. Lurlee
Boyles Bros.

-2-

February 21, 1965

for signature by an officer of this Company. I will then return one fully executed copy for your records together with additional conformed copies as you may require.

I wish to call your attention again to the requirement of a detailed list of equipment, pg. 3, needed for attachment to the contract.

Yours very truly,

C. P. POLLOCK

encls. (3)

cc: HSmith

AWWilliams) A/M

RBSprague) w/att.

KRRichard)

Mr. A. F. Goldsworthy w/att. (c/o RBS Line Office)

2/21/63

CONTRACT

Agreement made the _____ day of February, 1963, by and between Boyles Bros. Drilling Company, a Utah corporation, whose address is 1624 Pioneer Road, Salt Lake City, Utah, hereinafter called "Contractor", and American Smelting and Refining Company, a New Jersey corporation, whose address is 120 Broadway, New York 5, New York, hereinafter called the "Owner".

WITNESSETH:

This is a contract whereby the Contractor undertakes to do the drilling specified herein for the Owner on the Michiquillay Pomphyry Copper Prospect near Cajamarca, Northern Peru in accordance with the terms and provisions hereafter set forth.

NOW, THEREFORE, in consideration of the premises, the work and materials to be performed and provided by the Contractor for the Owner and the performance of and the payment of money by the Owner to the Contractor, and in consideration of the representations, covenants and promises of the parties all as herein-after set forth, the parties hereby represent and agree as follows:

1. Scope of Work

1-1. The Contractor agrees to drill with rotary and diamond core drills at said Michiquillay property only such total footage (meters) and such holes at such sites and depths and do only such other work in connection therewith, such as coring, reaming, casing, etc., all as designated by the Owner through its representative, as is called for in the invitation to bid subject, however, to the capacity of Contractor's equipment, which Contractor warrants will be capable to perform the work contemplated by Owner's invitation to bid as described therein.

1-2. The Owner contemplates that hole depths will range from 0 feet to 2,500 feet, and Contractor will not be required to drill to greater depths without a properly agreed to change order and extra charge.

2. Owner will

2-1. Pay for Contractor's cost of transportation of equipment and supplies from San Francisco, California, to job site and return to Salt Lake City, Utah. On demobilization, Contractor will

use its best efforts to sell as much drilling and automotive equipment as possible in Peru at prices that would be comparable to the fair value to contractor of like equipment in Salt Lake City. Contractor shall not be required to sell below such price. This will, in effect, reduce transportation expenses and all savings in transportation thus realized shall be for the benefit of the Owner. Contractor shall so use its best efforts to minimize such costs. If any such equipment is not sold as aforesaid in Peru, Owner shall have the option to purchase from Contractor in Peru any one or more of such items of equipment at a price equal to the fair value thereof in Salt Lake City. If Owner exercises such option and the parties cannot agree on the price of any item to be determined as aforesaid, such disagreement shall not defeat the sale thereof and the dispute as to price shall be settled by arbitration as hereinafter provided. None of the foregoing provisions concerning the sale of equipment in Peru either to third parties or to the Owner shall apply in the case of any and every item with respect to which the Contractor assumes the expense of transportation from Peru and waives its right to charge the Owner for such transportation expense.

2-2. Pay for Contractor's cost of transportation and other incidental costs of Contractor's initial personnel from the United States or South American places to job site and return, based on tourist rate fares plus one-half wage rate, plus meals and lodging.

2-3. Provide and pay for import clearances, licenses, fees, including export fees, real property taxes and import duties through Peruvian Customs on Contractor's equipment, and re-exportation of the same, in excess of the \$2,000.00 estimated by Contractor in his bid prices. The first \$2,000.00 shall be for Contractor's account and if the same amount to less than said sum, the difference shall be credited to Owner. All negotiations, procedures, and authorizations in connection with these matters will be handled by Owner and Contractor shall follow Owner's instructions with regard to import, export and all other such matters.

2-4. Provide access roads and drill sites.

2-5. Pay for cost of mud and additives, and for the time of mixing if drilling is thereby delayed. Owner may elect to supply mud, cement and additives, provided the quality thereof is satisfactory to the Contractor.

2-6. Pay for materials hereinafter specified used in and delays caused by cement, casing and reaming as undertaken by direction of Owner's representative, at the rates specified hereinafter.

2-7. Provide or pay for core boxes.

2-8. Provide in place satisfactory and adequate supply of culinary and drinking water, dormitories and buildings for cooking, eating and sleeping for Contractor's employees, including Peruvian.

2-9. Provide in place beds, mattresses, bedding, furniture, cooking and serving utensils, fuel for cooking, heating equipment and heating for the use of Contractor's employees.

2-10. Pay for transportation and related costs of supplying additional drillers beyond the number required to operate the five drills hereafter mentioned on a two, 8-hour shifts per day, 6-day week schedule, requested by the Owner in order to increase such drilling rate. Such transportation shall be by air at tourist rate and such costs shall include the driller's pay at half-time rate during traveling not exceeding one week. Total of all such costs per man shall not exceed \$500.00.

2-11. Pay for Contractor's charges for board for Owner's staff and Owner's Peruvian employees at the rate to be charged by the Contractor as shown below at Section 10.

2-12. Pay for Contractor's cost of purchasing and installation of an adequate amount of ungalvanized iron 2" water pipe of Peruvian manufacture, not to exceed 5,000 feet for use in supplying water for drilling purposes. Such pipe shall be the property of Owner and be returned to it at the completion of Contractor's work hereunder.

2-13. Provide and install a generator of 220 volts for power supply for the camp and the Contractor. Contractor shall give Owner sufficient prior notice of horsepower requirements of Contractor's maintenance machinery, if any power from such generator shall be required therefor.

2-14. Provide a sampler or samplers to receive the core from the core barrel, to verify all drill hole footage measurements, and to acquire all information related to the performance of the work. The Contractor agrees to furnish core only to such sampler or samplers, or such other person as the Owner may designate, and to furnish no information whatsoever regarding the records and results of the work to any third party.

No facilities or payment therefor, other than above set forth, shall be required of Owner.

3. Contractor will provide and pay for:

3-1. Four truck-mounted non-hydraulic feed wireline drills with equipment for core diameters of NCM of 1.400 inch, FXM of 1.875 inch, SMH of 1.432 inch and AMZ of 1.657 inch.

3-2. All necessary pumps and other equipment and supplies for such rigs, including suitable inventory of spare parts in Lima, Peru, or at the job site.

3-3. One truck-mounted non-rotary rig and all necessary supplies including suitable inventory of spare parts in Lima, Peru, or at the camp site.

3-4. Bits, wearing chills and core barrels.

3-5. Transportation for Contractor's men and supplies from the camp to the drill rigs and return.

3-6. Food and preparation thereof for Contractor's personnel.

3-7. The following North American personnel for the work: a competent superintendent, one experienced drill foreman, one experienced assistant drill foreman, one experienced camp manager, a minimum of nine experienced wire line core drillers, 2 rotary drillers and a requisite number of Peruvian employees as helpers, truck drivers, laborers, mechanics and all other personnel needed to perform the work on a basis of two 8-hour shifts a day, six days a week, which is the rate at which the Contractor agrees to perform the work.

3-8. Two water trucks and pumps for hauling and pumping water from water line to the drills.

3-9. An adequate inventory of supplies, materials, tools and spare parts for all equipment, to be kept in Lima, Peru, or at the job site, so that orders to the U.S.A. and delays/resulting therefrom will be at a minimum; and for the same purpose, shop facilities at the site of the job, with suitable equipment, for keeping in repair and servicing all of Contractor's other equipment. Contractor will make such shop facilities available to Giner for its repairs at a reasonable charge, subject to Contractor's prior call on such facilities. This will be a mobile field shop only and not a formal shop.

3-10. All other things required to be done or furnished, to perform the Contractor's work hereunder, except only those things

to be provided by Owner as herein set forth.

3-11. Contractor will file daily with Owner's representative legible copies of Contractor's drillers' shift reports.

3-12. Contractor will render to the company detailed monthly invoices covering all charges for the Owner's account incurred in the preceding calendar month, and on such invoices, will segregate the charges according to the individual holes concerned.

Contractor shall also perform all those things for which Owner is obligated to pay the costs thereof but not to provide as hereinabove set forth.

A detailed list describing all equipment being shipped by Contractor is attached and made a part hereof.

4. Rates for drilling:

Payment by Owner for all drilled footage completed by Contractor shall be made in accordance with the following schedule:

4-1. Rotary Rock Biting in glacial drift, alluvium or leached bedrock, either with rotary rig or diamond drill rig:

From 0 feet to 250 feet	\$3.20 per foot
From 250 feet to 500 feet	\$3.00 per foot
Below 500 feet	Price to be negotiated

4-2. Coring at a base rate for the first 10,000 meters of total drilling, at the price per foot:

	<u>NCNL</u>	<u>NIWL</u>	<u>EXWL</u>	<u>ANWL</u>
Ledge to 500 feet	\$4.60	\$4.00	\$4.00	\$3.70
500 to 1000 feet	4.80	4.60	4.40	4.10
1000 to 1500 feet		4.80	4.70	4.60
1500 to 2000 feet		5.60	5.50	5.40
2000 to 2500 feet		6.60	6.60	6.30
Below 2500 feet				Prices to be negotiated

5. Rates for reaming:

5-1. For all reaming completed by Contractor, Owner shall pay Contractor, for the following various diameters, at the following rates:

4 1/2"	\$3.90 per foot
EX	3.60 per foot
EX	3.40 per foot
AX	3.30 per foot

6. Casing, Cementing, etc.:

6-1. For casing, cementing, and mixing (if drilling is thereby delayed, to the extent of the delay) and delays for Owner's convenience or caused by the fault of the Owner, Owner shall pay Contractor for the time spent thereon at the rate of \$17.60 per hour per drill unit. It shall be Owner's responsibility to select beforehand the location for deep holes, and if Contractor is required to move its large drill rig to deepen a hole started by a smaller drill, the delay shall be deemed one for Owner's convenience and paid for at the aforesaid rate of \$17.60 per hour. Except as aforesaid, time spent on moving a drill rig from one completed hole to a new site shall be for Contractor's account. Delay through customs in Peru shall not be deemed the fault of Owner unless Owner is the cause of such delay.

7. Bonus for core recovery:

7-1. The Contractor will be paid the above based rates per foot of hole drilled plus a bonus of \$3.50 per foot of core recovered. Footage of core recovered and percentage of core recovery will be determined by the Owner by weighing all the core recovered from each run, making a specific gravity measurement by water immersion of a representative piece of core from such run, and thereupon computing the footage recovered and the percentage of recovery; such figures in turn to be tested for mechanical or arithmetical error by actual linear measurement of the core recovered.

8. Casing, lost, used up or ordered left in place shall be paid for by Owner at the following rate:

8-1. All sizes, \$1.70 per foot.

9. Boarding House Charges:

Contractor shall furnish meals for Owner's staff and Peruvian employees, at the following rates to be paid by Owner:

9-1. Staff employees \$ 4.00 per day

9-2. Local Peruvian \$ 0.75 per day

National employees

Above rates to apply only to the period covered by the first 10,000 meters of drilling. Thereafter, unless the parties mutually agree on a flat rate, rates charged Owner shall be equal

to Contractor's direct cost for food and preparation of food in feeding the above personnel plus 10% thereof.

10. Extensions of Drilling Program:

If the drilling by Contractor hereunder should continue beyond a total of 10,000 meters drilled, the rates per foot to be paid Contractor as listed in Subsection 4-2, shall each be reduced by 25 cents for the number of feet of coring within the second 10,000 meters of drilling or any part thereof. If drilling continues beyond a total of 20,000 meters drilled, the aforesaid reduction of 25 cents per foot shall no longer apply to such further coring beyond 20,000 meters.

If drilling continues beyond a total of 20,000 meters drilled, the rates per foot to be paid Contractor will be agreed upon by Owner and Contractor, taking into consideration the findings of the Contractor and the previous costs of the Contractor.

11. Delays:

11-1. Owner shall construct the required camp and access roads and drill sites and do all other things required of it under this contract so as not to delay the Contractor in the performance of its work. The Owner agrees to pay Contractor a reasonable sum to cover the losses and expenses incurred by the Contractor for any such delays caused the Contractor by the Owner. It is understood, however, that Contractor will await the prior notice of Owner of the dates when the above facilities will be ready before moving to the job site. Delays caused by government authorities in Peruvian importation of equipment and supplies without fault of Owner contributing thereto, shall not render Owner liable therefor.

12. Payment:

12-1. Owner agrees to pay the Contractor for the performance of this contract monthly in lawful money of the United States.

12-2. Before each such payment is due, the Contractor shall submit evidence satisfactory to the Owner that all claims, obligations and liabilities (except, in the case of payments other than final payment, indebtedness not then due) against the premises or chargeable to the Owner have been fully paid and satisfied.

13. Protection by Contractor:

The Contractor at all times shall maintain adequate protection of the work from damage and shall protect the Owner's

property and all persons thereon from injury, damage or loss by reason of any act or omission of the Contractor or any employee of the Contractor. The Contractor shall be responsible, and reimburse the Owner, for any loss or expense to the Owner arising from damage to the work or other property of the Owner caused by the wrongful act or neglect of the Contractor or the employees of the Contractor. Where such damage includes damage to the work it shall be repaired at the expense of the Contractor.

The Contractor shall use its best judgment and skill in dealing with labor matters, and take all reasonable steps to avoid labor disputes. In the event of any strike or threat of strike, slowdowns, featherbedding, or other like practices, the Contractor shall apprise the Owner of all relevant facts and implications of the particular labor problem involved, and shall consult in good faith with the Owner in an endeavor to reach a mutually satisfactory solution to such labor problem and, so far as reasonably possible, to protect the Owner against delays affecting the work or damage or losses to its other operations.

Contractor shall provide safe and proper facilities at all times for the inspection of the work by Owner, and at request of Owner shall promptly redo all work which Owner deems defective, whether or not there be a dispute with respect to such work being defective. Any such dispute shall be settled by arbitration. The foregoing right of Owner shall not impair its right to declare the contract terminated in case of a substantial breach by Contractor, as hereinafter provided for.

14. Indemnity by Contractor:

The Contractor shall save harmless and indemnify the Owner from and against any expense, loss or damage on account of any claim, demand or suit made by any person whomsoever, including any employee of the Owner, which is in any way caused by or connected with, or grows out of the execution and performance of this contract by the Contractor or any of its employees; provided, however, that the Contractor shall not be required to indemnify the Owner against any loss caused solely by the negligence or willful fault of the Owner or its employees.

15. Compliance with Laws and Ordinances:

The Contractor shall give all notices and comply with all laws, ordinances, rules and regulations, bearing on the performance of the work hereunder. If the Contractor performs any work contrary to any such law, ordinance, rule or regulation, he shall bear all

costs arising therefrom and Contractor indemnifies Owner against all loss, damage and liability by reason of Contractor's non-compliance with the foregoing.

If for any reason the Contractor's employees or agents acquire a status imposing liability on the Owner for employer's contributions or taxes under Peruvian Laws, the Contractor shall be exclusively liable for, and shall indemnify the Owner against, the same and agrees to comply with all such laws and regulations so as to relieve the Owner from any and all liability therefor and from the responsibility of making reports or keeping records with respect thereto.

16. Patents:

The Contractor shall indemnify and save harmless the Owner against and from any and all claims, losses, costs, damages, expenses, actions or other proceedings, growing out of or resulting from infringement of any patent by the Contractor in the performance of this contract.

17. Changes in the work:

The Owner, without invalidating this contract, may at any time order extra work capable of being performed by Contractor with its equipment and personnel even though not covered by this contract. If such extra work involves a change in cost, the price therefor to be paid Contractor shall be subject to mutual agreement, and if the parties fail to agree the price shall be the fair value thereof as determined by arbitration hereinafter provided for.

18. Correction of Work after Payment:

Neither payment nor any provision in this contract shall relieve the Contractor of responsibility for faulty materials or workmanship and the Contractor shall remedy any defects due thereto which shall appear while Contractor is at the Property, and pay for any damage to other work resulting therefrom. The Owner shall give notice of observed defects with reasonable promptness.

19. Owner's Termination for Cause:

If Contractor is in substantial breach hereunder and shall fail to correct promptly the default after written notice thereof served by Owner on Contractor's superintendent or foreman assigned to the work, then Owner may without prejudice to any other right or remedy, terminate this contract for Contractor's breach.

20. Voluntary Termination by Owner:

This contract may be terminated by Owner at any time after Contractor has begun the work hereunder, without any substantial breach hereunder by Contractor, upon giving written notice to Contractor, and in such case, Owner shall pay Contractor all sums accrued prior to such termination and all sums remaining unpaid under Subsections 2-1 and 2-2 and Owner will provide and/or pay for all such other items set forth in Section 2, necessary or proper in connection with completion of any work remaining to be done in connection with said termination, and departure and return of Contractor's equipment and other property and personnel, subject to the provisions of Subsection 2-1 concerning advantageous sale of items in Peru.

21. Arbitration:

All disputes herein shall be submitted to and determined by arbitration. Neither party shall have the right of recourse to legal proceedings, (other than to enforce this Section 21 of the contract providing for arbitration) unless and until an arbitration award has been made. Arbitration shall take place in Salt Lake City, Utah, in accordance with the rules of the American Arbitration Association before one arbitrator if only one dispute is to be determined and before three arbitrators if more than one dispute is to be determined, with such arbitrator or arbitrators chosen in accordance with such rules. Except in the case of the exercise of an alleged right of termination by either party hereunder, a dispute shall not cause a cessation of work or other performance by either party, but the settlement of such dispute shall be reserved for arbitration and pending such settlement Contractor shall comply with the instructions of Owner without any waiver of any rights of either party being implied thereby.

22. Applicable Law:

The parties intend that this contract and the rights and liabilities of the parties hereunder be interpreted under the principles of the American common law as they would be applied in the State of Utah (the agreed place of arbitration) without any reference under such local law to the laws of Peru.

23. Entirety Clause:

This contract constitutes the entire agreement between the parties, and except as may be specifically set forth herein no changes can be made herein except by an agreement in writing duly

executed by the parties or their duly authorized agents. This contract shall govern in case of any differences herein from Owner's invitation to bid, as amended; where this contract is silent, such invitation to bid shall be relevant for the purpose of aiding in determining the matters within the contemplation of the parties and their intent in entering into this contract, in case any issue arises wherein such determination becomes material, but such invitation to bid shall not add to nor subtract from the rights and obligations of the parties as set forth in this contract. Statements which are stated to be or which are in effect expressions of opinion (including all statements pertaining to conditions which may prevail in the future) if made in good faith by Owner in such invitation to bid, shall not be construed as representations or warranties for which Owner shall be liable.

24. Assignment:

This contract shall be binding upon the parties hereto and upon their successors and permitted assigns. Contractor shall not assign nor subcontract this contract in whole or in part, without the prior written consent of the Owner. An assignment or subcontracting hereof by Contractor to a wholly owned subsidiary corporation of Contractor is hereby permitted, but in the event of any such assignment or subcontracting, Contractor shall nevertheless remain liable for the Contractor's performance hereunder.

25. Status:

It is intended and understood that the relationship of the Contractor to the Owner is one of independent contractor and that the Contractor is not an employee or agent of the Owner, nor is Owner an agent of the Contractor.

IN WITNESS WHEREOF, the parties have executed this contract the day and year first above written.

BOYLES BROS. MILLING COMPANY

ATTEST:

By

Secretary

AMERICAN SHELTERING AND REFINING
COMPANY

ATTEST:

By

Vice President

Secretary

PURCHASE ORDER

DATE	June 1, 1967
ORDER NO.	T-6565
REQUISITION NO.	

PLANT JOB NO.
APPROPRIATION NO.

AMERICAN SMELTING & REFINING CO.

Tucson Office 1150 North 7th Avenue }
P. O. Box 5795 Tucson, Arizona 85703

To: Whatley Drilling Company (hereinafter referred to as CONTRACTOR)
1512 West Prince Road
Tucson, Arizona, 85705

DATE REQUIRED AT DESTINATION:

SHIPPING INTERVAL PROMISED	SELLER WILL SHIP BEFORE:
POINT OF SHIPMENT	TERMS
F. O. B. POINT	

FINAL DESTINATION — PLEASE NOTE CONSIGNMENT BELOW
J. H. C.
JUN 12 1967

CONSIGNMENT — SELLER WILL SHIP TO

— RENDER BILLS AS PER ATTACHED SHIPPING INSTRUCTIONS —

SHIP VIA

QUANTITY	UNIT	SPECIFICATIONS	ITEM NO.	UNIT PRICE
		<p>CONTRACTOR, in accordance with his letter proposal of May 29, 1967, a copy of which is attached, will drill holes and take samples at locations in the Harshaw Mining District, Santa Cruz County, Arizona, to be specified by ASARCO's engineers. For this work ASARCO will pay according to the following schedule:</p> <ol style="list-style-type: none"> (1) <u>FOR MOBILIZATION</u>: The sum of \$300.00; (2) <u>FOR HAMMERDRILLING</u>: At depths of 0 to 500 feet, \$4.00 per linear foot; (3) <u>FOR STANDBY TIME WITH CREW</u>: An all inclusive rate of \$22.00 per hour; (4) <u>FOR STANDBY TIME WITHOUT CREW</u>: An all inclusive rate of \$10.00 per hour. <p>ASARCO will not be liable for any other payments to CONTRACTOR and shall not be charged for any delay due to the failure of CONTRACTOR's equipment or personnel. CONTRACTOR's particular attention is called to clause eleven (11) on the reverse of this order. CONTRACTOR agrees to submit acceptable evidence of the required insurance on the form attached hereto before entering upon ASARCO's property to perform the work.</p> <p>Orig: Whatley Drilling Company cc: Whatley Drilling Company, for acceptance JRwojcik KvdSteinen File</p>		

Whatley Drilling Company
 ACCEPTED BY *[Signature]*
 CONTRACTOR

IMPORTANT

Attached Acknowledgment Card must be completed and returned promptly.

PLEASE ENTER OUR ORDER FOR THE ITEMS SPECIFIED ABOVE. SUBJECT TO ALL INSTRUCTIONS AND PROVISIONS ON REVERSE SIDE.

[Signature]
Chief Geologist

A MERICAN SMELTING AND REFINING COMPANY
SILVER BELL UNIT
Silver Bell, Arizona

MEMORANDUM TO: Mr. J. H. Courtright

Subject: The Use of Drilling Mud and Additives at Silver Bell.

The purpose of this report is to briefly summarize the methods followed at Silver Bell involving the use of bentonite drilling muds and certain additives to facilitate diamond drilling and improve core recovery. Most of the technical information was acquired from the Bariod Division of the National Lead Company or from conversations with experienced people. The procedures were derived by experimentation. Boyles Brothers Corporation is the contractor, using wire-line drill rigs exclusively, so the values given are for this drilling program.

Bariod Aquagel is used as the drilling mud. Another brand was used in the early drilling but the grade of bentonite was not sufficient to properly perform its functions so Aquagel was substituted with very satisfactory results. The primary functions of a drilling mud are: cooling, lubrication, removal of cuttings, prevention of caving and minor water loss, and checking corrosion. It must be able to hold the cuttings in suspension while in the hole, but also must allow them to drop out in tanks or ditches.

Certain additives are also added to the drilling fluid to improve or reduce different properties of the mud. Caustic soda is used to maintain an alkaline condition and to prevent the mud filter cake on the sides of the hole from becoming too thick. It also allows a larger amount of clay particles to be carried at lower viscosities. Quabracho is used with the caustic soda to increase the pH of the mud and to prevent flocculation. The two also act as thinners so technical grade sodium carboxymethylcellulose (CMC) is used to counteract this effect. CMC also serves as a lubricant and brings the particles in the filter cake closer together to make it stronger and also to reduce the loss of water through the cake. The net result of these additives is to give a thin, tough filter cake on the inside of the hole that prevents caving and reduces water loss. Also the core receives a coating of mud which tends to allow easier entrance into the core barrel and serves to hold the more friable pieces together, thus giving a better core recovery. Another additive, sodium tripolyphosphate, is sometimes used when the mud becomes too thick, although water is normally used as the thinner. Its main function is to prevent flocculation after drilling cement.

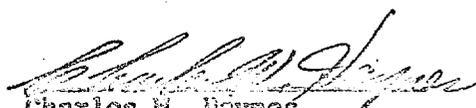
In practice three tanks are used for mud circulation, having a combined capacity of 1000 gallons. This amount is used to allow time for the bentonite to disperse and form its gel before going into the hole. The tanks are arranged in a step-like manner to allow only the top of the fluid to drain into each lower tank, leaving the bottoms for the accumulation of cuttings. When a new batch is made the tanks are drained, cleaned, and filled with fresh water. Three sacks of Aquagel are poured through a hydraulic mixer into the tanks. One quart each of CMC and quabracho are added with the dry Aquagel at this time. A five gallon bucket is set over the trough and one quart each of caustic soda and quabracho are mixed with a full bucket of water. A spigot is attached to the bottom of the bucket and this is opened to allow the solution to slowly drip into the trough. This bucket full is enough for two shifts. As the drilling fluid is used up, water and Aquagel with one quart each of CMC and quabracho is added to maintain supply.

A Marsh funnel is used to determine viscosity. Due to the close tolerances involved with wire-line drilling, a viscosity of 38 to 40 seconds is used. That is, it takes 38 to 40 seconds for 1000 ml. of fluid to pass through the funnel. The viscosity is taken on the fluid coming from the trough. If the mud is too thin Aquegel is added. If it is too thick water or one of the chemical thinners is added.

A closed circuit is used on the drilling fluid. The fluid comes from the hole, passes through a baffled trough, into the tanks, and then is pumped back into the hole. The trough is 6 to 8 feet long with baffles set 18" apart and 1" lower than the top to allow passage of the fluid. The larger cuttings settle out here and are removed periodically. The finer cuttings settle out in the tanks and are cleaned out when needed. The Aquegel is mixed in the upper tank to allow time for dispersal but care must be taken to prevent agitation of the cuttings. The fluid is always pumped from the lowest tank and the hose is situated so that it draws from near the top, thereby preventing any cuttings from re-entering the hole. A wire mesh screen is also placed at the outlet of the trough to catch the larger pieces of sandstone, etc., that are used when circulation is lost.

Since no drilling is done on the graveyard shift the drilling fluid in the tanks is agitated each morning to degelatinize the mud. Care must again be taken not to disturb the cuttings on the bottom. After the drill has operated for a time the viscosity is checked and corrections made, if needed. Since the mud does not deteriorate it is not thrown away when the hole is completed but pumped into the water truck and used in the next hole. At this time all the tanks are cleaned out.

The above procedures are those which have been worked out at Silver Bell with the equipment in use. While most of this could be used anywhere, variations would probably be needed at a different property. Because of this it is recommended that a mud engineer from the company supplying the bentonite be contacted so that definite amounts and types of additives needed at that property could be ascertained.


Charles W. Haynes,
Resident Geologist

CWE/jca
cc: DRJameson
HNRice
SAAxzalone

Cost for DDH No. _____ for the Month of _____ 6 _____

Base Price:

Hole Size	Footage		Total	Rate	Amount
	From	To			
_____	_____	_____	_____	@ \$ _____/ft.	\$ _____
_____	_____	_____	_____	@ \$ _____/ft.	_____
_____	_____	_____	_____	@ \$ _____/ft.	_____
_____	_____	_____	_____	@ \$ _____/ft.	_____

Total Feet Drilled _____

Feet Drilled in "vuggy" ground _____ @ \$ 3.00/ft _____

Balance of footage _____

Feet drilled with less than 30% core recovery _____

Feet drilled with more than 50% core recovery _____

Average core recovery _____ %

Bonus: Feet of recovered _____ @ \$ 3.00/ft. _____

Hourly Charges:

_____ hours Rockbit time @ \$ _____ /hour _____

_____ hours Reaming time @ \$ _____ /hour _____

_____ hours Casing time @ \$ _____ /hour _____

_____ hours Cement time @ \$ _____ /hour _____

_____ hours Mud time @ \$ _____ /hour _____

_____ hours Sawdust time @ \$ _____ /hour _____

Supplies:

Total for Hole \$ _____

Approved for Contractor _____

Approved for Company _____

Division - Son X —

av cost coin dialing — 9.45 9.45
Indirect 3.71

~~23~~

		<u>MX</u>	<u>BX</u>	
Jan 56	— 0-500 500 100	<u>8.00</u> 9.00	<u>7.50</u> 8.50	<u>8.50</u>
Oct 55	0-500	8.50 9.50	8.00 9.00	
Dec 54	0-500	5.50 6.00	5.00 5.50	