CONTACT INFORMATION
Mining Records Curator
Arizona Geological Survey
416 W. Congress St., Suite 100
Tucson, Arizona 85701
602-771-1601
http://www.azgs.az.gov
inquiries@azgs.az.gov

The following file is part of the Grover Heinrichs 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.

SENDER - EXTRACT GOLD COPY
FORWARD WHITE AND GREEN COPIES

REPLIER - RETURN WHITE COPY
AND RETAIN GREEN FOR FILE

SPEEDISET® MOORE BUSINESS FORMS, INC. 26

# SPEED MEMO



To HOWARD LANIER cc: P. EIMON | At FORT WAYNE

Subject KEYSTONE-WALLACE RESOURCES, MOAB - FINANCIAL | Date 6/14/72

THE FOLLOWING BASES FOR A DEAL, JUST RECEIVED BY TELEPHONE FROM RAY KUNKEL, ARE BACKGROUND FOR MY ORE RESERVE REPORT ON KWR-MOAB SENT TO YOU VIA PAUL EIMON. ALTERNATE POSSIBILITIES ARE AS FOLLOWS:

1.) JOINT VENTURE, SX & KWR. 50% EQUITY CAN BE OBTAINED FOR $0.5M. SX WOULD BUILD NEW PLANT. 75% OF GROSS

~~PLEASE REPLY TO~~ → ~~Signed~~ | ~~At~~

PROFITS FOR SX, 25% FOR KWR

2.) SX TAKES OVER ENTIRE OPERATION FOR $1.0M. SLIDING-SCALE ROYALTY ON COPPER AT 50¢, 55¢, 60¢ UNTIL KWR REALIZES ANOTHER $0.5M THEN KWR IS OUT.

3.) SX PAYS KWR $1.5M PLUS SOME ADDITIONAL AND THIS TAKES KWR COMPLETELY OUT AT BEGINNING.

Date | Signed

REPLIER—RETURN THIS COPY

# SPEED MEMO

PAGE 2

To | At

Subject | Date

THE SITUATION AT MOAB EPITOMIZES OUR ORIGINAL OXIDE LEACH CONCEPT. I AM VERY FAVORABLY IMPRESSED WITH THE POSSIBILITIES THERE. IT IS MY EARNEST RECOMMENDATION THAT WE SECURE AN OPTION ON THE KWR GROUND.

PLEASE REPLY TO → Signed Clement R. Chase | At Tucson

Date | Signed

REPLIER—RETURN THIS COPY

# KEYSTONE-WALLACE RESOURCES, MOAB, UTAH:

# SANDSTONE COPPER ORE RESERVES

Form No. X-114 F.W.P.

avoid verbal orders

AVC

TO P. Eimon LOCATION Tucson, Arizona

FROM C.K. Chase LOCATION Tucson, Arizona

SUBJ. Keystone-Wallace Resources, Moab, Utah: Sandstone Ore Reserves DATE June 7, 1972

COPY TO H. Lanier Ft. Wayne

Recommendation: In view of the proven reserve of 7,629,000 tons of sandstone ore at an average grade of 0.62% copper and an overall strip ratio of 1.1 to 1, I recommend that Essex consider negotiations for a six-month's option on these properties from Keystone-Wallace Resources.

At a recovery of 90% by flotation (see appended test summary by Hazen Research), this represents 85,000,000 pounds of copper recoverable from the proven reserves.

In addition to the proven reserves, many evidences of other orebodies exist in the area. These need drilling for delineation. I believe that additional reserves can be developed in the Lisbon Valley, especially at the southeast end, that will prove surprising for this type of occurrence.

General: These sandstone deposits occur in horizontal or slightly dipping attitude, are of substantial, mineable thicknesses, and are so loosely consolidated that they can be ripped and removed with scrapers. This makes for very low-cost mining at the existing strip ratios.

Mineralogically, a large proportion of the copper exists as a clean malachite (plus some azurite) shading to pyrite-free chalcocite in the lower parts of the deposits. The mineralization constitutes the cementing material between the sand grains and is rarely included within the grains.

Flotation tests by Hazen Research, Inc. have shown that both oxides and sulfides can be readily floated from these ores into acceptable grades of concentrate at a 90% recovery of total copper. The friable nature of these ores and the relatively coarse grind for liberation of copper values make this approach very attractive. The overall oxide-sulfide ratio in the 7,629,000 tons of proven ore is approximately 60:40, so a process capable of treating both oxides and sulfides is necessary.

Leach performance on the malachite mineralization is generally good with low acid consumption but a generally increasing sulfide proportion with deeper mining is cause for concern over the long range. Acid leach extractions on mixed ore is therefore low and inversely dependent on oxide content.

Keystone-Wallace Resources has been operating a copper leaching and scrap iron comentation plant on the 1.25% Cu oxide ores from the GTO and other deposits in the Lisbon Valley 40 miles southeast of Moab, Utah. Production of copper ranges from 10 to 12 tons per day of copper metal in a cement copper product. The plant is modern and well equipped though soluble losses are higher than desirable. The cement copper is shipped by truck to the Kennecott Copper Corp. smelter at McGill, Nevada. The oxide reserves in the GTO pit are becoming exhausted and, since Keystone-Wallace lacks the capital resources for proper development of the lower grade reserves, they wish to sell out their position in the district.

The currently-operating KWR mill is 10 miles by graded gravel road from the region where the major ore reserve is located. Furthermore, the 10 miles are up hill for the ore. The present mill location was determined by the location of a relatively small copper uranium orebody in sandstone that was treated by Cleveland Cliffs and others starting about 20 years ago.

KWR has a reasonably-designed mill and uses good, modern transport equipment. A part of their proposed deal is for someone to take over most of this equipment, but much of it could be turned back with a reduction in the capital outlay necessary to handle the property.

KWR has put together a package-deal which includes many rather distant possibilities such as inclusion of White Mesa and Cerillos, New Mexico in a large processing complex. I advise that we ignore this window dressing and concentrate on the basic reserves in the ground at the southeast end of the Lisbon Valley.

Geology: The Lisbon Valley copper deposits occur in permeable and loosely-cemented sandstones of Cretaceous age in the upper and middle Dakota members, and in the Burro Canyon member of the Morrison Formation. There are a few small but high grade deposits of Pennsylvanian age in the Hermosa formation but these are generally too calcareous for economic acid leach and their flotation performance is unknown.

These deposits occur on the eastern side of the Lisbon fault and it is obvious in this area that the orebodies are fault-controlled. The main Lisbon Fault and the associated sub-faults at the southeast end of the valley have been outstanding mineralizers and the copper deposits are much more substantial than known elsewhere in the Moab region. Original mineralization was chalcocite with appreciable accompanying silver. The chalcocite in the permeable sandstones

has readily oxidized near the surface to a very clean malachite. Iron minerals are notable by their relative absence.

Ore Reserves: Details of the proven ore reserve is presented in Table I. This is the latest available information and represents a substantial increase in proven reserves over information available six months ago.

Discussion: Recent drilling in the Lisbon Valley by Keystone-Wallace has penetrated many more copper deposits, one an extensive one under the GTO pit. Other known occurrences in the valley are the Nevada, Blue Jay, 3-Step, and extensions of the two Micro pits, as well as some ground leased from Homestake.

The overburden over many of the sandstones is a calcareous alluvium that stands well at very steep angles, thus assisting in the favorable strip ratios. Other deposits, such as the Sentinel, are essentially "grass roots" deposits where the mineralized layer lies exposed at the surface of the earth.

The Sentinel deposit can be mined at a lesser tonnage and higher grade but the processing characteristics are so advantageous that a cash flow study may show good economics at the lower grade.

Keystone-Wallace has taken an option ($15,000 per month payments) on the Continental Copper mill that attempted operation south of Tucson some years ago. This mill is in near-new condition and is complete, even with erection drawings. Keystone-Wallace feels that this mill would be ideal for the proposed flotation operation on the mixed oxide-sulfide sandstone ores in the Lisbon Valley. The mill capacity is 1300 TPD and the entire mill is available at a fraction of the original price.

If Essex were to take a six month option, KWR might continue to operate on the remaining high grade oxide ore in the upper horizon of the GTO pit and thereby reduce their indebtedness. Additional reduction could be managed by returning some of the mining and hauling equipment to the suppliers. Under these circumstances, a rather reasonable sum might handle the whole deal. KWR feels that the used flotation mill is an attractive part of the proposed operational plan but if this were not included in the deal, entry costs would be greatly reduced.

Attached hereto is a copy of KWR's "Revised Alternate Study - Feasibility Report." The cash flow annual rate of return on investment before taxes is impressive but I would prefer to generate our own figures in this area. I also prefer to deal in proven reserves (after checking them) without adding "indicated" and "inferred" categories. Even so, there are additional obvious reserves in the valley that are waiting to be proven. Particularly attractive is the possibility of joining up the

TABLE I

| MINE | Dimensions Length | Width | Thickness | Tons at 13.5 Ft.$^3$ ●/Ton | Average Grade, % Cu | Strip Ratio | Approx. Royalty | Drill Hole Spacing | Payout | Ore Reserve Calc. By: |
|---|---|---|---|---|---|---|---|---|---|---|
| Micro-Costanza | 1,400 | 100 | 25 | 259,000 | 1.23 | 2:1 | 2.5¢/lb | >100' | Micro - Yes Cost - S. Sec. | AJZ* |
| GTO - Upper Horizon | 800 | 300 | 70 | 1,244,000 | 1.22 | 3:1 | 3¢/lb | 100' | School Section | VJH** |
| Globe | --- | --- | -- | 50,000 | 0.62 | 2:1 | 1¢/lb | >100' | Yes | VJH |
| Micro-Harding | 800 | 150 | 10 | 88,000 | 0.87 | 1:1 | >2¢/lb | >100' | Yes | AJZ |
| Micro-Malin | 270 | 250 | 60 | 300,000 | 0.60 | 1:1 | >1¢/lb | 2 holes | Yes | AJZ |
| Micro-Harding Ext. | 400 | 300 | 80 | 711,000 | 0.55 | 1:1*** | >2¢/lb | >100' | Yes | AJZ & VJH |
| Micro-Costanza Ext. | 300 | 300 | 80 | 533,000 | 0.50 | 1:1*** | 3¢/lb | 100' | S. Section | VJH |
| Sentinel | 1,500 | 1,000 | 40 | 4,444,000 | 0.42 | 0.5:1 | >1¢/lb | 100' | Negotiating | VJH |
| TOTAL & Averages | | | | 7,629,000 | 0.62 Average | 1.1:1 Average | | | Total Payout $500,000-$600,000 | |

* Andrew J. Zinkl - Mining Engr., Prescott, Ariz.
** Victor J. Hoffman, PhD - Geologist, Denver, Colo.
*** Incremental stripping from present pit.

Sentinel deposit with the nearby Micro pits. If the mineralized sandstone under the alluvial cover is continuous between the two areas, large tonnages could be developed in this area.

This proposition by Keystone-Wallace Resources has been studied in the past by such varied interests as Cerro Corp., Earth Resources, Shield Development Co. Ltd., and George Freeman (of Transarizona Resouces fame) with Dennis Pickens. Earth Resources presently proposes an exploration agreement with KWR, which is received with no enthusiasm.

Currently, Ogilby-Norton is looking into the deal (Henry Martin currently works for them). Also, New Jersey Zinc has shown interest and was in Moab the week of June 5 to inspect the property (Radabaugh, of Tucson, is concerned in this).

Liquid Ion Exchange - Electro-Winning: The proven reserves appear large enough to justify inclusion of plans for roasting and leaching of the flotation concentrate, liquid ion exchange for purification, and electro-winning of a final cathode copper product. The lack of iron in the flotation concentrate should minimize ferrite problems in the concentrate roasting operation. Any additions to the ore reserve picture will increase the desirability of this approach.

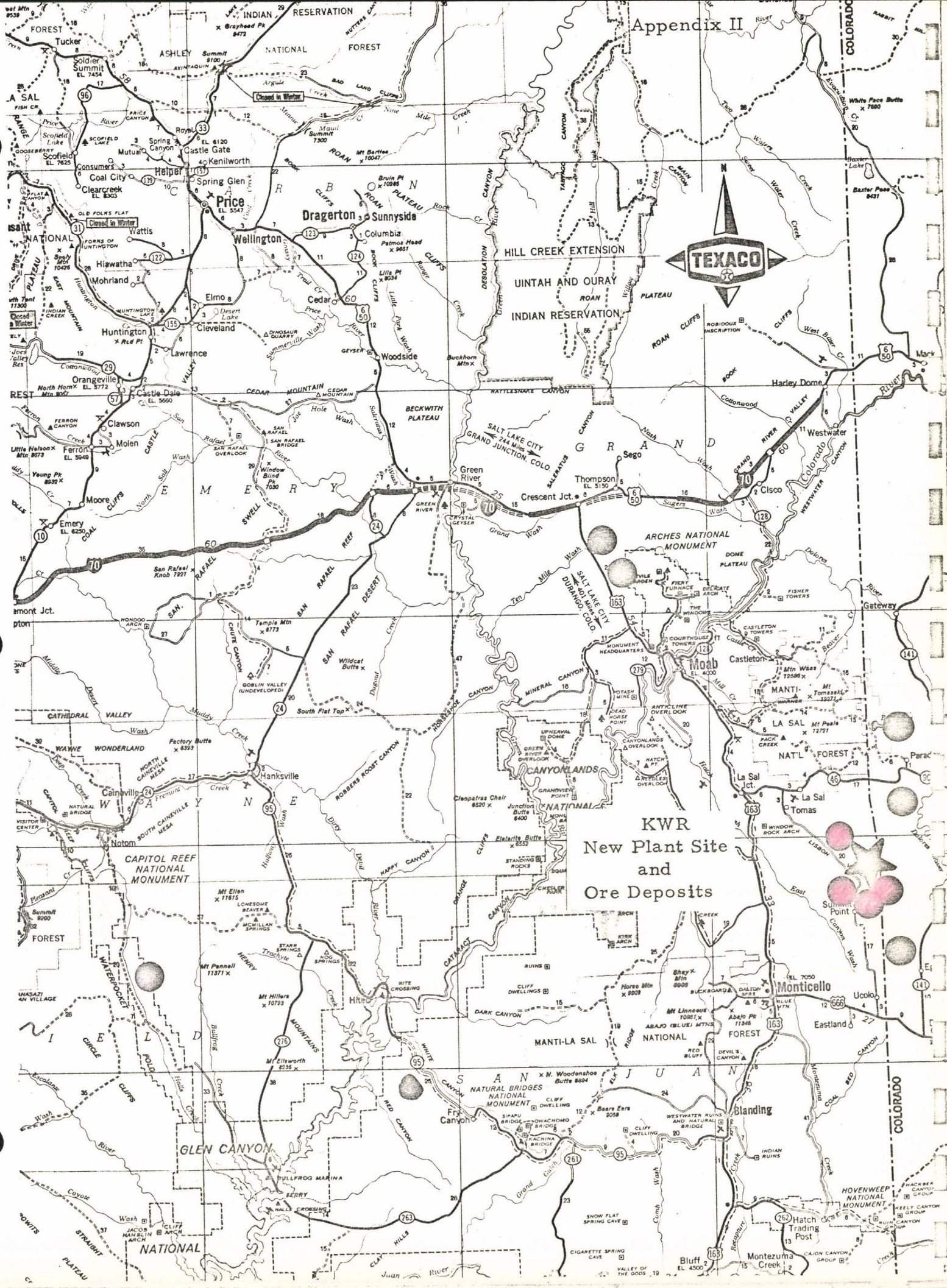
Milford sulfide concentrates could conceivably be handled in the same plant, with the low-volume residue being sold to a smelter for flux value and gold and silver recovery.

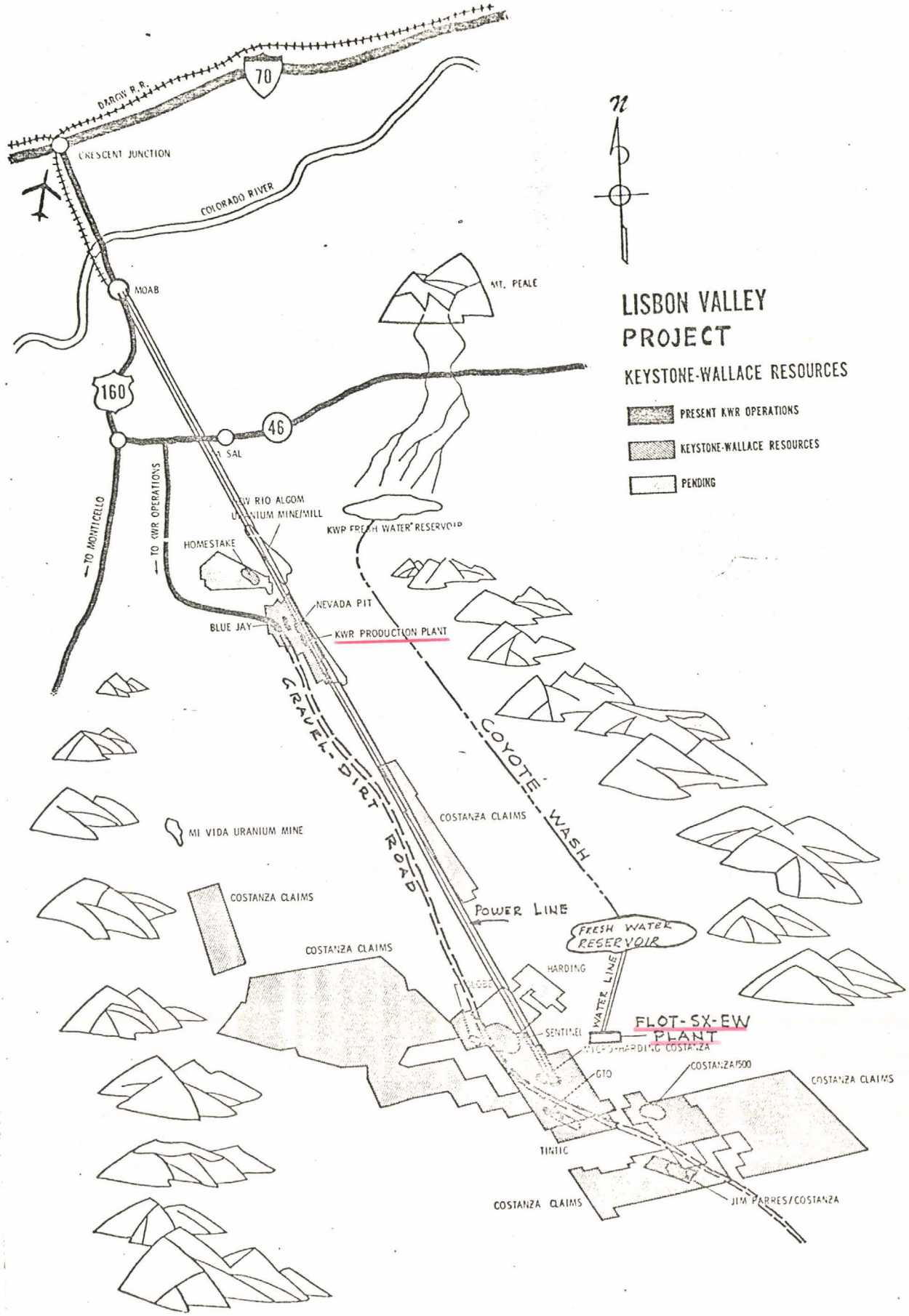
Clement K. Chase

C.K. Chase

CKC:td

Appendix II


KWR
New Plant Site
and
Ore Deposits
TEXACO
Price
Wellington
Helper
Castle Gate
Kenilworth
Spring Glen
Dragerton
Sunnyside
Columbia
Wattis
Hiawatha
Mohrland
Elmo
Cedar
Huntington
Cleveland
Lawrence
Woodside
Orangeville
Castle Dale
Clawson
Molen
Ferron
Moore
Emery
Green River
Crescent Jct.
Thompson
Sego
Cisco
Westwater
Harley Dome
Mark
Gateway
Moab
Castleton
Hanksville
Caineville
Notom
Hite
Monticello
Eastland
Blanding
Bluff
Montezuma Creek
Hatch Trading Post
Tomas
La Sal
La Sal Jct.
Ucolo
Fry Canyon
Summit Point
HILL CREEK EXTENSION
UINTAH AND OURAY
INDIAN RESERVATION
BECKWITH PLATEAU
ARCHES NATIONAL MONUMENT
CANYONLANDS NATIONAL
CAPITOL REEF NATIONAL MONUMENT
GLEN CANYON
NATURAL BRIDGES NATIONAL MONUMENT
HOVENWEEP NATIONAL MONUMENT
MANTI-LA SAL NATIONAL FOREST
SAN RAFAEL DESERT
SALT LAKE CITY 244 Miles GRAND JUNCTION, COLO.
SALT LAKE CITY 401 Miles DURANGO, COLO.
COLORADO


LISBON VALLEY PROJECT
KEYSTONE-WALLACE RESOURCES
PRESENT KWR OPERATIONS
KEYSTONE-WALLACE RESOURCES
PENDING
N
DARGW R.R.
70
CRESCENT JUNCTION
COLORADO RIVER
MOAB
MT. PEALE
160
46
LA SAL
TO MONTICELLO
TO KWR OPERATIONS
NEW RIO ALGOM URANIUM MINE/MILL
KWR FRESH WATER RESERVOIR
HOMESTAKE
NEVADA PIT
BLUE JAY
KWR PRODUCTION PLANT
GRAVEL-DIRT ROAD
COYOTE WASH
COSTANZA CLAIMS
MI VIDA URANIUM MINE
COSTANZA CLAIMS
POWER LINE
FRESH WATER RESERVOIR
COSTANZA CLAIMS
HARDING
GLOBE
WATER LINE
SENTINEL
FLOT-SX-EW PLANT
MICRO-HARDING COSTANZA
GTO
COSTANZA/500
COSTANZA CLAIMS
TINTIC
COSTANZA CLAIMS
JIM PARRES/COSTANZA

KEYSTONE WALLACE RESOURCES

5 Denver Technological Center
Englewood, Colorado 80110
Telephone (303) 758-1231
Telex No. 45-905

May 1, 1972

# REVISED ALTERNATE STUDY - FEASIBILITY REPORT

**This revised study has been prepared for the purpose of:**

1) Up dating current ore reserves taking into account current mining operations and the benefit of more recent drilling results. Cost data including mining and stripping has been rechecked.

2) Showing the financial analysis of only installing at this time the 1,300 ton-per-day flotation concentrator (now under our option - see pictures). Plant could be in operation in four to five months.

A number of financial forecasts have been prepared for various ore reserve alternatives. Based on an estimated capital investment of $1,500,000 and 52.5-cent copper, the most significant financial forecasts at present day costs are:

1) Over a 5.1-year life, 2,300,000 tons of proven 0.95% copper ore will generate a total cash flow of $7,750,000 (before taxes) yielding a 78% annual rate of return of investment.

2) Over a 7.6 year life, 3,400,000 tons of 0.86% copper ore will generate a total cash flow of $9,446,000 (before taxes) for a 64% annual rate of return of investment.

3) Based on a 7.6-year depreciation life, the breakeven price of copper is 38 cents. Breakeven grade of copper is 0.52%.

4) Total proven reserves are in excess of 4,000,000 tons of 0.75% copper and would provide a profitable operation for more than ten years. (See Ore Reserves sheet). Also, an excellent potential exists for finding additional reserves.

5) Since the crushing and screening section of the concentrator has been designed for doing all the crushing on a one-shift basis, the plant capacity could easily be expanded to 2,500 tons per day by going to a two-shift crushing operation. Likewise, the SX-EW circuit could be installed later.

This report also includes financial forecasts for 50-cent and 55-cent copper along with the further flotation tests by Hazen Research.

R. E. Kunkel
Vice President

Preliminary Financial Forecast - 3,400,000 Tons of 0.86% Copper
7.6 Years life, 450,000 Tons/Year

Annual Net Profits and Return on Investment
Proposed Lisbon Valley Operation

A. Estimated Total Plant Investment $1,500,000
Capacity 1,300 Tons/Day -

Average Lbs/Ton 17.2@ 90% recovery = 15.48 lbs.

| | | |
|---|---|---|
| Value of Cu/Ton Ore at Plant (15.48 lbs. @ 52.5¢) | $8.13 /Ton | |
| Less Royalty of Approx 2¢ per pound | .31 /Ton | |
| Gross Sale Price (apply 15% depletion) | | $7.82/Ton |

B. Costs to Produce Copper

| | | | |
|---|---|---|---|
| Mining, Hauling, Stripping | | $1.00 /Ton | |
| Crush, Grind & Flotation | | 1.65 /Ton | |
| Leaching | | /Ton | |
| Smelting & Refining @ 12.0¢/lb | | 1.86 /Ton | |
| Total Direct Cost | /Lb. | $4.51 /Ton | |
| Add 6 % O.H., Taxes & Ins. ($350.00 | /Day) | .27 /Ton | |
| Add for Depreciation ( 7.6 yrs) | | .44 /Ton | |
| | | $5.22 /Ton | |
| Add 5% Contingency Factor ($340.00/Day) | | .26 /Ton | |
| Total Cost Operation | | $5.48 | $5.48/Ton |
| Total Pre-Tax Profit/Ton | | | $2.33/Ton |
| Less Depletion - 15% of Gross Sale or 50% of Profit/Ton (Lessor) | | | $0.89/Ton |
| Income Tax Base | | | 1.44/Ton |
| Income Tax @ 52% | | | .75/Ton |
| | | | $ .69/Ton |
| Add Back Depletion | | | .89/Ton |
| Profit/Ton after Taxes | | | 1.58/Ton |
| Add Back Depreciation | | | .44/Ton |
| Cash Flow/Ton Ore | | | $2.02/Ton |

Total Cash Flow/Yr. $962,000.00

Pay Back Investment - 1.56 Years

Rate of Return Investment 962,000 ÷ 1,500,000 = 64%

Net Profit after Taxes, etc. $753,000.00

Total Cash Flow $6,895,000.00

Total Cash Flow before Taxes $9,450,000.00

1,300 TPD - 7.6 Years

## CAPITAL INVESTMENT ESTIMATE

| | |
|---|---|
| Cost of Mill | $ 485,000.00 |
| Cost of Haul to Moab | 25,000.00 |
| Mill Site Preparation & Move Office & Lab | 50,000.00 |
| Foundation & Erection | 300,000.00 |
| Tails Pond | 35,000.00 |
| Power & Water | 65,000.00 |
| | $ 960,000.00 |
| Engineering & Overhead | 90,000.00 |
| | $1,050,000.00 |
| Contingency Allowance | 100,000.00 |
| | $1,150,000.00 |
| Pre-Operational Costs* | 350,000.00 |
| | $1,500,000.00 |

## ESTIMATED VALUE
## KWR EQUIPMENT, ETC.

| | |
|---|---|
| Mill Equipment** at Present Plant | |
| Leach Circuit, Pumps, Shops, Office, Cones | |
| Thickeners, Lab., Radio Patch, Conveyors, etc. | $250,000.00 |
| Trucks, Transports, Mining Equipment, Cats., | |
| Scrapers, Pickups, Cranes, etc. | 200,000.00 |
| Prestripping already paid | 150,000.00 |
| Exploration and Development of Ore Reserves | 250,000.00 |
| | $850,000.00 |

Note: Since this concentrator is ready to load on trucks and all the engineering plans are included, a period of five months is estimated for erection of this plant.

* For mining equipment, development, and startup costs. This is a credit toward future operating costs.

** Also included; crushing plant, precipitation plant, extractor, spare motors, electrical, etc.

## ORE RESERVES[1]

1,300 TPD - 7.6 Year 3,400,000 Tons[1] - 0.86% Copper

| Mine | S/R | Tons | % Cu | Total Lb Cu | % Total Tons |
|---|---|---|---|---|---|
| Micro Cost | 3.0:1 | 300,000 | 1.23 | 7,350,000 | 9% |
| G.T.O. Upper | 3.8:1 | 1,200,000 | 1.22 | 29,040,000 | 35 |
| Globe | 2.0:1 | 50,000 | 0.62 | 600,000 | 2 |
| Micro-Harding | 1.0:1 | 100,000 | 0.87 | 1,740,000 | 3 |
| Micro-Malin | 2.0:1 | 300,000 | 0.60 | 3,600,000 | 9 |
| G.T.O. - Lower | 1.0:1 | 200,000 | 0.60 | 2,400,000 | 6 |
| Micro-Harding | 3.0:1 | 750,000 | 0.55 | 8,250,000 | 22 |
| Micro-Cost, Ext. | 3.0:1 | 500,000 | 0.52 | 5,300,000 | 14 |
| Totals | 3.0:1 | 3,400,000 | 0.86 | 58,280,000 | 100% |

## DAILY ORE & WASTE REQUIREMENTS

1,300 TPD

| Mine | Tons Waste | Tons Ore | % Cu | Total lbs. C |
|---|---|---|---|---|
| Micro-Cost | 345 | 115 | 1.23 | 2,830 |
| G.T.O. Upper | 1,730 | 455 | 1.22 | 11,100 |
| Globe | 25 | 15 | 0.62 | 180 |
| Micro-Harding | 40 | 40 | 0.87 | 700 |
| Micro Malin | 230 | 115 | 0.60 | 1,380 |
| G.T.O. Lower | 80 | 80 | 0.60 | 960 |
| Micro-Harding | 885 | 295 | 0.55 | 3,250 |
| Micro-Cost. Ext. | 555 | 185 | 0.52 | 1,940 |
| Totals | 3,890 | 1,300 | 0.86 | 22,340 |

(1) Combined Proven and Indicated Reserves from Ore Reserve Report

## MINING COSTS PER TON

| | Tons | Strip (1) | Mine & Haul | Total $/Day |
|---|---|---|---|---|
| Micro Costanza (2) | 115 | 0.60 | .30 | 150.00 |
| G. T. O. Upper (3) | 455 | 0.76 | .40 | 530.00 |
| Globe (3) | 15 | 0.30 | .35 | 10.00 |
| Micro-Harding (2) | 40 | 0.20 | .30 | 20.00 |
| Micro-Malin (2) | 115 | 0.40 | .30 | 80.00 |
| G. T. O. Lower (3) | 80 | 0.20 | .40 | 50.00 |
| Micro-Harding (2) | 295 | 0.60 | .30 | 265.00 |
| Micro-Cost. Ext. (2) | 185 | 0.60 | .30 | 165.00 |
| | 1300 | 0.60 | 0.34 | 1225.00 |

| | |
|---|---|
| Cost per ton | $0.94 |
| Contingency (6%) | 0.06 |
| Cost Per Ton | $1.00 |
| Cost per lb. recoverable copper (15.5 lbs.) | .065 |

EQUIPMENT COSTS:

| Mining | | |
|---|---|---|
| 2-34 Ton Trucks | $40.00/hr | $ 80.00 |
| 1-D8 Cat | 25.00/hr | 25.00 |
| 1-988 Loader | 16.00/hr | 16.00 |
| Total | | $ 81.00 |

| Stripping | | |
|---|---|---|
| 1-D9 Cat | $32.00 | $ 32.00 |
| 3-631 Scrapers | 32.00 | 96.00 |
| 1-D8 Cat | 25.00 | 25.00 |
| | | $153.00 |

(1) 20¢ per ton of waste
(2) Scraper pickup and haul will decrease this cost
(3) Front-end loader and truck haul

## TIME CYCLES

| Pit | R. T. Time | Ton/hr | Cost/hr | $/Ton |
|---|---|---|---|---|
| G. T. O. Pit | 20 Min. | 210 tons | 81.00 | 0.40¢/ton |
| Micro, etc. | 15 Min. | 280 tons | 81.00 | 0.30¢/ton |

## MILLING COSTS

| Item | $/Ton | $/Lb. (17 lbs) | Total $/Day |
|---|---|---|---|
| Crushing & Screening | 0.30 | | $390.00 |
| Grinding Balls & Liners | 0.15 | | 195.00 |
| Flotation - re-agents | 0.20 | | 260.00 |
| Thickener & Tails | 0.50 | | 65.00 |
| Power, Water, Air | 0.20 | | 260.00 |
| Maintenance & Supplies | 0.25 | | 325.00 |
| Lab. & Miscellaneous | 0.10 | | 130.00 |
| Plant, Admin., Office | 0.15 | | 200.00 |
| Grinding & Flot. Labor | 0.25 | | 325.00 |
| Direct Mill Cost | $1.65 | 0.097 | $2,150.00 |

## METALLURGICAL DATA

Initially, flotation tests were conducted separately on low-grade Sentinel ore and on high grade G. T. O. ore. Following these very favorable results a six-cycle locked test was conducted on a synthesized sample from all the ore deposits, so blended as to represent the ore reserves.

This sample was used on Hazen Flotation Test No. 5, Project No. 1147. The sample was composited as follows:

| Mine | Lbs. of Sample | Total Cu % | Oxide Cu % |
|---|---|---|---|
| G. T. O. | 15.0 | 1.48 | 1.44 |
| Micro Malin | 10.0 | 0.81 | 0.77 |
| Costanza | 5.0 | 1.09 | 0.93 |
| Harding | 5.0 | 0.86 | 0.83 |
| Sentinel | 12.5 | 0.46 | 0.43 |
| G. T. O. Hi-Grade | 3.5 | 3.22 | 0.76 |
| Total and Average | 40.0 | 1.12 | 0.91 |
| | | | |
| Hazen Assay Head | | 1.12 | N. A. |
| Hazen Calculated Head | | 1.20 | 1.03 |

The locked cycle test showed an overall recovery of 90.0% used in our forecasts with a ratio of concentration of 23 to 1 and a concentrate grade of 25.5% copper. Some silver was recovered in the sulfide concentrates which can be a credit of 10¢ per ton of ore. These concentrates will be excellent smelter feed, being low in sulfur content and having a high silica content.

## COMPLETE DISMANTLED, USED FLOTATION MILL

Attached is a Flow Sheet Bill of Material for a complete 1.300 ton-per-day flotation mill which is presently under option from Nelson Machinery Company in Arizona. This mill was erected new and operated for only a few weeks before being shut down. It is fully automated and practically in new condition. It includes the mill buildings and all engineering and foundation plans and drawings by Arthur G. McKee and Company.

The mill building and equipment has been dismantled and is on the ground (see pictures) at the old McCracken mine near Kingman, Arizona. It was originally erected in 1968 for Continental Materials Company at a mine near Tucson, Arizona, with a complete copper and zinc circuit. All electrical gear and rubber belts, etc. are in storage in Phoenix. The power demand is estimated at 1,800 horsepower. The grinding capacity for the Lisbon Valley sandstone ore is estimated at 1,300 tons per day.

The original cost of this equipment, building, and engineering was in excess of $2,500,000 before erection.

ST CONDITIONS Machine Agitair LA 500

FLOTATION TEST NO. 5 (P. 1 of 2)
ORE Minus 10-mesh ore: HRI No. 5538

PROJ. NO. 1147
DATE 4-7-72

| OPERATION | TEST CONDITIONS | | | | REAGENTS-lbs/TON | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | TIME MIN | SOLIDS % | PH | TEMP °C | $Na_2CO_3$ (Soda Ash) | $Na_2S$ (60% fused chips) | Z-200 | Z-6 | MIBC | | |
| ind (lab. ball mill) | 15 | 50 | 7.2 | 22 | - | - | - | - | - | | |
| ndition | 2 | 30 | 8.2 | 22 | 0.5 | - | 0.06 | 0.06 | 0.04 | | |
| ther sulfide flotation | 6 | 30 | 8.2 | 22 | - | - | - | - | - | | |
| ndition | 1 | 15* | 8.4** | 22 | - | 0.40 | - | - | - | | |
| ndition | 1 | 15 | 8.4 | 22 | - | - | - | 0.04 | 0.04 | | |
| ther oxide flotation No. 1 | 2 | 15 | 8.4 | 22 | - | - | - | - | - | | |
| ndition | 1 | 15 | 8.5 | 22 | - | 0.20 | - | 0.04 | 0.04 | | |
| ther oxide flotation No. 2 | 2 | 15 | 8.5 | 22 | - | - | - | - | - | | |
| ndition | 1 | 15 | 8.6 | 22 | - | 0.10 | - | 0.04 | 0.04 | | |
| ther oxide flotation No. 3 | 2 | 15 | 8.6 | 22 | - | - | - | - | - | | |

* Note the drop in percent solids of the pulp after sulfide floated. Because of recycle tail next larger bow was used in the oxide rougher flotation.

** Few drops of acid added to maintain pH around 8.5.

OBJECT: To determine the amount of copper in the middling products which would report to the concentrate by simulating closed circuit flotation by 6-stage locked cycle test.

OCEDURE: 1000 g of new charge (minus 10-mesh) ground in the laboratory for 15 minutes without any reagent.

T RESULTS

| TEST PRODUCTS | WEIGHT % | ASSAYS-PERCENT | | | | Units % | | DISTRIBUTION-PERCENT | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| st 5: | | Cu (Total) | Cu Acid Soluble | | | Cu (Total) | Cu Acid Soluble | | | Cu (Total) | Cu Acid Soluble | | |
| d (assay): | | 1.12 | | | | | | | | | | | |
| t cleaner sulfide conc. | 1.1 | 6.0 | 0.71 | | | 0.066 | 0.008 | | | 5.4 | 0.8 | | |
| t cleaner oxide conc. | 3.2 | 32.3 | 29.2 | | | 1.034 | 0.934 | | | 84.7 | 91.1 | | |
| ther tail | 94.8 | 0.09 | 0.06 | | | 0.085 | 0.057 | | | 7.0 | 5.6 | | |
| t cleaner sulfide tail | 0.6 | 2.4 | 2.1 | | | 0.019 | 0.012 | | | 1.6 | 1.2 | | |
| t cleaner oxide tail | 0.3 | 5.4 | 4.7 | | | 0.016 | 0.014 | | | 1.3 | 1.3 | | |
| | | | | | | 1.220 | 1.025 | | | | 100.0 | | |
| culated head | 100.0 | 1.22 | 1.03 | | | | | | | 100.0 | | | |
| c. combined sulfide & ox | 4.3 | 25.5 | 21.9 | | | 1.100 | | | | 90.1 | 91.9 | | |

FLOTATION TEST NO. 5 (P. 2 of 2) PROJ. NO. 1147

ORE Minus 10-mesh ore: HRI No. 4538 DATE 4-7-72

ST CONDITIONS

| OPERATION | TEST CONDITIONS | | | | REAGENTS-lbs/TON | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | TIME MIN | SOLIDS % | PH | TEMP | $Na_2CO_3$ (Soda Ash) | $Na_2S$ 60% fused chips) | Z-200 | Z-6 | MIBC | | |
| ondition | 1 | 15 | 8.5** | 22 | - | 0.10 | - | 0.04 | 0.04 | | |
| ucher oxide flotation No. 4 | 3 | 15 | 8.5 | 22 | - | - | - | - | - | | |
| ondition | 1 | 15 | 8.5 | 22 | - | 0.10 | - | 0.04 | 0.04 | | |
| ucher oxide flotation No. 5 | 3 | 15 | 8.5 | 22 | - | - | - | - | - | | |
| ondition | 1 | 5 | 8.2 | 22 | - | - | 0.02 | - | 0.02 | | |
| rst cleaner sulfide flotation | 5 | 5 | 8.2 | 22 | - | - | - | - | - | | |
| ondition | 1 | 5 | 8.5 | 22 | - | 0.04 | - | 0.02 | 0.02 | | |
| rst cleaner oxide flotation | 5 | 5 | 8.6 | 22 | - | - | - | - | - | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

** Few drops of acid ($H_2SO_4$) added to the pulp to maintain alkalinity around 8.5 pH.

ST RESULTS

| TEST PRODUCTS | WEIGHT % | ASSAYS-PERCENT | | | | | | DISTRIBUTION-PERCENT | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

KEYSTONE WALLACE RESOURCES
Complete Dismantled, Used Flotation Mill

Attached is a Flow Sheet Bill of Material for a complete 1,000 ton-per-day Flotation Mill which is presently available from the Nelson Machinery Company in Arizona. This mill was erected new and operated for only about six weeks before being shut down. It is fully automated with the mill building. The complete engineering drawings and foundation plans are available with the mill.

The mill building and equipment has been dismantled and is on the ground near Kingman, Arizona at the old McCracken mine. It was originally erected in 1968 near the Banner mine at Tuscon for Continental Materials Company for a copper-zinc circuit. Actually, there is more milling and flotation equipment (such as a required circuit) than is needed for the Cashin Flow Sheet. All the electrical gear and rubber belts, etc. are in storage in Phoenix. All the equipment is in like-new condition. The power requirements were 1800 horsepower. The grinding capacity for the Cashin ore is estimated at 1,250 tons per day.

The original equipment and building cost over $1,500,000 before erection. A price of $500,000 F.O.B., loaded on trucks, has been quoted to us.

475,000 tons including foundations & all foundations

FLOW SHEET

COAL CONCENTRATOR

NELSON MACHINERY COMPANY
11617 N. Sundown Drive
Scottsdale, Arizona 85254

Mine Stockpile

Secondary Crushing

FS 025 Vibrating Grizzly - 25 HP — 3' x 12' Telsmith, 4" x 4' bars.

FS 030 Jaw Crusher - 125 HP — 25" x 40" Telsmith, Overhead-Eccentric, pressure lube.

FS 035 Belt Conveyor - 20 HP — 24" x 205', 53'5" vert., 150 tph @ 300 fpm, 20° trough, vert. gravity take-up. Includes Catwalk (In 40' Sections).

FS 040 Stockpile — 100% - 4".

FS 045 Apron Feeder - 5 HP — 3" x 8' NICO Heavy Duty, Model FD-4265, Gear Reducer ratio 4.92:1, chain drive; variable speed drive.

FS 050 Belt Conveyor - 15 HP — 30" x 217', 46' vert.; 240 tph @ 300 fpm; 20° trough, vert. gravity take-up.

FS 052 Tramp Iron magnet — Erico Magnetic Co., Model SE1500, Silicon Rectifier Model 707, 4KW.

FS 055 Vibrating Screen, Rod Deck - 10 HP — 5' x 8' Nordberg Heavy Duty, Type K, 1/4" rods, 1/2" spacing.

Dust Collector

- 1/2" — + 1/2" (5/8" now)

FS 060 Cone Crusher - 200 HP — 5' Symons Short-head, Nordberg; hydraulic control.

FS 065 Belt Conveyor - 7.5 HP — 24" x 98'; 25' vert.; 160 tph @ 300 fpm; 20° trough; screw take-up

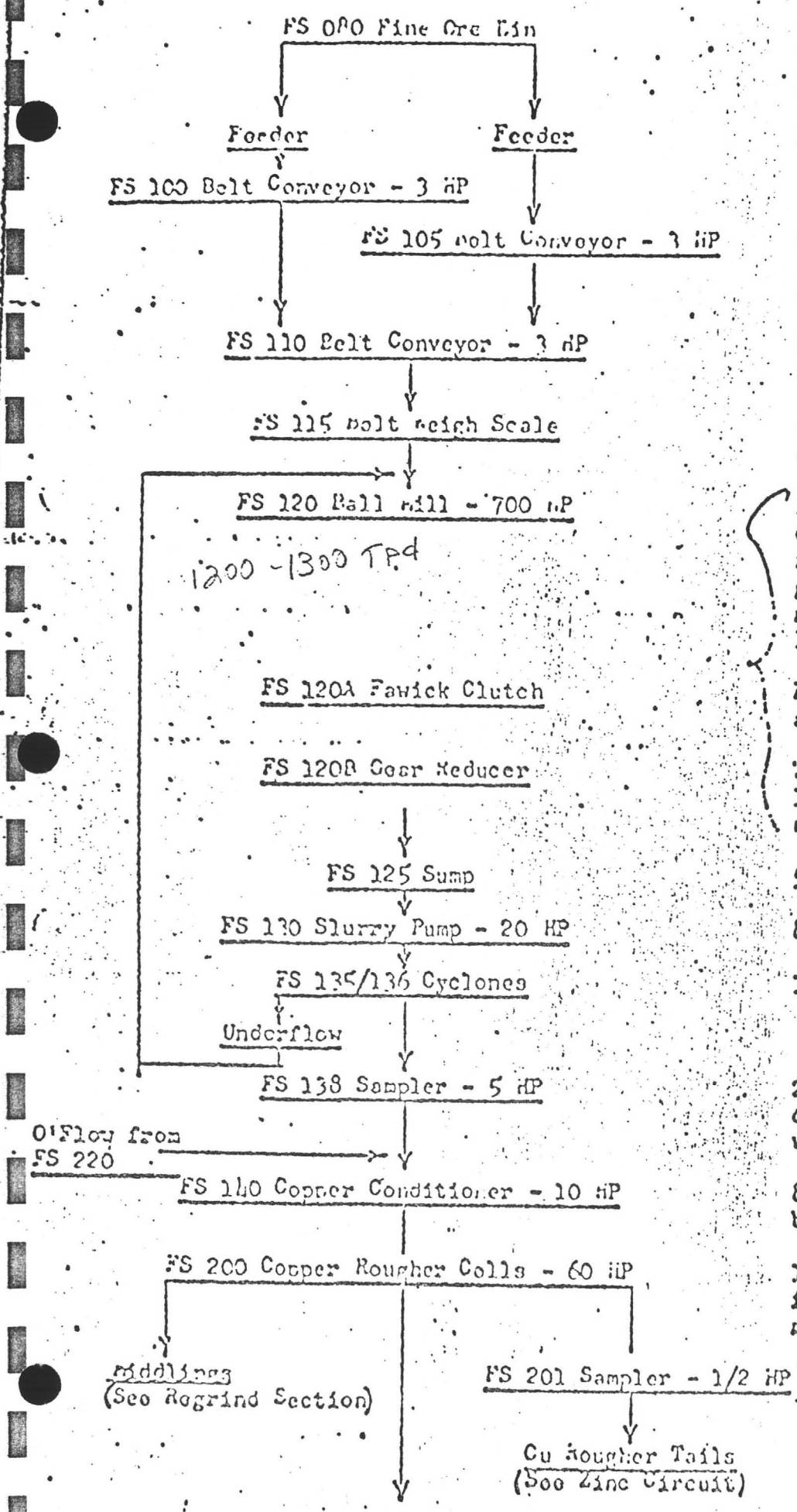
Dust Collector

Dust Collector

FS 070 Belt Conveyor - 7.5 HP — 24" x 135'; 35' vert.; 80 tph @ 300 fpm; 20° trough; screw take-up

FS 072 Transfer Tower

FS 075 Belt Conveyor - 10 HP — 24" x 129'; 80 tph @ 300 fpm; 20° trough; screw take-up.




32' high x 35' I.D.; bolted 1/4" plate; 20# rail @ 6" o.c.; 20' high concrete bottom.

2 - 3' x 20' Pioche type.

2 - 30" x 33'; Variable speed drive 12 to 24 tph @ 13 to 52 fpm; 20° trough or flat; screw take-up.

24" x 56'; 11' vert.; 24 tph @ 50 f 20° trough; horiz. gravity take-up.

Howe Richardson, mechanical, model 800-1; max. cap. 37.5 tph.

11' x 4' x 6' x 10' Hardinge Tricon open overflow; 14" bronze lead trun nion bearings; single, split Helica gear; double-lip scoop (Linatex), mistomatic gear lube; Motor: 3/60/2 1200 rpm; Induction, A/L start.

Fawick Airflex, model 32VC100, 700 air operated.

Western Gear, Model S-693, AGM clas 1035 HP; ratio 5.54:1; Waldron #5A motor shaft coupling.

5' x 4' x 4', 1/4" steel.

8" x 6" Denver SRL, Type FRL.

10" Krebs, Model D10LB.

24" Denver automatic, model S24, cycleflex timer; straight line wet type; integral magn. brake.

8' x 8' Denver tank and R/C impelle beam-type superstructure.

1 - 8 cell Denver D-R No. 24, 40 cu ft.; double froth launder; 4 - 15 motors, dual V-belt drive.

Denver Automatic, model S24, stra line wet type; cycleflex timer; integral magn. brake.

Concentrate

FS 202 Sump

4' x 4' x 4', 1/4" steel.

FS 203 Slurry Pump - 2 HP

1-1/2" Galigher Vertical, Model 1
SA400 x 41", R/L.

FS 205 1st Copper Cleaner Cell - 7.5 HP

1 - 2 cell Denver #18S, Type DR,
cu. ft.; single froth launder, cu
V-belt drive.

Tails to Regrind Section

Concentrate

FS 210 2nd Copper Cleaner Cells - 7.5 HP

1 - 2 cell Denver #18S, type "Sub
24 cu. ft.; single froth launder,
dual V-belt drive.

Tails

Concentrate

Alternate to Regrind Section

FS 215 Sampler - .5 HP

24" Denver automatic, Model S2S,
cycleflex timer; straight line wat
type.

FS 217 Sump

4' x 4' x 4', 1/4" steel.

FS 218 Slurry Pump - 2 HP

1-1/2" Galigher Vertical; Model 1.5
SA400 x 41", R/L.

FS 220 Copper Concentrate Thickener - 2 HP

Mechanism: Eimco Type BX; Radicon
gear reducer; chain drive; manual
lift. Tank: 8' x 20' dia.; welded
steel, 1/4" sides, 3/8" bottom:

O'Flow to FS 140 Cu Conditioner

FS 225 Sump

3' x 3' x 3', 1/4" steel.

FS 230 Slurry Pump - 3 HP

1-1/2" x 1-1/4" Denver SRL, horiz.,
open impeller.

FS 400 - 425 Cu Concentrate Filter - 45 HP

Peterson disc type - 4 disc cap. w/3
discs installed; 6'2" dia.; tank, sm
blow; Reeves varidrive; tank agitato
Nash Hytor Vacuum Pump, Model 703, 8
rpm; 40 HP vac. pump motor; Filtrate
Pump: Worthington #1 20 HP 74; non-
self supporting steel skid frame.

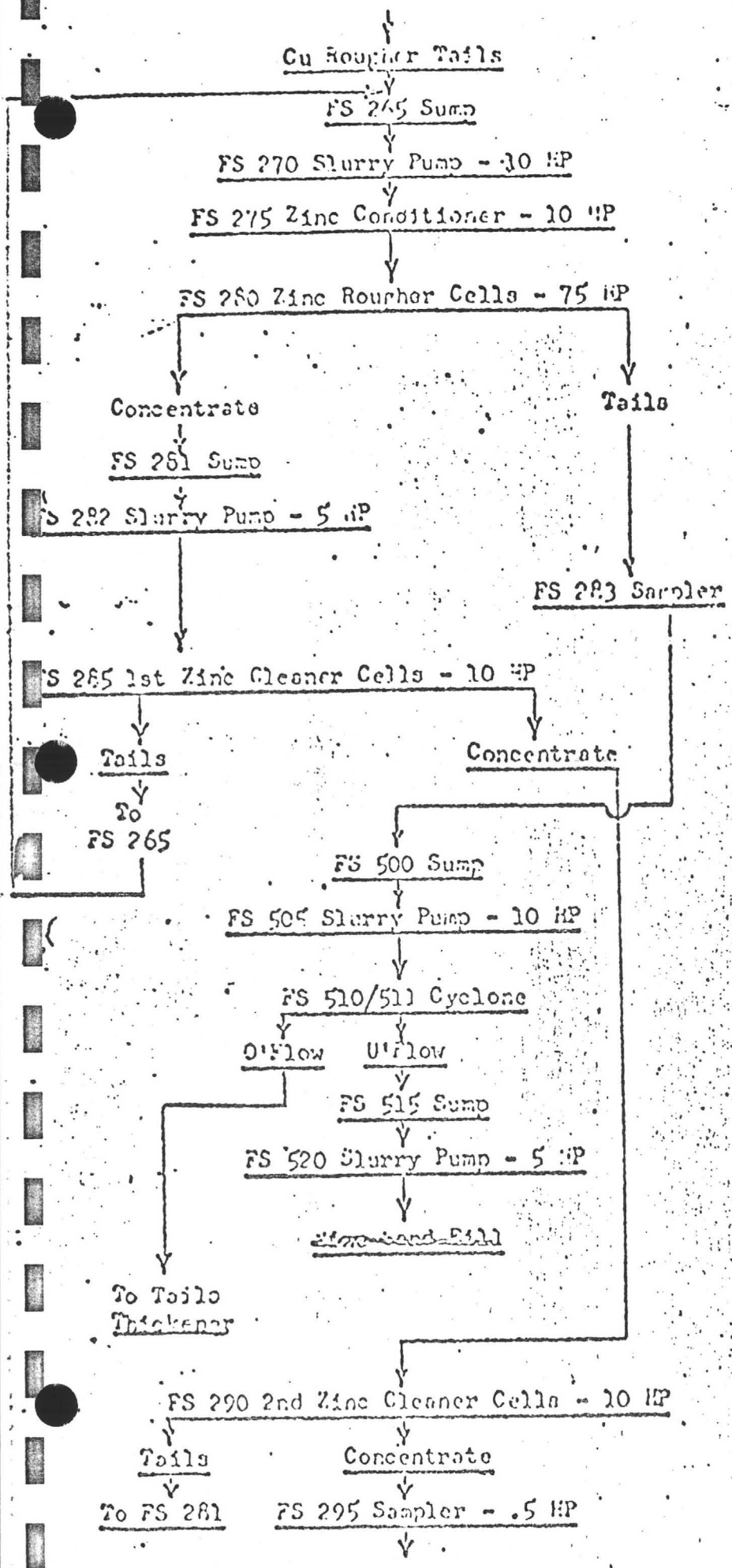
O'Flo

To FS 217

FS 405 Concentrate Bin

16' x 16' x 12' high, concrete.

# ZINC CIRCUIT




4' x 4' x 4', 1/4" steel.

5 x 5 Denver SRL, Horiz.; Type FR-3.

10' x 10' Denver tank and R/C impell beam-type superstructure.

1 - 2 cell; 2 - 4 cell units; Denve Type DR, No. 24, 40 cu. ft.; Single froth launder; dual V-belt drive; 5 - 15 HP motors.

4' x 4' x 4', 1/4" steel.

2-1/2" Galigher Vertical Model 2.5 SA 300 x 40", R/L.

24" Denver automatic; Model S2H, Cyc Flex timer; integral magn. brake.

1 - 2 cell Denver Type DR, No. 24, 40 cu. ft., single froth launder, dual V-belt drive.

4' x 4' x 4', 1/4" steel.

3" Galigher Vac Seal, R/L, Model 3-VRG-200.

Krebs, Model D10.

4' x 4' x 4', 1/4" steel.

2" Galigher Vac Seal, Horiz., R/L, Model 2-VRG-200.

1 - 2 cell Denver Type DR, No. 24, 40 cu. ft.; single froth launder; dual V-belt drive.

24" Denver, automatic; Model S2H; Cycloflex timer; integral magn. bra

FS 297 Sump

FS 298 Slurry Pump - 5 HP

FS 300 Zinc Concentrate Thickener - 2 HP

O'Flow

To FS 265

FS 305 Sump

FS 310 Slurry Pump - 5 HP

FS 135-140 Zinc Concentrate Filter - 1.5 HP

O'Flow

FS 140 Concentrate Bin

4' x 4' x 4', 1/4" steel.

2-1/2" Galigher Vertical, Model 2.5 SA-300 x 1.8"; R/L, semi-open impelle

Mechanism: Eimco Type 2X; Radicon reducer; chain drive, manual lift. Tank: 10' x 3[illegible]' dia., welded steel, 1/4" sides, 3/8" bottom.

2' x 2' x 3', 1/4" steel.

1-1/2" Galigher Vac Seal, Model 1.5 VR100; horiz.

Peterson disc type, [illegible] disc cap. w/[illegible] disc installed; Tank: snap blow; Drive: Reeves vari-drive; Tank Agitator; Nash Hytor Vacuum Pump, [illegible] 703, 870 rpm, 40 HP motor; Filtrate Pump: Galigher Vac Seal, Model D 1 VR-100, horiz., R/L.

---

REGRIND SECTION

Alternate 2nd Cu Cleaner Tails

1st Copper Cleaner Tails

Cu Roucher Middling

FS 235 Sump

FS 240 Slurry Pump

FS 245 Cyclone

O'Flow

FS 250 Regrind Ball Mill - 30 HP

FS 255 Sump

FS 260 Slurry Pump

To FS 140 Cu Conditioner

4' x 4' x 4', 1/4" steel.

1-1/2 x 1-1/4 Denver SRL, open.

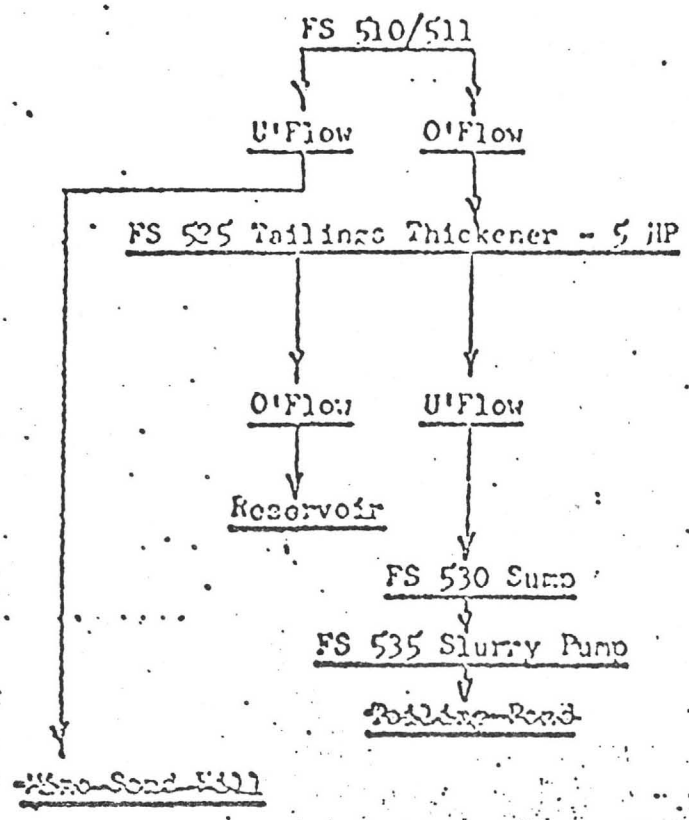
Krebs, Model D4B, 4".

Denver, 5' x 4'; drum feeder, conical steel heads w/integral trunnions; discharge screen.

4' x 4' x 4', 1/4" steel.

1-1/2" Galigher Vac Seal, Model 1. VR-100, R/L, Horiz.

## TAILINGS SECTION



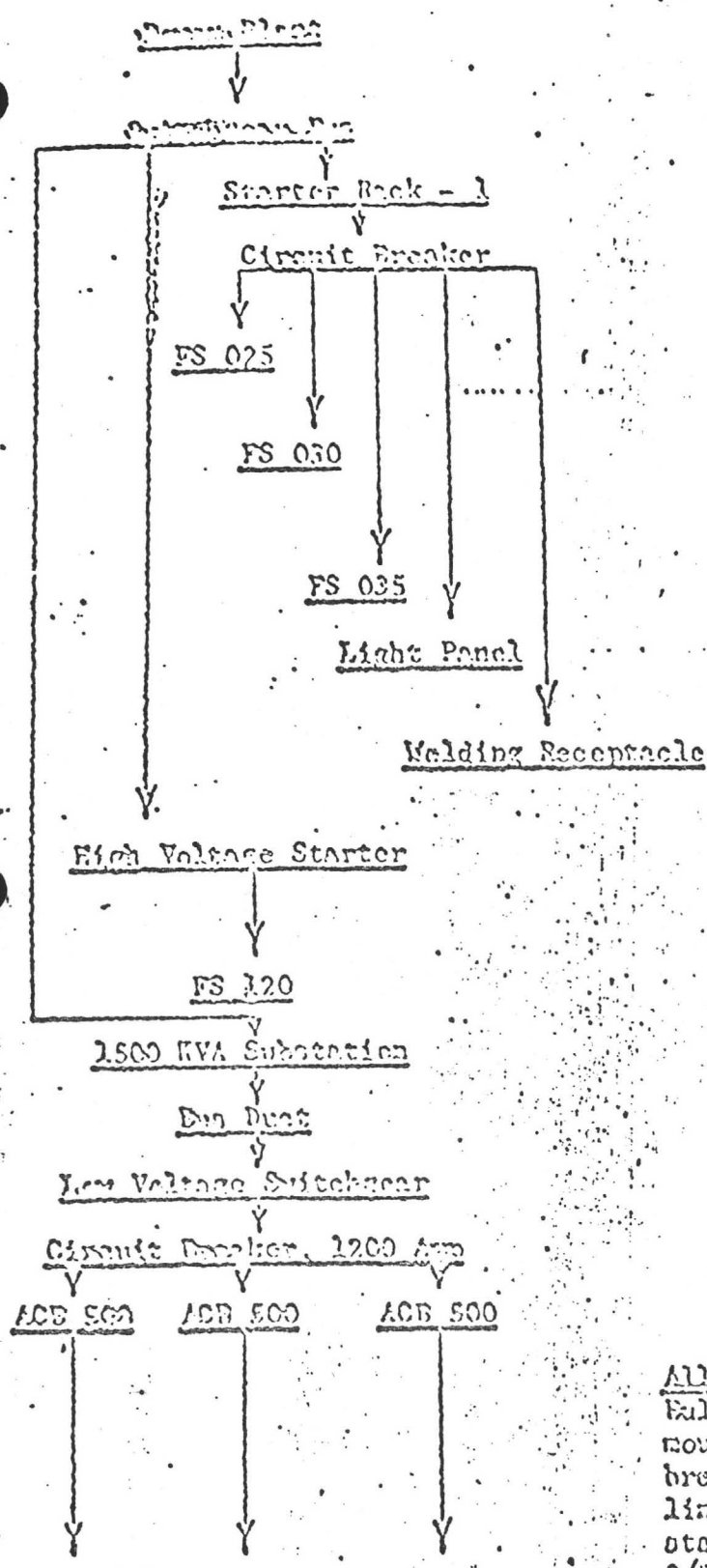

Mechanism: Eimco, Drive thru GE helical speed gear reducer; manua lift; Tank: 12' x 75' dia.; welded steel, 1/4" sides, 3/8" bottom, flat bottom.

40' x 40' x 8', concrete.

4' x 4' x 4', 1/4" steel.

3" Galigher Vac Seal; Model 3-VAC 200; horiz.; R/L.

# MAIN ELECTRICAL SYSTEM




5 - Cooper-Bessemer gas-oil 20V-8 engines, 2625 HP, 1455 KVA GE generator, 2300V.

1 - Westinghouse Cat. #PLA 3350, enclosed, NEMA 3R, 3 pole, 600V.

1 - W'house Cat. #11-206, R2FDNC 125 HD Comb. starter, 15 HP.

1 - W'house Cat. #11-206, R5RNLC control panel
1 - W'house Cat. #11-206, R1ADNC Comb. starter 1/2 HP.

1 - W'house Cat. #11-206, R2FDNC comb. starter

1 - W'house Cat. #RFA-2025 circuit breaker, NEMA 3R, encl., 2 pole, 600V.

1 - W'house Cat. #RFA-3070, c.b., NEMA 3R encl., 3 pole, 600V.

1 - W'house 600 HP Motor controller, NEMA 1, floor mounted, 600 HP, Class 11-202, Type 25L2, 3/60/2400, NEMA Class E2.

3 - 500 KVA W'house Transformers, 2400/440V, oil type, single phase.
15' W'house, 1600 Amp., 3 ph.

All enclosed in 54" x 44" x 90-3/8" high cabin

1 - W'house DB50, 1200 Amp. Air circuit breake

3 - W'house DB25, 500 Amp. air circuit breaker

All motor control centers: W'house, 480V, type W, Bull. 31-125, NEMA Class 1, Type C wiring, front-mounted NEMA 1 enclosure, starters air circuit breaker type, 600 Amp; 440V control circuit. All linestarters Class 11-206, non-reversing, local start-stop pushbuttons, red indicating lights, 3rd O/R.

NELSON MACHINERY COMPANY
[illegible] Goodwin Drive
Stoughton, Wisconsin [illegible]

(ACU 500) (ACU 500) (ACU 500)

CCU

CCU3

CCU2

22 - @ CCU1; 3 - @ CCU2; 5 - @ CCU3; 1 - @ CCU4

4 - @ CCU1; 11 - @ CCU2; 1 - @ CCU3.

8 - @ CCU1; 4 - @ CCU2; 1 - @ CCU4.

FS 055, 060, 835, 940 (All Conveyors, except 035)

FS 130, 140, 200, 205, 210, 275, 280, 285, 290, 850, 905, 906-912

SR 3 SR 4 SR 2 LP

Welding Receptacle

Starter Rack 2

FS 925 thru 932

8 - W'house motor watchmen, Cat. #[illegible], EA 1.

8 - W'house Cat. #[illegible], Type [illegible]-E fusible safety switches, 3 pole, EA 1.

Lighting Panel W'house Cat. #NQPL[illegible]L225.

FS 203, 218, 220, 230, 240, 250, 260, 270, 282, 288, 300, 310, 505, 520, 525, 535, 855, 860, 865, 870, 990, 400 - 460

LP C, LP D, DP 2

Lighting Panel

1 - W'house Panel, Cat. #NDP3L100.

Distribution Panel - 1

1 - W'house Fused Panel.

FS 138, 201, 215, 283, 285

Not shown -- 1 - W'house Transformer S[illegible]SC11[illegible]C5[illegible] 5KVA type EP dry, 480//120/240.

***** 3400 TONS AT .06 FOR CU PRICE .525 *********

KEYSTONE WALLACE RESOURCES - - - PRELIMINARY FINANCIAL REPORT

1. ESTIMATED TOTAL PLANT INVESTMENT IS $ 1500000
   CAPACITY 1300 TONS PER DAY AT 0.8600
   TOTAL TONS OF ORE IS 3400000

2. AVERAGE POUNDS OF COPPER PER TON 17.200 AT 0.900 = 15.480
   VALUE OF COPPER PER TON AT 0.5250 = 8.127
   LESS ROYALTY AT 2¢ PER POUND = 0.310
   GROSS SALES = 7.817

3. COST TO PRODUCE COPPER

| | | |
|---|---|---|
| MINING,HAULING AND STRIPPING | = | 1.000 |
| CRUSH,GRIND AND FLOAT | = | 1.650 |
| LEACHING,SX -EW | = | 0.000 |
| MARKETING CATHODE AT ( 0.00¢ PER POUND) | = | 0.000 |
| SMELTING AND REFINING AT ( 0.12 PER POUND) | = | 1.858 |
| TOTAL DIRECT COST ( 0.29 PER POUND) | = | 4.508 |
| ADD 0.06 CONTINGENCY FACTOR ( 351.59 PER DAY) FOR OVERHEAD,TAXES AND INSURANCE | = | 0.270 |
| DEPRECIATION ( 7.6 YEARS) | = | 0.441 |
| TOTAL | = | 5.219 |
| ADD 0.05% CONTINGENCY FACTOR | = | 0.261 |
| COST OF OPERATIONS | = | 5.4802 |
| TOTAL PRE TAX PROFIT PER TON | = | 2.3372 |
| LESS DEPLETION | = | 0.8940 |
| TAXABLE INCOME | = | 1.4432 |
| INCOME TAX AT 52% | = | 0.7505 |
| NET PROFIT AFTER TAX | = | 0.6928 |
| ADD BACK DEPLETION | = | 0.8940 |
| PROFIT PER TON AFTER TAXES ( 0.1025 PER POUND) | = | 1.58672 |
| ADD BACK DEPRECIATION | = | 0.4412 |
| CASH FLOW PER TON OF ORE ( 0.1310 PER POUND) | = | 2.027899 |
| TOTAL CASH FLOW PER YEAR | = | 962237.0000 |
| PAYBACK INVESTMENT IN YEARS | = | 1.5599 |
| NET PROFIT AFTER TAXES PER YEAR | = | 752899.7000 |
| TOTAL CASH FLOW | = | 6894855.0000 |
| TOTAL CASH FLOW BEFORE TAXES | = | 9446494.0000 |
| RATE OF RETURN OF INVESTMENT BEFORE TAXES | | 64% |

DO YOU WANT ANOTHER RUN? YES=1, NO=0
? 0

********* 3400 TONS AT .86 FOR CU PRICE .55 *********

KEYSTONE WALLACE RESOURCES - - - PRELIMINARY FINANCIAL REPORT

1. ESTIMATED TOTAL PLANT INVESTMENT IS $ 1500000
   CAPACITY 1300 TONS PER DAY AT 0.860%
   TOTAL TONS OF ORE IS 3400000

2. AVERAGE POUNDS OF COPPER PER TON 17.200 AT 0.900 = 15.480
   VALUE OF COPPER PER TON AT 0.5500 = 8.514
   LESS ROYALTY AT 2¢ PER POUND = 0.310
   GROSS SALES = 8.204

3. COST TO PRODUCE COPPER

| | |
|---|---|
| MINING,HAULING AND STRIPPING | = 1.000 |
| CRUSH,GRIND AND FLOAT | = 1.650 |
| LEACHING,SX -EW | = 0.000 |
| MARKETING CATHODE AT ( 0.00¢ PER POUND) | = 0.000 |
| SMELTING AND REFINING AT ( 0.12 PER POUND) | = 1.858 |
| TOTAL DIRECT COST ( 0.20 PER POUND) | = 4.508 |
| ADD 0.06 CONTINGENCY FACTOR ( 351.59 PER DAY) | = 0.270 |
| FOR OVERHEAD,TAXES AND INSURANCE | = 0.441 |
| DEPRECIATION ( 7.6 YEARS) | = 5.219 |
| TOTAL | = 0.261 |
| ADD 0.05% CONTINGENCY FACTOR | = 5.4802 |
| COST OF OPERATIONS | = 2.7242 |
| TOTAL PRE TAX PROFIT PER TON | = 0.9520 |
| LESS DEPLETION | = 1.7722 |
| TAXABLE INCOME | = 0.9215 |
| INCOME TAX AT 52% | = 0.8506 |
| NET PROFIT AFTER TAX | = 0.9520 |
| ADD BACK DEPLETION | = 1.80267 |
| PROFIT PER TON AFTER TAXES ( 0.1165 PER POUND) | = 0.4412 |
| ADD BACK DEPRECIATION | = 2.243845 |
| CASH FLOW PER TON OF ORE ( 0.1450 PER POUND) | = 1064704.0000 |
| TOTAL CASH FLOW PER YEAR | = 1.4028 |
| PAYBACK INVESTMENT IN YEARS | = 855366.2000 |
| NET PROFIT AFTER TAXES PER YEAR | = 7629072.0000 |
| TOTAL CASH FLOW | =10762300.0000 |
| TOTAL CASH FLOW BEFORE TAXES | 71% |
| RATE OF RETURN OF INVESTMENT BEFORE TAXES | |

DO YOU WANT ANOTHER RUN? YES=1, NO=0
?

***** 3400 TONS AT .86 FOR .50 CU PRICE *****

# KEYSTONE WALLACE RESOURCES - - - PRELIMINARY FINANCIAL REPORT

1. ESTIMATED TOTAL PLANT INVESTMENT IS $ 1500000
   CAPACITY 1300 TONS PER DAY AT 0.860%
   TOTAL TONS OF ORE IS 3400000

2. AVERAGE POUNDS OF COPPER PER TON 17.200 AT 0.900 = 15.480
   VALUE OF COPPER PER TON AT 0.5000 = 7.740
   LESS ROYALTY AT 2¢ PER POUND = 0.310
   GROSS SALES = 7.430

3. COST TO PRODUCE COPPER

| | |
|---|---|
| MINING,HAULING AND STRIPPING | = 1.000 |
| CRUSH,GRIND AND FLOAT | = 1.650 |
| LEACHING,SX -EW | = 0.000 |
| MARKETING CATHODE AT ( 0.00¢ PER POUND) | = 0.000 |
| SMELTING AND REFINING AT ( 0.12 PER POUND) | = 1.858 |
| TOTAL DIRECT COST ( 0.29 PER POUND) | = 4.508 |
| ADD 0.06 CONTINGENCY FACTOR ( 351.59 PER DAY) | |
| FOR OVERHEAD,TAXES AND INSURANCE | = 0.270 |
| DEPRECIATION ( 7.6 YEARS) | = 0.441 |
| TOTAL | = 5.219 |
| ADD 0.05% CONTINGENCY FACTOR | = 0.261 |
| COST OF OPERATIONS | = 5.4802 |
| TOTAL PRE TAX PROFIT PER TON | = 1.9502 |
| LESS DEPLETION | = 0.8359 |
| TAXABLE INCOME | = 1.1143 |
| INCOME TAX AT 52% | = 0.5794 |
| NET PROFIT AFTER TAX | = 0.5349 |
| ADD BACK DEPLETION | = 0.8359 |
| PROFIT PER TON AFTER TAXES ( 0.0886 PER POUND) | = 1.37078 |
| ADD BACK DEPRECIATION | = 0.4412 |
| CASH FLOW PER TON OF ORE ( 0.1171 PER POUND) | = 1.811253 |
| TOTAL CASH FLOW PER YEAR | = 859771.5000 |
| PAYBACK INVESTMENT IN YEARS | = 1.7446 |
| NET PROFIT AFTER TAXES PER YEAR | = 650433.0000 |
| TOTAL CASH FLOW | = 6160638.0000 |
| TOTAL CASH FLOW BEFORE TAXES | = 8130694.0000 |
| RATE OF RETURN OF INVESTMENT BEFORE TAXES | 57% |

DO YOU WANT ANOTHER RUN? YES=1, NO=0
?

********* 2300 TONS AT .05 FOR CU PRICE .525 ******

# KEYSTONE WALLACE RESOURCES - - - PRELIMINARY FINANCIAL REPORT

1. ESTIMATED TOTAL PLANT INVESTMENT IS $ 1500000
   CAPACITY 1300 TONS PER DAY AT 0.950%
   TOTAL TONS OF ORE IS 2300000

2. AVERAGE POUNDS OF COPPER PER TON 19.000 AT 0.900 = 17.100
   VALUE OF COPPER PER TON AT 0.5250 = 8.977
   LESS ROYALTY AT 2¢ PER POUND = 0.342
   GROSS SALES = 8.635

3. COST TO PRODUCE COPPER

| | | |
|---|---|---|
| MINING,HAULING AND STRIPPING | = | 1.000 |
| CRUSH,GRIND AND FLOAT | = | 1.650 |
| LEACHING,SX -EW | = | 0.000 |
| MARKETING CATHODE AT ( 0.00¢ PER POUND) | = | 0.000 |
| SMELTING AND REFINING AT ( 0.12 PER POUND) | = | 2.052 |
| TOTAL DIRECT COST ( 0.27 PER POUND) | = | 4.702 |
| ADD 0.06 CONTINGENCY FACTOR ( 366.76 PER DAY) FOR OVERHEAD,TAXES AND INSURANCE | = | 0.282 |
| DEPRECIATION ( 5.1 YEARS) | = | 0.652 |
| TOTAL | = | 5.636 |
| ADD 0.05% CONTINGENCY FACTOR | = | 0.282 |
| COST OF OPERATIONS | = | 5.9181 |
| TOTAL PRE TAX PROFIT PER TON | = | 2.7174 |
| LESS DEPLETION | = | 0.9875 |
| TAXABLE INCOME | = | 1.7299 |
| INCOME TAX AT 52% | = | 0.8995 |
| NET PROFIT AFTER TAX | = | 0.8303 |
| ADD BACK DEPLETION | = | 0.9875 |
| PROFIT PER TON AFTER TAXES ( 0.1063 PER POUND) | = | 1.81786 |
| ADD BACK DEPRECIATION | = | 0.6522 |
| CASH FLOW PER TON OF ORE ( 0.1444 PER POUND) | = | 2.470032 |
| TOTAL CASH FLOW PER YEAR | = | 1172930.0000 |
| PAYBACK INVESTMENT IN YEARS | = | 1.2798 |
| NET PROFIT AFTER TAXES PER YEAR | = | 862573.9000 |
| TOTAL CASH FLOW | = | 5681072.0000 |
| TOTAL CASH FLOW BEFORE TAXES | = | 7740990.0000 |
| RATE OF RETURN OF INVESTMENT BEFORE TAXES | | 78% |

******* 2300 TONS AT .95 FOR .50 CU PRICE *******

KEYSTONE WALLACE RESOURCES - - - PRELIMINARY FINANCIAL REPORT

1. ESTIMATED TOTAL PLANT INVESTMENT IS $ 1500000
   CAPACITY 1300 TONS PER DAY AT 0.950%
   TOTAL TONS OF ORE IS 2300000

2. AVERAGE POUNDS OF COPPER PER TON 19.000 AT 0.900 = 17.100
   VALUE OF COPPER PER TON AT 0.5000 = 8.550
   LESS ROYALTY AT 2¢ PER POUND = 0.342
   GROSS SALES = 8.208

3. COST TO PRODUCE COPPER

| | | |
|---|---|---|
| MINING,HAULING AND STRIPPING | = | 1.000 |
| CRUSH,GRIND AND FLOAT | = | 1.650 |
| LEACHING,SX -EW | = | 0.000 |
| MARKETING CATHODE AT ( 0.00¢ PER POUND) | = | 0.000 |
| SMELTING AND REFINING AT ( 0.12 PER POUND) | = | 2.052 |
| TOTAL DIRECT COST ( 0.27 PER POUND) | = | 4.702 |
| ADD 0.06 CONTINGENCY FACTOR ( 366.76 PER DAY) FOR OVERHEAD,TAXES AND INSURANCE | = | 0.282 |
| DEPRECIATION ( 5.1 YEARS) | = | 0.652 |
| TOTAL | = | 5.636 |
| ADD 0.05% CONTINGENCY FACTOR | = | 0.282 |
| COST OF OPERATIONS | = | 5.9181 |
| TOTAL PRE TAX PROFIT PER TON | = | 2.2899 |
| LESS DEPLETION | = | 0.9234 |
| TAXABLE INCOME | = | 1.3665 |
| INCOME TAX AT 52% | = | 0.7106 |
| NET PROFIT AFTER TAX | = | 0.6559 |
| ADD BACK DEPLETION | = | 0.9234 |
| PROFIT PER TON AFTER TAXES ( 0.0924 PER POUND) | = | 1.57932 |
| ADD BACK DEPRECIATION | = | 0.6522 |
| CASH FLOW PER TON OF ORE ( 0.1305 PER POUND) | = | 2.231488 |
| TOTAL CASH FLOW PER YEAR | = | 1058841.0000 |
| PAYBACK INVESTMENT IN YEARS | = | 1.4166 |
| NET PROFIT AFTER TAXES PER YEAR | = | 749385.0000 |
| TOTAL CASH FLOW | = | 5132422.0000 |
| TOTAL CASH FLOW BEFORE TAXES | = | 6766745.0000 |

RATE OF RETURN OF INVESTMENT BEFORE TAXES 70%

DO YOU WANT ANOTHER RUN? YES=1, NO=0
?

```
********** 2300 TONS AT .95,FOR .55 CU PRICE ********

KEYSTONE WALLACE RESOURCES - - - PRELIMINARY FINANCIAL REPORT

1.  ESTIMATED TOTAL PLANT INVESTMENT IS $   1500000
    CAPACITY      1300 TONS PER DAY AT     0.950%
    TOTAL TONS OF ORE IS          2300000

2.  AVERAGE POUNDS OF COPPER PER TON   19.000 AT     0.900  =  17.100
    VALUE OF COPPER PER TON AT  0.5500                      =   9.405
    LESS ROYALTY AT 2¢ PER POUND                            = 0.342
    GROSS SALES                                             =   9.063

3.  COST TO PRODUCE COPPER

    MINING,HAULING AND STRIPPING                            =  1.000
    CRUSH,GRIND AND FLOAT                                   =  1.650
    LEACHING,SX -EW                                         =  0.000
    MARKETING CATHODE AT (    0.00¢ PER POUND)              =  0.000
    SMELTING AND REFINING AT (    0.12 PER POUND)           =  2.052
    TOTAL DIRECT COST (    0.27 PER POUND)                  =  4.702
    ADD    0.06 CONTINGENCY FACTOR  ( 366.76 PER DAY)
        FOR OVERHEAD,TAXES AND INSURANCE                    =  0.282
    DEPRECIATION (    5.1 YEARS)                            =  0.652
    TOTAL                                                   =  5.636
    ADD  0.05% CONTINGENCY FACTOR                           =  0.282
    COST OF OPERATIONS                                      =        5.9181
    TOTAL PRE TAX PROFIT PER TON                            =        3.1449
    LESS DEPLETION                                          =        1.0516
    TAXABLE INCOME                                          =        2.0932
    INCOME TAX AT 52%                                       =        1.0885
    NET PROFIT AFTER TAX                                    =        1.0048
    ADD BACK DEPLETION                                      =        1.0516
    PROFIT PER TON AFTER TAXES (  0.1203 PER POUND)         =      2.05641
    ADD BACK DEPRECIATION                                   =        0.6522
    CASH FLOW PER TON OF ORE ( 0.1504 PER POUND)            =  2.708579
    TOTAL CASH FLOW PER YEAR                                = 1285220.0000
    PAYBACK INVESTMENT IN YEARS                             =        1.1671
    NET PROFIT AFTER TAXES PER YEAR                         =  275764.6000
    TOTAL CASH FLOW                                         = 6229731.0000
    TOTAL CASH FLOW BEFORE TAXES                            = 8733245.0000
    RATE OF RETURN OF INVESTMENT BEFORE TAXES                     85%

 DO YOU WANT ANOTHER RUN? YES=1, NO=0
? 1
 ENTER VALUES FOR X,X1,X2...
? 1500000,1
          300,.95,2300000,19,.90,.50,1,1.65,0,0,.12,.06,.05
ROLL PAPER TO NEXT PAGE,TYPE ANY LABEL OR TITLE AND PRESS RETURN KEY
  PAUSE AT LINE  335
```

******** 5100 TONS AT .74 FOR .525 CU PRICE **********

## KEYSTONE WALLACE RESOURCES - - - PRELIMINARY FINANCIAL REPORT

1. ESTIMATED TOTAL PLANT INVESTMENT IS $ 1500000
   CAPACITY 1300 TONS PER DAY AT 0.740%
   TOTAL TONS OF ORE IS 5100000

2. AVERAGE POUNDS OF COPPER PER TON 14.800 AT 0.900 = 13.320
   VALUE OF COPPER PER TON AT 0.5250 = 6.993
   LESS ROYALTY AT 2¢ PER POUND = 0.266
   GROSS SALES = 6.727

3. COST TO PRODUCE COPPER

| | |
|---|---|
| MINING,HAULING AND STRIPPING | = 1.000 |
| CRUSH,GRIND AND FLOAT | = 1.650 |
| LEACHING,SX -EW | = 0.000 |
| MARKETING CATHODE AT ( 0.00¢ PER POUND) | = 0.000 |
| SMELTING AND REFINING AT ( 0.12 PER POUND) | = 1.598 |
| TOTAL DIRECT COST ( 0.32 PER POUND) | = 4.248 |
| ADD 0.06 CONTINGENCY FACTOR ( 331.37 PER DAY) FOR OVERHEAD,TAXES AND INSURANCE | = 0.255 |
| DEPRECIATION ( 11.4 YEARS) | = 0.294 |
| TOTAL | = 4.797 |
| ADD 0.05% CONTINGENCY FACTOR | = 0.240 |
| COST OF OPERATIONS | = 5.0373 |
| TOTAL PRE TAX PROFIT PER TON | = 1.6893 |
| LESS DEPLETION | = 0.7692 |
| TAXABLE INCOME | = 0.9201 |
| INCOME TAX AT 52% | = 0.4784 |
| NET PROFIT AFTER TAX | = 0.4416 |
| ADD BACK DEPLETION | = 0.7692 |
| PROFIT PER TON AFTER TAXES ( 0.0909 PER POUND) | = 1.21097 |
| ADD BACK DEPRECIATION | = 0.2941 |
| CASH FLOW PER TON OF ORE ( 0.1130 PER POUND) | = 1.504985 |
| TOTAL CASH FLOW PER YEAR | = 714115.3000 |
| PAYBACK INVESTMENT IN YEARS | = 2.1005 |
| NET PROFIT AFTER TAXES PER YEAR | = 574556.7000 |
| TOTAL CASH FLOW | = 7675422.0000 |
| TOTAL CASH FLOW BEFORE TAXES | =10115470.0000 |
| RATE OF RETURN OF INVESTMENT BEFORE TAXES | 47% |

DO YOU WANT ANOTHER RUN? YES=1, NO=0

***** 5100 TONS AT .74 FOR .55 CU PRICE **********

KEYSTONE WALLACE RESOURCES - - - PRELIMINARY FINANCIAL REPORT

1. ESTIMATED TOTAL PLANT INVESTMENT IS $ 1500000
   CAPACITY 1300 TONS PER DAY AT 0.740%
   TOTAL TONS OF ORE IS 5100000

2. AVERAGE POUNDS OF COPPER PER TON 14.800 AT 0.900 = 13.320
   VALUE OF COPPER PER TON AT 0.5500 = 7.326
   LESS ROYALTY AT 2¢ PER POUND = 0.266
   GROSS SALES = 7.060

3. COST TO PRODUCE COPPER

| | |
|---|---|
| MINING,HAULING AND STRIPPING | = 1.000 |
| CRUSH,GRIND AND FLOAT | = 1.650 |
| LEACHING,SX.-EW | = 0.000 |
| MARKETING CATHODE AT ( 0.00¢ PER POUND) | = 0.000 |
| SMELTING AND REFINING AT ( 0.12 PER POUND) | = 1.598 |
| TOTAL DIRECT COST ( 0.32 PER POUND) | = 4.248 |
| ADD 0.06 CONTINGENCY FACTOR ( 331.37 PER DAY) FOR OVERHEAD,TAXES AND INSURANCE | = 0.255 |
| DEPRECIATION ( 11.4 YEARS) | = 0.294 |
| TOTAL | = 4.797 |
| ADD 0.05% CONTINGENCY FACTOR | = 0.240 |
| COST OF OPERATIONS | = 5.0373 |
| TOTAL PRE TAX PROFIT PER TON | = 2.0223 |
| LESS DEPLETION | = 0.8192 |
| TAXABLE INCOME | = 1.2031 |
| INCOME TAX AT 52% | = 0.6256 |
| NET PROFIT AFTER TAX | = 0.5775 |
| ADD BACK DEPLETION | = 0.8192 |
| PROFIT PER TON AFTER TAXES ( 0.1049 PER POUND) | = 1.39668 |
| ADD BACK DEPRECIATION | = 0.2941 |
| CASH FLOW PER TON OF ORE ( 0.1269 PER POUND) | = 1.690798 |
| TOTAL CASH FLOW PER YEAR | = 802203.5000 |
| PAYBACK INVESTMENT IN YEARS | = 1.8697 |
| NET PROFIT AFTER TAXES PER YEAR | = 662725.0000 |
| TOTAL CASH FLOW | = 8623068.0000 |
| TOTAL CASH FLOW BEFORE TAXES | =11013760.0000 |

RATE FO RETURN OF INVESTMENT BEFORE TAXES 53%

DO YOU WANT ANOTHER RUN? YES=1, NO=0
?

YES

TYPE OF SENSITIVITY ANALYSIS(PLOT,SENS ,TAB OR MULT)? TAB
INPUT VARIABLE TO BE VARIED? 7
RANGE? .25,.40
OUTPUT VARIABLE? 16

SENSITIVITY OF OUTPUT VARIABLE 16 TO INPUT VARIABLE 7

| INP. VAR. 7 | OUT. VAR. 16 | |
|---|---|---|
| 0.2500 | -1.9198 | |
| 0.2650 | -1.6876 | |
| 0.2800 | -1.4554 | |
| 0.2950 | -1.2232 | |
| 0.3100 | -0.9910 | |
| 0.3250 | -0.7588 | |
| 0.3400 | -0.5266 | |
| 0.3550 | -0.2944 | |
| 0.3700 | -0.0622 | ← Breakeven - 38¢ |
| 0.3850 | 0.1700 | |
| 0.4000 | 0.4022 | |

WANT MORE OUTPUT VAR. AS FUNC. OF INPUT VAR. 7? NO
VARY OTHER INPUT VARIABLES? YESD

OUTPUT VARIABLE? 16

SENSITIVITY OF OUTPUT VARIABLE 16 TO INPUT VARIABLE 3

| INP. VAR. 3 | OUT. VAR. 16 | |
|---|---|---|
| 0.4500 | -0.4040 | |
| 0.4600 | -0.3372 | |
| 0.4700 | -0.2703 | |
| 0.4800 | -0.2034 | |
| 0.4900 | -0.1366 | |
| 0.5000 | -0.0697 | |
| 0.5100 | -0.0029 | ← Breakeven - 0.52% |
| 0.5200 | 0.0640 | |
| 0.5300 | 0.1309 | |
| 0.5400 | 0.1977 | |
| 0.5500 | 0.2646 | |

KEYSTONE WALLACE RESOURCES

5 Denver Technological Center
Englewood, Colorado 80110
Telephone (303) 758-1231
Telex No. 45-905

# KEYSTONE WALLACE RESOURCES

# ORE RESERVES & FEASIBILITY REPORT

JANUARY 27, 1972

By: Andrew J. Zinkl
Andrew J. Zinkl
Project Engineer

Approved By:
R. E. Kunkel
R. E. Kunkel
Vice President

Victor J. Hoffmann
Victor J. Hoffmann Ph. D
Consulting Geologist

KEYSTONE WALLACE RESOURCES

ORE RESERVE AND FEASIBILITY REPORT


SUMMARY:

Keystone Wallace Resources presently has a mining and leaching operation in the Lisbon Valley near Moab in southern Utah which is producing in excess of 750,000 pounds of copper per month from copper oxide ore mined in the sedimentary sandstones. The ore reserves in Lisbon Valley have been increased to over 7,000,000 tons with an average ore grade of 0.65% equal to or more than 90,000,000 pounds of copper. The major part of these reserves is ten miles from the existing plant site and the geological potential exists for increasing the reserves in this immediate area by 100 percent or more.

Part A of this report covers the feasibility of constructing a Flotation-Leach, Solvent Extraction - Electrowinning Plant to produce cathode copper, thereby bypassing the conventional smelter with its attending high cost. The flow sheet for this plant includes a break-through in metallurgical concept whereby the mixed oxide sulfide (chalcocite) sandstone ore can be readily floated with 93-95% recovery of the copper. The flotation circuit produces a small tonnage of high-grade concentrate for leaching to produce, through the use of solvent extraction and electrowinning, a 99.95% cathode copper product. The basic metallurgical test work on this approach has been done by Hazen Research. The advantages are lower capital investment and higher copper recovery with lower acid consumption and operating costs.

Based on known reserves in Lisbon Valley, this feasibility study shows that a 3,000 ton-per-day-plant, using an average ore grade of 0.65%, will require an additional estimated $4,600,000 investment* to produce 35,000 pounds of copper per day, or 12,000,000 pounds of copper per year. Of the $4.6 million, $1.5 million is a firm turn-key proposal for the engineering and installation of the Solvent Extraction-Electrowinning plant for producing 30,000 pounds of cathode copper per day. This complete facility is available with financing or can be obtained on a lease-purchase arrangement.

The return of investment is estimated at 34% with 50¢ copper, and this would increase to 39% for 53¢ copper and to 47% for 56¢ copper. The investment payback period for 50¢ copper is


* The mining, mobile, and plant equipment now in use at Lisbon Valley, and which can be used in the new project, has an estimated value of $1,400,000.

3.0 years with a cash flow of $1,550,000 per year. At the present time, there is every indication that the price of copper has "bottomed out." Taking into account the devaluation of the dollar, market futures indicate the price will be moving upward again. The additional potential reserves in the area should extend the operation or may justify a larger plant. This, of course, would certainly increase the return on investment.

Part B of this report shows how the nearby Cashin mine, with 35,000,000 pounds of known copper reserves, could be operated to produce a flotation concentrate for the Lisbon Valley plant to increase the production of copper to 45,000 pounds per day or 16,000,000 pounds per year, with an added investment of about $1,500,000. A nearly new, complete, dismantled, 1,000-ton-per-day mill and flotation plant is presently available in Arizona at a quoted price of $500,000. This investment would also improve the return on investment in the Lisbon Valley plant by virtue of its higher production output of cathode copper.

The Cerrillos, New Mexico property of Keystone Wallace Resources, with its 5,000,000 tons of 0.5% proven copper oxide reserves, could be incorporated into this concept, or may justify a separate processing operation which would open the door to exploiting the numerous copper oxide deposits in the Red Bed Sandstones of northern New Mexico. Keystone Wallace Resources also holds a good 128-claim copper prospect near Cuba, New Mexico.

Part C of this report shows the Part B concept expanded to where the Lisbon Valley operation could be considered essentially a geographic center of numerous known copper deposits in the southeastern Utah Four Corners area. Under this concept, the Lisbon Valley plant could be expanded to serve as a Hydrometallurgical Smelter to produce cathode copper from the oxide concentrates delivered from a number of smaller satellite mining operations located in the Four Corners district.

Under this concept, the copper oxide reserves in the White Mesa district near Page, Arizona, alone, could contribute another 35,000,000 pounds of copper for the Lisbon Valley plant. The potential from this area is much larger.

The total potential of this concept presents the opportunity of producing 300-400 million pounds of copper that may otherwise never be produced from this area in the years that lie ahead. We believe this is important to the conservation of our natural resources, besides producing a beneficial return on capital investment.

reserves indicate those reserves thought possible considering the size of target. Such reserves have little or no drill or sample support.

The deposits are all fault controlled and occur at intersections of permeable sedimentary units with faults where these faults either change attitude or where side faults begin. The majority of the mineralization is in the Dakota and Burro Canyon formations, but is also found in the Mancos and Hermosa formations.

The copper mineralization is concentrated at both ends of the Lisbon Valley structure where maximum fracturing could be expected.

The distribution of silver is not exactly known but the southeast end of the structure appears to contain more silver than the northwest end. Silver analyses are conspicuously lacking because the priority has been handling the exploration of copper analysis and the routine but necessary daily mill samples. The silver analyses are planned as soon as time permits. Silver reserves can only be based on the limited analysis and as such can only be considered as inferred reserves.

The present mill located on the Big Indian property processes ores from the Blue Jay, GTO, and Micro/Harding - Micro/Costanza orebodies. The ores are blended to give a uniform mill head.

A copper exploration program is presently underway utilizing biogeochemical and geochemical prospecting, infra-red imagery, surface mapping and drilling. Results thus far have been encouraging.

The estimated combined potential reserves of the Lisbon Valley project are considered to be in excess of 350,000,000 lbs. of copper which includes 230,000,000 of copper proven and indicated with 130,000,000 lbs. for which there is some drilling and other geological evidence. Such reserves offer the potential of a successful long-term operation in Lisbon Valley.

The calculated reserves are all under the control of Keystone Wallace Resources and negotiations are well advanced on the remaining favorable areas.

A. Micro-Costanza and Micro-Harding

This property is in sections 25 and 36 T30S, R25E. Much of the ore that has been processed has been taken from this combined orebody (approximately 200,000 tons averaging 1.2% cu.).

The ore occurs in two parallel mineralized sandstone units dipping approximately 30° SW. The total thickness of the known ore units varies from 20 to 30 feet. Mineralization is considered to be in the lowermost member of the Mancos formation.

Some high-grade direct shipping ore had been produced from underground workings by previous owners.

The sulfide content of the orebody increases with depth. The planned limit of open pit mining is 150 feet. The reserves could be increased by as much as 5,000,000 lbs. of copper by underground mining below the 150 foot level.

The silver content of the orebody is appreciable. Intervals containing as much as 2 oz. per ton have been noted. Approximately 100,000 oz. of silver are indicated from the present knowledge of the deposit. No silver is presently being recovered. Preliminary tests indicate that 50% of the silver is recoverable in the proposed flotation circuit.

A considerable amount of low-grade copper ore is known to parallel the high-grade ore presently mined. Little information is available on this potential but surface outcrops and limited drilling indicate that the low-grade reserves may be in excess of several million tons of 0.5 to 0.6% Cu.

B. Hi-Lime

The Hi-Lime property is in sections 17 and 18, T30S, R25E. The property is now leased by Keystone Wallace but arrangements have been made to purchase ore from the present owner.

Mineralization occurs as malachite dissemination in a thin sandstone member of the upper unit of the Hermosa Formation. The sandstone is about 6-8 feet thick and occurs between two dense fossiliferous limestone members. The color is light gray where mineralized and grades rapidly to light brown or tan where not. The ore limits are thus easily defined.

The average grade of the oxide portion is 1.5% and of the sulfide 1.1% copper. A cutoff of 0.2% was used in the calculations. A cutoff grade of 0.35% would only decrease the total reserves by about 100,000 tons (400,000 - 500,000 lbs. of copper) but 0.2 appeared to be a more natural value.

The cross sections upon which reserves were calculated were based on extrapolation of thickness and grade between drill holes. No unusual thicknesses or grades were noted and the reliability of these extrapolations is expected to be good.

The dip of the orebody increases to the northeast. Present pit design allows for a 10:1 stripping ratio along the northeast side of the pit. The reason for permitting this high stripping ratio is because of the apparent low stripping costs being experienced in this pit. If the cost of stripping increases to more than $0.18 per ton the pit limit should be pulled in to an 8:1 ratio. However, the average stripping ratio for the entire orebody is about 5:1. A detailed study of the benefication portion of this program may indicate decreased costs will permit a higher stripping ratio.

The figures used in the tabulation are based on the ore reserve as of December 1, 1971, allowing for tons and grade since the original reserves were estimated.

D. Sentinel: (9 & 10)

The Sentinel orebody is in sections 25 and 26, T30S, R25E. Low-grade mineralization has been recognized in the area and some drilling in 1967 delimited approximately 600,000 tons of 0.50% Cu. No effort was made at that time to probe the limits of mineralization.

In May 1971 an exploration drilling program was initiated in the alluvial valley approximately 1200 feet west of the previous drilling. This exploration was directed toward locating the major northwest trending fault that resulted in the down-dropped central block of the Lisbon Valley. Since the known copper deposits in the region are related to faulting the area immediately adjacent to this fault was considered to provide an excellent target for economic mineralization.

(9) Appendix VIII - Sentinel Ore Reserves - Letter to A. J. Zinkl from V. J. Hoffmann

(10) Drill logs, assays, etc. - available at KWR office.

The location of the projected fault was estimated from aerial photographs and field examinations. Drilling in the alluvial valley confirmed these projections.

The down-dropped side contained abundant sulfide mineralization (pyrite) but no sifnificant quantities of copper. The upthrown side was found to contain about 100 feet of low-grade oxide copper mineralization. Drilling was continued away from the fault on approximate 100-foot centers. A drill hold interval of 100 feet is considered necessary to provide mine control of a low-grade ore body.

From this preliminary exploration and a detailed study of surface exposures, an area of approximately 1,300,000 square feet was delimited that could contain low-grade copper mineralization (0.4% Cu). The average thickness is about 65 feet depending on cutoff grade. Proven reserves from the initial drilling completed thus far include approximately 3,500,000 tons that average about 0.38% Cu. The indicated ore zones include an additional 500,000 tons, with inferred reserves of another 2,000,000 tons. Topographic maps of the area have been completed. Contour interval is 5 feet and the scales are 1" - 200' and 1" - 50'.

While the mineralization is known to be low grade, it appears possible to economically exploit the resources due to the large tonnage (relative to other deposits in the Lisbon Valley) and to the fact that mineralization is near surface and the stripping ratio is low (about 0.6:1). Additionally, the royalty payments on the tonnage would be low ($0.15 or less per ton).

The oxide copper mineralization thus far recognized is primarily present as malachite with minor amounts of azurite. Brochantite and antlerite and chalcocite are reported from composites used in beneficiation testing. Chalcocite is the major sulfide mineral. Minor amounts of covellite, bonite and chalcopyrite have been recognized.

With the concept of a flotation-solvent extraction - electrowinning circuit the Sentinel ore deposit provides about 50% of the present reserves.

E. Globe: (11)

The Globe orebody is in Section 26, T30S, R25E. Mineralization occurs as a fine-grained dissemination of malachite and chalcocite in the Hermosa formation.

The ore unit averages only 12 feet and thins rapidly to the south. The present proven reserves based on existing drilling are 25,000 tons averaging 0.62% copper (300,000 lbs.). The indicated reserves are about the same, for a total of 50,000 tons.

The drilling on the property is not complete and additional proposed drilling is recommended. Two drill holes intersected significant mineralization at a depth between 70 and 100 feet. This deeper zone should be more thoroughly investigated. A drill hole location map has been prepared for this property.

The presently known mineralization is both oxide and sulfide and recoveries in the present mill are low. Much of the ore has been stripped but no plans for further mining have been made in order to have this tonnage available for the sulfide recovery in the flotation circuit. A few analyses for silver have also been made and some ore contains about one ounce of silver per ton.

Drilling on the northeast side of the claims has exposed some low grade mineralization. This is continuous with the Sentinel orebody and has been considered with that property description.

F. Blue Jay

The Blue Jay property is adjacent to the present mill at the northwest end of the Lisbon Valley structure. Mineralization is in the lower part of the Burro Canyon formation.

A considerable amount of drilling was required to block out the ore on this property because of the spotty and discontinuous nature of the mineralization. Drilling is on approximate 50 foot centers. From this pattern, however, a mineable unit was clearly outlined.

---

(11) Drill hole location map available at KWR office.

The proven reserves are about 500,000 tons that average 0.51 percent copper. The stripping ratio is approximately 1:1. Stripping of the property is about completed and some ore has been removed. It appears that the grade may be slightly higher and more continuous than originally calculated.

The ore body has not been closed to the northwest where mineralization dips under a small hill. Drilling has shown that the ore is both higher grade and more uniform in this direction and this potential must certainly be explored. Exploration in this direction was stopped because of depth to the mineralization and the amount of sulfide copper compared to oxide increased beyond the economic recovery limits.

Drill hole data and ore reserve calculations sheets are available at the office in Denver. A cutoff grade of 0.2 percent copper was used in the calculations but frequently it was necessary to include intervals of even lower grade in order to permit large scale mining of the property.

Some copper sulfides and silver were noted in the deeper portions of the property. One interval in the northwest side of the deposit contained 17 percent copper over a 5-foot interval. The mineralization was primarily chalcocite and covellite.

G. Three-Step:

The Three-Step property is in Section 7, T31S, R26E. Negotiations are underway to acquire the property.

Three diamond drill holes intersected 40 to 60 feet of copper mineralization containing between 0.6 and 0.8 percent copper. From these drill holes and geologic evidence about 700,000 tons are indicated but could be more than twice that figure.

Mineralization is in the Dakota formation and is controlled by the same fault that is responsible for the GTO mineralization.

Several analyses have been made for silver and as much as 11 oz. per ton have been found. It appears, however, that the average will more likely be about 0.2 - 0.5 oz. per ton. If sufficient tonnage could be proven, tests should be made to recover these values.

H. Other Lisbon Valley Properties:

Under this category are included several other areas of known copper mineralization about which little is known concerning the potential. The figures shown in the tabulation are purely conjecture and are only indicative of the potential of each area based only on fault projections and intersections and reports of others on copper mineralization.

Exploration of these properties will be initiated when time permits. The geochemical survey of Lisbon Valley, presently underway, should be helpful in outlining areas of favorability.

A brief discussion of each area is included. Texas Uranium Company owns 80 claims in the Central part of Lisbon Valley. These claims were staked for uranium but no organized exploration was ever done on them. The area of interest on this property lies at the intersection of the main Lisbon Valley fault with the side fault in the structure (the fault responsible for ore at the Hi-Lime property). The fault intersection is projected under the alluvial valley. Depth to outcrop is unknown but should be less than 100 feet. Some high-grade pieces of float have been found in the area but the source is unknown.

The Costanza-Security group of claims is owned by Keystone Wallace but no exploration has as yet been directed toward them. One oil exploration hole on these claims encountered 20 feet of low-grade mineralization (0.18% Cu.) at a depth of 220 feet. This occurence is approximately 500 feet from a major fault projection and the intersection of the mineralized unit and the fault must be explored.

Negotiations have been completed on a group of claims and fee land equivalent to about 500 claims in area. These are known as Costanza/500. The claims are not contiguous but are located throughout Lisbon Valley. Mineralization is known on many of the claims but no reserves have been blocked out.

The property of Homestake Mining adjoins Keystone Wallace holdings in the northwest end of Lisbon Valley. Homestake has mined a considerable tonnage of uranium ore but is reported to be near the end of their reserves and are planning to cease operations shortly.

Examination of drill cuttings from their exploration program showed the presence of as much as 40 feet of copper mineralization at a depth of about 100 feet. Underground maps and workings were examined in detail and the projection of the main Lisbon Valley fault determined from this examination offered an exploration target that was drilled on a limited basis. Twenty holes were drilled and significant but low-grade mineralization was encountered. Analysis of the samples is presently underway. (12)

Several other areas of possible mineralization are also recognized but rate low exploration priority because little or nothing is known about them or because negotiation for acquisition has not been completed.

## VII. MINING AND STRIPPING.

As a result of actual production, the stripping, mining and hauling have been very well established. All of the deposits, except the Blue Jay, have been stripped and mined by D-9 Caterpillar dozer with a ripper. No explosives are required to remove either the waste material or the ore from the other deposits.

Test mining of 6,000 tons of ore removed from the Sentinel deposit indicates that it can be ripped with the D-9. Some lower strata may require minor amounts of drilling and blasting in certain areas.

Stripping ratios were originally calculated from the exploration data and these figures are used in the operating costs which follow in this report.

The ratio's vary from a low of 0.6 to 1 at the Sentinel to a high of 5.4 to 1 at the Micro deposits.

Mine production records for the first eight months of 1971 show that the operation was stripping at the rate of 330,000 tons of waste to 36,000 tons of ore removed, thereby exceeding the normal stripping requirement, in total, which is 4:4 to 1. Prestripping has reduced the ratio to 2.4 to 1.

---

(12) Drill and assay data in KWR office in Denver

The tabulation on Appendix[13] shows the ore requirements as calculated to uniformly mine out the known ore reserves; also tabulated are the stripping ratios and tons of waste to be moved to fulfill the monthly requirements. Ore and waste removal will be approximately 10,000 tons per day. The KWR equipment has averaged more than 12,000 tons per day for the past year. The last column on that sheet shows the number of days each month the equipment could be used at each mine.

The mill and finishing plant will be located at or near the Sentinel mine, within hauling distance of scrapers. The ore at the Sentinel will be ripped and scraper loaded and transported to the grizzly at the crushing plant. It is not intended at this time to have large storage of coarse Sentinel mine run ore at the crusher. The ore storage is to be as fine ore already through the crushing circuit.

The ore from the other deposits will be ripped, piled, and loaded on trucks for transportation to the mill. Some ore from the smaller deposits can and probably will be stored in front of the crushing circuit to be fed as needed for uniform mill feed.

The adaptability of using scrapers for ore from the Sentinel and trucks from the other deposits will permit for daily control of the blending for continual uniform feed to the mill. This versatility, along with some coarse ore storage and a large amount of fine ore storage will permit this control.

Details have not been engineered on the crushing circuit; but a fine ore storage of not less than 15,000 tons is in the preliminary planning. This storage pile will be built utilizing a regular continuous conveyor belt distributor. Ore from the fine ore storage will be drawn from 3 or 4 places onto one conveyor belt to feed the ball mill.

The flexibility of all the ore feed alternatives will be considered in the mine production plans and in the crushing and storage circuit so that the blending for a uniform grade mill feed will not be a major problem.

---

(13) Appendix IX - Tabulation of Stripping and Mining Requirements

As noted on the Appendix sheet, last paragraph, the present mining equipment can easily handle the daily stripping, mining, and hauling requirements. Actually the mining production problem could be fulfilled operating on a 6-day week or 27 days per month, as the equipment is capable of moving 12,000 tons per day.

Over the past 18 months the stripping has exceeded the daily requirements for production so that over 1,500,000 tons of waste, worth $250,000 in prestripping costs, is already paid and credited to the project.

The mining equipment is included in the Appendix list of equipment.

The stripping, mining and hauling costs used later in this report are based on the actual costs over the past 18 months of operation in bringing ore to the leach plant. These costs include direct mine supervision and the administrative portion charged to mining.

## VIII. BENEFICIATION: (14 & 15)

The plant Keystone Wallace Resources is now operating at Lisbon Valley is a straight leach-precipitation circuit that is producing copper at the rate of over 750,000 pounds per month. The ore fed into this mill is coming from the GTO and Micro-Costanza ore deposits which are higher grade ores and are located some ten miles distance in the lower end of the valley.

The large ore reserves of the Sentinel are too low grade (0.38%) to process through this circuit because the transportation cost for this ore is in the range of 7¢ to 8¢ per pound of contained copper.

In addition, the reserves of the GTO and Micro-Costanza are increasing in sulfide content with increase in depth and the sulfide ore is not amenable to the present leach circuit.

---

(14) Appendix X, XI, and XII - Flotation Test Results on Sentinel and GTO

(15) Appendix XIII - FLOT, SX-EW Circuit

As a result of these facts, Keystone Wallace Resources had several flotation tests conducted at Hazen Research in Denver. These tests were conducted on composite samples from drill holes on the Sentinel ore (Hole 96 & Hole 103) showing excellent recovery. Also tested was one sample of high-grade ore from the GTO mine. This test also showed excellent results. As a further check on the flotability of these oxide-sulfide (chalcocite) mixed ore, a sample of the Cashin ore out of the Wingate formation was tested. This result checked the other tests.

Briefly the results can be summarized as follows:

| Sample | Total Cu | Oxide Cu | Sulfide Cu | Cu Recovery |
|---|---|---|---|---|
| Cashin | 0.58% | 0.30% | 0.28% | 96.0% |
| GTO | 4.95% | NA | NA | 96.6% |
| Sentinel (96) | 0.46% | 0.22% | 0.24% | 95.1% |
| Sentinel (103) | 0.42% | 0.31% | 0.11% | 93.1% |

These results prompted the investigation into the present overall concept of a flotation-solvent extraction-electrowinning facility in lower Lisbon Valley at the Sentinel deposit.

Study of these flotation tests note the short time needed for conditioning and flotation of this ore. At a minus 65 mesh size the results appear to be optimized, as finer grind did not improve results.

This rapid flotability and lack of fine grinding reduces the capital cost, in that no large flotation circuit is needed. In addition, this flotation circuit is not intended to produce a high grade concentrate so that cleaner flotation is minimized as the best overall copper recovery is the target with all concentrates giving directly to the leach circuit.

An examination of the available reserves showed that over 7,000,000 tons of ore could be consolidated into a mill feed (16) of 0.65% copper, having an oxide content of 0.38% and a sulfide content of 0.27% Cu. (18) A 95% recovery is projected through the flotation circuit and a 95% recovery is used for the solvent extraction-electrowinning circuit. Actually, it is expected the recovery through this final circuit will be higher (98 % or more) since the circuit is essentially closed and residue will be shipped to the smelter.

(16) Appendix IX - Shows proposed mill feed schedule.

Preliminary examination of the flow circuit indicates that plus-90% of the total copper will be recovered, with 8.8 pounds per ton produced as cathode copper and 2.90 pounds per ton as sulfide copper concentrates, with some silver shipped to the smelter.

It is planned to hot acid leach all the oxide and 40% of the sulfide content of the concentrates, with this pregnant liquor as feed to the SX-EW circuit. An alternate is to investigate an ammonia-ammonia carbonate leach for the total copper content in the flotation concentrate, thereby converting all the copper into cathode.

The operating costs for the beneficiation circuit are based in part on present costs at the plant and in part on estimates from similar size flotation plants. The solvent extraction-electrowinning operating costs are direct estimates from Holmes and Narver, who have been consulted on this portion of the project.

Preliminary estimates are based on operating at a rate of 3000 tons per day. This figure results in the production of approximately 26,000+ pounds of copper as cathode copper, and 8700+ pounds of copper in smelter concentrates per day. Some silver recovery will also be realized; no estimate of the amount is made here because of lack of sufficient test data. However, it is anticipated that the silver content in the mill feed will be approximately 0.10 oz. per ton.

Satellite or other property production of concentrates for feed to the leach SX-EW circuit would enlarge this portion of the facility. At this time, only 3000 tons per day of flotation capacity is planned for the Lisbon Valley reserves.

Capital investment of this full circuit is covered under that subject later.

## IX. OPERATING COSTS:

The cost figures which follow are based on ore feed from the various deposits in a regular uniform manner which will result in uniform mining of the total reserves, as per the daily mill feed schedule.

The critical aspect of this project was whether, at the present price of 50¢ per pound, the Sentinel ore reserve was profitable to operate. The cost and profit evaluation of this ore is included as Appendix material [17] showing that the Sentinel ore will produce a profit of 12¢ per pound.

A. Mining Costs: [18]

Analysis of this portion of the cost figures are based on Keystone Wallace Resources cost accounting. Stripping ratios are those remaining on the ore reserves at this time. Stripping costs are in the area of 18¢ per ton of waste; whereas ore mining costs generally average 35¢ per ton; hauling costs will average 18¢ per ton.

The combined cost data for each deposit in the analysis show that the daily expenditure will be approximately $2,950 for direct mining costs, which at 3,000 tons per day means delivery to the mill at a cost of $0.98 per ton or 8.4¢ per pound of copper.

B. Milling Costs: [19]

The figures used here are inclusive starting at the crusher through concentrates fed to the leach circuit.

These costs are based in part on present costs at the leach plant, such as power, water, administration, assay laboratory, etc. adjusted to 3000 tons per day. The crushing, grinding, flotation and other costs are based on estimates from operations of similar size, and from consultation with outside consultants as well as the judgment of these authors.

An estimate of $3,990 per day to process the 3000 tons through the mill results in a figure of $1.33 per ton of ore, and calculates to a cost of 11.4¢ per pound of marketable copper.

(17) Appendix XIV - Sentinel Costs and Profit Estimate
(18) Appendix XV - Mining Cost Data Sheet
(19) Appendix XVI - Milling Cost Data Sheet

C. Leach - Solvent Extraction - Electrowinning: (20)

The costs for this portion of the total circuit are consolidated here and are based on quotations from engineering and operating estimates by Holmes and Narver. The correspondence and quotations are too voluminous to include in the Appendix, so excerpts are used herein.

The leaching costs are based on present costs at the Keystone Wallace Resources' leach plant wherein three pounds of acid are used for each one pound of copper produced. Acid costs 1.25¢ per pound so that at 3 pounds of acid per pound of copper, the acid cost is 3.8¢ per pound of copper produced. It is expected the actual cost of acid will be lower, since only the concentrates will be leached instead of the ore.

The solvent extraction-electrowinning costs are from quotations from Holmes and Narver, which follows:

"We estimate direct operating costs of this facility as follows (per pound of copper produced):"

| | |
|---|---|
| Labor (7 men and Superintendent) | 1.33¢ |
| Electric Power | 1.1 |
| Solvent Losses | 1.0 |
| Premium for purchasing starter sheet | 1.0 |
| Total: | 4.5¢ |

An acid savings of 1.5 pounds of acid per pound of copper is regenerated in this process, and credit for this acid is taken here at the rate of 1.5¢ per pound of produced copper, thereby reducing this cost of 3.0¢ per pound of copper.

(20) Appendix XVII- Holmes & Narver Flow Diagram

These costs total as follows:

| Item | ¢/lb of Copper |
|---|---|
| Leaching | 3.8¢ |
| SX-EW | 4.5 |
| Acid Credit | -1.5 |
| Total: | 6.8¢ |

D. Smelter Copper Cost:

As a portion of the flotation concentrates in the form of sulfides will not leach in the acid circuit, it will be shipped to the smelter. Of the 13 pounds of copper in each ton of ore, approximately 2.9 pounds will be residual in the leach circuit tails, unless an ammonia leach circuit is used. It may be necessary to reconcentrate this residue, or because of the high silica content, it may be acceptable for direct shipment to the smelter. At this time, and for this report, it is assumed that direct smelter shipment will be made. Based on current smelter schedules and including the cost of trucking to the smelter, a figure of 12.5¢ per pound for the 2.9 pounds is used here. In addition, a cost of 1¢ per pound is expected for marketing the cathode copper.

E. Cost Summary:

Using the foregoing costs, the total is as follows:

| Item | $/Ton | $/Lb (11.7 lbs) | $Total/Day |
|---|---|---|---|
| Strip, Mine, Haul | 0.98 | 0.084 | $ 2,946.00 |
| Flotation Milling | 1.33 | 0.114 | 3,990.00 |
| Leach - SX-EW 8.8 lbs @ 0.068 | 0.60 | 0.051 | 1,792.00 |
| Smelter, Copper 2.0 lbs @ 0.125 | 0.36 | 0.031 | 1,094.00 |
| Marketing Cathode @ 1¢/lb. | 0.09 | 0.008 | 264.00 |
| Total Cost: | $3.36 | $0.28.8 | $ 10,086.00 |

COMBINED ORE RESERVES

Preliminary Flot - SX-EW Cost and Profit Estimate

Based on indicated results of Flotation Tests
Use: 90% Total Recovery to Market.

| | |
|---|---|
| 0.38% | Oxide Copper Content |
| 0.27% | Sulfide Copper |
| 0.65% | Total Copper |

| | | |
|---|---|---|
| 3,000 Tons Per Day - Recover: | 20,520 | pounds oxide |
| | 14,580 | pounds sulfide-5,830 leach |
| | 35,100 | pounds Total |

Costs based on 3,000 Tons Per Day Flot. - SX-EW Circuit

| ESTIMATED COSTS | $ PER TON | $ PER LB. | TOTAL COST |
|---|---|---|---|
| MINING: | | | |
| Stripping (2:4:1) | $0.45 | $0.038 | $1,343.00 |
| Mining | 0.35 | 0.031 | 1,060.00 |
| Hauling | 0.18 | 0.015 | 543.00 |
| Mining Total | 0.98 | 0.084 | 2,946.00 |
| MILLING: | | | |
| Crush & Screen | 0.25 | | 750.00 |
| Grinding Balls & Liners | 0.15 | | 450.00 |
| Flotation | 0.20 | | 600.00 |
| Thickening & Tailings | 0.03 | | 90.00 |
| Power, Water, Air | 0.15 | | 450.00 |
| Maintenance & Supplies | 0.20 | | 600.00 |
| Miscellaneous | 0.01 | | 30.00 |
| Lab | 0.02 | | 60.00 |
| Plant, Admin, Office, Tele | 0.17 | | 510.00 |
| Grinding & Flot. Labor | 0.15 | | 450.00 |
| Milling Total | $1.33 | $0.114 | $3,990.00 |
| Total to Leach Circuit | $2.31 | $0.198 | $6,936.00 |
| ACID LEACH - SX-EW CIRCUIT: | | | |
| 20,520 pounds oxide | | | |
| 5,830 pounds sulfide | | | |
| 26,350 pounds @ 0.068 | 0.60 | 0.051 | 1,792.00 |
| SMELTER COPPER: | | | |
| 8,750 pounds @ 0.125 | .36 | 0.031 | 1,094.00 |
| Market Cathode @ 1¢/Lb | .09 | 0.008 | 264.00 |
| Total through Market | $3.36 | $0.288 | $10,086.00 |
| VALUE AT 50¢/Pound | | | $17,550.00 |
| PROFIT PER DAY | $2.49 | $0.21 | $7,464.00 |