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James Doyle Sell Mining Collection

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January 22, 1980

MEMO TO: F. T. Graybeal

FROM: J. D. Sell

Miami East
Cities Service Company
Gila County, Arizona

F.T.G.

On 1/15/80, I chatted with Ralph Molhollen, resident geologist, and Errol Anderson, mine superintendent of the Miami East Project, concerning some features sketched by Mr. J. H. Courtright from a meeting last December (see JHC file copy).

It was confirmed that the diabase mass is 60-350 feet thick and dips to the southeast, crosscutting schistosity of the Pinal Schist host. They would not speculate on the original dip of the diabase prior to down-faulting on the Miami fault.

Although the diabase has a faulted base, they believe it was intruded along an older fault as the diabase has chilled borders, and then reactivated during down-dropping of the basin side.

The diabase is host for a number of variable-sized quartz veins which also dip southeasterly at an angle greater than the dip of the diabase. No strike direction was given, but presumably they trend northeasterly. If the entire Schultz granite complex has been rotated counter-clockwise (looking northeasterly), then steeper veins would rotate to the flatter southeast dip.

The quartz veins contain a zoned assemblage of hypogene chalcocite surrounded by bornite, followed by chalcopyrite, and pyrite in variable-sized pods. This same zoned assemblage was noted in the replacement deposits at Magma). A minor amount of secondary chalcocite enrichment is found at the oxidized interface. *

Miami East presently has over 10,000 feet of underground development for extracting the seven million tons of plus 3% copper reserve in diabase. About 40 gpm of water is produced from this area at the present time.

Although the first attempt to find viable mineralization in this area was initiated in the late 1920's, and again in the 1950's, both these efforts were in low grade material. The late 1960's renewed interest and a number of holes were drilled prior to late 1969 when the go-ahead hole was cored.

Miami East has announced(?) 95 million tons of 1.95% copper with the bulk of this being in Pinal Schist which is not presently in their thoughts of mining because of very poor rock support.

(heavy ground) *James D. Sell*
James D. Sell

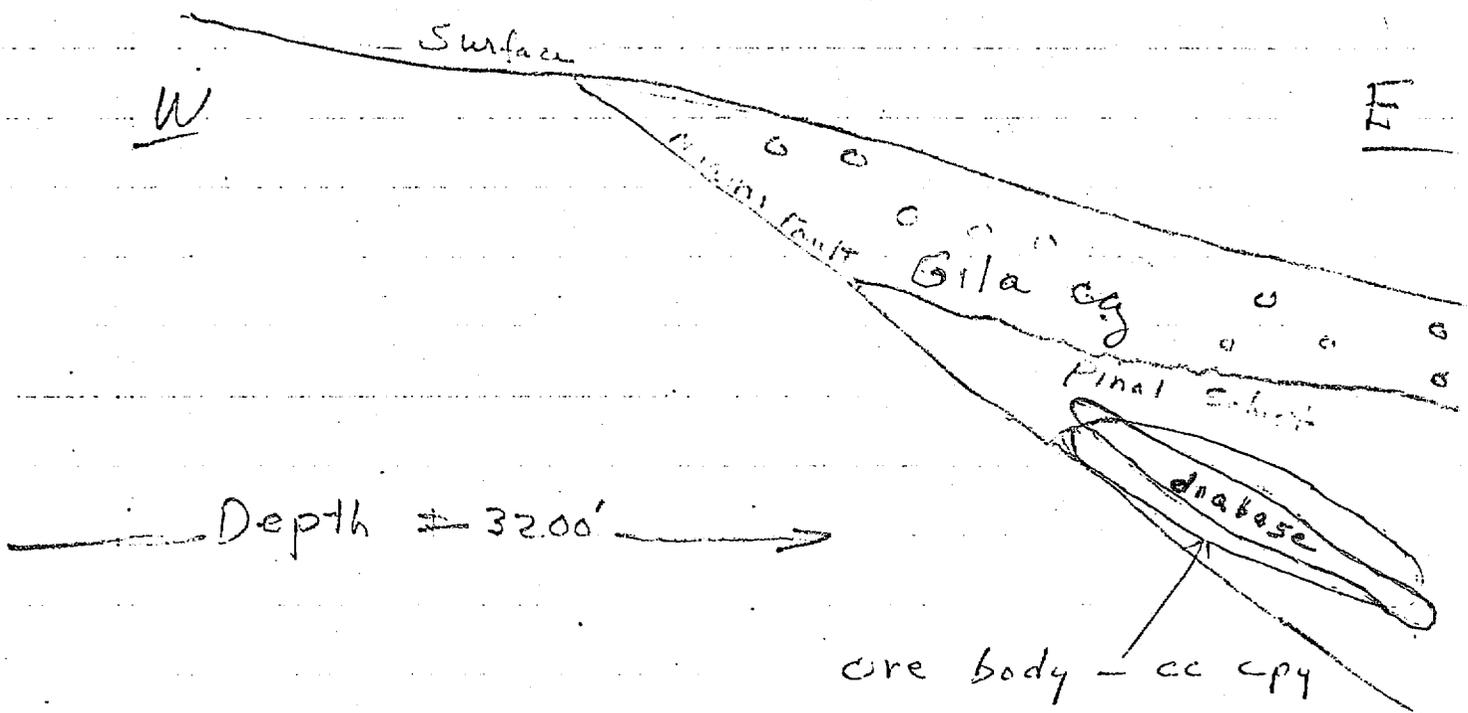
JDS:jlh

~~WKK, FIG, JDS~~ → files 4-9-79

Miami East
Gila County, Ariz.

Sketch section below picked up during recent SEG meeting in Tucson.

J.W.K.



P.S. Highest grade in diabase (2.0%?)

Tilting to East unexplained —

Reserve: (1977 data) 40 million at 1.9% cu

Will be mined by sublevel stoping or
some other selective method — not block caving

J.W.K.

* ~~_____~~

Citronium
 etc } Carlotta - bx - slide block covered by volcanic
 } Drilled -
 } Cactus - bx drilled - fault exposure on E
 } ~~bx~~ Top part of cc blanketed in hanging wall

Oxide - schist - }
 " granite - } heap leached

Montezuma - oxide + cc - gravel covered
~~cc~~ cc - primary - + oxide

Barney - (Bluebird type - transported cu } Schist
 Black Copper (" " - some in dacite) "

Miami East - developing 1/2 - 2% in diabase sill -
 schist is incompetent -

Insp	lime oak - Thornton	-	28000 tpd	-	w/o 1:1	± .7%
prints	-		32000 "	-	1:1.7	.45%
Blue Bird			11000 "			± .5%

11/10/76

FROM: F. T. GRAYBEAL

~~JHE~~
To: WLK
JDS

MIAMI EAST

Bob Cummings from his brother:

- ① 50 million tons @ 1.7% Cu based on 7 drill holes
- ② 30% of reserve came from polygon of a single hole - later underground work indicated grade of polygon was significantly less than surface hole indicated (all holes were surveyed)
- ③ further test mining indicates schist was 't cut and fill - exceptionally broken
- ④ current reserves of ore down to 15 million tons which Bob says is mostly in diabase and is high grade.
- ⑤ Miami currently looking for other alternatives to mine - can't block cave due to adverse crack line.

copy FTG.

AMERICAN SMELTING AND REFINING COMPANY
TUCSON ARIZONA

September 24, 1974

J. H. C.

MAY 6 1975

FILE MEMORANDUM

file
Miami East
AIME Talk
Miami District
Gila County, Arizona

Mr. John Brandon, Project Chief of the Miami East Project, gave a talk at the September 17th meeting at Kearny. Some of his comments:

5,000 tpd production anticipated.

35 to 50 years of operation. (Based on these figures, some 1,500,000 tons per year to be mined, with total reserves of between 52 and 75 million tons. Previously announced grade of over 1.2% copper.)

Rock temperatures of 110°-115°F.

400,000 cfm ventilation, refrigerated.

In the late 1920's, they had drifted into the general area from Number 5 Shaft toward the ICC Smelter and diamond drilled a number of holes. The results were not sufficient for the time and also the lack of secondary escape routes caused the closure of the operation.

In the late 1960's, a drilling program was initiated in the tailings areas and seventeen holes were drilled, only one of which failed to return an ore intercept.

They have deepened Number 5 Shaft and are driving haulage levels on the 2900 and 3300 levels. Two additional shafts are being sunk. Number 11, a 10-1/2' circular cement lined fresh air intake with manway, and Number 12, a 14' circular cement lined "bullet" exhaust shaft.

They will mine by horizontal cut-and-fill with alternate panels using cemented sand-fill, then mine the intervening panel. Essentially 100% extraction is planned. Jumbo drilling with load and carry machines to dump pockets. Rail haulage (3/4 mile) to Number 5 Shaft. All diesel equipment.

Number 5 Shaft holds the world record of 153 million tons hoisted from a single shaft -- which will soon be broken by the shafts at San Manuel.

J. D. Sell
J. D. Sell

JDS:1b

AMERICAN SMELTING AND REFINING COMPANY
TUCSON ARIZONA

September 24, 1974

W. L. K.
OCT 2 1974

J. H. C.
OCT 21 1974

file

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J. D. Sell
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JDS:1b

JHC - WLR - fca

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

April 9, 1971

TO: W. E. Saegart
FROM: J. C. Balla

W.E.S.
APR 12 1971
J. H. C.
APR 13 1971

Re: MIAMI EAST WES

I talked this afternoon with John Abel, Professor of Mining Engineering at the University of Arizona, and learned the following information, which may be of interest.

The Miami East orebody averages about 2% copper, with a 0.75% Cu cutoff. The shape of the orebody in vertical section, appears to be bounded by faults. In vertical section, the orebody has a shape as shown below. The central core is not barren, merely low grade.



The depth of the deposit is variable, but appears to be 2600 feet below the surface. Mineralization extends eastward to a depth of at least 4000 feet.

Miami has decided to mine the deposit by cut and fill methods, starting with several levels at the top of the orebody (in order to get the high grade first). Fill will be tailings.

Miami is not communicating with Occidental Petroleum and does not plan a joint venture operation with Occidental.

Dames and Moore is doing the rock mechanics study for Occidental, while Abel is for Miami.


John C. Balla

JCB:sh

cc: JDSell

Cities Service ↓

Cities Service operates fertilizer plants at Cedartown, Georgia; Tuscaloosa, Attalla, Montgomery and Decatur, Alabama; and New Albany, Indiana. In addition, it operates 249 fertilizer bulk blending plants in the Midwest, Southeast and in western Texas.

Cities Service owns a majority interest in a phosphatic fertilizer, sulfuric acid and phosphoric acid plant in Cubatao, Brazil; a 68.7% interest in a mixed fertilizer blending plant in Corinto, Nicaragua; and a 49.65% interest in a Belgian company engaged in the production and marketing of nitrogen fertilizers.

The fertilizer industry is being adversely affected by a general condition of over capacity in terms of present demand.

Industrial Chemicals

Inorganic chemical products include sulfuric acid produced at Copperhill, Tennessee; East Tampa, Florida; Augusta, Georgia; and Lake Charles, Louisiana. In addition, the Copperhill complex produces liquid sulfur dioxide, copper chemicals, sodium hydrosulphite, secondary zinc oxide, ferric sulfate and a variety of sulfonation products. Aluminum sulfate also is produced at Augusta and Cedar Springs, Georgia and Fernandina Beach, Florida. Chemicals produced at East Tampa, other than plant foods, are sodium fluosilicates and hydrofluosilicic acid. Chlorosulfonic acid and potassium sulfate are produced at Lockland, Ohio and other specialized chemicals are produced at East Point, Georgia.

Metals

Ducktown Basin, Tennessee

Engineering studies are underway for a 25% expansion in operations along with extensive modernization of the Copperhill facilities. The limits of the ore body are not established but the proven reserves would sustain the increased rate for 20 years. The average ore mining rate for the past 5 years has been 1,565,996 tons per year. Beneficiation and smelting of this ore provides sulfur dioxide (which is converted into sulfuric acid), copper, iron sinter (approximately 68% iron), and zinc concentrate (approximately 60% zinc).

The operations at Copperhill were suspended on September 15, 1969 as a result of a strike. Negotiations between the Company and unions representing the employees are continuing.

Globe-Miami Mining District, Arizona

The Copper Cities and Diamond H open pit mines are estimated to have ore reserves (as of December 31, 1968) of 31 million tons of .55% ore—approximately 290 million pounds of recoverable copper. The average ore mining rate over the past 5 years was 3,427,372 tons per year. Copper is recovered from this ore by milling and flotation. The Copper Cities mine also currently produces annually 5 million pounds of copper by leaching and precipitation.

Leaching operations at the block-caved Miami mine currently produce 13 million pounds of copper annually. This rate will decline gradually over a number of years.

Leaching operations are also conducted at the Castle Dome property. Current production is one million pounds of copper annually which has declined to the point that this operation will be discontinued later this year.

Internal Consumption

A part of the copper produced is fabricated at Company owned plants into plate, sheet, strip and roll copper at Seymour, Connecticut and into insulated wire and cable at Chester, New York.

Approximately 12 million pounds of copper per year are used in the production of copper chemicals at Copperhill, Tennessee.

Exploration

On the Miami East project, in a down-faulted block of the Miami-Inspiration ore body, 6 holes drilled in 1969 have encountered copper mineralization at depths ranging from 2,460 to 3,300 feet.

The average thickness of mineralization is 465 feet containing 1.51% copper. The distance between the present extremities of the drilling is about 1,900 feet. It is estimated that 6 additional holes will be drilled by the end of this year.

During the past six years, 150 drill holes have proved the occurrence of widespread low grade copper mineralization in the immediate vicinity of the old Castle Dome mine, about 8 miles northwest of Miami, Arizona. A computer study of the data from this drilling is being made to optimize tonnage and grade of prospective ore and waste in order to evaluate the open pit mining feasibility of this project. Preliminary estimates indicate over 300,000,000 tons of possible ore containing .45% copper.

Cities Service has a 34% interest in Union Minera del Sur, S. A. de C. V., a Mexican company engaged in exploration for sulfur and other minerals in Mexico. A sulfur discovery by this company was announced on November 12, 1968.

A total of 60 holes has been drilled on two of the seven concession areas held. Sulfur with a net thickness of three feet or more has been encountered in 20 of the holes in two separate mineralized areas. Exploration indicates sulfur reserves exceeding 1,500,000 tons, but the full extent and value of the deposit is not known. Drilling is continuing.

Other Operations

Marine

The vessels comprising the marine fleet owned by Cities Service traveled 825 thousand miles and transported 24 million barrels of crude oil and petroleum products and 25,000 long tons of grain during the first six months of 1969. The 15 vessels in this fleet range in size from T-2 class to three 70,000-ton tankers. Total fleet tonnage is 610,000 deadweight tons. Cities Service tankers are in both foreign and domestic service and are used for Cities Service movements and for chartering to others, including the Military Sea Transport Service. Barges and shallow draft tankers are also chartered for domestic movements.

Helium

Cities Service owns and operates the Jayhawk Helium Plant 13 miles east of Ulysses, Kansas. The plant, located on a 200-acre site in the Hugoton natural gas field, processes in excess of 500 million cubic feet of natural gas daily for the extraction of crude helium. Pursuant to a firm contract with the United States Government, Cities Service for 22 years from 1961 will tender to the United States Government the helium output and the Government will pay for such helium, whether taken or not, at an initial price of \$11.78 per Mcf, subject to escalation, but limited to a maximum amount of \$9,100,000 annually. The General Accounting Office has filed a report with Congress recommending that certain helium supply contracts, including the Cities Service contract, negotiated by the Department of the Interior be amended to include provision for price redetermination. The results of such recommendation are indeterminable at this time.

The Jayhawk Plant also processes crude helium delivered by pipeline from the Company's 50% owned Sunflower Plant, located near Scott City, Kansas. The crude helium produced in excess of Government requirements is refined and sold either as a gas or liquid.

Real Estate

Cities Service owns several office buildings in the financial district of New York City. The more important buildings are those located at 52 Wall Street, 60 Wall Street and 70 Pine Street (also known as Sixty Wall Tower). The latter is located on land partly owned in fee and partly held under long-term lease; while the other buildings are located on land owned in fee.

Cities Service also owns a 50% interest in two office buildings under construction. In Atlanta, Georgia, a building is scheduled for completion in early 1970 in which Cities Service will lease approxi-

Miami - District

To J.H.C.
From R.R.K.

J. H. C.

PROSPECTUS

OCT 16 1969

EXCHANGE OFFER
TO HOLDERS OF COMMON STOCK OF

Cities Service Company

2,370,000 Shares

Atlantic Richfield Company

Common Stock
(Par Value \$5)

EXCHANGE OFFER

Cities Service Company ("Cities") hereby offers to exchange 2,370,000 shares of Common Stock ("Atlantic Richfield Common Stock") of Atlantic Richfield Company ("Atlantic Richfield") owned by Cities for shares of Cities Common Stock in the ratio of

1 SHARE OF ATLANTIC RICHFIELD COMMON STOCK

for

2 SHARES OF CITIES COMMON STOCK

Holders of \$4.40 Cumulative Convertible Preferred Stock of Cities ("Cities Preferred Stock") and holders of \$2.25 Cumulative Convertible Preference Stock of Cities ("Cities Preference Stock") may make arrangements to tender Cities Common Stock by delivering Cities Preferred Stock or Cities Preference Stock, or by converting Cities Preferred Stock or Cities Preference Stock, and then tendering Cities Common Stock, all as more fully set forth herein under "Exchange Offer".

THE EXCHANGE OFFER WILL EXPIRE AT 3:30 P. M. NEW YORK TIME, ON OCTOBER 22, 1969, UNLESS EXTENDED BY CITIES AS PROVIDED HEREIN.

The First Boston Corporation and Loeb, Rhoades & Co. have been retained by Cities as Dealer Managers to form and manage a group of Soliciting Dealers, including the Dealer Managers, to solicit exchanges under the Exchange Offer. Each Soliciting Dealer will be paid a fee by Cities of 75¢ for each share of Cities Common Stock exchanged under the Exchange Offer through the efforts or facilities of such Soliciting Dealer, as evidenced by the appearance of the name of such Soliciting Dealer on Exchange Forms, subject to a maximum aggregate fee of \$1,500 to Soliciting Dealers with respect to shares exchanged by any one beneficial owner. Cities will also pay the Dealer Managers in the aggregate a fee equivalent to \$50,000 plus 5¢ for each share of Cities Common Stock exchanged under the Exchange Offer, plus all reasonable out-of-pocket expenses, including counsel fees, incurred by them. Cities has agreed to indemnify the Dealer Managers and Soliciting Dealers against certain liabilities. See "Solicitation of Tenders and Expenses" herein for additional information.

THESE SECURITIES HAVE NOT BEEN APPROVED OR DISAPPROVED BY THE SECURITIES AND EXCHANGE COMMISSION NOR HAS THE COMMISSION PASSED UPON THE ACCURACY OR ADEQUACY OF THIS PROSPECTUS. ANY REPRESENTATION TO THE CONTRARY IS A CRIMINAL OFFENSE.

The First Boston Corporation

Loeb, Rhoades & Co.

The date of this Prospectus is October 1, 1969.