



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 Arimetco, Inc. 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.



Western States
ENGINEERING

ARIMETCO INC.
335 N. Wilmot, Suite 400
Tucson, Arizona 85711

ZONIA PROJECT
FEASIBILITY STUDY
EXTRACT

WSE Project No. 95015

EXECUTIVE SUMMARY

Introduction

Western States Engineering (WSE) has prepared a technical/economic study of the feasibility of copper production at the Zonia Mine located in Yavapai County, Arizona. The results of this report indicate that open pit mining, acid leaching, and solvent extraction/electrowinning (SX/EW) can produce cathode copper (LME Grade A) at Zonia and provide positive economic returns. Estimated time required for engineering and construction is 10 months and life of operation will be a minimum of 8.1 years.

Ore Reserves

The Zonia Project mineable reserves, calculated at a cut-off grade of 0.19% Cu amount to 34.7 million tons at a grade of 0.366% total copper with a strip ratio of 0.45 to 1. On an average basis, 4.3 million tons of ore per year will be mined, crushed, and leached to produce 21.9 million pounds of electrowon cathode copper.

The reserves have the potential to be increased with additional exploration drilling.

Process Description

The design strategy will utilize open-pit mining methods with primary equipment of 85-ton haulage trucks loaded with Caterpillar 992 (or equivalent) FEL's. Mining operations will be scheduled 5 days per week on a three shift basis. Ore will be transported to the crushing plant where it will be reduced in size to minus 1 inch. Following crushing the ore will be agglomerated with concentrated sulfuric acid and then transported to the leach heaps.

Leaching will be on a constant basis, 7 days per week, by irrigating with raffinate solution covering an area approximately 644,000 square feet. Leach cycles will average 40 days and will produce 1900 gallons per minute of copper pregnant solution containing an average of 2.8 grams per liter of copper. This solution is collected and sent to the solvent extraction/electrowinning plant.

Solvent extraction will treat 1900 gpm of PLS solution on a 7 day per week basis. The circuit consists of a single train of two extraction and one strip mixer-settlers. Copper in electrolyte solution is processed in the electrowinning tankhouse where it is plated into pure copper cathode sheets. Daily production rate will be 60,000 pounds. Final product is immediately shipped to market.

Western States

Economics

Initial capital expenditures required to put Zonia into operation are estimated at \$17,498,000 including working capital. Incremental leach pad construction, mine equipment purchased, and other sustaining capital through the mine life will be an additional \$6,542,000.

Total unit costs of production per pound of copper is estimated at \$0.544.

Base Case Economic Analysis as Follows:

Copper Price:	\$1.05per pound
NPV @ 10%:	\$13,868,000
IRR:	36.6%
Cash Break Even:	\$0.67per pound
Pay Back:	2.5years

Recommendations

The project appears technically and economically viable under current market conditions. The mining and processing technology is well proven and the cost of construction and operation are very reasonable by industry standards. Arimetco is an experienced operating company and will be able to apply its in-house expertise to the project. Zonia should be considered as an attractive copper producing potential.



ARIZONA

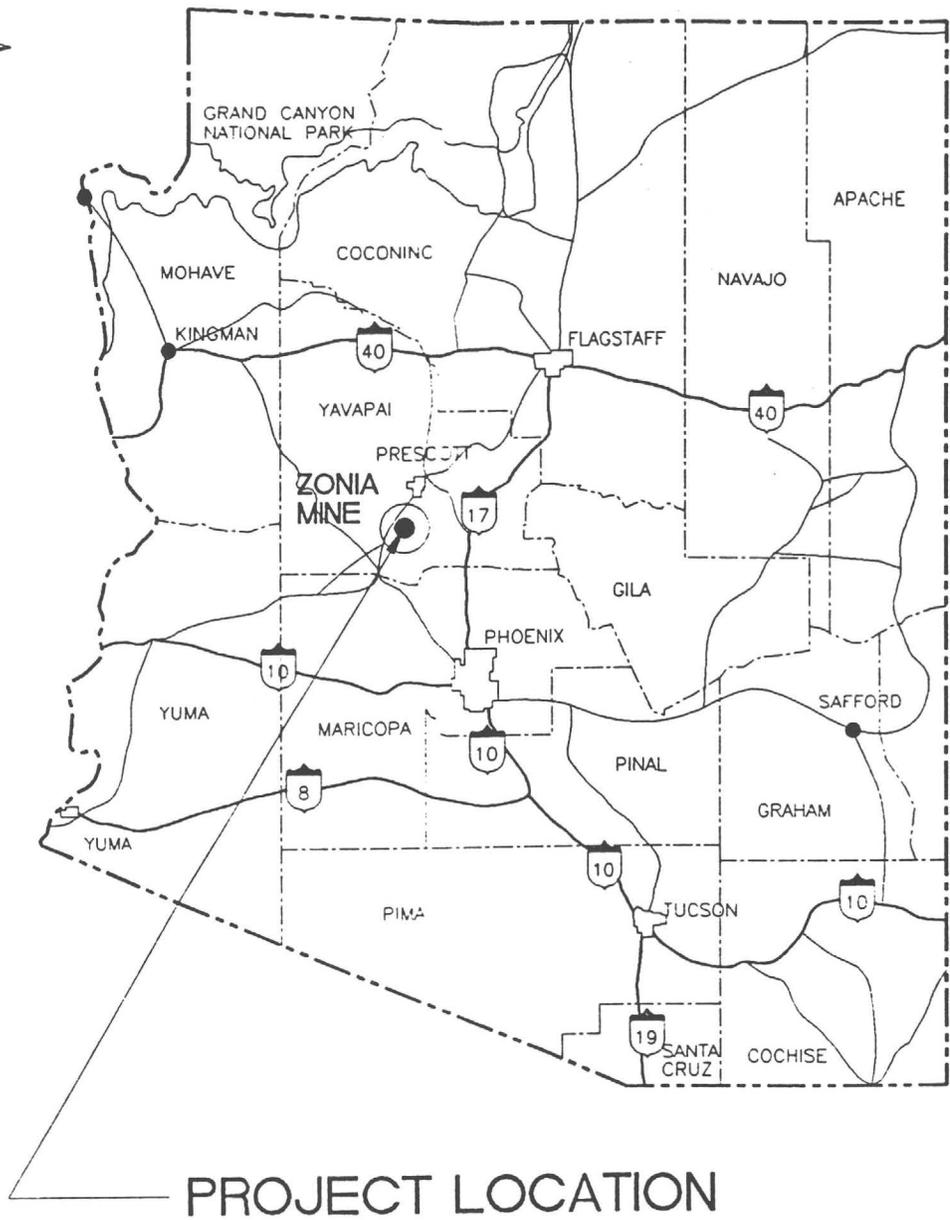


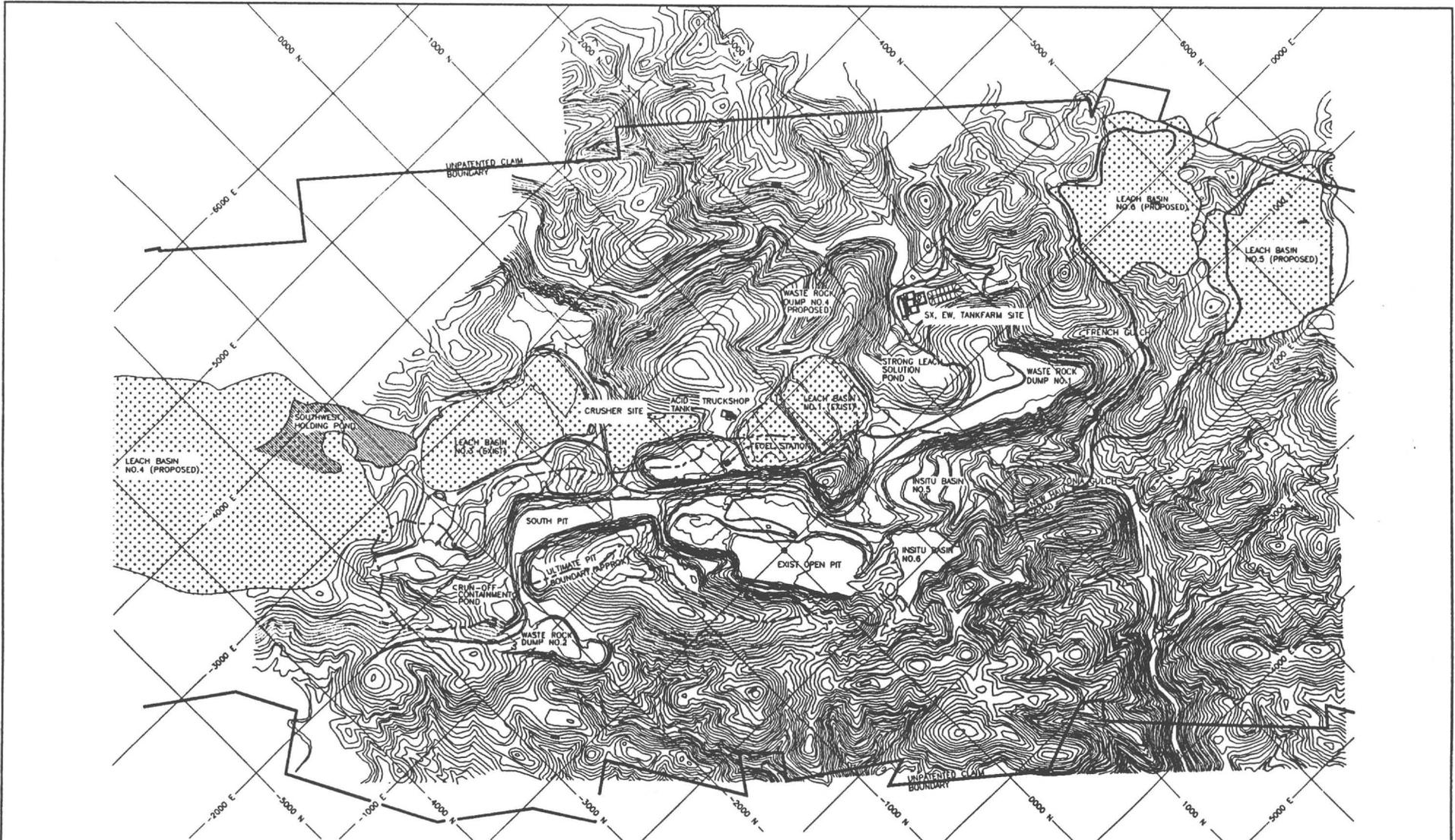
FIG 1.1



Western States
ENGINEERING
TUCSON ARIZONA

WSE PROJECT NO.

95015



OVERALL SITE PLAN
SCALE: 1" = 400'



PRELIMINARY
NOT FOR CONSTRUCTION

DESIGN AND APPROVAL	DATE
DRAWN BY T.T.	2-10-85
CHECKED BY	
PROJECT ENG	
ENGR. SUPV. P.K.	
PROJECT	
CLIENT	

PROJECT

Western States Engineering
TUCSON, AZ

ARIMETCO INC.
335 N. WILMOT, SUITE 400
TUCSON, ARIZONA 85711

DRAWING TITLE

**ZONIA MINE
CIVIL
OVERALL
SITE PLAN**

Western States Engineering
TUCSON, AZ

DRAWING NUMBER
65-05-C-01

SCALE 1"=400' DATE 7/10/85 PROJECT NO. 95015

REV. P1

4/25/85
65-C-01.DWG

11.0 OPERATING COSTS

This section presents the estimated operating costs in United States Dollars (US\$) for the Zonia project over the expected operating life of 8.1 years. The average cash production cost is estimated to be 54.4 cents per lb. of copper. Table 11-1 is a summary of the operating costs which average \$11,946,000 per year.

Table 11-1: Operating Cost Summary

Description	Average Annual Cost \$(000's)	\$/lb of Cu
Mining	3909	.178
Crushing/Agglomeration	1882	.086
Leaching	2080	.095
SX/EW	2838	.129
Services	572	.026
Expl./Development	190	.009
Admin.	<u>475</u>	<u>.021</u>
TOTAL	<u>11,946</u>	<u>.544</u>

Note: Costs per pound of Cu assume an annual production rate of 21,900,000 pounds.

11.1 Mining Cost Summary

Table 11-2 presents a summary of the direct operating costs for the mine. This area includes all costs for drilling, blasting, loading, ore haulage (includes haulage to leach pads), waste haulage, road maintenance, and mine development. This summary indicates an annual average mining cost of \$3,909,000 or \$.178/lb of copper produced.

Table 10-1: Capital Cost Summary
 (\$, manhours x 1,000)

<u>COMMODITY</u>	<u>EQUIPMENT</u>	<u>MATERIALS</u>	<u>LABOUR</u>	<u>SUB- CONTRACT</u>	<u>TOTAL</u>
<u>Direct Costs</u>					
Site Prep				50	50
Infrastructure				54	54
Mine Equipment	4520				4520
Crushing (& Agglomeration) Plant	1799	41	59	750	2649
Leach Pads & Ponds				1011	1011
Solution Management	119	201	148		468
SX Plant		195	74	368	637
Tank Farm	335	132	34	211	712
EW Plant	384	904	66	374	1728
Electrical	564	700	243		1507
Utilities	159	17	18	120	314
Truck Shop	103	11	2	428	544
Fueling Station	25	9	5	34	73
Acid Storage		10	1	87	98
Reagents (Initial)		672			672
Repair Parts/Supplies		166			166
Total Direct Cost					15203
<u>Indirect Costs</u>					
Engineering					400
Construction Management & Procurement					160
Training					25
Mobilize/Demobilize					50
Insurance & Freight					175
Total Indirect Cost					810
<u>Other Costs</u>					
Feasibility Study					See Note
Fees & Licenses					"
Environmental Permitting					"
Contingency					500
Total Other Cost					500
TOTAL CAPITAL COST					16513
Working Capital					985
TOTAL CAPITAL REQUIREMENT					17498

Note: The cost of these items will be included in a separate financial analysis by Client.