



CONTACT INFORMATION

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Arizona Department of Mines and Mineral Resources Mining Collection

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PRINTED: 01/15/2003

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES AZMILS DATA

PRIMARY NAME: CONTENTION MINE

ALTERNATE NAMES:

HEAD CENTER
FLORA MORRISON
TRANQUILITY
PUMP SHAFT
YELLOW JACKET
GRAND CENTRAL GROUP

COCHISE COUNTY MILS NUMBER: 171

LOCATION: TOWNSHIP 20 S RANGE 22 E SECTION 11 QUARTER SE
LATITUDE: N 31DEG 42MIN 10SEC LONGITUDE: W 110DEG 03MIN 44SEC
TOPO MAP NAME: TOMBSTONE - 15 MIN

CURRENT STATUS: PAST PRODUCER

COMMODITY:

SILVER
GOLD LODE
LEAD
COPPER OXIDE

BIBLIOGRAPHY:

KEITH, S.B., 1973, AZBM BULL. 187, P. 74
AIME TRANS. V. 10, P. 335-339, 342-343
AIME TRANS. V. 33, P. 3-37
AZBM BULL. 143, P. 41, 43-45, 69-71
ADMMR CONTENTION MINE FILE
AGS 1988 FALL FIELD TRIP

See: Tombstone Consolidated Mines Co., Ltd. (file)
Tombstone Development Co. (file)
"Arizona Days and Ways Magazine" March 2, 1958, In Publicity file (corres. files)

ABM Bulletin #143, p. 20, 27, 107

MAPS - Upstairs in the ABM rolled file boxes listed under Contention
mine and Grand Central - maps of claims, workings and cross-sections.

AIME Transactions V. 10, p. 335-339 & 342-343

AIME Transactions V. 33, p. 3-37

ABM Bul. 187, p. 74

MILS Sheet sequence number 0040030590

Mining Record, September 28, 1983, Pg. 4

Tombstone Deep Pumping Plant Proposal (Included in file)

A Brief History and Review of Ore grades and Production in the
Tombstone Mining District with emphasis on the Contention
Mine area. (DMR publication)--by Mike Greeley

IC 8969 -- Gold and Silver Leaching Practices in the U.S.; p. 16, 19-21, 22

ABSTRACTED FROM ADMMR ACTIVE MINES DIRECTORY, 1989

Cochise County

COWICHAN RESOURCES INC.

Contention Mine

T20S R22E Sec. 11

905 Skyline Drive, Tombstone, 85638 - Phone - 457-2282 - Employees 50 -
Open pit gold silver mine - Cyanide heap leaching - Merrill-Crowe 4,000
TPD capacity recovery plant

Executive Vice President & Mine Manager Dustin Escapule

Continuation Cochise Co (F)

R MSB

FOR OFFICE USE ONLY

START-UP NUMBER _____
STATE NUMBER _____
MSHA NUMBER _____

NOTICE TO ARIZONA STATE MINE INSPECTOR

In compliance with Arizona Revised Statute Section 27-303, we are submitting this written notice to the Arizona State Mine Inspector of our intent to start stop _____ move _____ (please check one) a mining operation.

If this is a move, please show last location: N/A

If you have not operated a mine previously in Arizona, please check here: If you want the Education & Training Division to assist with your mine safety training, please check here: If this operation will use Cyanide for leaching, please check here:

COMPANY NAME: Ramco Inc. - General Delivery

DIVISION: Tombstone AZ. 85638

MINE OR PLANT NAME: PBR Minerals TELEPHONE: 602-457-2282
602-457-3555

CHIEF OFFICER: Navarre L Smith

COMPANY ADDRESS: Gen. Delivery

CITY: Tombstone STATE: AZ. ZIP CODE: 85638

MINE OR PLANT LOCATION: (Include county and nearest town, as well as directions for locating property by vehicle)

Tombstone, Cochise Co, Ariz. 85638

East/South of town 1/4 mile on old
BENSON Highway

TYPE OF OPERATION: OPEN Pit PRINCIPAL PRODUCT: Gold/Silver

STARTING DATE: 8-1-89 CLOSING DATE: _____ DURATION: _____

PERSON COMPLETING NOTICE: Navarre Smith TITLE: Project Manager
Ramco Inc.

DATE NOTICE MAILED TO STATE MINE INSPECTOR: 7-19-89

CONTENTION

COCHISE COUNTY

MG WR 10/31/87: Mr. Jack Schissler of PBR Minerals, Inc. reports that silver and gold are coproducts at the washing operation at the Contention mine (file) Cochise County. The approximate value of the mine tailings (originally produced by TEI) is \$9.00 per ton. PBR employs 35 people and is treating 40 to 60 tons/hour.

MG WR 11/20/87: Learned that the Harbor Financial company of the Phoenix area is in financial trouble. The three principals, forming PBR Minerals (the company that is operating the Contention Mine - file, Cochise County, are associated with or employed by Harbor Financial.

MG WR 5/27/88: Mr. Dusty Escapule reports that PBR Minerals (card) plans to mine the southern end of the Contension trend (file) Cochise County. The company would like to begin operations in the late fall.

CONTENTION MINE

PIMA COUNTY

MG WR 5/23/86: The name of Frank Magini's company that plans to operate the Contention mine (Cochise Co) is Cochise Silver Mines.

NJN WR 9/26/86: Frank Magini (c) called and reported that they should have all the necessary permits to reopen the Contention Mine (f) Cochise County at Tombstone soon.

RRB WR 1/30/87: Frank Magini reports that production at the Contention Mine (file) Cochise County is suspended until a larger vacuum pump for the filters arrives.

RRB WR 4/3/87: Arie Hilbrand with Magini, etc. at the Contention Mine (file) Cochise Co came in for information about carbon-in-pulp. He reports that they are slurrying old tailings with plain water and the residual cyanide is sufficient to put the silver and gold into solution. The tailings run about 30% minus 300 mesh with most of that in the colloidal range which has given them considerable difficulty in filtration. They are now considering flocculating with guar and carbon-in-pulp extraction. Their tests indicate with a 40% pulp density slurry typically running .31 oz Ag and .02 oz Au they can extract 99% of the Ag and 90% of the Au in 15 minutes using CIP.

MG WR 6/5/87: A Mr. Sam Riley of Sierra Vista has reportedly just completed crushing and tabling precious metal-bearing slag from the defunct Tombstone Exploration Inc. operation at the Contention mine (file) Cochise Co. The equipment was obtained from Stutenroth Milling. Approximately 600 pounds of dore, yielding 97% silver and 3% gold, were reportedly recovered. The recovered dore apparently has a value in excess of \$165,000. The slag was reportedly sold for \$5,000 by Tombstone Development Co. to a group known as Gold Hawk of Globe, Az.

NJN WR 7/10/87: The Tombstone address for Silver Mines Inc (card) Cochise County is 950 Skyline Drive, Tombstone, Arizona 85638, 457-2282.

CONTENTION MINE

COCHISE COUNTY

MG WR 8/24/84: Messrs. Dave Rabb, Clem Chase and I attended a hearing on alleged cyanide contamination by Tombstone Exploration, Inc. (TEI) operations at Contention Mine, Cochise County, in Tombstone. Approximately 150 people attended the hearing sponsored by the Arizona Dept. of Health Services.

MG WR 2/1/85: Learned that the Tombstone Exploration, Inc., wash plant at the Contention mine (Cochise County) was removed from the property during the week of January 21. This wash plant was designed to clean the leach tails and prepare the tails for sale as road aggregate.

MG WR 4/5/85: Tombstone Exploration, Inc. (Contention mine, Cochise Co) has submitted a formal closing notice (3-28-85) to the State Mine Inspector's office.

MG WR 7/12/85: Learned that a preliminary court hearing was held on Monday July 8, concerning the bankruptcy proceedings of Tombstone Exploration, Inc. (Contention Mine, Cochise County). I was informed that Mr. Frank Magini is the principal creditor and he has asked the court to agree that the mine property is an asset of TEI, the lessee, and to allow him to take over the lease, as is, and operate the mine to recover the debt owed him. The property owner, Tombstone Development Co., apparently disagrees with this request; the company wants the right to negotiate a new lease with Magini. I believe the court asked for more information before making a decision.

NJN WR 2/14/86: Eddie Martin, Asst. State Mine Inspector (c) reported a rumor from a "reliable source" that Dusty Escapule is in the process of leasing the TDC property (Contention Mine) in Tombstone.

CJH WR 6/6/86: Eddie Martin (c) furnished this office with a copy of the attached self-explanatory post card. He said that 250 (unconfirmed report) cards had been returned. Number sent is unknown.

I drove to Tombstone where I visited the 71 Minerals property. VBD WR 5/13/75

MG WR 2.5.82: Mr. Jim Brooks, geologist with CF&I Co. of Pueblo, Colorado, informed me that he received, from agent Jim Briscoe, an offer to buy the assets of the Tombstone Development Co., Tombstone, AZ. No price was mentioned. Tombstone Exploration Inc. is leasing at least a portion of Tombstone Development's property in and around the Contention Mine.

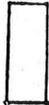
MG WR 4/2/82: Visited the Tombstone Exploration Inc., operation at the Contention mine south of Tombstone, Cochise County. Security has been increased at this property. Since I had no formal appointment I was not allowed past the new guard house. I have learned indirectly, however, that the average grade of ore is about 1 oz. Ag/ton and it is rumored that the company has had problems maintaining grade. The problem apparently stems from materials handling difficulties rather than present or absence of ore. Normally rock assaying 0.5 to 1.0 oz silver is stockpiled and blended with high grade ore when appropriate but occasionally this intermediate-grade rock is process as high grade material by mistake. When this happens, of course, the anticipated production of silver falls off. I understand normal recovery is about 60%.

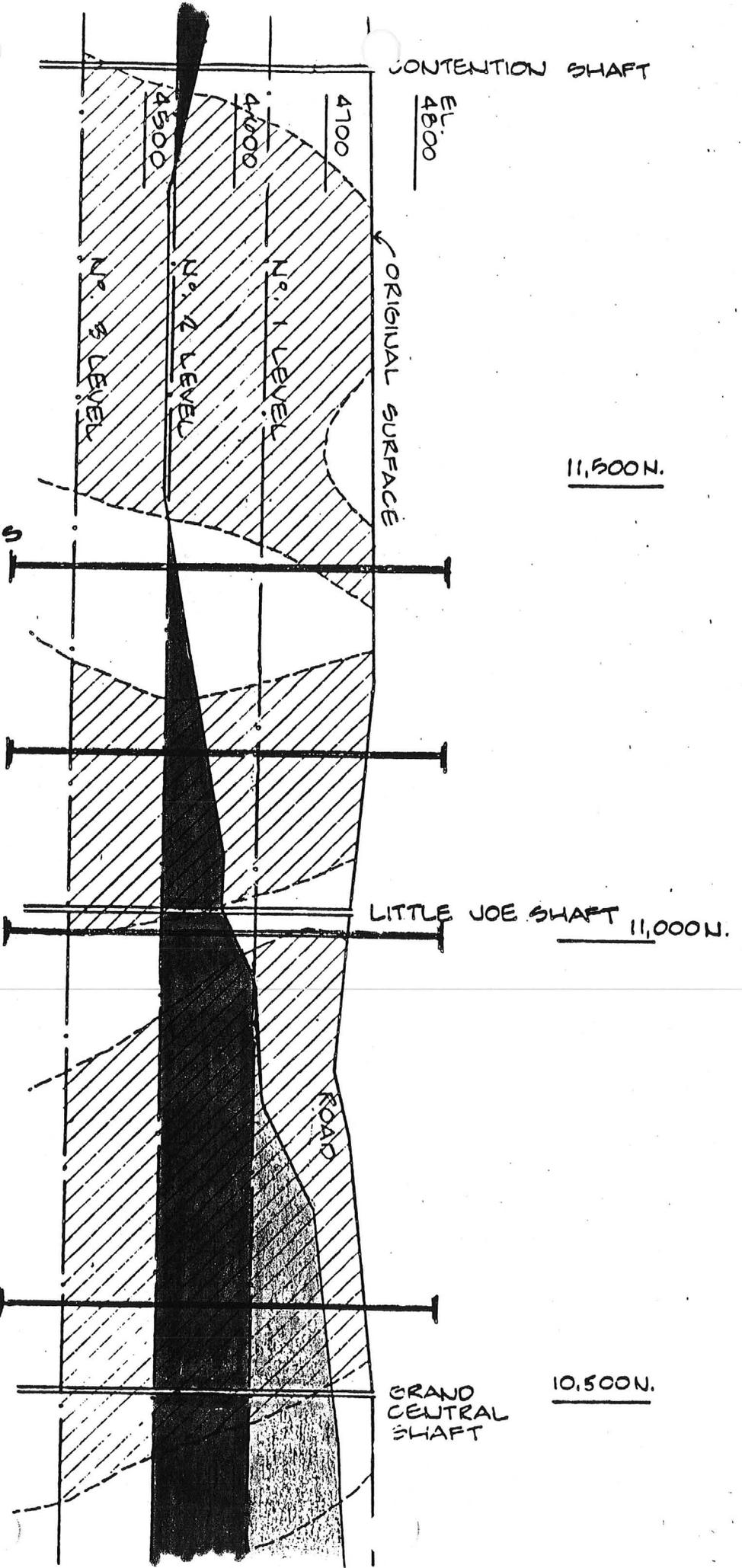
MG WR 5/6/83: Spoke to Mr. John Escapule, Chief of Maintenance and Safety at Tombstone Exploration, Inc. (Contention-Grand Central mine area, Cochise County). His company now employes 135 people. The contention shaft area has been cut down from the surface about 150 feet and openings to the old Head Center workings have been exposed.

MG WR 2/24/84: Visited the Contention mine operated by Tombstone Exploration Inc., in Cochise County. Met Mr. John J. Fritts, the mine geologist. He reports that the ore currently mined is generally restricted to the Contention dike. He also mentioned tight folds occur in the sedimentary members of the Bisbee Group, an occurrence apparently never recorded before.

MG WR 6/7/84: At the Contention mine (Cochise County) Mr. Joe Graves has resigned as Mine Superintendent. Mr. John Fritts, Chief Geologist, has assumed his duties. Mining is concentrated in the Grand Central area at the south end of the cut. Approximately 100,000 tons of ore have been identified for this phase of mining, with an initial stripping ratio of 8:1. As this ore is mined and the ratio is lowered, waste removal in the Head Center area on the west side of the cut will be resumed.

I drove to Tombstone area where I examined the Sierra Minerals Management operations at Tombstone, the State of Maine mill which is closed down for expansion of crushing facilities and the operation commencing on the Chance claim by Resources International Inc. whose property adjoins the State of Maine operation on the south. The Sierra Minerals operation in south Tombstone will be a heap leach operation of dumps. Any high grade material will be treated in the State of Maine mill. VBD WR 12/19/74

-  AREAS STOPPED FROM 1880 TO PRESENT
-  AREA MINED TO AUGUST 1, 1963
-  AREA TO MINE TO N° 1 LEVEL
-  AREA TO MINE FROM N° 1 TO N° 2 LEVEL



11,500 N.

CROSS SECTIONS
11,400 N.

11,200 N.

11,000 N.

LITTLE JOE SHAFT 11,000 N.

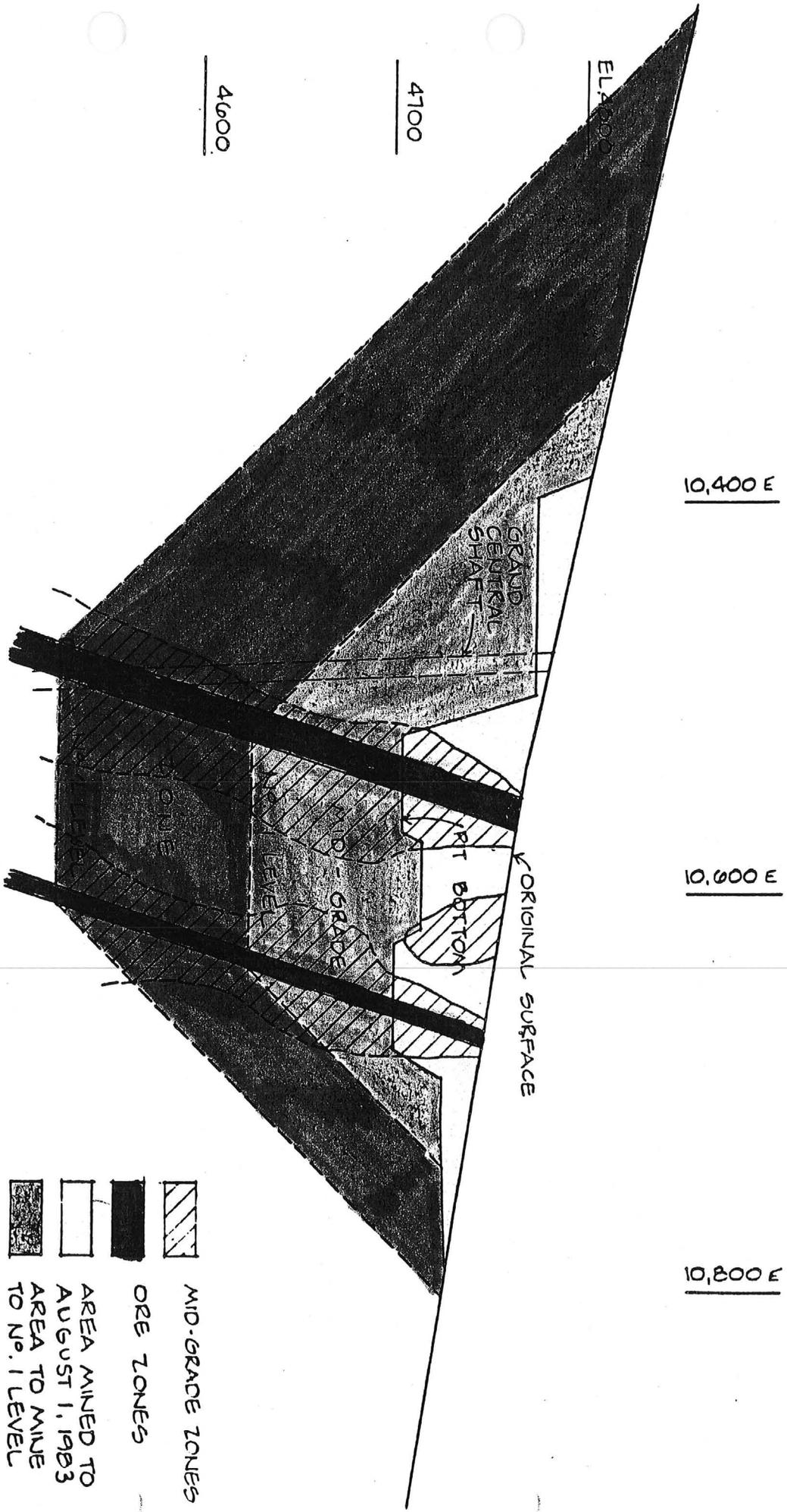
10,900 N.

GRAND CENTRAL SHAFT 10,500 N.

CONTENTION - GRAND CENTRAL ORE ZONE
UPPER LEVELS ALONG ORE ZONE

VERTICAL - LONGITUDINAL SECTION LOOKING N 20° E

SCALE: 1" = 166'
AUG 1, 1963 A.J. GRAVES



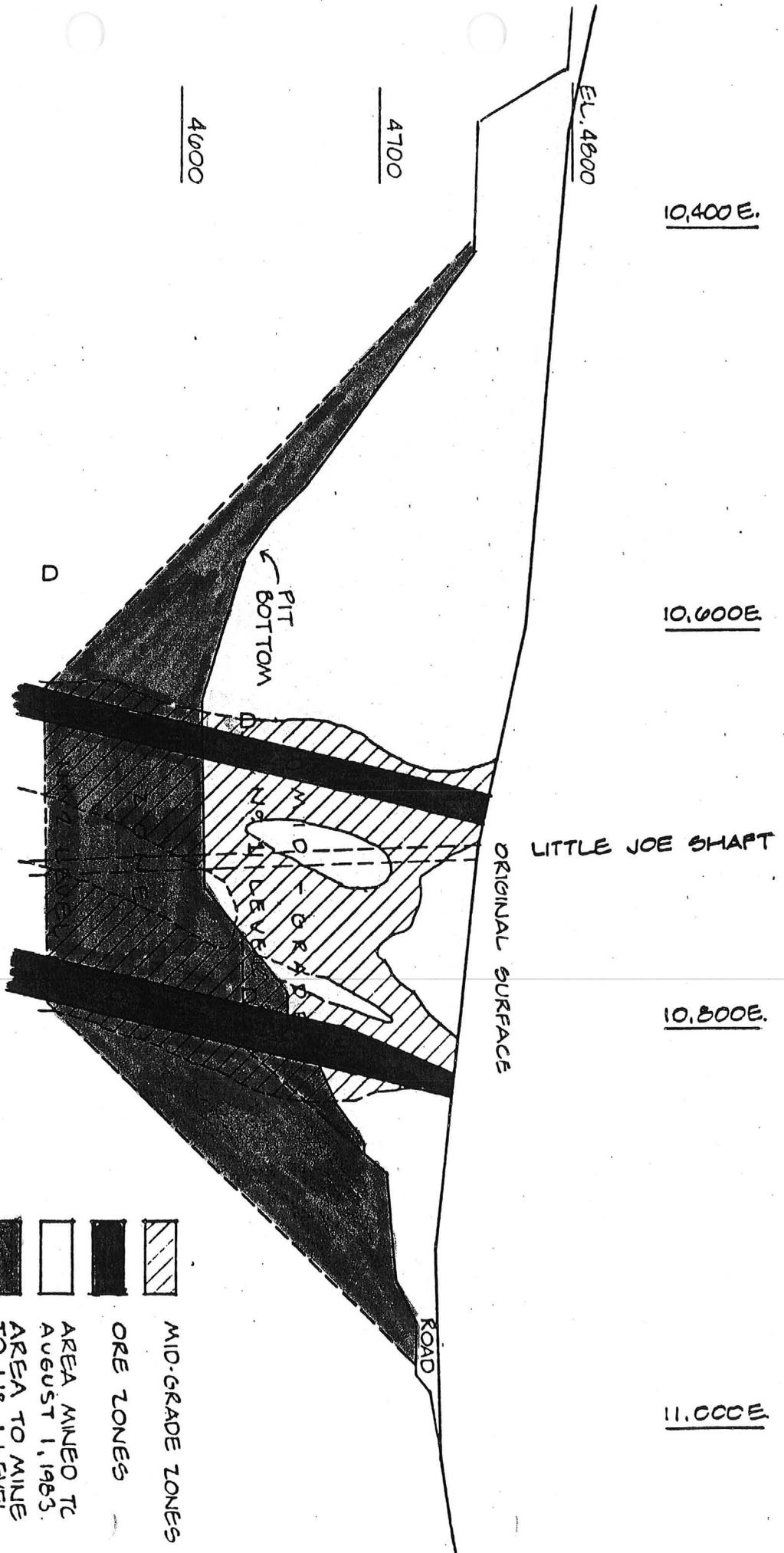
10600 N X-SECTION

-  MID-GRADE ZONES
-  ORE ZONES
-  AREA MINED TO AUGUST 1, 1983
-  AREA TO MINE TO No. 1 LEVEL
-  AREA TO MINE FROM No. 1 TO No. 2 LEVELS

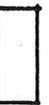
PIT CROSS SECTIONS

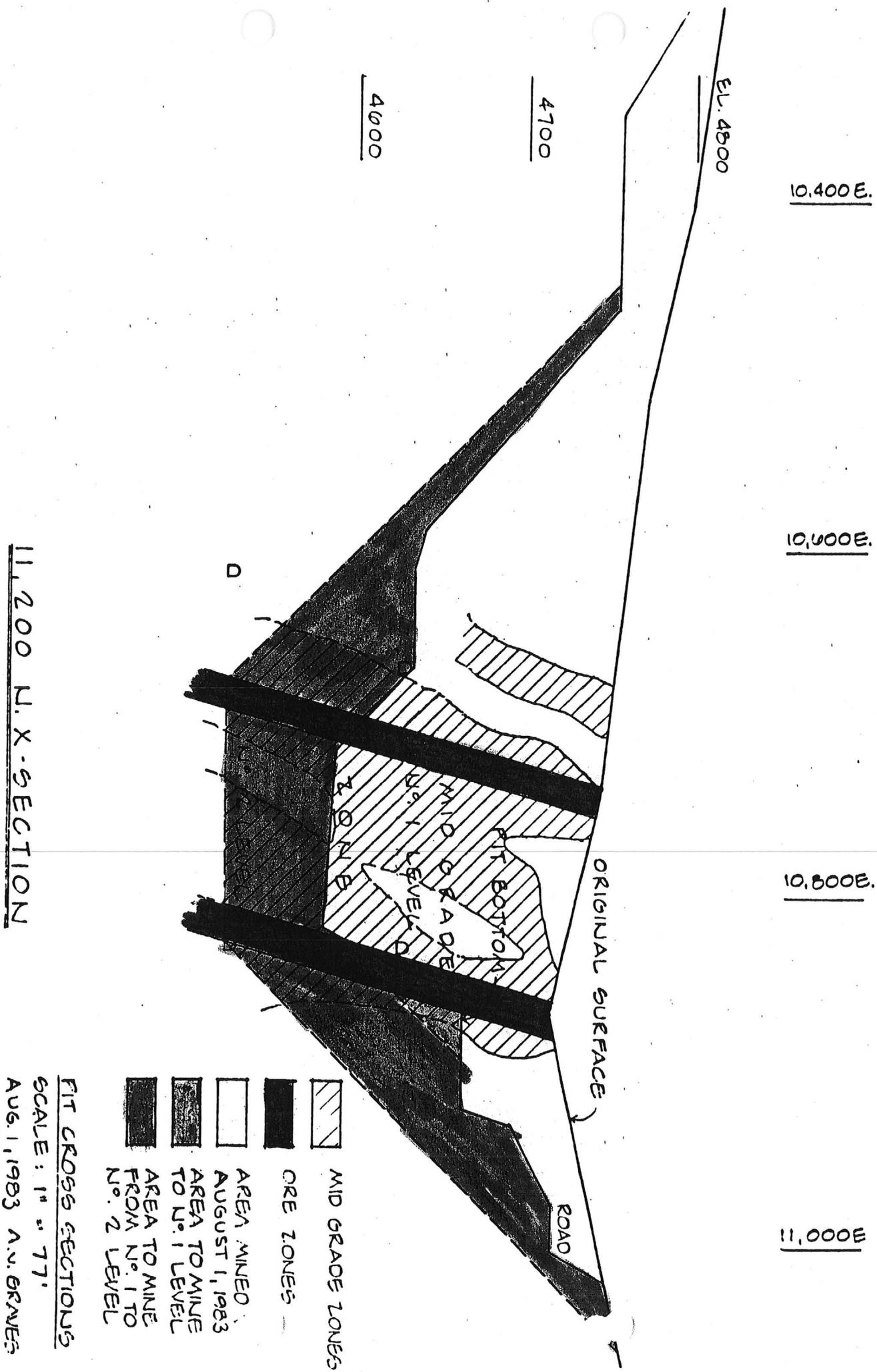
SCALE: 1" = 77'

AUG. 1, 1983 A. J. GRAVES



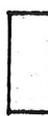
11,000 N. X-SECTION

-  MID-GRADE ZONES
 -  ORE ZONES
 -  AREA MINED TO AUGUST 1, 1983.
 -  AREA TO MINE TO N° 1 LEVEL
 -  AREA TO MINE FROM N° 1 TO N° 2 LEVELS
- PIT CROSS SECTIONS
 SCALE: 1" = 77'
 AUG. 1, 1983 A.J. GRAVES



11,200 N. X-SECTION

FIT CROSS SECTIONS
 SCALE: 1" = 77'
 AUG. 1, 1983 A.V. GRAVES

-  MID GRADE ZONES
-  ORE ZONES
-  AREA MINED AUGUST 1, 1983
-  AREA TO MINE TO NO. 1 LEVEL
-  AREA TO MINE FROM NO. 1 TO NO. 2 LEVEL

EL. 4800

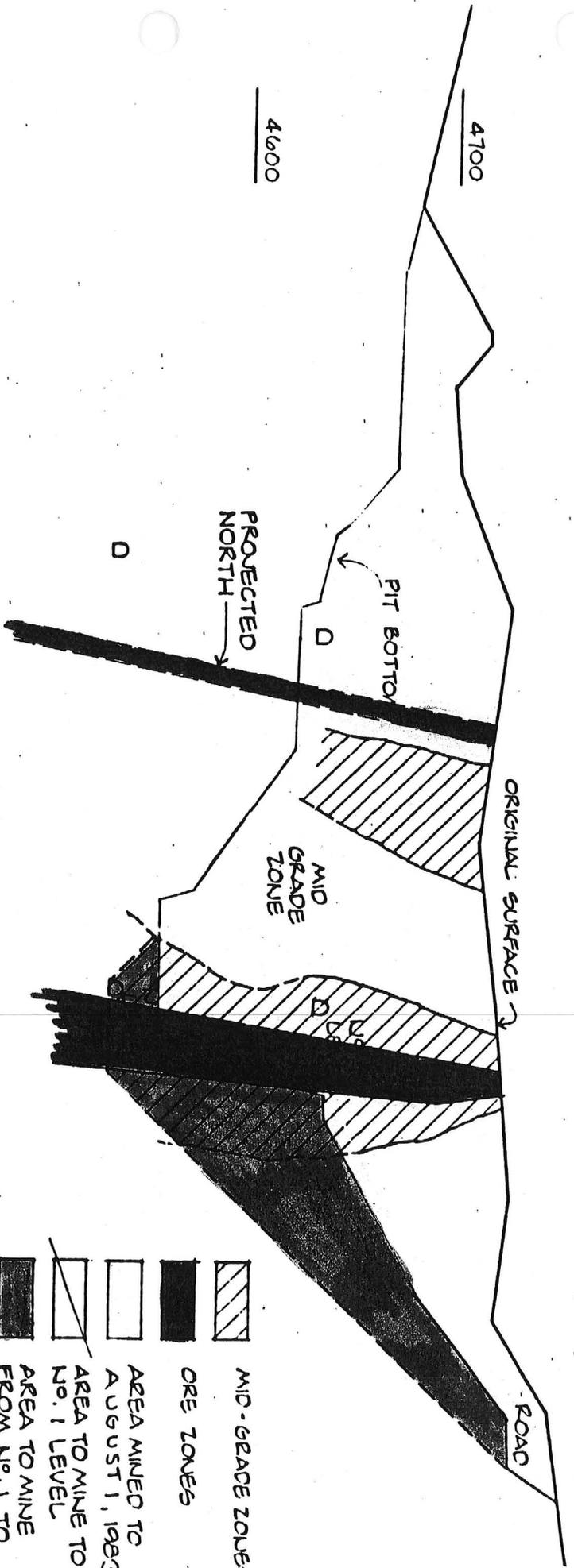
10,400 E.

4700

10,600 E.

4600

10,800 E.



114 00N X - SECTION

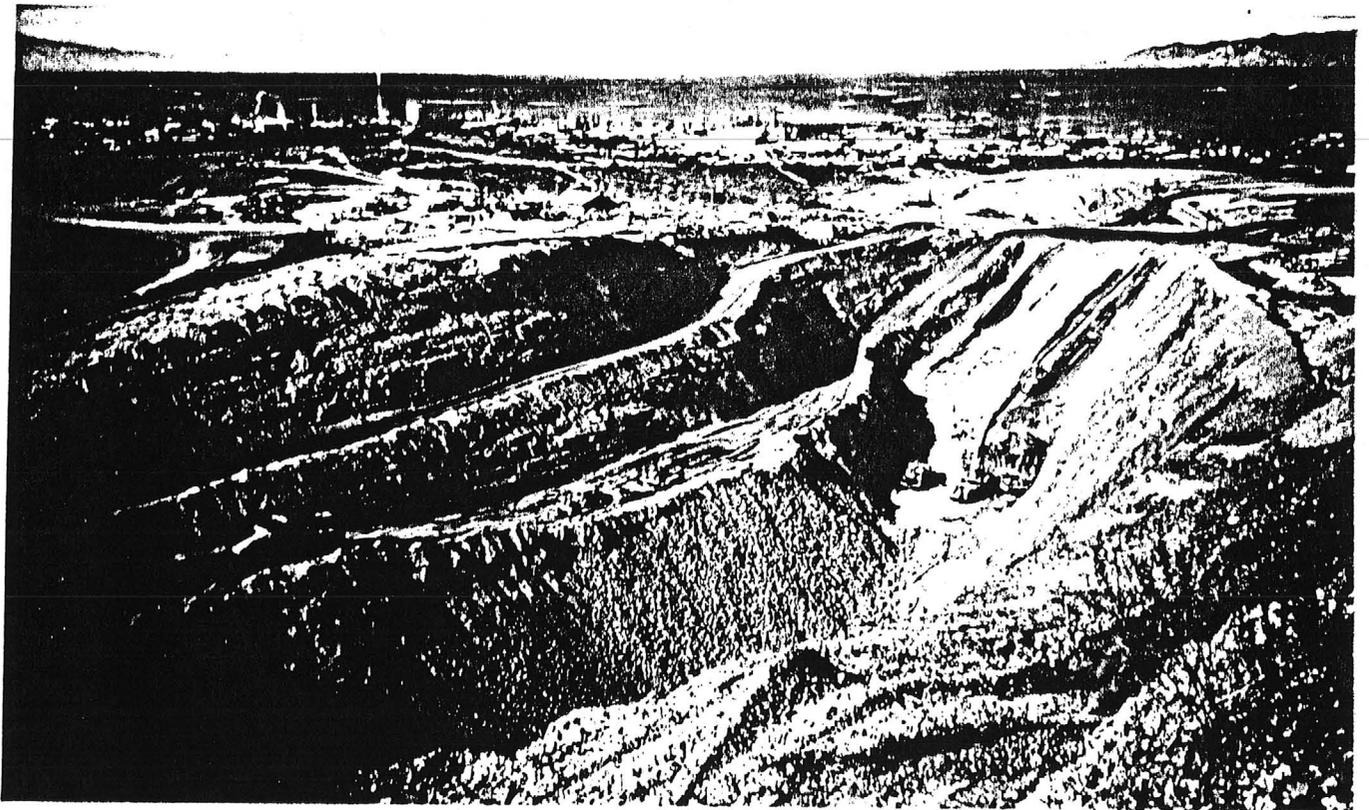
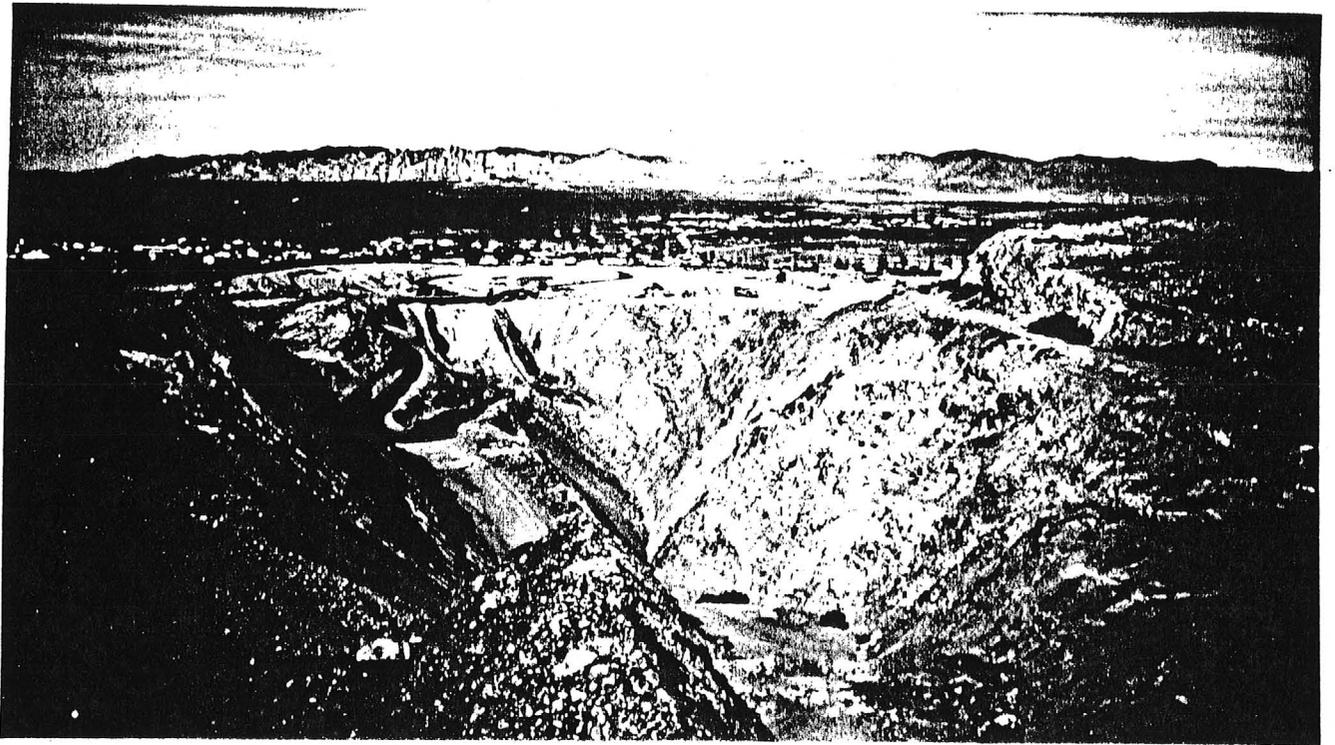
-  MID-GRADE ZONES
-  ORE ZONES
-  AREA MINED TO AUGUST 1, 1983
-  AREA TO MINE TO No. 1 LEVEL
-  AREA TO MINE FROM No. 1 TO No. 2 LEVELS

PIT CROSS SECTIONS

SCALE: 1" = 77'

AUG. 1, 1983 A.J. GRAVES

CONTENTION-GRAND CENTRAL PIT



☒ DS
☒ NN
☒ KP

**NOTICE OF THE PRELIMINARY DECISION TO DENY AN
INDIVIDUAL AQUIFER PROTECTION PERMIT**

INVENTORY NO. 102806

Contention Mine file, Cochise Co.

Public Notice No. 27-04APP

Published on or about November 7, 2003

Pursuant to Arizona Administrative Code, Title 18, Chapter 9, Article 1, the Director of the Arizona Department of Environmental Quality intends to deny an individual Aquifer Protection Permit to the following applicant(s):

Tombstone Development Company/Contention Mine

Mr. Lynn Hansen

Tombstone Development Company/Saddle Hills Realty

P.O. Box 68511

Tucson, AZ 85737

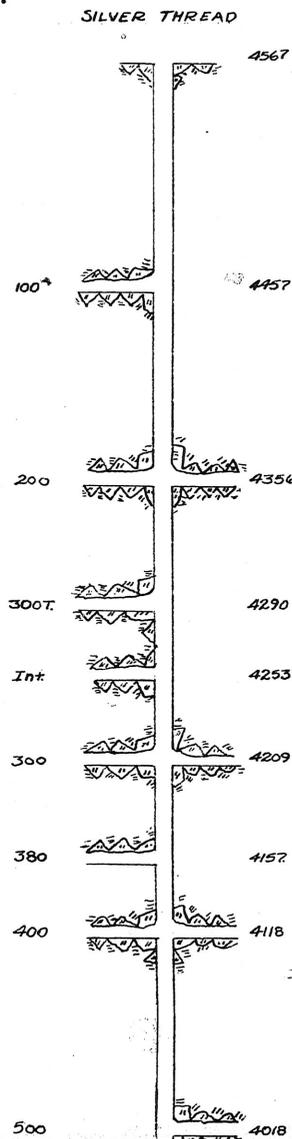
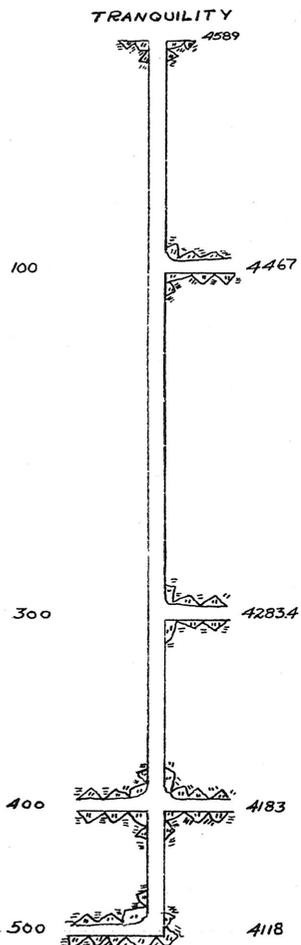
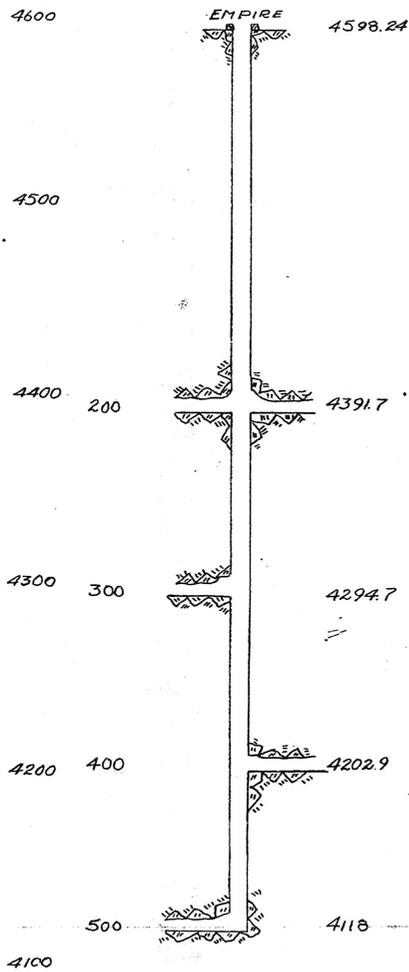
Underground mining began on the Tombstone Development Company/Contention mine site as early as the 1870's. Tombstone Development Company (TDC) acquired the property in the 1950's. TDC leased portions of the site for operation of precious metal mining and extraction operations.

The portions of the site regulated pursuant to the Aquifer protection Permit (APP) program Statutes and Rules contain facilities used in conjunction with cyanide heap leach operations to recover gold and silver concentrates from ore mined on site. The facilities include an open pit mine, leach pads, crushing and grinding facilities, surface impoundments for collection and holding of various stages of leachates, a concentrator facility, tailings and waste rock dumping sites, several chemical storage areas, a waste tire disposal area, and a solid waste disposal area.

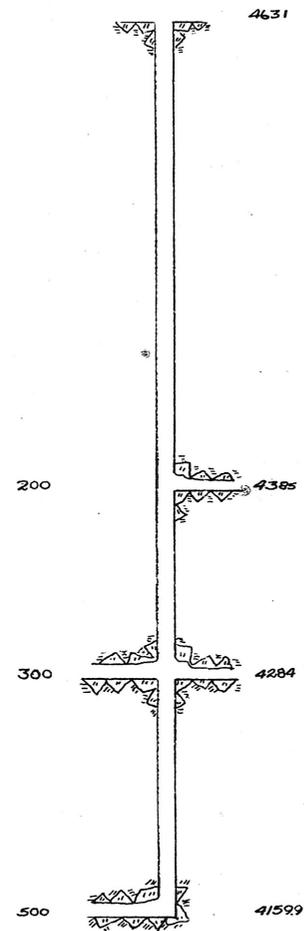
After mining and extraction operations ceased in 1992, all ancillary and processing facilities at the site were left in place as abandoned by the mine operators. From 1992 through 1995, TDC assessed the potential for developing a large copper ore body at the site, and subsequently decided instead to apply for an APP application for closure. An APP application for closure was received by ADEQ on December 27, 1997.

The Aquifer Protection Permit application documentation is available for public review, Monday through Friday, 8:00 a.m. to 4:45 p.m., at ADEQ, Records Management Center, 1110 West Washington Street, Phoenix, Arizona, 85007. To review the file, contact the project manager, Mr. Barry Rechterovich 24 hours in advance at (602) 771-4789.

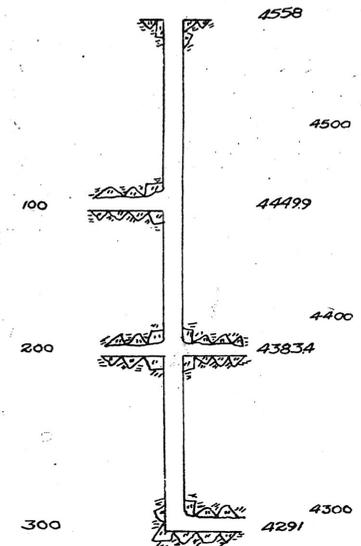
Persons may submit comments or request a public hearing on the proposed action, in writing, to Mr. Barry Rechterovich, ADEQ, 1110 West Washington Street, 5415B-3, Phoenix, Arizona, 85007 within thirty (30) days from the date of this notice. A public hearing request must include the reasons for such request.



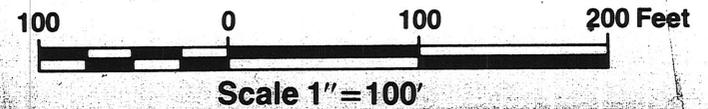
SULPHURET



TOUGHNUT



WATER LEVEL
4100

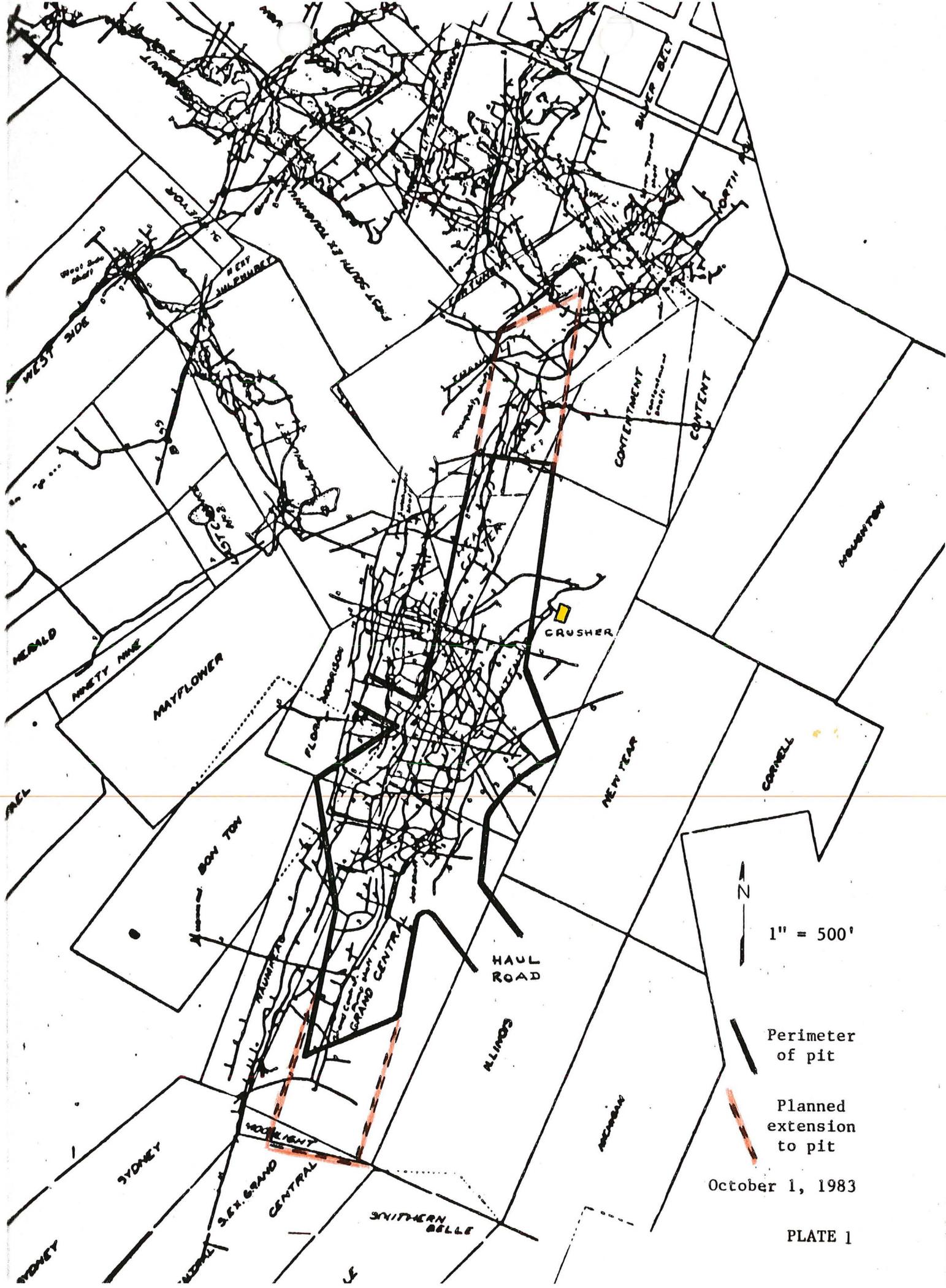


LEGEND

- ⊕ Rise with Spad
- ⊖ Rise without Spad
- ⊙ Waste
- ⊕ Workings Going Down
- ⊖ Workings Going Up
- ⊕ Workings Below Base of Map
- ⊖ Workings Above Base of Map

Spad Numbers 1-18 Exp
Spad Elev. Tenths of a foot 4275.25
Floor Elev. Tenths of a foot 4270.0
Floor Elev. of Base Maps = Red

TEMPSTONE DEVELOPER
SILICA COLLOID
100%
NOV 24 1981



October 1, 1983

PLATE 1

CONTENTION SHAFT

EL. 4800

11,500 N.

ORIGINAL SURFACE

4700

4600

4500

Nº. 1 LEVEL

Nº. 2 LEVEL

Nº. 3 LEVEL

CROSS SECTIONS

11,400 N.

11,200 N.

11,000 N.

LITTLE JOE SHAFT 11,000 N.

ROAD

10,600 N.

10,500 N.

GRAND CENTRAL SHAFT

- AREA STOPED FROM 1860 TO PRESENT
- AREA MINED TO AUGUST 1, 1983
- AREA TO MINE TO Nº. 1 LEVEL
- AREA TO MINE FROM Nº. 1 TO Nº. 2 LEVEL



VERTICAL - LONGITUDINAL SECTION LOOKING EAST N 20° E

SCALE: 1" = 166' AUG 1, 1983 A.N. GRAVES

CONTENTION - GRAND CENTRAL ORE ZONE UPPER LEVELS ALONG ORE ZONE

10,400 E

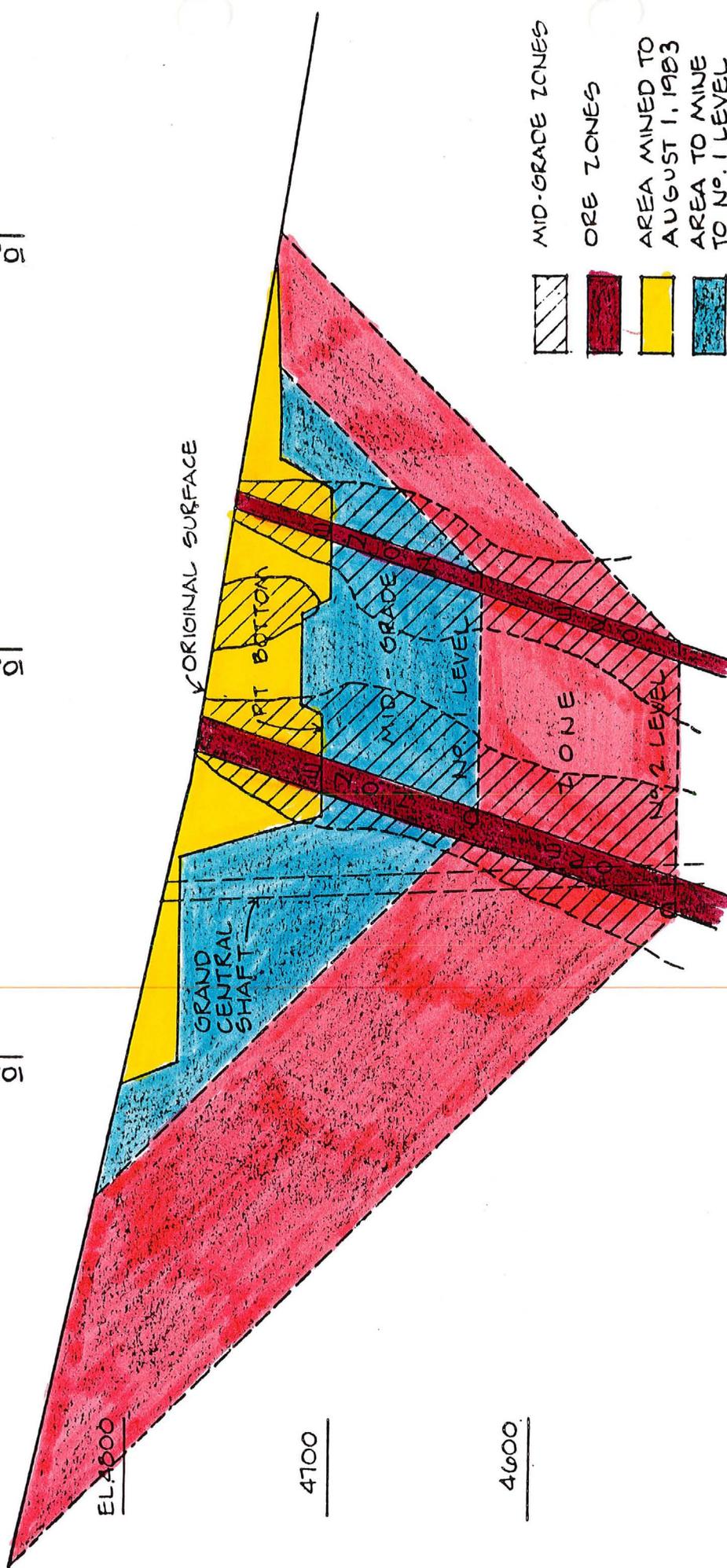
10,600 E

10,800 E

EL 4800

4700

4600



- MID-GRADE ZONES
- ORE ZONES
- AREA MINED TO AUGUST 1, 1983
- AREA TO MINE TO NO. 1 LEVEL
- AREA TO MINE FROM NO. 1 TO NO. 2 LEVELS

PIT CROSS SECTIONS
 SCALE: 1" = 77'
 AUG. 1, 1983 A.J. GRAVES

10600 N X-SECTION

11,000E.

10,800E.

10,600E.

10,400E.

LITTLE JOE SHaft

ORIGINAL SURFACE

ROAD

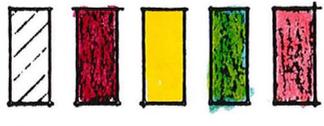
PIT BOTTOM

EL. 4800

4700

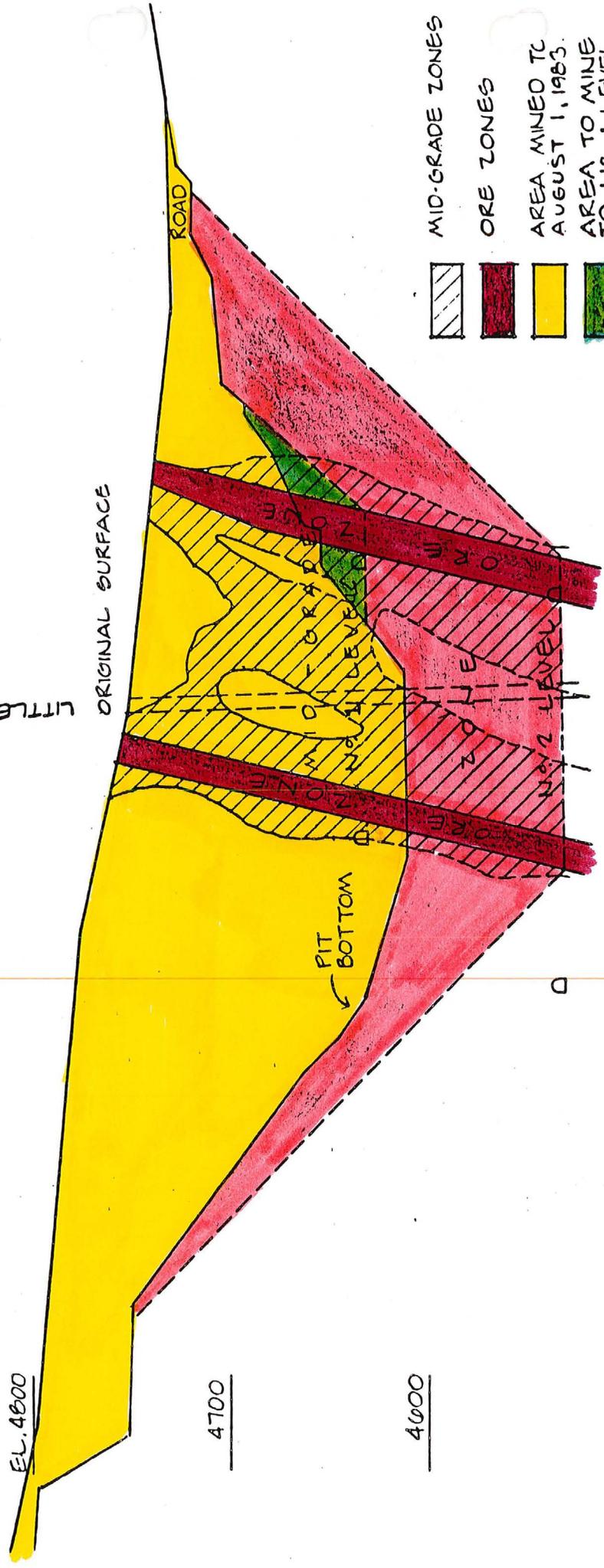
4600

- MID-GRADE ZONES
- ORE ZONES
- AREA MINED TO AUGUST 1, 1983.
- AREA TO MINE TO N^o. 1 LEVEL
- AREA TO MINE FROM N^o. 1 TO N^o. 2 LEVELS



PIT CROSS SECTIONS
 SCALE: 1" = 77'
 AUG. 1, 1983 A.J. GRAVES

11,000 N. X-SECTION



10,400E.

10,400E.

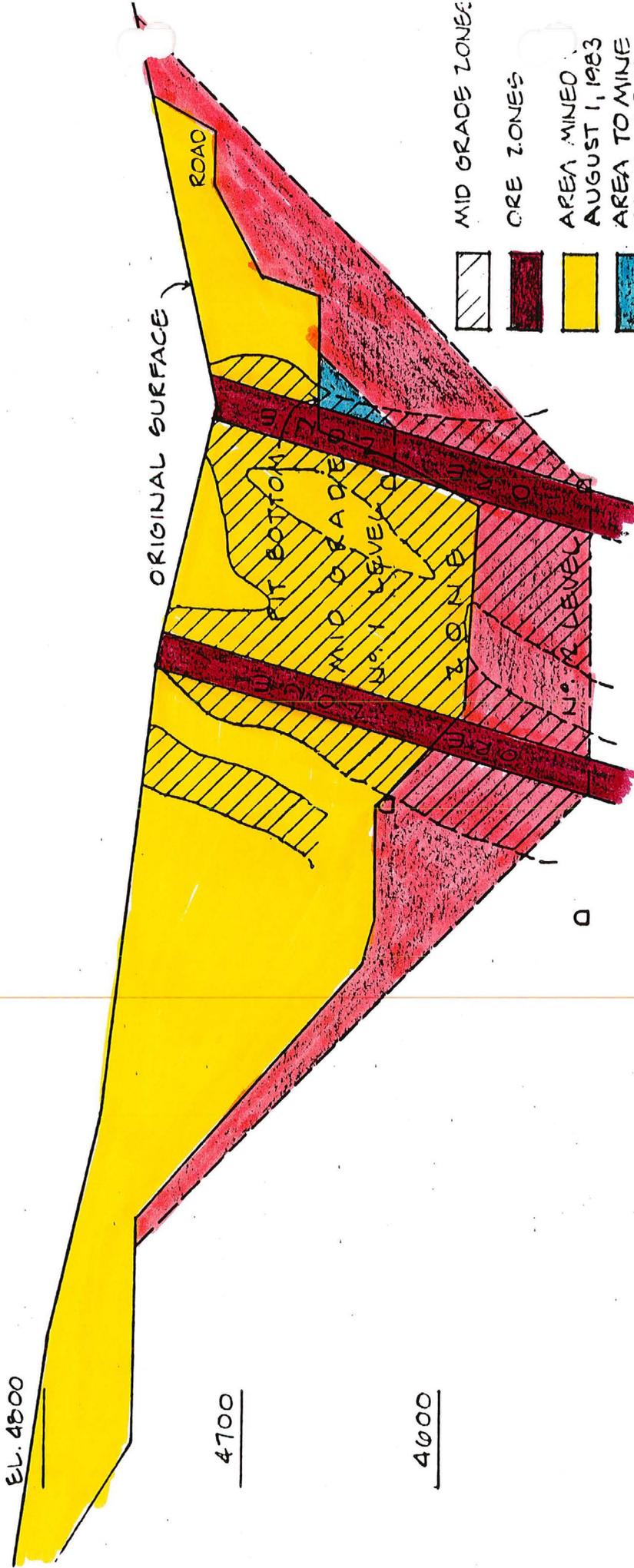
10,600E.

11,000E.

EL. 4600

4700

4600



MID GRADE ZONES

CRE ZONES



AREA MINED AUGUST 1, 1983



AREA TO MINE TO NO. 1 LEVEL



AREA TO MINE FROM NO. 1 TO NO. 2 LEVEL

FIT CROSS SECTIONS

SCALE: 1" = 77'

AUG. 1, 1983 A.V. GRAVES

11,200 N. X. SECTION

10,400 E.

10,600 E.

10,800 E.

EL. 4800

4700

4600

ORIGINAL SURFACE

ROAD

PIT BOTTOM

MID GRADE ZONE

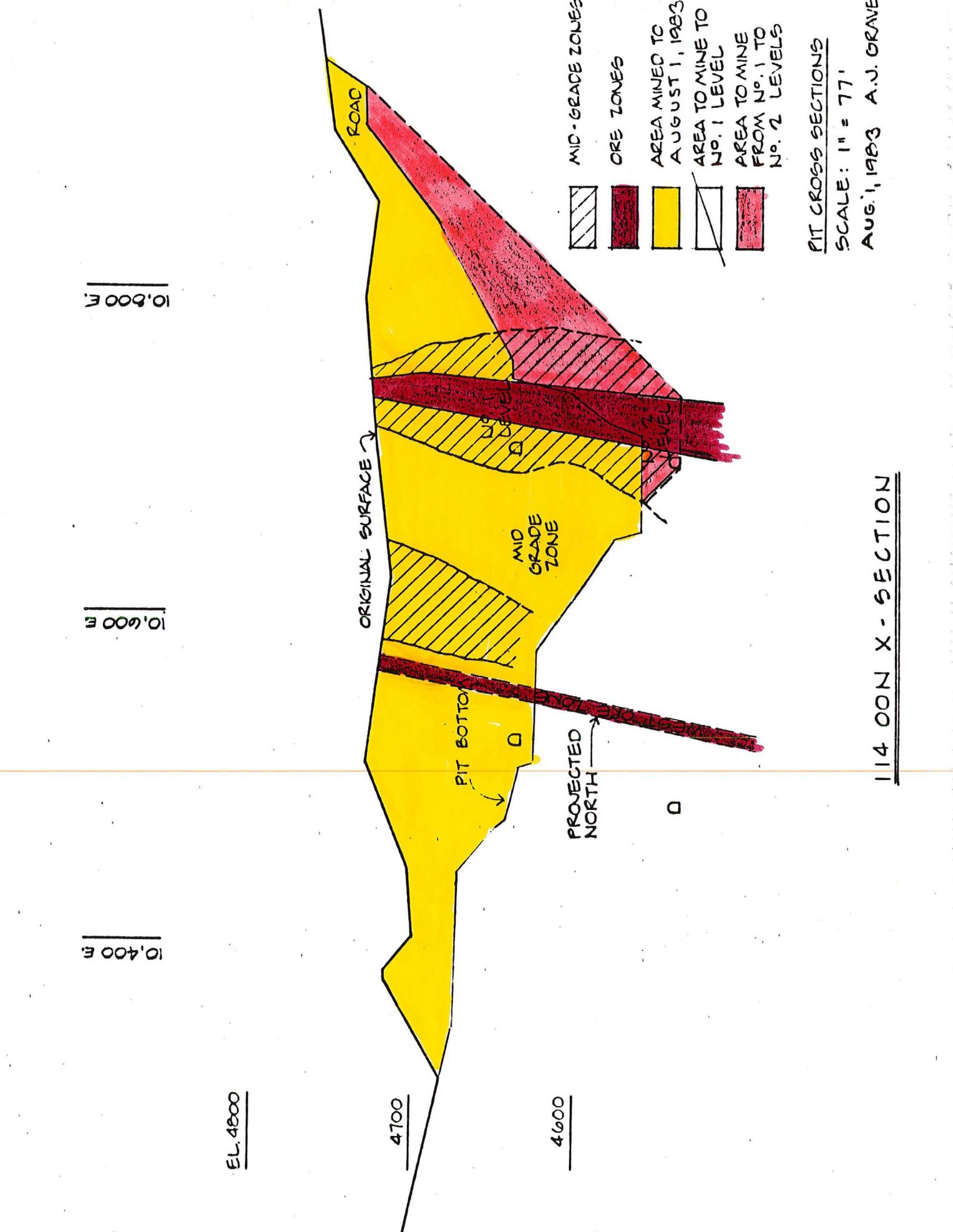
PROJECTED NORTH

- MID-GRADE ZONES
- ORE ZONES
- AREA MINED TO AUGUST 1, 1983
- AREA TO MINE TO No. 1 LEVEL
- AREA TO MINE FROM No. 1 TO No. 2 LEVELS

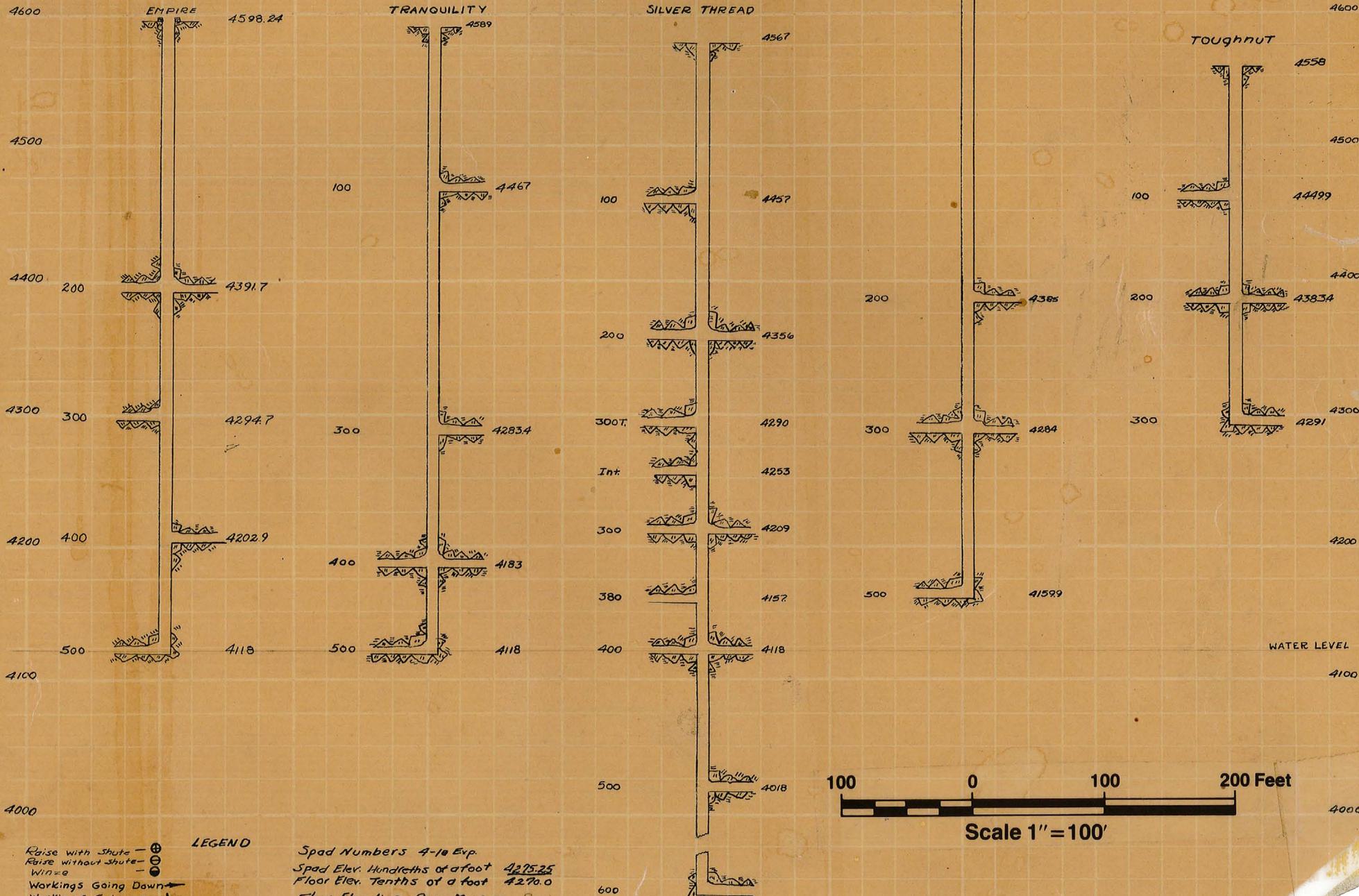
PIT CROSS SECTIONS
SCALE: 1" = 77'

AUG. 1, 1983 A.J. GRAVES

114 00N X - SECTION



SULPHURET



LEGEND

- Raise with shaft — ⊕
- Raise without shaft — ⊙
- Winze — —
- Workings Going Down — ↘
- Workings Going Up — ↗
- Workings Below Plane of Map — Brown
- Workings Above Plane of Map — Green

Spad Numbers 4-10 Exp.
 Spad Elev. Hundredths of a foot 4275.25
 Floor Elev. Tenths of a foot 4270.0
 Floor Elevation Base Maps — Red

TOMBSTONE DEVELOPMENT
 SHAFT COLLARS OF
 1/2" = 100'

INDEXED NOV 24 '81



CONTENT (F) COCHISE
a

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

Fife Symington, Governor Edward Z. Fox, Director

NOTICE OF THE PRELIMINARY DECISION TO REVOKE A GROUNDWATER QUALITY PROTECTION PERMIT

Pursuant to Arizona Administrative Code, Title 18, Chapter 9, Article 1, the Director of the Arizona Department of Environmental Quality intends to revoke a Groundwater Quality Protection Permit from the following permittee:

Public Notice No. 91-93AZAP
PBR Minerals-Grand Central Leaching Facility
PBR Minerals, Inc.
PO Box 370
Tombstone, AZ 85000

On or about
June 14, 1993

Groundwater Quality Protection Permit No. G-0020-02

The facility is located at the Contention Mine site approximately one mile south of Tombstone, Arizona in Cochise County, over groundwater of the Upper San Pedro Basin in Township 20 S, Range 22 E, Sections 11, 12, 13, 14 -Gila and Salt River Base Line and Meridian.

On January 20, 1989 Groundwater Quality Protection Permit No. G-0020-02 was issued to PBR Minerals, Inc. for the purposes of operating the Grand Central Leaching Facility and to perform hydrologic investigations and necessary corrective actions relating to groundwater contamination which occurred as a result of the operation of a previous leaching facility at the Contention Mine site. PBR Minerals, Inc. did not fully comply with the terms and conditions of the permit. In accordance with Arizona Administrative Code R18-9-121.F.1, due to the non-compliance with the conditions of Groundwater Quality Protection Permit No G-0020-02 and the apparent inability to correct this non-compliance, this letter is notification that the Director of ADEQ intends to revoke the permit.

The permit and related materials are available for public review Monday through Friday 8:00 a.m. to 5:00 p.m. at the Arizona Department of Environmental Quality, Plan Review and Permits Section, 3003 N. Central Avenue, 5th Floor, Phoenix, AZ 85012.

Persons may submit comments or request a public hearing on the proposed action, in writing, to Al Roesler, Plan Review & Permits Section, ADEQ, at P.O. Box 600, Phoenix, AZ 85001-0600 within thirty (30) days from the date of this notice. Public hearing requests must identify this proposed permit action and state specifically the reason for such request. The Director expects to reach a final decision within 30 days after the close of the public comment period established by this public notice. For further information contact Al Roesler at (602) 207-4662.

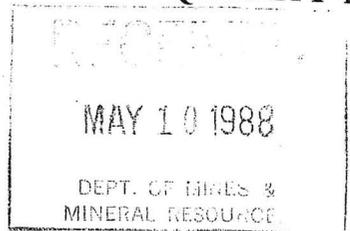
MSJ

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

EVAN MECHAM, GOVERNOR
GERALD H. TELETZKE, PH.D., DIRECTOR

File

JLR



NOTICE OF ISSUANCE OF A TEMPORARY GROUNDWATER QUALITY PROTECTION PERMIT

Pursuant to Arizona Administrative Code, Title 9, Chapter 20, Article 2, the Director of the Arizona Department of Environmental Quality has issued a Temporary Groundwater Quality Protection Permit(s) to the following applicant, subject to certain special and general conditions.

Public Notice No. 24-88AZ

On or about
May 9, 1988

PBR Minerals, Inc.

#603-3104 East Camelback

Phoenix, Arizona 85016

Temporary Groundwater Quality

Protection Permit No. G-0019-02T

The permit authorizes the continuation of the cleanup of soils contaminated with cyanide at the Contention Mine site at Tombstone, Arizona. The soils will be treated through a pilot scale leaching plant at the site. No cyanide will be added during this treatment. The treated material will be stacked on lined areas which drain to a lined impoundment both of which have leak detection systems. The treated material will be analyzed to determine the effectiveness of the treatment system before removal from the stacking areas. Groundwater quality will be monitored on a regular basis from three on-site wells and one city well. Depth to groundwater beneath the site is in excess of 500 feet. A public hearing was held in Tombstone on December 29, 1986 at 7:00 p.m. concerning the original cleanup permit, No. G-0011-02, issued to Cochise Silver Mines, Inc. The Temporary Permit is valid until January 9, 1989.

The permit and related material are available for public review Monday through Friday, 8:00 a.m. to 5:00 p.m. at the Arizona Department of Environmental Quality, Water Permits Unit, 2005 North Central Avenue, Phoenix, Arizona 85004.

Persons may submit comments or request a public hearing on the proposed action, in writing, to ADEQ at the above address within thirty (30) days from the date of this notice. Public hearing request must include the reason for such request.

The Department of Environmental Quality is An Equal Opportunity Affirmative Action Employer

Frank Magini and Dusty Escapule are attempting to run the tails stockpile at the Contention Mine near Tombstone. They would appreciate your support by signing this card and giving it to Dusty. If you have any questions concerning this matter, please feel free to call Frank collect at 602-242-7315 or talk to Dusty in town. THANK YOU!!!

To Whom It May Concern,
I am in favor of the Contention Mine opening so long as the utmost care is taken to safeguard the water wells and other requirements of the State are met.

Other Comments?

signature

print name & address

June 17, 1988

San Pedro Water Resource Assoc.

My conversation with Mr. Brett on the

afternoon of June 14, 88 in Tomblaine was

something like this:

I said to him - I read in the Sierra

Water paper your story on the water thing

that Maginn & Sway need to operate.

I hope they don't get it, because they're

not honest. Well I don't know. I wish

Maginn - but I know from experience

that Escapule would have trouble apert-

ing the word.

Then again, some people are judged by

the company they keep.

We (Brett and myself) briefly touched

on items brought out in the recent

article.

Escapule says - that there is enough

recovered cyanide in the heaps to do the

job if he can just get water on one.

And this same material came from that

was spread in Tomblaine about some

from these heaps?

I worked there for TEI in 1981 -

I remember that when a leach heap

obtained in purchasing pay solution, it

was added to a mine to a drive over

as to speak. I don't recall anything

being reported to neutralize it. I don't

know, the own leach cyanide - but

the way it was moved and kept &

figures not much was being neutralized.

The accident was being investigated
just for that.

I cited the incident in which the young
man Mike Russell died (no relation to me)
I don't think the right questions were
asked.

Did anyone think he got what was the
mortality of the man?

He was slow, as slow that of times
he didn't remember within moments of
me taking him how to use a tool, to use
it properly.

This young man shouldn't have
never been anywhere near the necessary
tools, special tools, whatever. The
retention span, I don't think could
ever remember all the procedures
necessary for working around that
area.

I was Mike Russell's supervisor
while there. I feel I know what was
talking about. I was able to describe
him at very close quarters.

I held former foreman positions in
account area - Construction - Build
the peltier - with me points from
my department heads - busy supervised
it, and I drew up the plans, and built
area at the time.

Then I was the safety officer.
When I questioned some methods of
operation, and points in handling
various materials - I used my

Long Russell
Robertson B. June 17, 1986

of the investigation. Perhaps now that
Mr. Hartman has no further need
to cover for Mr. Zappale, since his
pay check comes from another source
more. He may say what needs to be
said. The truth?
The day I quit T.E.I. Ruby and
I had a short + hot conversation, as to
his use and abuse of the personnel.
at T.E.I. - He looked at me, smiled,
repped back in his chair, put his feet
upon his desk, dropped his hands up
behind his head and said "That's the way
it is in business, that's what they've
learned for, ~~you~~ you just don't
understand big business!"

This is basically the gist
of our conversation

Equipment maintenance forms
 I shut down pieces of equipment
 for necessary and immediate repairs,
 mostly what came by with his and
 Bot Lee and put the machine back
 in operation, causing the rest of
 one huge machine to really come
 out of its pocket as it were.
 This can be verified by Tom Gardner
 who is the son-in-law of Mike
 Shatto having a ceiling in Sierra Vista
 He was the operator at the time of
 this particular incident.
 The pellets were built entirely with
 our parts. Cost?? 3 to 4 times what
 it should have. If anything about
 go right or last month. Really could
 get angry and show all these steps
 connected with the project.
 When asked for points on it, he
 conveniently changed the subject or
 his attitude.
 Always staff meetings with deep
 heads - I want you, you a you to
 do this, this, that.
 Before the day was through he came
 by with Bot Lee and changed every-
 thing without mentioning my dept.
 head.
 Incidentally - Tom Hartman was
 Mike Rusk's supervisor at the time of
 his death. I'm talking with Tom at
 a later time - It is my feeling that
 there is something that was left out

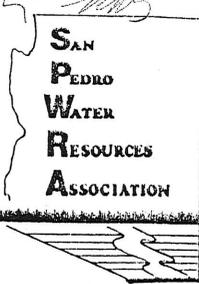
COCHISE
SILVER
MINES

FRANK MAGINI

CONTENTION FILE?

Post Office Box 1173

Sierra Vista, AZ 85636-1173



June 25, 1986

Water Permits Unit
Office of Waste & Water Quality Management
Arizona Dept. of Health Services
2005 N. Central Avenue
Phoenix, Az 85004

RECEIVED
JUN 30 1986
DEPT. OF MINES &
MINERAL RESOURCES

Gentlemen:

The San Pedro Water Resources Association (SPWRA) is interested in the status of the permit of the proposed resumption of a cyanide leaching operation for silver ore at the Contention Mine site in Tombstone, Arizona. Our primary concern is, of course, the safety and well-being of Tombstone residents. Of only slightly less importance is our concern to avoid at all costs contamination of any kind to our aquifer in the Upper San Pedro Basin. We would appreciate very much your response to our concerns as soon as possible.

We have reviewed Mr. Roger Kennett's report from his site inspection of May 22, 1986. We are pleased he has placed the testing program on hold until proper permit applications have been filed. We assume you are satisfied the empty cyanide barrels have been properly neutralized. It is of interest that Mr. Frank Magini, president of Cochise Silver Mines, stated in the Tombstone Epitaph on May 23, 1986 that the burial of these barrels at the mine site is not regulated by State law because it is taking place on "private land." We are pleased you will require burial of these barrels in an approved landfill.

We would appreciate, if possible, receiving copies of the hydrology mapping report of the Tombstone aquifer, the report delineating the area involved in the cyanide contamination of T.E.I.'s well #2, and a copy of the discharge permit application.

A Phoenix News Times article of April 1, 1986 reveals that Tombstone officials have indicated a dramatic rise in cyanide concentrations in samples from the contaminated well following rainfall, even after pumping of the well had been underway for some time. This is most disturbing. If the deeper aquifer that supplies Tombstone city wells has been compromised, will the State prosecute? Will future polluters be prosecuted?

Does the cyanide which has been leaching from existing tailing piles since Tombstone Exploration, Inc. (T.E.I.) filed for bankruptcy in Jan.

1985 pose any threat to groundwater? See enclosure. Mr. Escapule indicates there is enough cyanide present in existing tailings to run the pilot test program.

Mr. Scott Larson, P.E. submitted a set of proposals to you on April 28, 1986, concerning the proposed operations of Cochise Silver Mines. His report raises a few questions.

The contaminated soil to be removed from the former leaching ponds is addressed. Mr. Larson does not indicate the final destination or disposition of this soil. Your comments please.

Mr. Larson proposes clay liners for future leaching ponds. Is this adequate? Should not the lining of such ponds be of an impermeable material.

Mr. Larson indicates monitoring equipment for water sampling and analysis is available at the site. We feel that since it is in the pecuniary best interest of Cochise Silver Mines to have a "clean" operation, it is a conflict of interest for the mine to do it's own monitoring. Possible alternatives could be officials who monitor Tombstone's city wells, or to require the mine to use a state registered laboratory as required for drinking water.

We certainly endorse the use of lysimeters beneath the leaching pad and ponds, and downgradient from leaching pad site.

We are enclosing the statement of Mr. Tony Russell, formerly employed by T.E.I. , because it is relevant to this issue. Mr. Russell knew but was not related to the 25 year old T.E.I. employee who expired of cyanide poisoning in 1982.

In view of the past near disasters at this site, we would much prefer to see an alternative method used to process ore that does not utilize cyanide. Any assistance you can provide would be appreciated.

Thank you very much.



Tom Cochran, President
SPWRA

CC:

Gov. Bruce Babbitt
Charles Anders, ADHS
Lloyd Novick, M.D., Director, ADHS
Judith Ayres, Administrator EPA, Region 9
Alex Gradillas, Mayor of Tombstone
Cochise County Board of Supervisors
Robert Corbin, State Attorney General
Bureau of Mines
Carol Mordhorst, R. N. - Cochise Co. Health Dept.
Joe Lane, Representative
Dennis De Concini, Senator
Barry Goldwater, Senator



Office of State Mine Inspector

705 West Wing, Capitol Building
Phoenix, Arizona 85007
602-255-5971

NOTICE TO ARIZONA STATE MINE INSPECTOR

In compliance with Arizona Revised Statute Section 27-303, we are submitting this written notice to the Arizona State Mine Inspector (705 West Wing, Capitol Building, Phoenix, Arizona 85007) of our intent to start (stop) (please circle one) a mining operation.

COMPANY NAME Tombstone Exploration Inc.

CHIEF OFFICER T.H. Schloss

COMPANY ADDRESS Box 610 Tombstone AZ 85638

COMPANY TELEPHONE NUMBER 457-2231

MINE OR PLANT NAME Continuation Mine (F)

MINE OR PLANT LOCATION (including county and nearest town, as well as directions for locating by vehicle)

South of Tombstone old US 80 HWY

Cochise Co. AZ

TYPE OF OPERATION MINING PRINCIPAL PRODUCT Silver

STARTING DATE 9/79 CLOSING DATE 3/28/85

DURATION OF OPERATION 5 1/2 YEARS

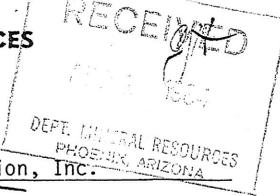
PERSON SENDING THIS NOTICE Bob M Lee

TITLE OF PERSON SENDING THIS NOTICE Gen Manager

DATE NOTICE SENT TO STATE MINE INSPECTOR 3/28/85

*A.R.S. Section 27-305 NOTIFICATION TO INSPECTOR OF BEGINNING OR SUSPENDING OPERATIONS: When mining operations are commenced in any mine or when operations therein are permanently suspended, the operator shall give written notice to the inspector at his office prior to commencement or suspension of operations.

ARIZONA DEPARTMENT OF MINERAL RESOURCES
Mineral Building, Fairgrounds
Phoenix, Arizona



1. Information from: John Fritts, Geologist, Tombstone Exploration, Inc.
Address: P.O. Box 610, Tombstone, AZ 85638, phone 457-2231
2. Mine: CONTENTION 3. No. of Claims - Patented Yes
(Cochise Co.) Unpatented _____
4. Location: Approximately 1/2 mile southeast of Tombstone, AZ
5. Sec. 11 Tp. 20S Range 22E 6. Mining District Tombstone
7. Owner: Tombstone Development Co. (TDC)
8. Address: P.O. Box 1445, Grand Island, NE 68802, phone (308) 382-7480
9. Operating Co.: Tombstone Exploration, Inc. (TEI)
10. Address: _____
Vice President: Dustin L. Escapule
11. President: Thomas H. Schloss 12. Gen. Mgr.: Bob G. Lee
13. Principal Metals: Ag & Au 14. No. Employed: about 100
15. Mill, Type & Capacity: Crushing and agglomeration
16. Present Operations: (a) Down (b) Assessment work (c) Exploration
(d) Production (e) Rate _____ tpd.
17. New Work Planned: Cutting a bench on the west side to deepen mine at least 50 feet more. Also deepening mine on south end. May bench southeast side of mine (in ore) also.
18. Misc. Notes: The mine is actually a large trench that trends NNE from the vicinity of the Grand Central shaft to just east and south of the Tranquility shaft. The trench is about 2800 feet long and 200 feet deep. The ore zone, reportedly confined to the Contention dike and short cross-structures, averages 40 feet wide. Mine walls are steep. In general the rock is easily ripped. Currently the Contention dike is at the toe of the west wall.
Sedimentary units exposed in the mine comprise the Bisbee Formation of Cretaceous age. In general as the mine is developed to the south it exposes stratigraphically higher members of the Bisbee. At a point approximately midway between the Contention pump shaft and the Tranquility shaft, a northeast-trending fault, called the Contentment, has been identified by Mr. Fritts. This fault dips steeply to the south, with the north side upthrown. Mr. Fritts believes

(continued)

Date: April 2, 1984

(Signature)

Alfred Greeley

(Field Engineer)

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine 71 Minerals Dump-Teach Operation
(Contention Mine Area)

Date April 22, 1983

District Tombstone District

Engineer Mike Greeley

Subject: Recorded production

Recorded production from the Tombstone Mining District, Cochise County according to an abstract of U.S. Bureau of Mines data was obtained from the Arizona Bureau of Geology and Mineral Technology.

Production is recorded for the period 1974-77.

Cumulative totals are:	Tons of ore	1,238,276
	Pounds of copper	
	Pounds of lead	
	Troy ounces of gold	8,152
	Troy ounces of silver	264,376

The following mines or mining claims in the district contributed to the production: Contention Mine area.

Abstracted copy

A ARIZONA DEPARTMENT OF MINERAL RESOURCES
Mineral Building, Fairgrounds
Phoenix, Arizona

- 1. Information from: Mine Visit
- Address: _____
- 2. Mine: Contention/Grand Central Area 3. No. of Claims - Patented _____
Unpatented _____
- 4. Location: _____
- 5. Sec 11 & 14 Tp 20 S Range 22 E 6. Mining District _____
- 7. Owner: _____
- 8. Address: _____
- 9. Operating Co.: Tombstone Exploration Inc.
- 10. Address: P.O. Box 610, Skyline Dr., Tombstone, AZ 85638
- 11. President: Thomas Schloss (NY) 12. Gen. Mgr.: Dustin L. Escapule
- 13. Principal Metals: Ag 14. No. Employed: 47
- 15. Mill, Type & Capacity: _____
- 16. Present Operations: (a) Down (b) Assessment work (c) Exploration
(d) Production (e) Rate _____tpd.
- 17. New Work Planned: _____

- 18. Misc. Notes: Moderate sized operation that involves crushing old dump material
and newly mined ore from an open cut, pelletizing the ore, and spreading the
3/4 - in (?) material on heap leaching pads. Escapule (State of Maine
Mining Co.) zinc dust precipitation plants are used to recover the silver.
The precipitates are shipped to the east coast for smelting and refining.

Date: 1-2-81

Michael W. Greeley
(Signature) (Field Engineer)

ambstone District

State ARIZ County Cochise Mineral Products A4 & A9

Name of property or deposit Contention & other pat'd claims

Date examined 5/13/75 Engineer VB Dale Date of this report 5/23/75

Reason for examination To look at leaching operation

Engineer accompanied by No one Address _____

Element of property Unknown but probably 2 or 3 pat'd claims

Owner Unknown Address _____

Leased or optioned to 71 Metals, a subsidiary of Sierra Minerals Management Address Gambstone Ariz.

Location of property (be specific) _____

Mostly Within Gambstone city limits at South end of ~~6th~~ sheet

Type of deposit and mineralogy (brief description) Typical Gambstone silver deposit.

Known dimensions of the deposit Unknown
Length _____ Width _____ Depth _____

Attitude of the deposit (strike, dip, etc.) All ores to be leached are in old dumps.

Possible extensions; correlation of known showings _____

Mine workings (brief description or attach map or sketch) (indicate whether accessible) _____

The ~~leach tank~~ impervious leach pad has been completed and dumps are being transferred to the leach pad at an estimated rate of 1500 tons per day. The solution pond is excavated and ready for its impervious lining of compacted thiling. The ~~precipitation~~ precipitation building is completed; solution tanks, pressure filter, lines & valves are nearly complete. Probably 300 feet of piping from leach pad to pregnant pond and piping to the refinery (\pm 150 feet) has not been installed.

Mining and milling equipment on property 1 - D-8 Driller Ripper; 1 DW20
and 1 DW21 earth pad; Compressor + miscellaneous;
1 - Cat grader (No. 127); misc. tools + equipment. Partially
completed precipitation plant.
Past production (if any) Unknown

Present rate of production (if any) None. Consultant Metallurgist
Robert M. Darrak stated that plant would be in operation
and precipitates being recovered by middle of June.
Sampling (describe briefly, or attach sketch)

Tentative Estimate of Reserves

(Subject to revision when assays are received or after engineering calculations)

Measurable..... tons..... Grade.....

Indicated..... tons..... Grade.....

Inferred..... tons..... Grade.....

Mining method (actual or suggested).....

Milling or processing method (actual or suggested) ^{or pad} leach leaching of
gold + silver from old dumps

Processing tests suggested.....

Tentative conclusion and decision a visit to this operation
should be scheduled the latter part of
June.

To be accompanied by brief letter giving examining engineer's general impression of the deposit, his impression of the owner, and any other confidential information he may care to submit. Refer to any known prior examinations and reports. May be executed in pencil. Should be mailed within 24 hours after examination is completed.

Darrak stated that Averill Harrison's money (about \$3,000,000) had been lost in the ~~the~~ Sierra Minerals management operations. Darrak asserted that this loss plus costs of the leaching operation would be recovered with interest in a 1-year operation. He estimated about a million tons in three dumps which they plan to leach on the single pad. Zinc dust is used to precipitate the gold + silver from solution. Precipitates ~~is~~ will be sold to Handy & Harmon who will refine + recover gold and silver. (Combined mining, transportation and treatment costs are less than 1 percent)

SUMMARY REPORT OF MINERALS EXAMINATION

Tombstone District

State Ariz. County Cochise Mineral Products gold-silver

Name of property or deposit Contention Mine (Patented claim)

Date examined 12/19/74 Engineer V.B. Dale Date of this report 12/26/74

Reason for examination Initial visit

Engineer accompanied by No one Address _____

Extent of property one patented claim

Owner unknown - Address _____

Leased or optioned to Sierra Minerals Mgmt Address 4741 E. Sunrise Drive
Tucson

Location of property (be specific) Within Tombstone City Limits at south end of 6th street.

Type of deposit and mineralogy (brief description) Typical Tombstone silver deposit - extensive underground workings

Known dimensions of the deposit unknown
Length _____ Width _____ Depth _____

Attitude of the deposit (strike, dip, etc.) unknown -

Possible extensions; correlation of known showings _____

Mine workings (brief description or attach map or sketch) (indicate whether accessible) _____

Present work consists of preparation of heap leach pads for cyanidation of silver in dumps. Lowgrade will be heap leached near the dumps and any high-grade ores will be transported to the state of Maine mill. A haul road from the mill to the contention ~~claim~~ claim has been completed, a distance of about two miles.

Permits from Tombstone City Council and from state Health Department had not yet been obtained.

About 6 men were working at the site.

Mining and milling equipment on property One - 8 Dozer and a small (1/2 yd) front end loader.

Past production (if any) The Contention - Grand Central mine group has produced probably 15,000,000 min silver from 1880 to 1920.

Present rate of production (if any) None

Sampling (describe briefly, or attach sketch) Unknown

Tentative Estimate of Reserves

(Subject to revision when assays are received or after engineering calculations)

Measurable Unknown tons _____ Grade _____

Indicated " tons _____ Grade _____

Inferred " tons _____ Grade _____

Mining method (actual or suggested) _____

Milling or processing method (actual or suggested) Heap leach - cyanidation for low grade dumps and high-grade to Cyanide Mill.

Processing tests suggested None

Tentative conclusion and decision Management appears to be inadequate.

To be accompanied by brief letter giving examining engineer's general impression of the deposit, his impression of the owner, and any other confidential information he may care to submit. Refer to any known prior examinations and reports. May be executed in pencil. Should be mailed within 24 hours after examination is completed.

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine Proposed Pumping Plant

Date November 15, 1944

District Tombstone Area

Engineer A. Macfarlane

Subject:

Tombstone Deep Pumping Plant Proposal

Byron Jackson Co.
Los Angeles, California

CONTENTION MINE

Attention: Mr. Bertelsen

Gentlemen:

Please pardon this long delay in answering your appreciated favor of July 31, as shortly after receiving same, my duties kept me busy and distant from the Tombstone area.

However, our new Director, Mr. Chas. Dunning, has expressed his interest in this tentative proposition to unwater the mines of Tombstone and I am again at spare times working on the details in a preliminary way.

Enclosed herewith find a vertical section sketch, which may assist you in giving us a rough estimate now covering the cost of power plant for pumps plus about 200 H.P. in excess of pump requirements for hoists.

The main natural gas line from Texas to points west in Arizona cross the Tombstone claims now, and it is likely that firing high pressure boilers with this gas, thence to steam turbines, thence to generator followed by electric motors to the various machines, pumps, hoists and air compressor of about 1,000 cubic foot of air at 100# plus; this may be the most efficient installation, but you may suggest a better layout.

The water from these mines I am advised are potable except for a little excess in fluoric acid. The ores to the old 1,000' level were predominantly oxidized, lead-gold-silver with occasional bunches of zinc and copper; naturally the corrosive acid condition will be determined before pumps are decided upon.

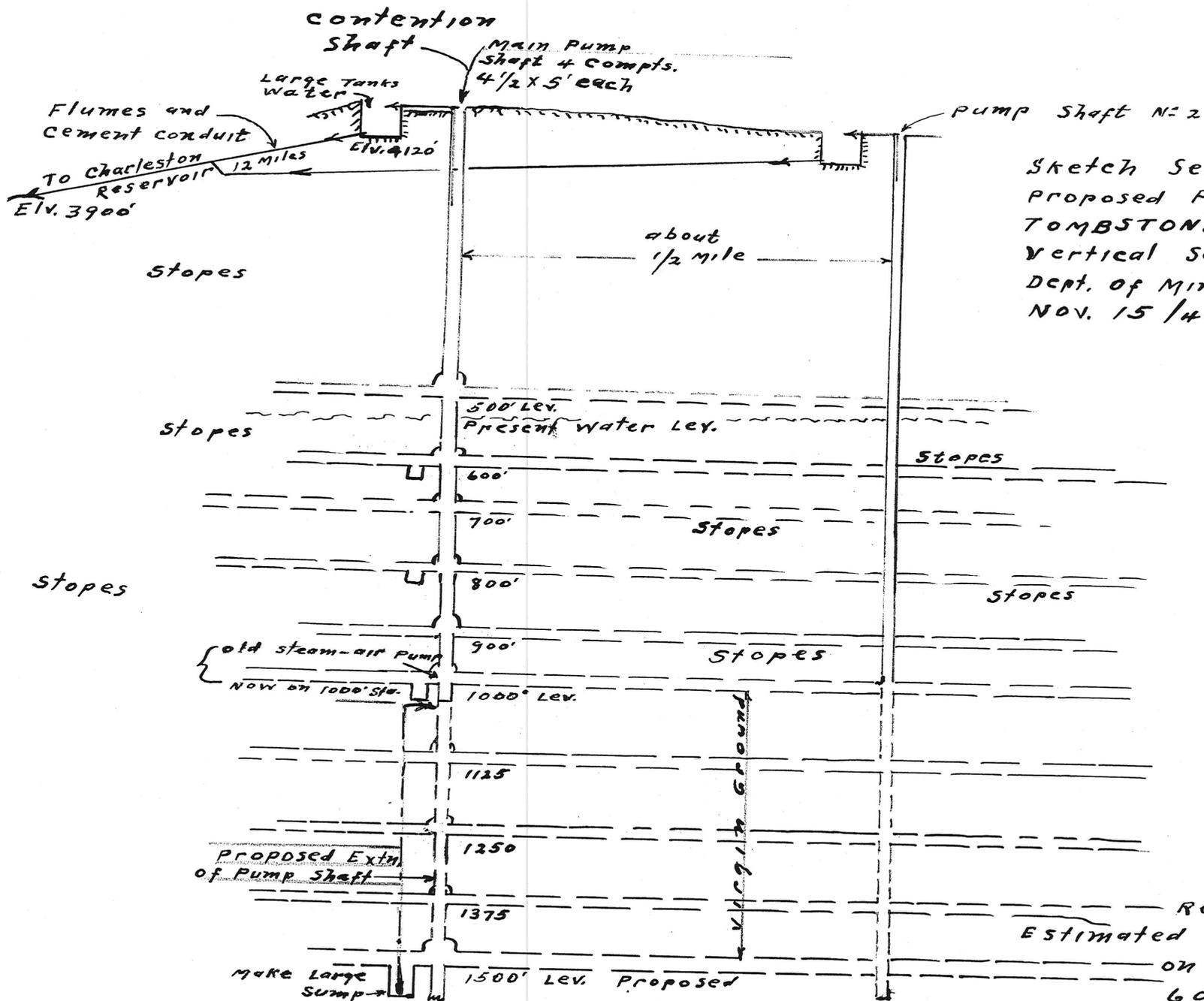
Assuming a predetermined head of 1500' at 6,000 GPM for station (lower level) pumps, plus sinking pumps to handle the sinking from 1,000' to the 1,500', this equipment to be of your standard material.

The estimate we request from you to cover the cost of plants and installation of same, piping, etc. during a normal time.

Buildings and mine development, trackage, etc. we can estimate here on the ground. This includes shaft sinking and connecting drifts, underground stations and many other considerations, in all in an endeavor to arrive at an overall cost and amount of investment.

Thanking you in the above and kindly answer to the following address.

Department of Mineral Resources
304 Home Builders Bldg., Phoenix, Arizona



Sketch Section
 Proposed Pump Plant For
 TOMBSTONE MINES
 Vertical Scale 1" TO 250'
 Dept. of Mineral Resources
 NOV. 15 /44

Stopes

Required
 Estimated Pump Capacity
 on 1500' Lev.
 6000 GPM

Increased Water Volume Expectancy From the Tombstone Mines: As stated above the water output was over 5,000,000 gallons per 24 hours from the 1,000 foot level of the Contention shaft, this being the deepest point attained in the entire Tombstone mining belt.

It is now being studied by the State Department of Mineral Resources, the project of deepening the Contention shaft and one other shaft (about 1/2 mile more or less distant from the Contention) to a depth of 1,500 feet, or 500 feet deeper than the former 1,000 foot level attained by the Bunker Hill Mines Co. up to 1911 (this subject to further investigations).

It is consistent with the experience gained in lowering mine water that if 5,000,000 gallons are encountered on the 1,000 foot level daily, double that amount will have to be pumped from the 1,500 foot level, and it seems a fair surmise that approximately 10,000,000 gallons per 24 hours will be the water output from the 1,500 foot level of the Tombstone mines.

Assuming that this water is sold at 20 cents per 1,000 gallons, times 10,000 units, produces \$2,000.00 daily, or at the low price of 10 cents per 1,000 gal. unit \$1,000.00.

The water in the Contention shaft now rests on or about the 500 foot level and as stopes of magnitude, long drifts and all other types of mines underground workings reached to a depth of about 800 feet below shaft collar, these workings are now and have been for the past 33 years filled with water; an underground reservoir of no mean dimensions to be pump drained, as the first step in advance of shaft deepening to the proposed 1,500 level.

Financial Considerations: It is almost a universal practice that whenever a private concern, community, state or federal government drains by adequate methods, a mineral area previously left in a flooded state, that a fair royalty on all minerals mined and sold, produced from the area, drained and made available by said drainage system, that said royalty is contracted to the agency performing this objective, for ample time, or in perpetuity, as compensation for the invested capital. The usual royalty will vary from 5% to 10% of the net smelter or mill payments on all mineral marketed and produced from the drained area.

Tombstone Ores: Are fortunate insofar as the mines were developed to consist of gold, silver and lead, almost entirely free of arsenical or sulphurous acids, the mineralization being commonly known as oxidized. Pyrites, zinc oxides, or sulfides being found only in minor quantities, the water is potable and only requires usual purification treatment common to nearly all city water systems prior to domestic use.

Mining the ores of Tombstone provides an industry not dependent on war need markets. The substantial gold, silver and lead contents of the principal mines will fit into the post war period and by the drainage of the entire Tombstone mineral area, as herein proposed, it is confidently believed the mines will again produce millions.

In this connection a resume of mine operations beginning late in 1902 and after the consolidation of the Tombstone Mill and Mining Company and Contention Company joined the Grand Central Company in a reorganization.

This consolidation under the name of the Tombstone Consolidated Mines Company, with E. B. Gage, manager, decided to sink a 4 compartment shaft to the 1,000 foot level.

During 1906 this main unwatering and hoisting shaft reached the 1,000 foot level and the large steam driven pumps installed on the 8th and 10th levels, and the work of mining, milling and pumping proceeded. The year 1909 was disastrous as about June 1 the 10th level pump was submerged due to break down in plant. During year of 1910 new and larger boilers were installed, also a 4,000 cubic foot compressor, and by use of large air driven sinking pumps the water was drained to the 1,000 foot level again and the station pumps again placed in operation.

Unsuccessful in refinancing and due to incapable and uneconomical pumping operations the then operating company closed down, pumping discontinued on January 19, 1911 and blocks of the mineable area above the water level leased to local miners.

Phelps Dodge Corporation acquired the holdings of the Tombstone Consolidated Mines Company during June 1914 and carried on the work thereafter under the name of the Bunker Hill Mines Company. They made no attempt to regain the pumps or to unwater the deeper workings but did further exploration work above the water level and by the end of the year were shipping substantial quantities of ore.

From the above history we learn it is that period of time from 1902 to 1911 when ores were mined from under the water, 5th to 9th levels, and a study of said ores are now the only tangible records on which to base an approximate estimate of their grade and character.

The schedule of production covering these 9 years comprising the main mines of the Tombstone Consolidated Mines Co. output gives values as follows:

From 1902 to 1907 total in dollars based on metal prices of that period	\$3,100,000.00
From 1908 to 1911 inclusive	<u>936,290.00</u>
For 9 years total value	\$4,036,290.00

Note: 2 years were almost lost by mines flooded.

The assays of the minerals recovered were about as follows:

Gold	ozs.	0.24 @ \$20.00	\$4.80
Silver	"	8.70 .65	5.75
Lead	2.0% 40# @	.05	<u>2.00</u>
This deduction made from dollar			\$12.55
Value of 4 years output.			

Prices of 1944 value as follows:

Gold	ozs.	0.24 @ 32.3	7.75
------	------	-------------	------

Silver ozs. 8.70 @ .70	6.09
Lead 40# @ .0725	<u>2.90</u>
Present per ton gross value	16.74

Prior to 1902 the best record now obtainable above water level gives a production of \$25,300,000.00

(part under water) 1902 to 1911 with water delays 4,036,290.00

All above (Since 1911 to 1934 4,102,281.00
water level (Since 1934 to 1940 about 500,000.00

Tombstone mines production \$33,938,571.00

Many small high grade chloriders output not included in the above, nor are the carlot shipments made during the past three years. The above record of Tombstone's production makes clear that no very large tonnage was stoped below the 6th level probably not in excess of 250,000 tons, as compared to about 2,400,000 tons mined above the 6th or 7th levels of the discovered mineral area.

The proposed pumping project aimed at lowering the water down to the 1500 foot level would make available all ores already developed by the former miners, tributary to the 1,000 foot level and also penetrate to 500 feet depth into virgin ground under the present known mineralization.

Probable Income From Ores: Again it is reasonable to assume that from the present water level, being about 500 feet below shaft collar down to the 1500 foot level, an ore tonnage about equal to the total of the former production should be a fair expectancy.

Taking this at \$34,000,000 and deducting 1/3 for treatment costs, a net smelter or mill return of \$22,667,000 and assuming a royalty of 6% is to be obtained from this net smelter or mill production, the pumping and hoisting agency would earn \$1,360,000.



TOMBSTONE EXPLORATION, INC.

Az DMMR Contention Mine (file) Tombstone Dist. Cochise Co.

1983

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INTRODUCTION

Tombstone Exploration, Inc. (TEI) is a privately held and controlled company, which holds a mineral lease on approximately 95% of the historically productive claims in the Tombstone Mining District. Past production in the District, valued at prices of \$400 per ounce gold and \$10 per ounce silver, was approximately \$463,000,000. Effective production ceased in 1911, with the apparent cut-off grade for underground mining being 40 ounces of silver per ton of ore.

The town of Tombstone is in Cochise County, about 60 miles southeast of Tucson. TEI's property is on the outskirts of the town, and there is an available work force, much of it with experience in mining precious metals. The climate is warm and arid, which permits the company to operate year round, and which is ideal for mining, crushing and heap leaching.

At present, TEI is mining on only 40 acres of its properties, where it is operating a low cost open pit, with a heap leaching operation involving proprietary patentable techniques and equipment. In comparison to a conventional leaching operation, leaching time has been reduced from thirty days to less than one week, and silver and gold recovery has increased from 30% to 60% for silver, and higher for gold. To recover further silver and gold values, TEI has installed a wash plant to process the leached ore. The process also creates a by-product of marketable construction aggregate. From the complete processing circuit, sales from gold and silver and construction aggregate may show a greater income than could be achieved by using a mill, and at a small fraction of the cost.

The cost of producing the silver and gold is less than the cost of implementing an exploratory drilling program on the ore would have been. Using innovative sampling, mining and processing techniques, TEI has generated a cash flow, while in effect taking the ultimate bulk sample. A conservative correlation between the historical production from the first and second levels at the site of the open pit mine, and TEI's production from those levels, shows a ratio where TEI extracts one ounce of silver for every five ounces previously extracted. TEI believes that a similar correlation may exist on much of the property it is currently anticipating mining.

Sales of silver and gold production from the open pit were:

1980	\$421,000
1981	\$2,220,000
1982	\$4,472,000
1983 (9 months)	\$7,289,000

HISTORY OF THE TOMBSTONE MINING DISTRICT

In 1857 Frederick Brunckow located and began working the Bronco claim, five miles from the present town of Tombstone. In 1877, Ed Schieffelin, the son of a forty-niner, visited the Brunckow mine while on a trip to Fort Huachuca. An army friend had warned him that in this Apache territory all he would find would be his own tombstone. Schieffelin noticed that the direction of ore was trending northeast from the Bronco, and following this trend he found what is now known as the Tombstone Mining District.

With his partners, Schieffelin located and staked a claim to the Lucky Cuss, and then the Toughnut. They then split the Contention and the Grand Central with a new partner. These two mines were to become the major producing silver mines of the early 1880's.

The town of Tombstone sprang up in 1879, following the news of Schieffelin's strike, and two years later it achieved international notoriety after the gunfight at the O.K. Corral.

By 1883 many major mines had become producers for the Tombstone Mining District. These included the Flora Morrison, NaumKeg, south extension of the Grand Central, Emerald, Moonlight, Grand Dipper, Vizina, Head Center, Good Enough, Tranquility and Silver Thread mines. Yearly production at its peak appears to have exceeded \$5,000,000 at the metal prices of that time.

During the mid 1890's, the mining industry in the Tombstone district faced a number of problems. Many claims were tied up in litigation over ownership, mining costs were increasing, working mines had ineffective pumping systems, and precious metal prices were dropping. In the late 1890's, Mr. E. B. Gage raised enough money to consolidate 95% of the Tombstone mines. The company operated with many difficulties including fires and inadequate steam boilers to power their machinery. In the early 1920's, Tombstone Consolidated Mines sold all of their holdings to Bunker Hill Mining Company, a subsidiary of Phelps Dodge. By this time the pumps had been shut down, and the water had risen back to the 600 foot level. Bunker Hill did not attempt to dewater the mines, but reworked the gob or backfill from the water table to the surface, and did further mining on high grade veins in the upper levels. In the mid 1930's they sold their holdings to Tombstone Development Company (T.D.C.).

Production in the Tombstone District virtually ceased. Silver was now at \$0.23 an ounce, compared with the \$1.20 an ounce it had commanded in the 1870's, when the mines were first discovered. Wages and costs had increased, and mining was not economically viable.

In the early 1950's, after prolonged dormancy of the mines, and after the Gold Closing Act of World War II had been rescinded, T.D.C. was sold to the Newmont Mining Company. During this period gold remained constant at \$35 an ounce, and silver increased from the 1930's level of \$0.23 an ounce to \$0.85 an ounce, but wages and operating costs had more than tripled. Reopening of the mines at that time appeared uneconomical. T.D.C. was sold to a group of Nebraska investors who have held the properties to the present day.

Over the past forty years T.D.C. has leased portions of its holdings to small mining companies. It is virtually impossible to obtain any meaningful production records from these companies.

In February, 1979, Tombstone Exploration Inc. acquired a favorable mineral lease on all the mineral rights and lands of T.D.C. This property covers almost 2,000 acres and includes 87 patented and 18 unpatented claims.

In August, 1983, Tombstone Exploration purchased the mineral rights to a further 84 unpatented claims in the Tombstone Mining District, covering approximately 1,200 acres.

Tombstone Exploration recently purchased an option to buy the mineral rights to an additional 34 unpatented claims in the Dragoon Mountains.

PROJECTED MINE SITES

TEI has used the philosophy of mining in locations where there has been substantial past production of silver and gold; in the Tombstone Mining District during the 1800's, the Contention-Grand Central mine was the largest producer. This is the site of the current open pit operation at TEI. As with other mines in the area, there was very little production after 1920. This was not due to a lack of mineralization, but to high operating costs coupled with low metal prices.

TEI geologists and management have located fourteen areas of mineralization, which include opportunities for incline shaft, vertical shaft, and open pit mining. The following is a partial list of the targets; it is not in order of priority.

Girard-Toughnut

Dames & Moore, a mining consulting company, surveyed the Girard-Toughnut (Girard Underground Mine, or GUM) and recommended a two phase drilling and development operation. There are existing open shafts and extensive workings, which need some refurbishment to enable the mine to become operational. Of the 97 samples taken by Dames & Moore, 29, or approximately 30%, averaged at least 5.0 ounces of silver per ton, or the equivalent dollar value in combined silver and gold. Dames & Moore concluded that "excellent potential exists for the discovery of significant ore reserves". The GUM was only one of the major producing mines in the district, and it would not be unreasonable to assume that other mines in the TEI holdings might have similar potential.

Prompter Structure

Dump samples from the Emerald mine, on the Prompter fault, have been independantly tested and have shown values of 13 ounces of silver and .07 ounces of gold per ton. Some of the ore in this area is manganiferous and shows signs of being refractory; research is being conducted by government agencies and private concerns to discover an economic method of recovering precious metals from refractory manganiferous ore; TEI has entered a joint venture with a Texas based research corporation which feels that it has a method of extracting precious metals from TEI refractory ore.

The Contact claim is a continuation of the Prompter structure, but the ore does not appear to be manganiferous. Dump samples from the Contact mine have shown values of 4 ounces of silver per ton, and there is a high probability of economically recoverable silver and gold values at the north end of this claim.

Grand Central (extension to current operation)

To the south of the present open pit, TEI has recently refurbished the Grand Central mine shaft to the 200 foot level. On the 100 foot level, samples have been taken along 300 feet of intrusive dyke, with a width of 15 feet. TEI estimates 40,000 tons of ore, with 2.8 ounces of silver per ton, for the specific area sampled from the existing surface to the 100 foot level. This does not include the probable continuation of this ore body to the north and south.

Lucky Cuss

The Lucky Cuss mine was a major producer in the Tombstone area, and ore mined from this structure in the late 19th Century averaged 40 ounces of silver and .44 ounces of gold per ton. Opportunities exist for open pit mining, with the best potential being on the East side of the Lucky Cuss fault. Underground mining possibilities include new mineralization in both the hanging wall and the foot wall, and backfill material in the stopes.

Unpatented Claims

As well as historically productive mines, TEI leases 18 unpatented claims southwest of Tombstone, in the area of the Tombstone Extension Mine, which was mined to 550 feet below the surface. There is a possibility of discovering a virgin ore body in the unpatented claims, and it has been suggested that an inexpensive method of electromagnetic exploration could determine the probability of such an ore body.

The above mentioned claims are all leased from the Tombstone Development Company, and royalty payments are made on TEI's production. In addition to those 87 patented and 18 unpatented claims, TEI has recently purchased the mineral rights to 84 unpatented mining claims, comprising the Fox, Misy, and Solstice groups. These claims are not subject to any royalty payments.

Fox, Misy, and Solstice Groups

In the past, exploration work has been done in the claim groups by various mining companies including Occidental Minerals, Austral, and Eocene Research. Santa Fe Minerals Division is currently working at the San Pedro claim, which joins the Fox group at the southwest end.

Claims in the Misy, Solstice, and Fox groups cover extensions of known ore structures in mines which have been historical silver and gold producers. These mines include the State of

Maine group, which was a major producer in the late 1800's and is still an operating mine, the Mamie, which has a wide strong braided ore zone which is proven into the Misy group. The North Bonanza, South Bonanza, and the Last Chance were historically producing mines with northeast fissures which carry onto TEI's adjacent claim groups. The San Pedro, the Silver Cable, Dry Hill, and Baker mines have been worked within the last year. There are surface showings on the Misy group where it joins the Silver Cable; also strikes extending from the Mamie, North Bonanza, and Solstice mines have been exposed at the surface on TEI's claim groups.

Previous operators on the Solstice claim group reopened the Solstice shaft to the 140 foot level, and built three declines for a total of 700 feet, costing over \$200,000. These are in good repair and are easily accessible.

One of the major attractions of the claim groups is that there has been relatively little mining done in a known mineralized area. The majority of mining that has been done was abandoned at a time when silver was selling at \$0.23 per ounce. Cut-off grades were necessarily very high. There appear to be opportunities to discover virgin ore zones and to take advantage of earlier operations where current metal prices allow further mining.

The claim groups are close to TEI's existing operation and to the town of Tombstone. They are fenced, and roads exist through the claims. There are three freshwater wells on the properties.

Dragoon Claims

TEI has an option to purchase the mineral rights to 34 unpatented claims in the Dragoon mountains. Production on these claims would not be subject to any royalty payments. The mining company of Congdon & Carey drilled the properties in the 1960's, and blocked out ore reserves of approximately \$6,000,000 at the precious metal prices of that time.

PRODUCTION

The Contention-Grand Central Pit

Since January 1981, TEI has moved over 6 million tons of material from the Contention, Grand Central, and Head Center claims. Of this material, approximately 1.5 million tons was ore, and approximately .65 million tons was midgrade which has been stockpiled for possible processing in the future.

The pit has an approximate length of 2,000 feet and approximate width of 1,200 feet (on Plate 1, the present mining operation is delineated by a solid red line).

It is anticipated that it will extend 2,400 feet south through the Grand Central and 1,200 north-west through the Head Center (on Plate 6, the broken green line delineates the projected open pit operation). This will make available over a mile of ore zones that can be mined and processed with existing TEI facilities.

A drilling program is being conducted to prove out ore zones and expand the pit. Reverse circulation drilling is being used, every five feet of material being separately cycloned. Metal values are determined by fire assay.

The first stage is south of the existing pit. In the past, ore was mined as far as 1200 feet south of the Grand Central Shaft; drilling will determine the economic viability of extending the pit this far. The grand Central shaft is being retimbered to the 600 foot level, which will allow underground drilling and sampling, and which is also the first step to underground mining the Grand Central claim.

The second stage of drilling will be on the Head Center claim, at the north end of the pit. Further drilling will be done according to the results obtained in the first two stages.

Once TEI reaches the limit of economically operating an open pit (believed at present to be approximately 250 feet below the original surface), it will start a decline, to mine to the water level (approximately 600 feet from the original surface). The ore body will have been defined by the results from the open pit operation.

3000.00

2400.00

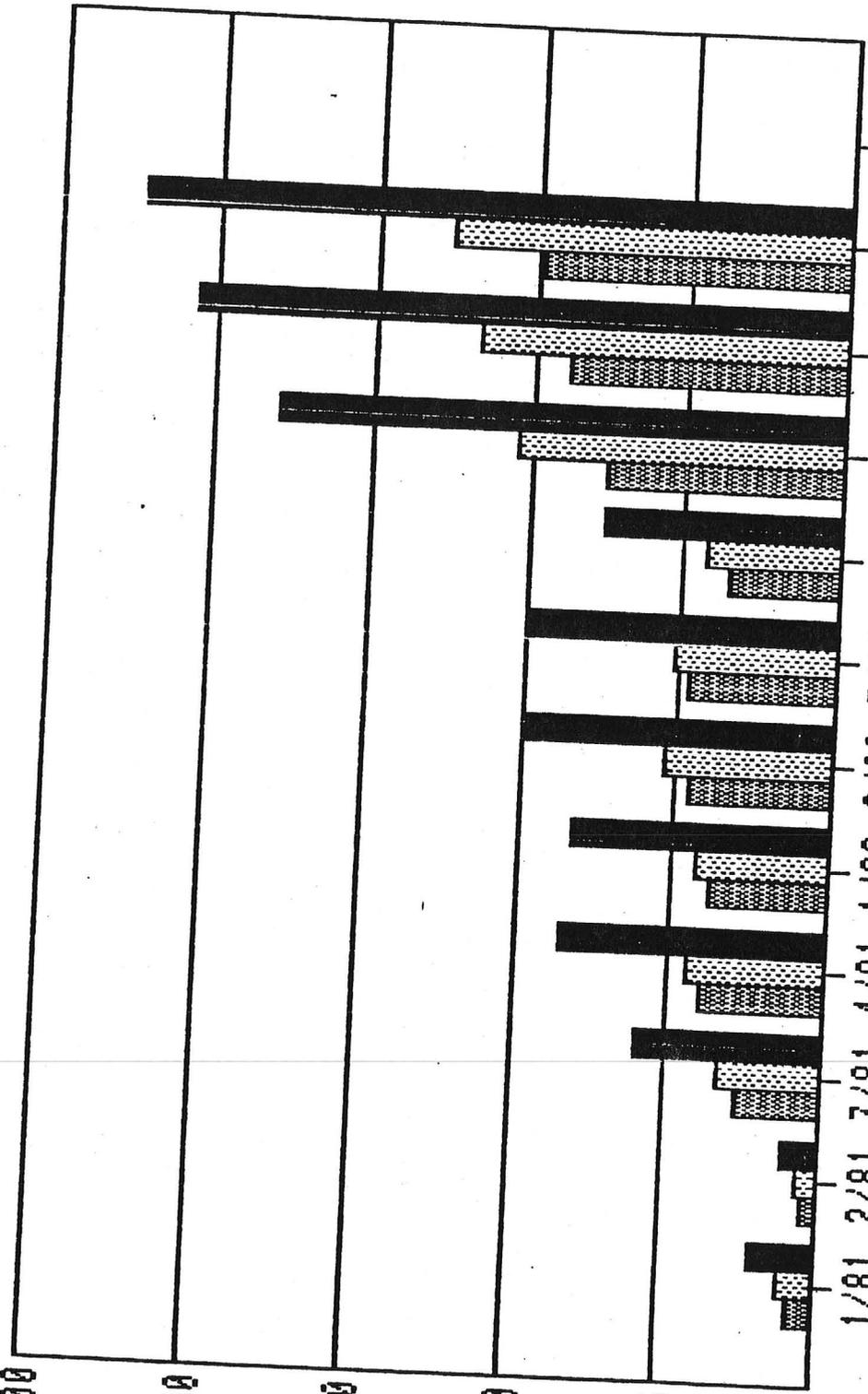
1800.00

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600.00

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\$ I N 0 0 0 , 5



QUARTERLY

TOTAL REV.
 SILVER
 GOLD

SILVER AND GOLD SALES

Production from the Open Pit

The following are monthly sales records (rounded to the nearest ounce and dollar) of bullion produced by TEI from 1981 to the present. The figures do not include inventory adjustments. Production and revenue have approximately doubled each year.

DATE	GOLD (OZ)	AMOUNT	SILVER (OZ)	AMOUNT
Jan 81	92	\$51,597	5,235	\$76,260
Feb 81	92	44,658	2,071	26,245
Mar 81	23	11,958	3,470	41,863
Apr 81	44	21,373	4,056	44,301
May 81	35	16,317	2,192	23,197
Jun 81	38	16,266	621	7,403
Jul 81	83	33,360	7,223	62,369
Aug 81	254	103,883	18,505	171,898
Sep 81	434	188,308	15,777	165,921
Oct 81	246	107,840	13,885	128,695
Nov 81	550	235,713	28,689	259,944
Dec 81	294	125,855	17,280	156,387

TOTAL 1981	2,185	\$957,129	119,005	\$1,164,482
=====				
Jan 82	415	\$174,824	30,890	\$272,082
Feb 82	345	141,709	15,014	126,150
Mar 82	337	140,661	14,238	122,508
Apr 82	436	183,272	23,778	206,555
May 82	383	162,874	22,878	200,249
Jun 82	497	211,628	26,314	231,565
Jul 82	501	201,875	24,785	215,765
Aug 82	421	156,579	23,299	177,496
Sep 82	507	207,422	27,111	234,429
Oct 82	292	125,094	16,755	161,472
Nov 82	299	122,982	15,579	151,626
Dec 82	343	152,683	18,969	200,016

TOTAL 1982	4,776	\$1,981,602	259,611	\$2,299,914
=====				
Jan 83	863	\$398,246	42,891	\$515,821
Feb 83	503	247,450	26,420	362,202
Mar 83	621	257,601	35,304	371,972
Apr 83	631	271,590	25,425	289,305
May 83	858	375,050	39,666	500,146
Jun 83	1,013	419,802	51,405	610,008
Jul 83	696	295,432	34,642	413,944
Aug 83	1,029	427,354	41,649	486,227
Sep 83	1,073	441,789	50,351	604,334

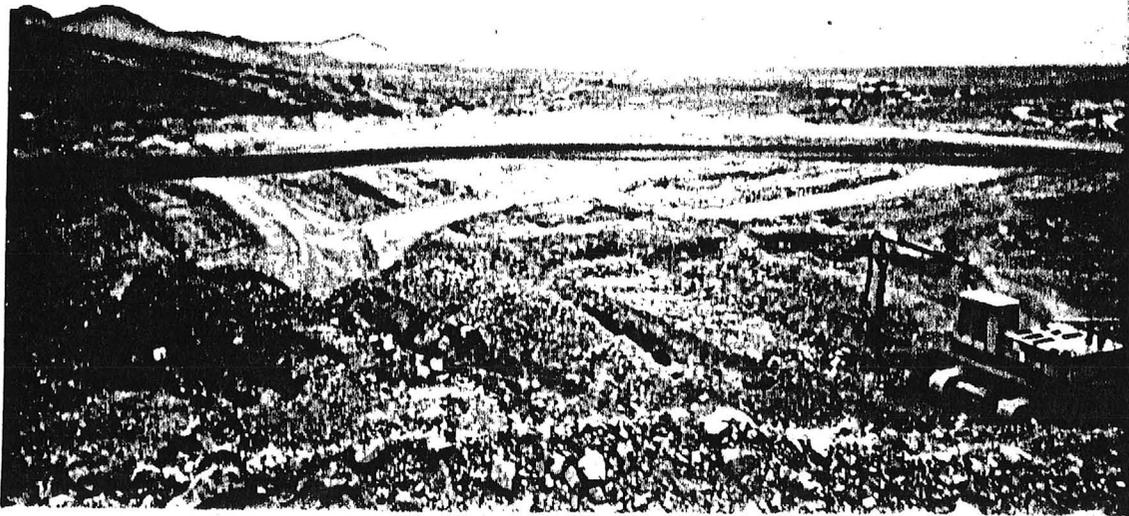
1983 TO DATE	7,288	\$3,134,314	347,753	\$4,153,958

Hedging.

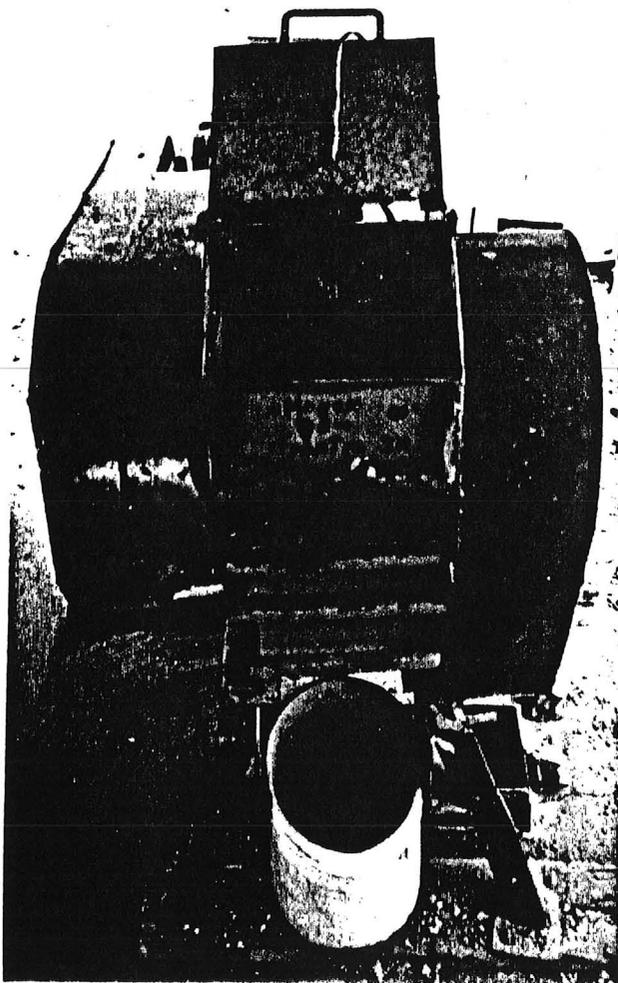
TEI sells its production according to its perception of the metals market. The hedging division monitors the market very closely, with the aid of real time updates from several commodity and other exchanges by telephone linked computer and advice from several external experts.

In 1982, the hedging division realized in excess of \$500,000 above the accumulated average monthly spot prices for delivery of TEI's production.

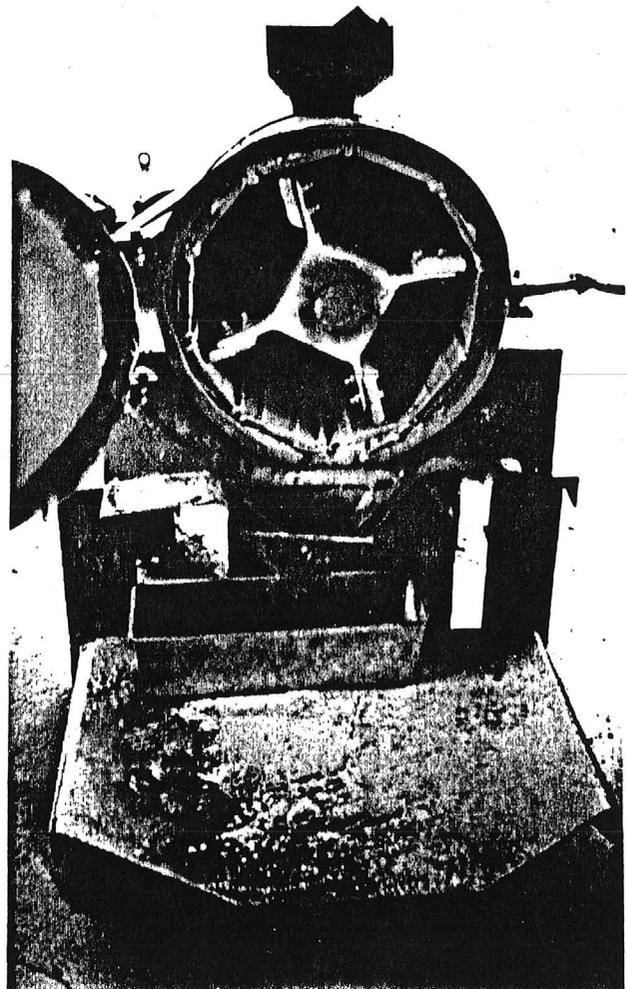
SAMPLING



Trenches and excavator



Sample crusher



Impact mill

OPERATIONS AT THE CONTENTION-GRAND CENTRAL MINE

Sampling Department

TEI considers careful and exact sampling to be of primary importance; every phase of the mining operation is dependent on a valid sampling technique.

A study by TEI determined that core drilling, percussion drilling or reverse circulation drilling would not be effective in the area of the present pit. It was determined that a better indication of ore grade would be provided by channel sampling, a method which also has the advantages of exposing the ore zone and preparing it for mining. Drilling costs to determine ore zones would exceed TEI's total costs of mining and processing that ore, and TEI therefore believes drilling in this area to be an uneconomic approach.

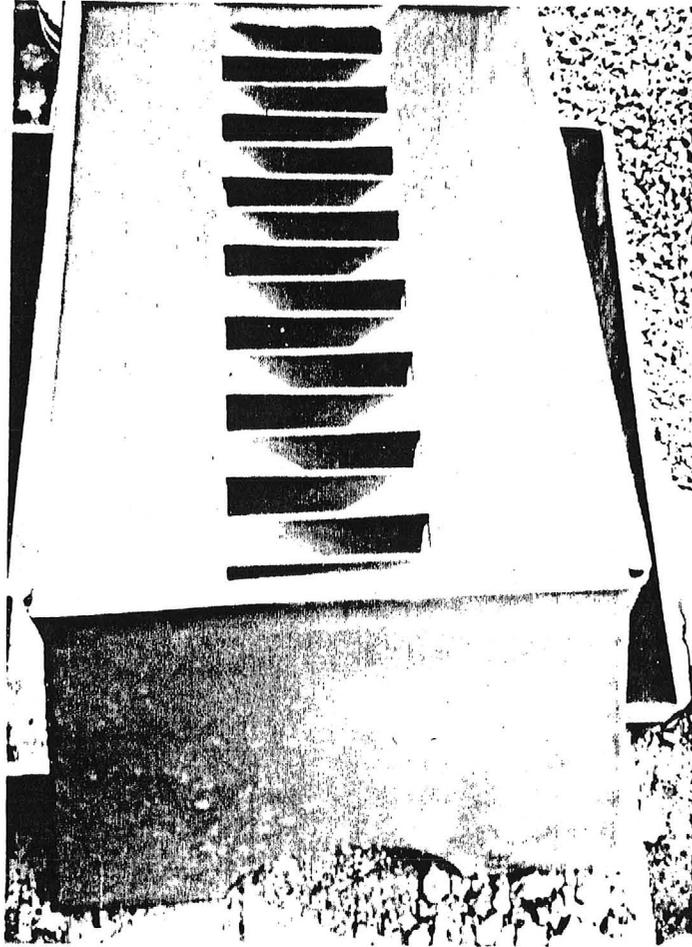
TEI uses a grid system based on the Cartesian coordinate system, incorporating north, east, and elevation coordinates for its samples. A Caterpillar 225 Excavator is used to dig east/west trenches at intervals of 25 feet, and to a maximum depth of six feet. Along the trenches, at intervals of no more than ten feet, with the actual interval governed by rock formation and structure, a channel approximately three inches wide and one inch deep is cut in the rock face. This yields a sample weighing approximately twenty five pounds, which satisfies to two requirements: it is representative, and it is manageable by one person.

The individual samples taken are each representative of, on average, 150 tons of ore, allowing TEI geologists precise definition of ore zones and geological structures.

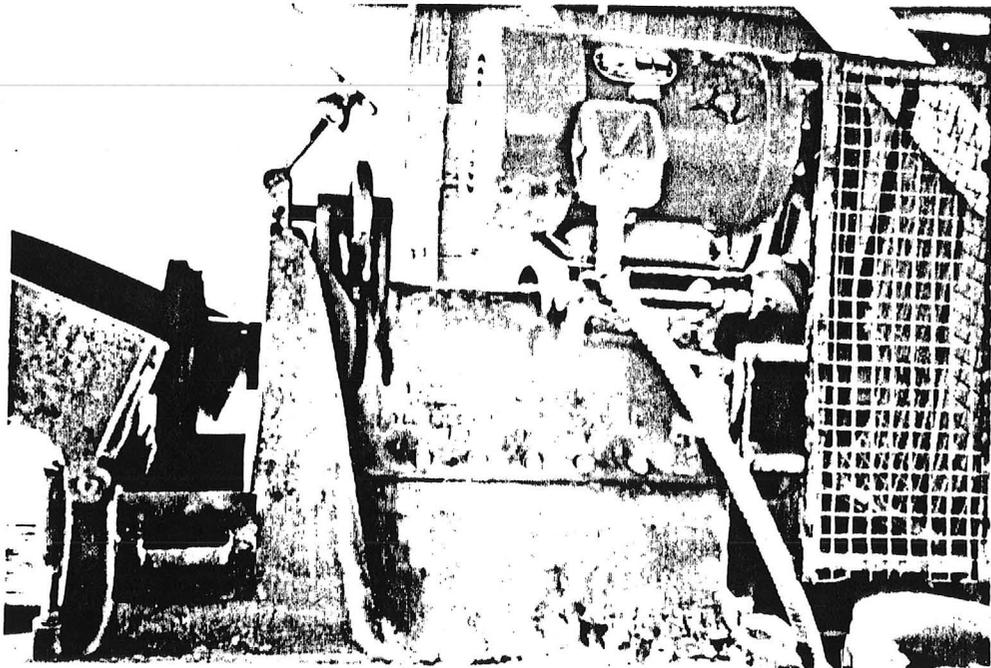
The collected sample is prepared for assay in five stages. It is crushed to minus one inch and a split is taken. This split is then impact milled and another split is taken, which is then pulverized and sent to the assay laboratory. By using progressive splitting, the final assay results are much more representative than those obtained by simple one stage pulverizing.

When the assay report is returned, the assay value of the sample, using its specific coordinates, is plotted on a map. When all the assays for a particular bench have been plotted, grades are designated for the ore, using the weighted average method.

SAMPLING



Splitter

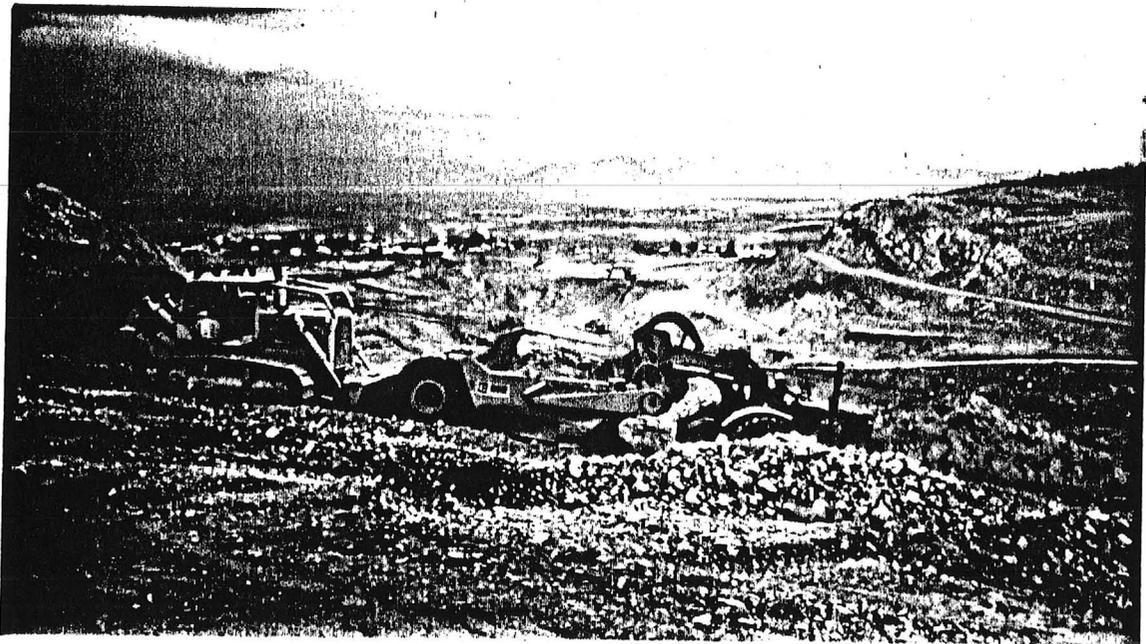


Pulverizer

TEI has established three grades for the rock which it mines, based on silver content per ton of rock, (gold content in the ore at TEI has, on average, a dollar value equivalent to 80% of the dollar value of the silver content). The grades are: waste (less than .25 ounces of silver per ton), mid grade (.25 to 1.5 ounces of silver per ton), and ore (above 1.5 ounces silver per ton). Since May, 1983, the mid grade has been mixed with the ore, as the combined values are above 1.5 ounces of silver per ton. In the course of mining the ore, the mid grade material has to be mined and moved. The marginal cost of processing this material is more than offset by the income from the silver and gold recovered.

After the average grade has been determined, tonnage is calculated for the volume of ore. The ore zone is then marked on the bench with color-coded flags for mining.

MINING



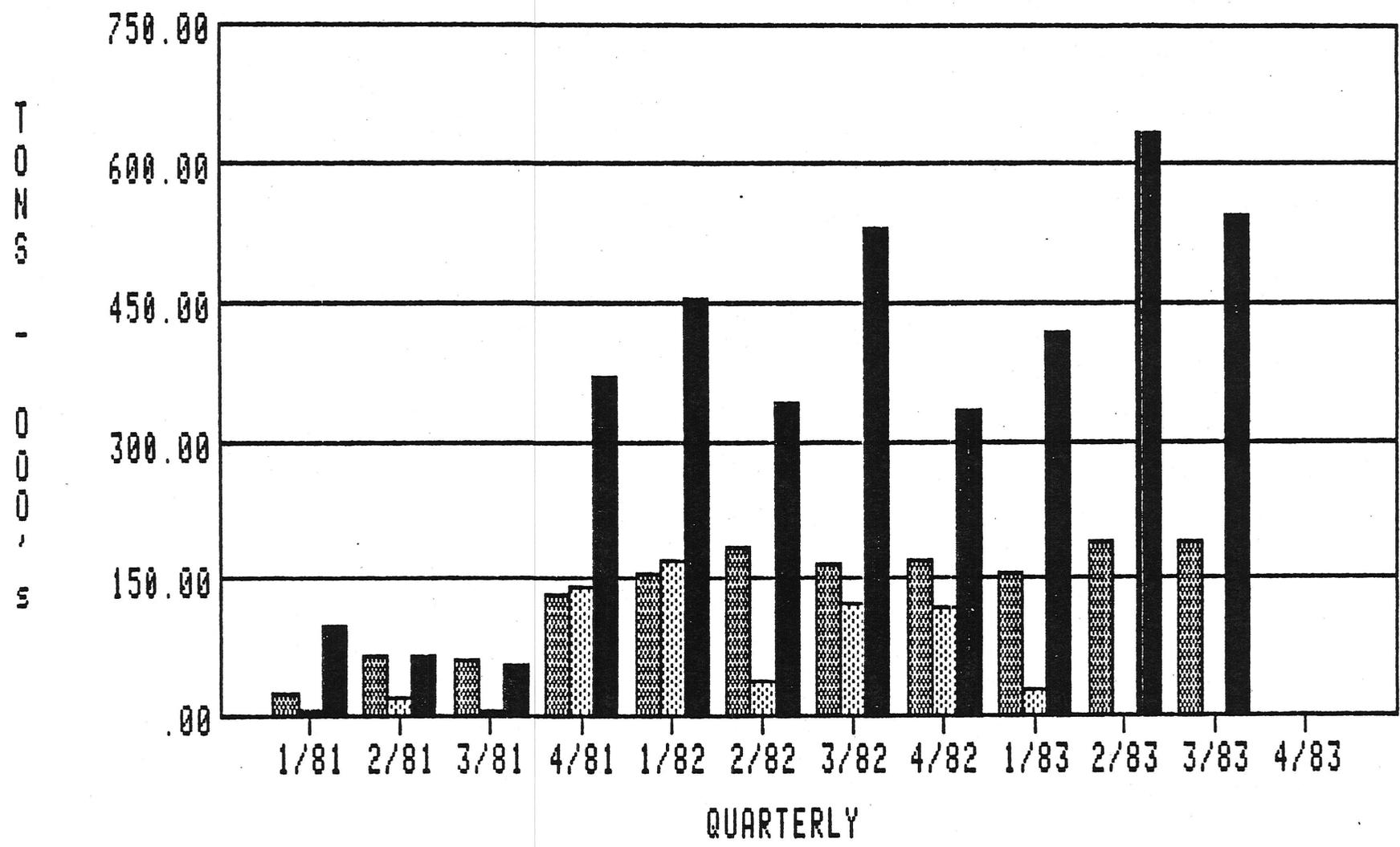
Mining Department

TEI uses the mining method of ripping the rock and picking it up with 35 ton scrapers. Less than 10% of the rock requires drilling and blasting, and the resulting mining cost per ton is low for an open pit operation.

The mining is subcontracted to Magini Leasing and Contracting. Equipment employed by the contractor includes seven 637C Caterpillar scrapers and five D9G Caterpillar bulldozers. Magini moves about 7500 tons of TEI material per day.

The mined ore is transported by the scrapers to the crushing circuit.

A 600 foot conveyor belt has been purchased, which TEI is considering installing from the pit to the crusher. Maintenance and repair costs will be low, and fewer operating personnel will be needed. The conveyor will also allow an advantageous stripping ratio.



 WASTE
 MIDGRADE
 ORE

TONNAGE MOVED FROM OPEN PIT

Total Tonnage

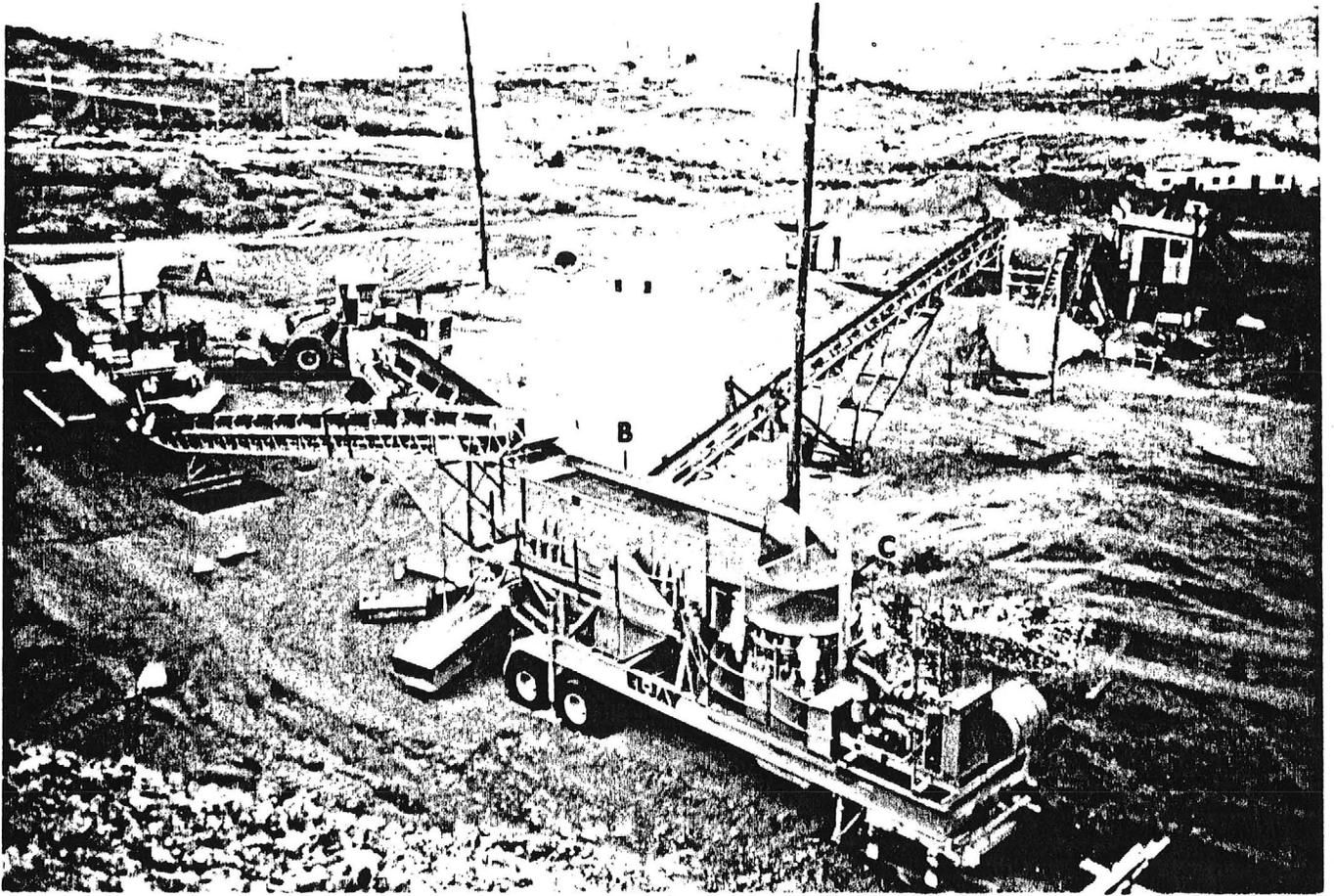
From the Contention-Grand Central open pit TEI has mined a total of 5,262,271 tons.

The following are ore records from 1981 to the present.

DATE	ORE	MIDGRADE	WASTE
1981			
1st quarter	22,500	5,780	98,500
2nd quarter	66,444	20,990	68,741
3rd quarter	61,281	4,704	56,163
4th quarter	132,362	141,730	369,565
TOTAL 1981	282,587	173,204	592,969
1982			
1st quarter	158,562	172,839	451,985
2nd quarter	186,261	38,245	341,203
3rd quarter	165,736	124,367	528,560
4th quarter	168,557	119,623	331,841
TOTAL 1982	679,116	455,074	1,653,589
1983			
1st quarter	155,135	29,421	414,296
2nd quarter	191,407	2,608	633,295
3rd quarter	181,535	0	764,514
1983 TO DATE	528,077	32,029	1,812,105
TOTAL	1,489,780	660,307	4,058,663

TOTAL TONNAGE MOVED FROM THE OPEN PIT: 6,208,750

CRUSHING CIRCUIT



A. Primary crusher

B. Shaker screen

C. Cone crusher

D. Pelletizer

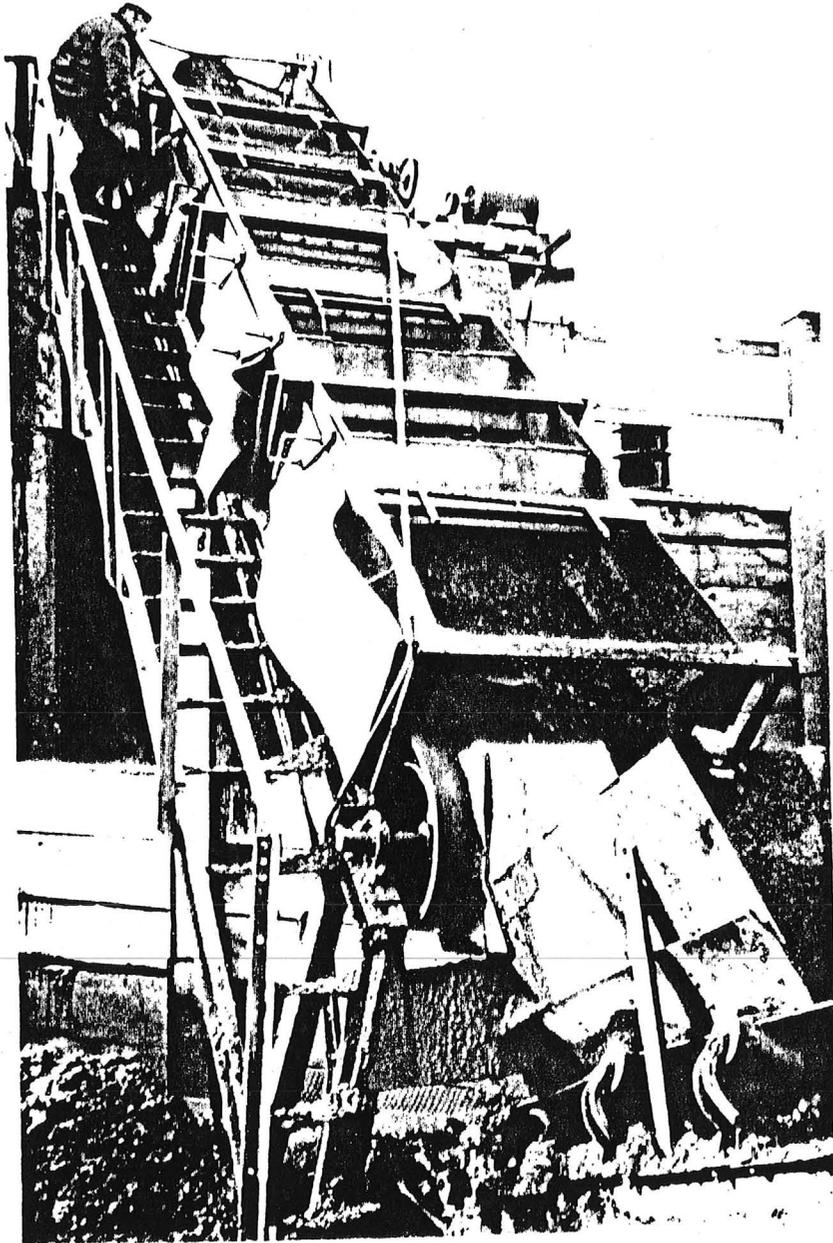
Crushing Department

TEI operates a portable 36" x 24" Cedarapids jaw crusher and 54" Eljay cone crusher, with a rated capacity of 150 tons per hour. The crusher is generally operated two shifts per day, six days per week.

Ore from the stockpile is fed into the vibrating hopper of the primary crusher. The oversize ore is scalped by the grizzly, and the rock is crushed to minus 3" in diameter. The fines and crushed rock are screened to minus 3/4". The oversize material continues across the screening decks and into the secondary crusher, and is then dumped with the screened material onto a stacker belt which transports it to the pelletizer.

Research is being done to determine the feasibility of employing a heat exchange system in the crusher to heat the spray to the pads in cold weather, to improve precious metal recovery.

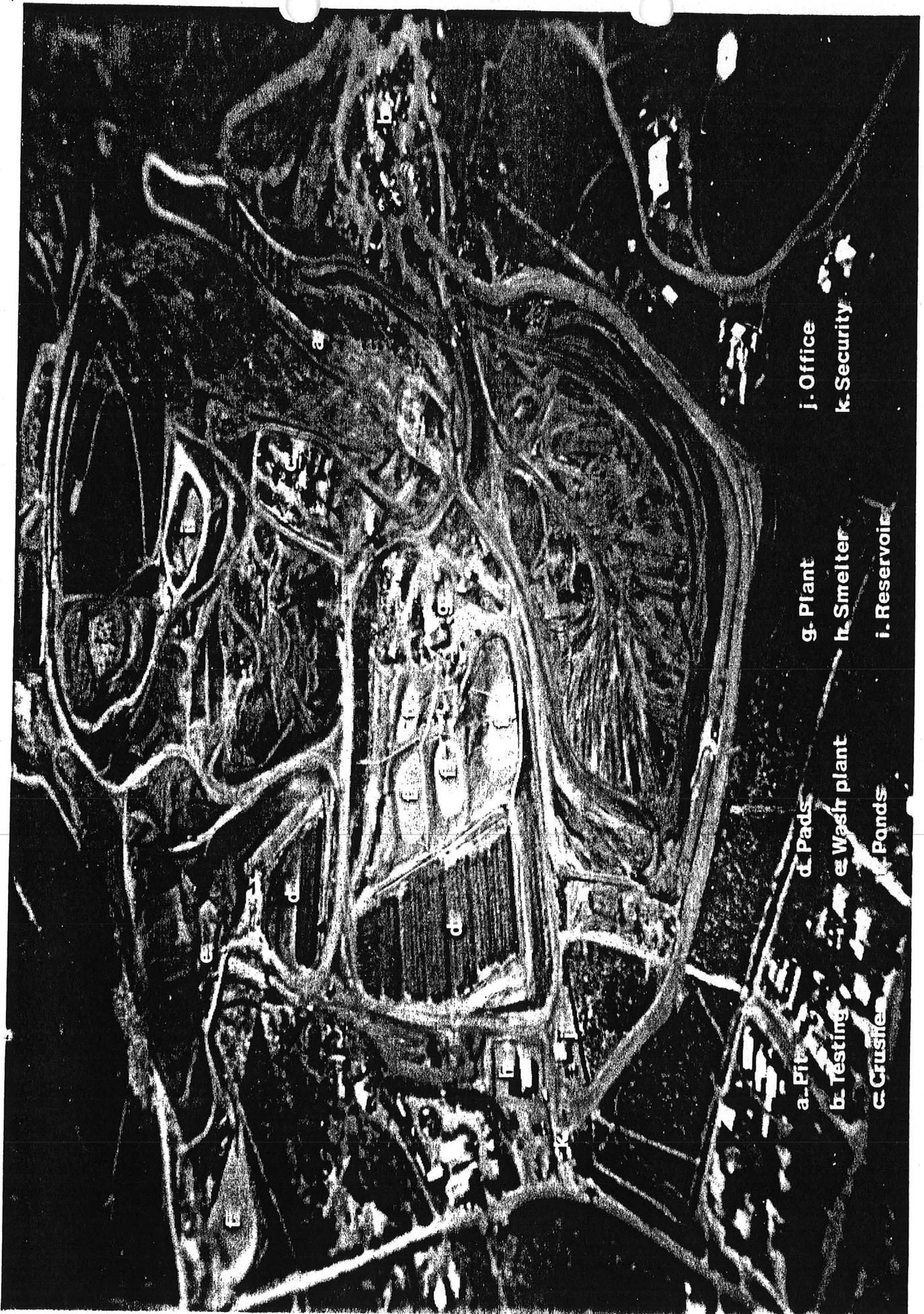
PELLETIZING



Pelletizing Department

After the ore is crushed, lime is added. Then both the fines and the larger particles and fragments are gravity-fed into the pelletizer. The crushed ore slides down an inclined conveyor belt which is moving upward against the flow of ore. The broken ore is sprayed with cyanide. The fines adhere to the larger particles or fragments, increasing their already relatively large mass. The advantages produced by this process are significant. The crushing tends to break the ore-bearing rock along its fracture or cleavage planes or lines. The smaller the post-crushing particles, the greater the total surface area exposed. The fines (particles under one half inch in diameter) tend to be captured by the larger particles or fragments. They adhere in irregular patterns, not in smooth concentric layers. This prevents compaction of fines into a non-permeable, low porosity mass. Increasing porosity and permeability facilitates greater recoveries from the leaching process in less time.

The pelletized ore is dumped onto stacker belts and piled for haulage.



j. Office
k. Security

g. Plant
h. Smelter
i. Reservoir

d. Pads
e. Wash plant
f. Ponds

a. Pits
b. Testing
c. Crushers

Leaching Department

The pelletized ore is allowed to "cure" for between 24 and 48 hours on the production pads. It is then sprayed with solution to extract the precious metal values. In excess of one pound of cyanide per ton of solution is needed for extraction. Lime and caustic soda are added to the solution to maintain the correct pH level. The spray is recirculated over the pads.

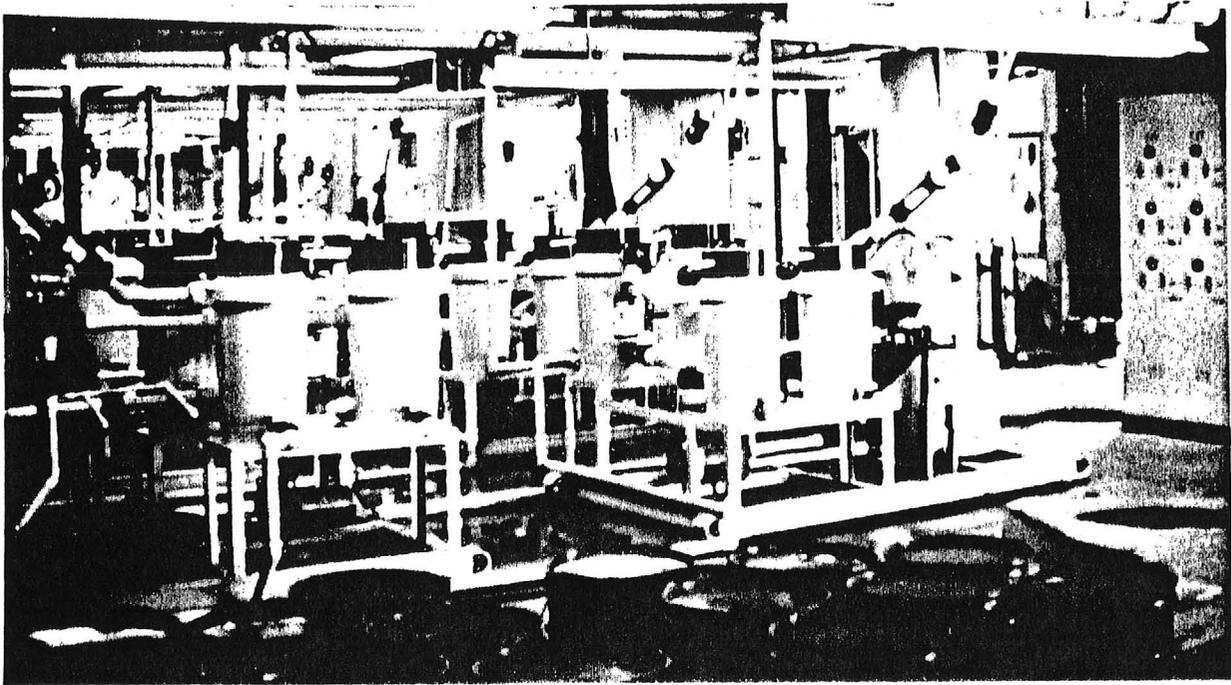
Two production pads, each 350 feet by 400 feet, are located on the Content and Contentment claims. They are stacked to a height of 7 feet. A further pad, located on the Houghton claim, is 300 feet by 300 feet. Half of this pad is used for leaching pelletized ore, and half is used for the stockpile from the wash plant. The pads can hold a total of approximately 125,000 tons of ore.

The fresh water reservoir has a capacity of 2,500,000 gallons, and is fed from three wells on TEI property. The reservoir feeds the spray pond, which has a capacity of 1,000,000 gallons. The reservoir also provides water for the crusher and the water trucks, which spray the roads to keep dust from the air.

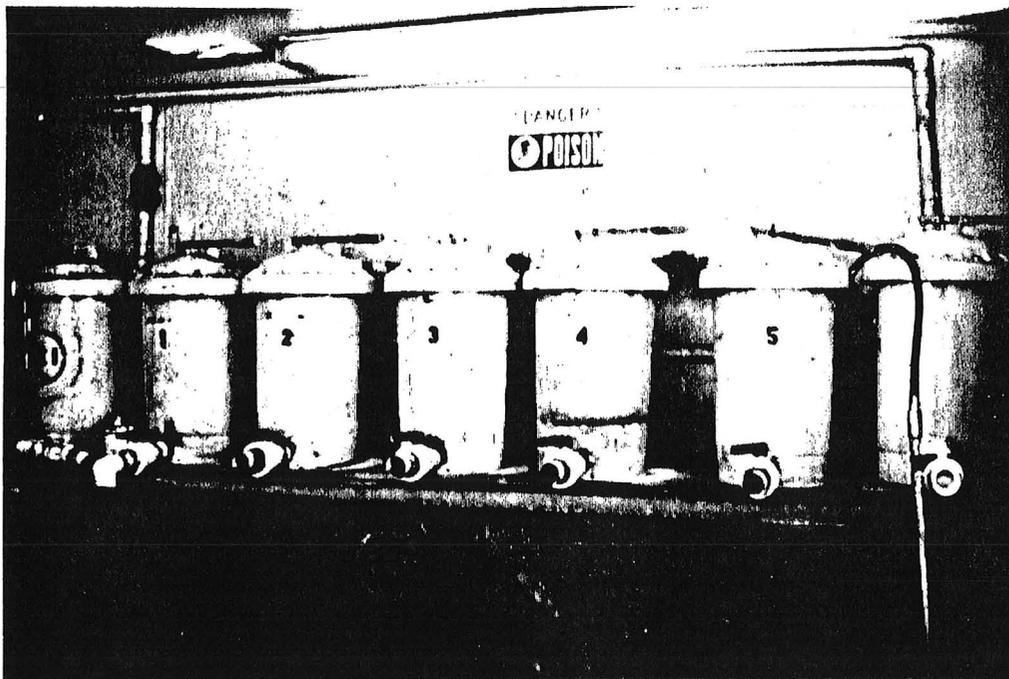
Cyanide and lime are automatically added to water entering the spray pond, and the solution goes down an inclined chute with baffles to ensure proper mixing. Two pumps, with a combined capacity of 700 gallons per minute, pump the solution to the pads.

Pregnant solution from the production pads is collected in a 1,500,000 gallon preg pond. It is recirculated until the values in solution are appropriate to process through the plant department. After processing, the solution, now barren, is returned to the spray pond, completing the closed circuit.

PLANT DEPARTMENT



Precipitation plants



Secure collection area

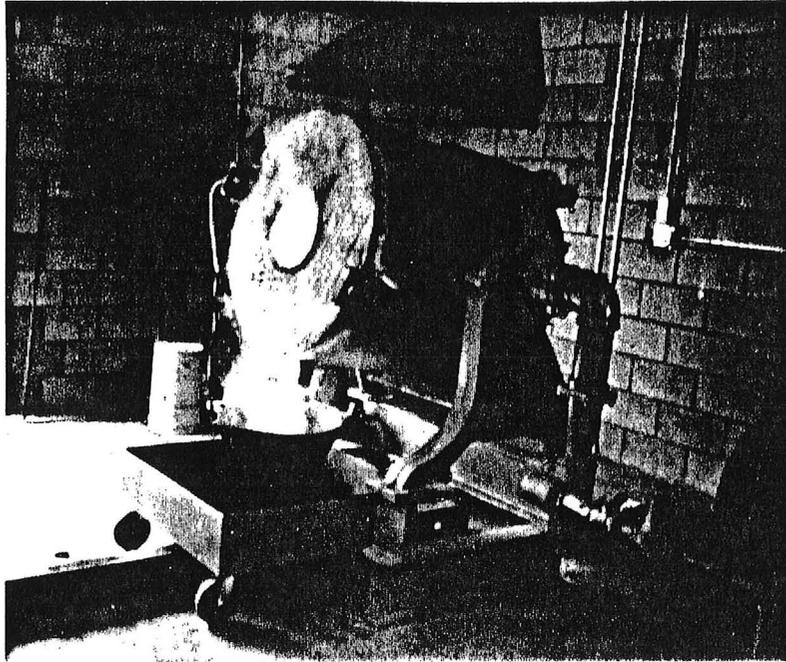
Plant Department

TEI has incorporated six Merrill Crowe zinc precipitation plants manufactured by the State of Maine Mining Company. Each plant has a rating of 300 tons of solution per day, for a total of 1800 tons of solution per day. An adequate amount of zinc dust is added to the solution, which causes the precipitation of the gold and silver from the solution. Simple sodium sulfide tests are performed to determine the amount of zinc to be used. Innovations and efficient operation have increased the capacity of the plants to a total exceeding 2000 tons of solution per day. A venturi system is used to create a vacuum to remove the dissolved oxygen from the pregnant solution. Each precipitating plant can operate separately or in conjunction with the others. In the event of any component failure on one plant, the entire processing does not shut down.

The precipitates are pumped into a secure area, where access is limited to a few key personnel. They are then dried in a drying oven and transported to the smelter.

TEI has recently installed an additional six Merrill Crowe plants, housed in a building adjacent to the present plant building. These plants will have the capacity to process TEI's increased production, and the anticipated production from the wash plant.

SMELTING



Smelter



Vibrating table & slag

Smelting Department

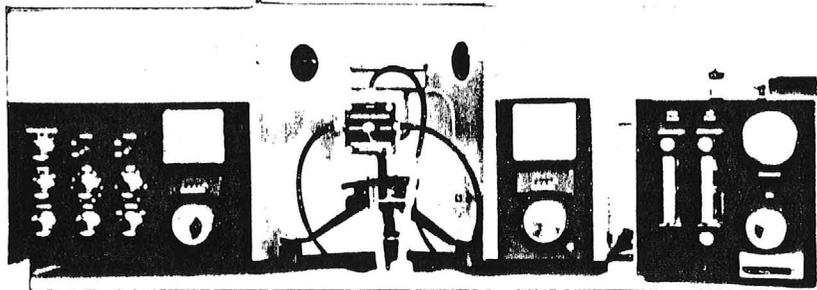
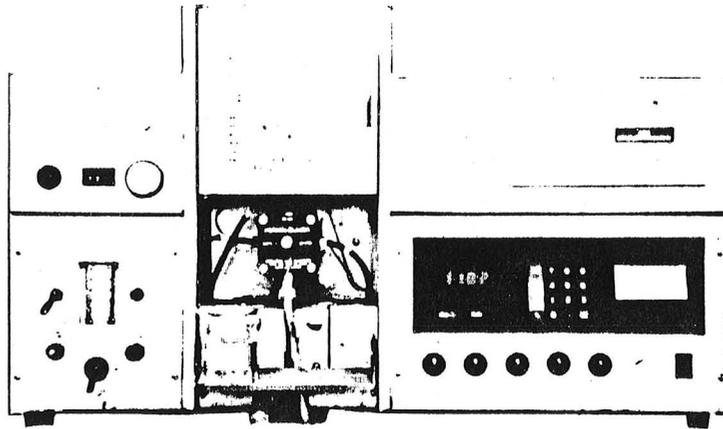
The Smelting Department is located in sight of the main security station, and is surrounded by two chain link and razor wire fences. Two fully automated tilt furnaces, one of which was engineered and constructed by TEI, are used to smelt the precipitates. The furnaces use #430 crucibles. The precipitates are handled in pre-weighed paper bags, to prevent airborne losses.

The smelted dore' averages 92% silver and 1.5% gold. It is stored in a time lock vault of steel and concrete sunk into the floor of the smelter building. The vault is under closed circuit television surveillance.

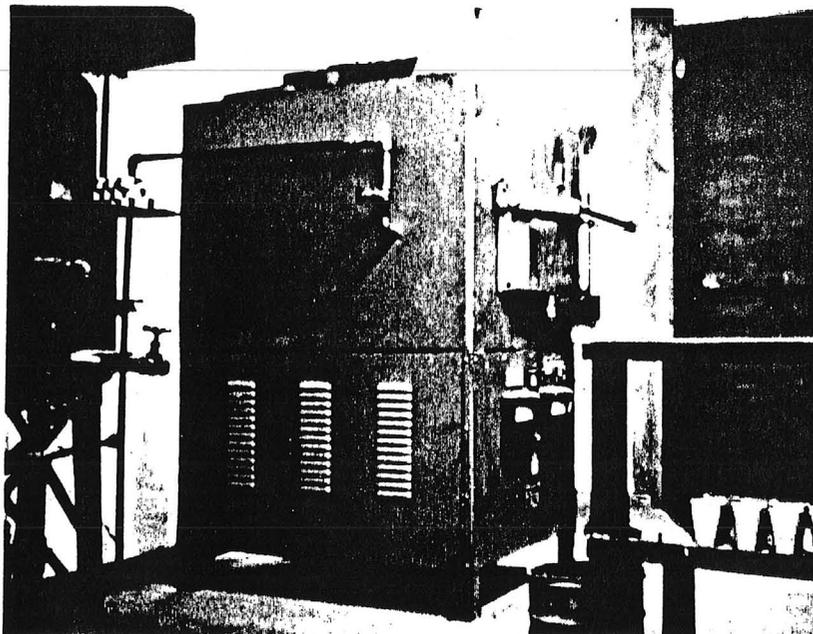
The dore' is shipped by armored car to an airport, and then by TEI's Cessna T210 aircraft to a refinery. TEI has current contracts with Engelhard, Johnson Matthey, and Handy and Harmon. TEI has trained its own representative, who is present at the weighing and assay of the dore' in the refinery, rather than relying on an outside witness. A vacuum tube is used, under TEI's observation, to collect a homogeneous sample from the molten dore'. The sample is cut into thirds; one third remains with the refinery, one is sent to an independent laboratory, and one returns to TEI's testing department.

From the smelting process, TEI has accumulated a large volume of slag with appreciable metal values. Smelting Department personnel process this material with an impact mill and vibrating table. TEI is building a larger table to handle increased production.

TESTING



Atomic absorbtion spectrometers



Fire assay equipment

Testing Department

This department uses two atomic absorption spectrometers and full fire assay equipment. Sample testing is provided for the mining, leaching, plant and smelter departments to check the metallurgical balance; printed daily reports track the processing of the ore and allow fine tuning of the various controls. The reports are also sent by computer link to the New York office.

Mining Department:

Pit samples received daily are assayed for gold and silver by both atomic absorption and fire assay. The mining department uses the assay report to designate the sampled area as either ore, mid grade, or waste.

Leaching Department:

The testing department runs controls on the heads and tails of pad ore. This includes fire assay for gold and silver, and barrel tests for leachability and expected percentage recovery. Hourly samples are taken from the ore, mid-grade, and tails pads. The testing department assays for gold and silver values in solution. A careful monitoring of pH and cyanide content is conducted.

Plant Department:

Hourly samples are taken to determine the gold and silver values in the pregnant and barren solutions. Results of these assays are used for quality control by the plant supervisor.

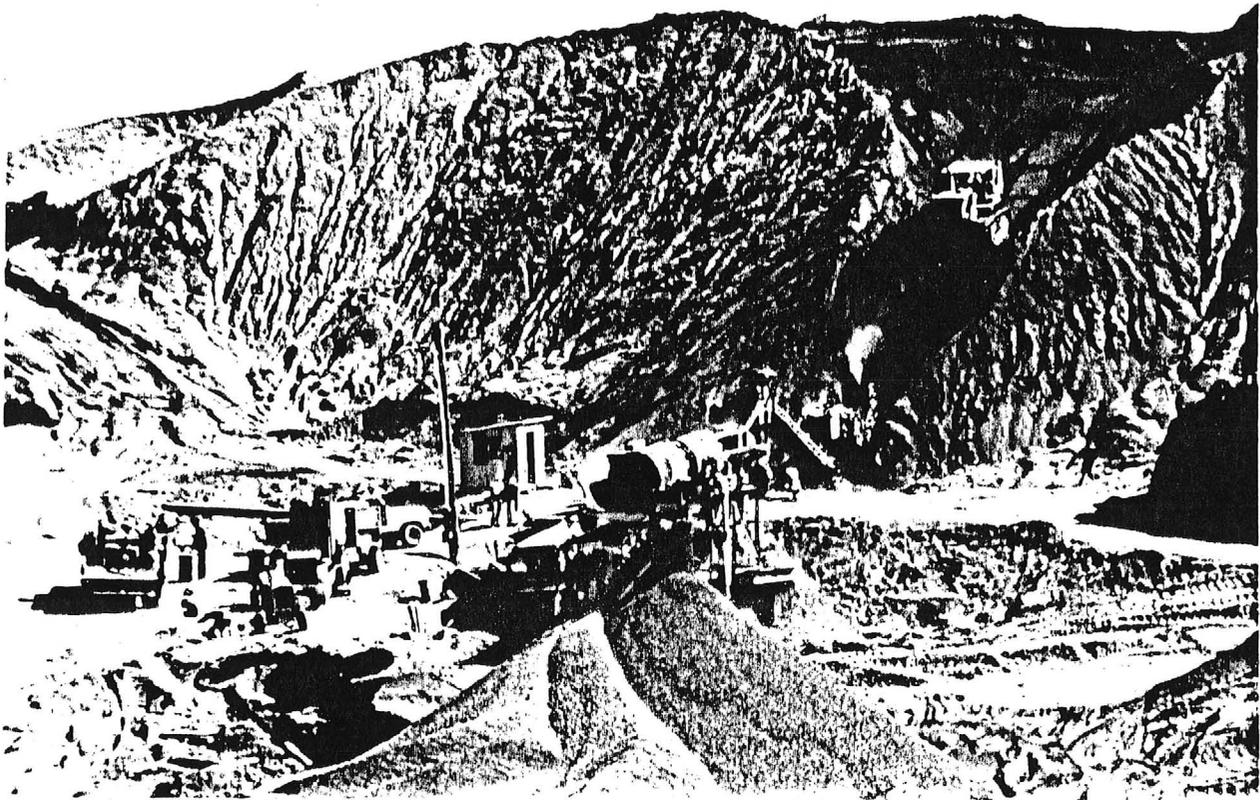
Smelter Department:

Fire assays are run daily on precipitate lots received by the smelter from the plant department. This allows management to compare actual dore' ounces to both plant results and pit samples from the mining department.

Research and Development:

The testing department analyses ore and wash plant material to determine crushing sizes, methods of separation and recovery, and possible innovations to increase profitability of TEI's operation.

WASH PLANT



Wash Plant

From TEI's mining and processing operations, the company has accumulated a stockpile of over 1,500,000 tons of pre-pelletized and leached material. This material has precious metal values which were not recovered in the heap leaching process. TEI has determined that it can, by processing the material through a wash plant, recover significant quantities of silver and gold. A representative sample of 5,000 tons was tested and yielded \$2.85 per ton in precious metals (based on silver at \$10 per ounce and gold at \$400 per ounce).

A trommel and twin sand screw are used to process approximately 500 tons per hour, which handles daily production and decreases the stockpile. Pregnant solution from the wash plant is pumped through a series of cyclones, which remove any material of 200 mesh and above. The solution then goes to a settling pond, and then to the plant department, where the silver and gold values are recovered.

The washed material is transported by conveyor to a stockpile located on the old Houghton pads.

The wash plant runs at a rate of 500 tons per hour; a six day week, with two shifts per day, yields a recovery of silver and gold with a value of approximately \$135,000. Operating costs do not exceed \$50,000.

A valuable by-product is also created from the wash plant operation in the form of construction aggregate. The washed rock and sand can be used for MA sand, CM11 chips, concrete rock and mortar sand. As the material is already mined and crushed, (the major costs in producing construction aggregate), expense is minimal, so TEI can be very competitive in supplying road surfacing to Southern Arizona. Sales have already been made to the town of Tombstone and the State of Arizona. In effect, the normal waste products of a mining operation have become a valuable and marketable commodity.

Current precious metal values in the ore TEI is mining do not justify the use of the type of mill customarily used in processing; however, by using the pelletizer, leaching pads, and the wash plant, and selling the recovered metals and the by-product, TEI may realize a greater income from its ore than could be achieved using a mill, and at a small fraction of the cost.

GEOLOGY

General

Tombstone deposits are vein structures which are characteristically irregular lenses and pods in favorable geologic bedding planes or slips, faults, fissures and brecciated shear zones. The favorable geologic horizons are in or near the Naco limestone, the Novaculite and the Blue limestone. Originally the ore solutions came up through rising vertical pipes as epigenetic replacement deposits where release of pressure and the chemical changes induced precipitation of the mineral values.

Regional

The rock formations of the Tombstone Hills range from Pre-Cambrian to Recent. The Pre-Cambrian is represented by a granodiorite intrusive. Paleozoic rocks are the Cambrian Bolsa Quartzite and Abrigo Limestone, and the Pennsylvanian-Permian Naco group sediments. Mesozoic sediments are the Cretaceous Bisbee group sediments. The Tertiary Period is represented by the Schieffelin Granodiorite intrusive and andesite porphyry dikes, the Uncle Sam Tuff and the Bronco Volcanics. Recent sediments consist of Quaternary Alluvium.

The Paleozoic and Mesozoic sediments in the Tombstone Hills have been folded, faulted during uplift, and intruded by late stage dikes of the Schieffelin Granodiorite.

Folding of the sediments has produced anticlines (rolls) which trend northwest. Later tectonism produced northeast trending fissures along which several dikes intruded the sediments. Emplacements of the Schieffelin Granodiorite and its late stage dikes, along with the extrusion of the Uncle Sam Tuff, took place in the Tertiary following the structural deformation. Mineralization has been inferred to be of the same age. Several episodes of faulting followed in Tertiary times after the intrusive emplacement. Late Tertiary and Quaternary have been an erosional period for the Tombstone Hills.

Local

The rocks exposed in current operations in the Contention-Grand Central pit are Bisbee group sediments which have been intruded by the northeast trending Contention dike. The Bisbee group sediments are a sequence of altered limestones, shales, and quartzites which strike generally N 30 degrees E and dip 35 degrees to the southeast. Intrusion of the sediments along northeast trending fissures, by andesite emplacement by hydrothermal solutions.

Major ore zones are developed along the Contention dike in intrusive breccias and along the fault line breccias of the Tranquility fault. Hypogene minerals in the ore zones are thought to have been tetrahedrite and various tellurides. However, subsequent leaching above the water table produced the supergene ore minerals currently being mined. The supergene minerals are primarily Chlorargyrite, Bromargyrite, Native Silver and Gold.

Currently, geological mapping of lithology and structure, on a scale of one inch = 20 feet, is providing new information to be used to expand existing ore zones and target new ones.

* A more comprehensive report on the Geology and Mineralization of the Tombstone Mining District is available upon request.

PLATE 7

SEQUENCE OF GEOLOGIC UNITS

		Geologic Units	Brief Description of Units
QUATERNARY		Phonolite porphyry dike	-very pale orange to pale yellowish-brown phonolite.
		Basalt intrusive	-dark gray to grayish black basalt has a micro-crystalline texture.
		Quaternary undivided	-Plio-Pleistocene Gila Conglomerate and modern gravel and alluvial deposits.
TERTIARY		Rhyolite porphyry: 63 m.y.	-grayish pink rhyolite with medium to fine grained phenocrysts in a devitrified groundmass.
CRETACEOUS		Hornblende andesite intrusives	-medium bluish gray to light olive gray andesite.
		Rhyodacite	-very pale orange to dark yellowish-orange rock with porphyritic-glassy texture.
		Granophyre dike	-grayish-orange-pink to pale yellowish-orange, medium grained rock with micrographic texture.
		Quartz latite porphyry	-light gray, holocrystalline rock with medium grained phenocrysts. This lacks a vitric groundmass and a pyroclastic texture.
		Uncle Sam Tuff: 71.9 ± 2.4 m.y.	-light yellowish-brown to light brown tuff- a lithic, crystal, vitric quartz latite porphyry intrusive.
		Schieffelin Granodiorite: 72 m.y.	-light gray to grayish pink, medium grained granodiorite.
		Andesite porphyry dikes	- 5 dikes, including the Boss dike. Dark greenish gray to grayish-orange andesite.
		Bronco volcanics Upper rhyolite member Lower andesite member	-pale orange to light gray rhyolite (tuffaceous beds and flows.) -greenish-gray to moderate-red andesite.
	Bisbee Formation: 3000 ft ±	-Basal Gila Conglomerate. Maroon sandstone and mudstones, minor limestone beds, and brown to buff sandstone.	
PERMIAN	MACO GROUP	Concha Limestone: 1500 ft.	-medium-gray, thin to medium thick, silty limestone.
		Scherrer Quartzite: 150 ft.	-lower-red siltstone, then white to brownish sandstone and minor limestone, limestone and dolomite, and upper light brown to pink sandstone.
		Epitaph Dolomite: 780 ft.	-lower dolomite, then calcitic siltstone, dolomite, and upper limestone.
		Colina Limestone: 635 ft.	-dark gray to nearly black, medium to thick bedded, crystalline limestone. Color weathers to pale gray.
PENNSYLVANIAN	MACO GROUP	Earp Limestone: 595 ft.	-extremely varied; lower-dominantly shale with minor sandstone; upper - pink to reddish brown, medium to very thick limestone and dolomite beds.
		Horquilla Limestone: 1100 ft.	-light to dark gray, medium bedded to massive limestone; contains red and green mudstones.
MISSISSIPPIAN		Escabrosa Limestone: 780 ft.	-lower: white to light gray, massive limestone and dolomite. Two chert horizons - dark gray to black chert beds and brown nodules. Sandstone and shale are absent; corals, crinoids, and brachiopods are present.
DEVONIAN		Martin Limestone: 230 ft.	-dark gray to brownish black; chert, limestone, sandstone, and shale. At Tombstone sandstone and shale predominates.
CAMBRIAN		Abrigo Limestone: 844 ft.	-grayish-olive green to dark greenish-gray colors, thin beds of conglomerates. 3 parts: 1. lower shale, limestone, and conglomerates, 2. med. crystalline limestone, 3. upper sandy limestone and quartzite.
		Bolsa Quartzite: 440 ft.	-pale orange on fresh surfaces; light brown on weathering. Thick to very thick bedded medium to very coarse grained, somewhat cross-bedded quartzite.
PRECAMBRIAN		Granite	-pinkish-gray to light-gray, medium grained, biotite granite, with a poorly to moderately well defined gneissoid structure.
		Pinai Schist	-dark greenish-gray to brownish-gray, moderately to well-foliated, fine grained, quartz sericite schist.

MINERALOGY

Memorandum on the Grand Central Contention Ore Zone, Tombstone AZ

by Sidney A. Williams
April 21, 1982

General. The Grand Central-Contention ore zone has been the most productive one in the Tombstone district, and virtually all ores produced occurred in the uppermost 500 feet of it. The zone is nearly vertical and over 3000 feet long. It is really a series of veins and veinlets generally paralleling a swarm of granodiorite dikes that strike slightly East or North and are en echelon.

Host rocks include gently dipping Bisbee group beds as well as the dikes that cut them. Within shales and quartzites of the Bisbee group ore is most apt to occur in veins, whereas in limy beds replacement type ores may occur. Ore also occurs in veins cutting the dikes as well as in the matrix of brecciated portions of the dikes where they have been disturbed by faulting.

The zone was discovered and first staked in 1878 by Boyer and Williams (Grand Central claim) and quickly followed to the north. In its first ten years it produced \$10M, or almost exactly half of the entire production of the district.

Mineralization. There have been two episodes of mineralization. The earlier episode was volumetrically the major one including all of the replacement ores and most of the veins. Base metals (Cu, Pb, Zn) were a major constituent, the ores consisting primarily of galena, sphalerite, and chalcopyrite, often with abundant pyrite. Although the gold content of these ores was negligible, silver was abundant, occurring in tetrahedrite and probably as various species microscopically present in galena.

The younger episode of mineralization occurred in veins and stringers along the Grand Central-Contention zone just as the earlier episode but these ores were especially prone to occur in or close to the dikes. The minerals included tellurides of gold, silver, and perhaps of lead (as well as galena).

Both mineralizing events affected not only major structures, thus producing veins, but occurred disseminated on a myriad of fractures and joints within the Bisbee group beds. Thus, although values were concentrated in larger or more obvious veins, primary values were also dispersed in the wallrocks between them. Recent open pit mining along the zone shows

clearly that in addition to the larger veins mined in the past there are numerous small veins and veinlets, and that between them, sulfides were dispersed in small amount on virtually every joint surface within the Bisbee group rocks.

Oxidation. The role of oxidation has been critical in understanding the distribution of ores in the zone. From the present surface down to the 100-200 foot level (the depth is variable) leaching and oxidation have been severe. Except in the larger structures already mined out, most of the silver has been oxidized and generally carried downward in a continuous process of leaching and redeposition as silver halides (mainly chlorides and bromides). The halides that fix the silver as relatively insoluble ore minerals such as chlorargyrite or embolite have been provided by ground water and rain water that have continuously percolated down through the zone. Gold has behaved similarly but undoubtedly to a much lesser degree so that downward enrichment has been slight.

We know from Rasor's work that only partially oxidized and very rich ores occurred on the 400 level, and historical records indicate that ore grades dropped dramatically just below the 500 level (the current water level was then at about the 600 level). The grade of silver ore, then, should increase downward from the surface, culminating about in the region of the 400 level, for it must be remembered that all silver leached from the surface has been redeposited during its downward descent. As noted already, the gold shows similar behavior but to a much lesser degree, and grade should increase only slightly.

Sampling. Since the major veins have long since been removed, future mining must depend on the smaller veins and veinlets and on the ores disseminated throughout the zone on fracture and joint surfaces. Because of the extensive fracturing and jointing in the Bisbee group rocks they are crumbly, and separate readily on a myriad of surfaces. Because of severe oxidation, the ore minerals on these surfaces are friable and are readily dislodged from them.

Thus the best possible assay is the tenor of ore actually removed by bulk mining. But, as discussed earlier, this represents an absolute minimum value, for the silver removed from the rock already mined has been leached and carried downward. Since we know that the ore zone extends downward another 400-500 feet, how should this block of ground be best

sampled? At the upper surface this is relatively easy. Backhoe trenching can provide bulk samples that accurately reflect ore grade with minimal loss of pulverulent ores on fracture surfaces. For samples below the surface, drifts and crosscuts in the old workings should be rehabilitated and used for channel sampling or even bulk sampling (mined material).

The ore zone is essentially a vertical slab with a "matrix" of low grade ores disseminated on joint surfaces and laced irregularly with small but richer veins. To attempt to sample such a block of ground by a series of vertical rotary or churn drill holes would be prohibitively expensive, and to drill parallel to the plane of the structure is questionable practice. Also, the friable nature of mineralized material would cause some losses, resulting in unreliable samples.

Dr. Sidney A. Williams received his M.S. degree from Michigan Technological University (1957) and his PhD from the University of Arizona (1962). He is a member of the Society of Economic Geologists, the Mineralogical Society of Great Britain, the Japanese Mineralogical Society, and a fellow of the Mineralogical Society of America.

Previous positions include Assistant Professor (Michigan Technological University) 1960-1963; Mineralogist (Silver King Mines) 1963-1965; Director of Exploration Research (Phelps Dodge Corporation) 1965-1982. He is now a private consultant to the minerals exploration industry.

Dr. Williams is the author of some 50 publications, a few of which are noted below:

1. The Tombstone District; Min. Rec. 1980
2. Structural, Petrological, and Mineralogical Controls for the Dos Pobres Ore Body (with J. M. Langton); Univ. Ariz. Press 1982
3. Mineralogy of Arizona (with J. Anthony and R. Bideaux); Univ. Ariz. Press 1977
4. Oxidation of Sulfide ores of the Mildren and Steppe Mines; Econ. Geol. 1963

MINERALS PRESENT IN THE TOMBSTONE MINING DISTRICT

H designates hypogene mineralization

S designates supergene mineralization

Silver minerals	argentite (acanthite) Ag_2S	S
	stromeyerite $\text{Ag}_2\text{S} \cdot \text{Cu}_2\text{S}$	S
	hessite Ag_2Te	H
	argentojarosite	S
	native silver Ag	S
	cerargyrite AgCl	S
	embolite $\text{Ag}(\text{Br}, \text{Cl})$	S
	bromyrite AgBr	S
	argentiferous tetrahedrite	H
	argentiferous galena	H
Gold mineral	native gold Au	
Lead minerals	galena PbS	H
	bournonite $\text{Cu}_2\text{S} \cdot 2\text{PbS} \cdot \text{Sb}_2\text{S}_3$	
	cerrussite PbCO_3	
	pyromorphite $9\text{PbO} \cdot 3\text{P}_2\text{O}_5 \cdot \text{PbCl}_2$	
	vanadinite $9\text{PbO} \cdot 3\text{V}_2\text{O}_5 \cdot \text{PbCl}_2$	
	descloizite $4(\text{Pb}, \text{Zn})\text{O} \cdot \text{V}_2\text{O}_5 \cdot \text{H}_2\text{O}$	
	mottramite (cuprodescloizite) $\text{Pb}(\text{Cu}, \text{Zn})\text{OH} \cdot (\text{VO}_4)_3$	
	anglesite PbSO_4	
	wulfenite PbMoO_4	
	plumbojarosite $\text{PbO} \cdot 3\text{Fe}_2\text{O}_3 \cdot 4\text{SiO}_3 \cdot 6\text{H}_2\text{O}$	
bindheimite-hydrous antimonate of lead		
Copper minerals	native copper Cu	
	chalcocite Cu_2S	
	stromeyerite $\text{Ag}_2\text{S} \cdot \text{CuS}$	

covellite CuS
 bornite Cu_5FeS_4
 chalcopyrite CuFeS H
 bournonite $\text{Cu}_2\text{S} \cdot 2\text{PbS} \cdot \text{Sb}_2\text{S}_3$
 tetrahedrite $5\text{Cu}_2\text{S} \cdot 2(\text{Cu}, \text{Fe})\text{S} \cdot 2\text{Sb}_2\text{S}_3$ H
 famatinite $3\text{Cu}_2\text{S} \cdot \text{Sb}_2\text{S}_5$
 cuprite Cu_2O
 tenorite CuO
 malachite $\text{CuCO}_3 \cdot \text{Cu}(\text{OH})_2$
 azurite $2\text{CuCO}_3 \cdot \text{Cu}(\text{OH})_2$
 rosasite $(\text{Cu}, \text{Zn})\text{CO}_3 \cdot (\text{Cu}, \text{Zn})\text{OH}_2$
 aurichalcite $2(\text{Zn}, \text{Cu})\text{CO}_3 \cdot 3(\text{Zn}, \text{Cu})\text{OH}_2$
 chrysocolla $\text{CuSiO}_3 \cdot 2\text{H}_2\text{O}$
 connellite $\text{CuSO}_4 \cdot 2\text{CuCl}_2 \cdot 19\text{Cu}(\text{OH})_2 \cdot \text{H}_2\text{O}$
 brochantite $\text{CuSO}_4 \cdot 3\text{Cu}(\text{OH})_2$
 beaverite $\text{CuO} \cdot \text{PbO} \cdot \text{Fe}_2\text{O}_3 \cdot 2\text{SO}_3 \cdot 4\text{H}_2\text{O}$

**Manganese
minerals**

alabandite MnS H
 hataerolite $\text{ZnO} \cdot \text{Mn}_2\text{O}_3$
 polianite MnO_2
 pyrolusite MnO_2
 manganite $\text{Mn}_2\text{O}_3 \cdot \text{H}_2\text{O}$ S
 psilomelane H_4MnO_5
 rhodochrosite MnCO_3
 "black" calcite contains minute Mn oxides

Zinc minerals

sphalerite ZnS H
 smithsonite ZnCO_3
 hydrozincite $\text{ZnCO}_3 \cdot 2\text{Zn}(\text{OH})_2$
 rosasite $(\text{Cu}, \text{Zn})\text{CO}_3 \cdot (\text{Cu}, \text{Zn})\text{OH}_2$
 aurichalcite $2(\text{Zn}, \text{Cu})\text{CO}_3 \cdot 3(\text{Zn}, \text{Cu})\text{OH}_2$
 calamine (hemimorphite) $2\text{ZnO} \cdot \text{SiO}_2 \cdot \text{H}_2\text{O}$