Royal Mines of Zacualpan Mexico
500 Years of Mining History

IMPACT SILVER CORP.

Brian V. Hall  Behrooz Behnam  Karen J. Fox
AREAS OF DISCUSSION FOR THIS TALK

• What is the Zacualpan Silver-Gold District
• Historical Significance
• The task at hand for the Data Compilation
• ArcView as a Data Viewer
• ArcView for Data Analysis and Interpretation
• ArcGIS as a Management Tool
WHAT IS THE ROYAL MINES OF ZACUALPAN SILVER – GOLD DISTRICT?
TYPES OF SILVER – GOLD VEINS
ZACUALPAN DISTRICT

Silver-Lead-Zinc Vein

Gold-Silver-Copper Vein

Veins at the Guadalupe Mine

3.0 meters
A GOOGLE SEARCH FOR “SILVER, MEXICO”

**Taxco Silver Capital** of Mexico - Taxco City Guide - Taxco Tourist ...

Taxco is the place to buy silver in Mexico. It’s also a picturesque colonial town with winding cobblestone streets and white-washed houses. gomexico.about.com/od/colonialcities/p/taxco.htm - 22k

Welcome to ShoreTrips® - TRAVEL TO TAXCO – THE SILVER CAPITAL OF ...

Acapulco shore excursions and activities by Shoretrips. We test all our Acapulco shore excursions and activities before we list them on our site so we know ...www.shoretrips.com/common/search4.asp?tcode=006254 - 30k -

**Silver Jewelry From Taxco Mexico’s Silver Capital**

Taxco which is pronounced Tahs-ko, itself is located in the hills between Acapulco and Mexico City and is a city with a natural ambiance and charm with its www.articlesbase.com/jewelry-articles/silver-jewelry-from-taxco-mexicos-silver-capital-610465.html - 56k - Cached - Similar pages

**Pilot Guides.com: Silver capital of the world: Taxco**

Not only has Taxco been declared a National Historical Monument, but it’s also widely regarded as the silver capital of the world. There are 6 working mines ... www.pilotguides.com/destination_guide/north_america/mexico/taxco_silver.php - 31k -

**Taxco, the silver capital of Mexico - a set on Flickr**

Flickr is almost certainly the best online photo management and sharing application in the world. Show off your favorite photos and videos to the world, ... www.flickr.com/photos/myrmardan/sets/72157594397833711/ - 29k - Cached - Similar pages

**YouTube - The Silver Capital, Tasco, Taxco Mexico**

the bigget silver capital in the world. ... is just not even trying for a lady on TV! Taxco is gorgeous!
LOCATION OF ROYAL MINES OF ZACUALPAN SILVER-GOLD DISTRICT
MAJOR SILVER-GOLD VEINS OF THE ZACUALPAN – TAXCO DISTRICTS

- Exploration ongoing at Zacualpan and Mamatla and Zacatecas
- Ramp up Zacualpan production to 500 tpd from four mines
- Prepare additional mines for production
- Exercise option on Zacatecas Processing Plant
- Grow through exploration and acquisition
ZACUALPAN’S HISTORICAL SIGNIFICANCE
Pre-Hispanic Mining Centers in Latin America

(From Cathro, R. J., 2000)
OBRAS = OLD MINE WORKINGS
OLD MILLS AND SMELTERS

La Zorra

Guadalupe

El Calvario

Nombre de Dios

La Fortuna

San Carlos

Santa Efige
MORE AN EXERCISE IN MINING ARCHEOLOGY THAN EXPLORATION
ZACUALPAN MINEROS (CIRCA 1890’s)
THE TASK AT HAND…

THREE SMALL HOUSES FILLED WITH OLD MAPS AND DATA

COMPILE ALMOST 500 YEARS OF MINING ACTIVITY INTO A USABLE DATABASE

FIND MORE MINES SUCH THAT THIS 500 YEAR LEGACY OF MINING CONTINUES
# SPREADSHEET STATISTICS

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<td>13,663</td>
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REPRESENTING 7,376,000 CELLS OF INFORMATION
DATA COMPILATION STATISTICS

CELLS OF INFORMATION IN OTHER SPREADSHEET = 5,324,358

5,000 RECTIFIED MAPS OF WHICH ONLY ABOUT 1,000 HAVE BEEN DIGITIZED INTO SHAPEFILES

8,000 MAPS AWAITING RECTIFICATION

1,500 LAYER FILES WITHIN THE DATA COMPILATION

ALL OF WHICH NEED TO BE ORGANIZED INTO A GEODATABASE
THIS OLD CLAIM MAP IS ABOUT A HUNDRED YEARS OLD
AND THIS OLD MAP IS THOUGHT TO BE ABOUT 200+ YEARS OLD
ArcVIEW

AS A

DATA VIEWER
SOCAVON CONEXION

DETAILED UNDERGROUND SAMPLING AND MAPPING
MULTIPLE UNDERGROUND WORKINGS
GOLONDRINAS AREA
INDUCED POLARIZATION, ROCK SAMPLES
AURORA II PROSPECT
VEIN THICKNESS IN LONG SECTION
HUATECOSCO PROSPECT

HUATECOSCO LONG SECTION
APRIL 22, 1011
VEIN THICKNESS (true / meters)
ArcVIEW FOR DATA ANALYSIS AND INTERPRETATION
CONTOURED SILVER VALUES
LA CADENA SOIL GEOCHEMISTRY GRID
RIDGETOP AREAS SHOWN AND SILVER GEOCHEMISTRY - LA CADENA GRID
VEIN ORIENTATION MEASUREMENTS
LA CADENA GRID

VEIN AZIMUTH
- 1 - 25
- 26 - 90
- 91 - 165
- 166 - 190
- 191 - 270
- 271 - 340
- 341 - 360
### VEIN AND FAULT INTERPRETATION
#### LA CADENA GRID

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DRILLING SUCCESS RATE USING ArcVIEW

PREVIOUS SUCCESS RATE

31%

DATA BASE DRIVER SUCCESS RATE
(as of 2009)

61%

ECONOMIC INTERSECTION DEFINED AS
120 g/t Silver across 2.0 meters
SILVER GRADES TIMES WIDTH FOR VEINS
LA CADENA GRID
DRILL HOLES PRE AND POST DATABASE
LA CADENA GRID

DRILL HOLES
- 1990 - 2005 Minpoza
- 1999 Int. Capri
- 2005 - 2008 IMPACT
- 2009 - 2011 IMPACT (post ArcView Database)
PREDICTIVE MODELLING

LOOK AT THE SHAPES OF THE HIGHER-GRADE VEIN SEGMENTS TO DETERMINE COMMON CHARACTERISTICS

CONTINUE TO BUILD AND REFINE THE STRUCTURAL MODEL FOR THE VEIN EVOLUTION

COMPILE AND STUDY GEOCHEMICAL TRENDS WITHIN INDIVIDUAL VEINS, AND VEIN SETS

SILVER VEINS AND DRILL HOLES
LA CADENA GRID

SILVER
(g/kg) x (meter)

0.0 - 10
10. - 50
50. - 100
100. - 200
200 - 500
500 - 1000
1,000 - 2,000
2,000 - 5,000

DRILL HOLES

1990 - 2005  Minpoza
1999  Int. Capri
2005 - 2008 IMPACT
2009 - 2011 IMPACT (post ArcView Database)
DRILL CORE FROM SILVER VEIN
LA CADENA GRID
ArcVIEW AS A MANAGEMENT TOOL
OBRA FINDING (AFTER 5 MONTHS)
NOCHEBUENA – CERRO CUATES AREA

OLD MINE WORKINGS
SEPTEMBER 28, 2007
N = 193
BENEFITS TO DATE

IMPACT HAS BEEN SUCCESSFUL IN BRINGING A NEW MINE INTO PRODUCTION FOR EACH OF THE PAST FOUR YEARS

ANNUAL SAVINGS RESULTING IN BETTER TARGET SELECTION FOR DRILLING AVERAGE $2.3 OUT OF A DRILLING BUDGET OF $5.0

AS FOR THE THREE SMALL HOUSES THAT WERE USED FOR MAP STORAGE, MOST OF THIS DATA NOW RESIDES IN AN EXTERNAL HARD DRIVE

IN TERMS OF SAFETY OUR FIELD CREWS CAN NOW BETTER AVOID CONFLICTED AREAS
THE TASK AT HAND

PREVIOUS SUCCESS RATE

31%

DATA BASE DRIVEN SUCCESS RATE

61%

Can we improve upon this success rate?

By using this sort of approach
PREDICTIVE MODELLING

LOOK AT THE SHAPES OF THE HIGHER-GRADE VEIN SEGMENTS TO DETERMINE COMMON CHARACTERISTICS

CONTINUE TO BUILD AND REFINE THE STRUCTURAL MODEL FOR THE VEIN EVOLUTION

COMPILE AND STUDY THE GEOCHEMICAL TRENDS WITHIN VEINS, AND VEIN SETS IN ORDER TO BETTER PREDICT WHERE THE HIGHER GRADE SILVER AND GOLD ZONES MAY LIE

POSSIBLY MODEL THE DATA USING SPATIAL DATA MODELLER TO DETERMINE THE HIGHEST POTENTIAL AREAS
FUTURE PLANS

COMPLETE THE PROCESS OF DIGITIZING DATA AND MAPS INTO THE DATABASE

CONSTRUCT A GEODATABASE TO BRING ORDER TO OUR DATA

PLACE OUR DATABASE ONTO A SERVER WITH A NETWORK SYSTEM

FOCUS MORE ON DATA INTERPRETATION AND ANALYSIS

BEGIN THE PROCESS OF MODELLING OF OUR DATA SUCH IT CAN BE USED IN A PREDICTIVE MANNER
The End