



CONTACT INFORMATION

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Arizona Department of Mines and Mineral Resources Mining Collection

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PRINTED: 02/06/2003

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES AZMILS DATA

PRIMARY NAME: CYCLOPIC

ALTERNATE NAMES:

CLIMAX
GOLD BAR
BIG LEDGE
SAN JUAN

MOHAVE COUNTY MILS NUMBER: 183A

LOCATION: TOWNSHIP 28 N RANGE 18 W SECTION 30 QUARTER S2
LATITUDE: N 35DEG 46MIN 58SEC LONGITUDE: W 114DEG 14MIN 39SEC
TOPO MAP NAME: GOLD BASIN - 7.5 MIN

CURRENT STATUS: PAST PRODUCER

COMMODITY:

GOLD
SILVER

BIBLIOGRAPHY:

ADMMR CYCLOPIC MINE FILE
ADMMR MOHAVE CUSTOM MILL PROJECT MAPS
ADMMR INTERMOUNTAIN EXPLORATION CO. FILE
SCHRADER, F.C. "MIN. DEPTS OF CRBT RNGE, BLCK
MTN, GRND WSH CLFS,AZ" USGS BUL 397, P 124-6
INDIAN CLAIMS COMM. DOCKET NO. 90, P 101,1946
MALACH, R "MOHAVE CTY PLACE NAMES" P 24, 1977
MALACH, R "CRBT MTN. CTRY" P 35, 1975
BLM AMC FILE 24466
WILSON, E.D. "AZ LODGE GLD MNS" AZBM BULL 137
P 77, 1967
ALSO IN SEC. 19, S2S2, T28N-R18W
ADMMR CYCLOPIC MINE & MILL COLVO FILE
USGS PP 1361, P. 137

12/18/90

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES FILE DATA

PRIMARY NAME: CYCLOPIC

ALTERNATE NAMES:

CLIMAX
GOLD BAR
BIG LEDGE
SAN JUAN

MOHAVE COUNTY MILS NUMBER: 183A

LOCATION: TOWNSHIP 28 N RANGE 18 W SECTION 30 QUARTER S2
LATITUDE: N 35DEG 46MIN 58SEC LONGITUDE: W 114DEG 14MIN 39SEC
TOPO MAP NAME: GARNET MTN - 15 MIN

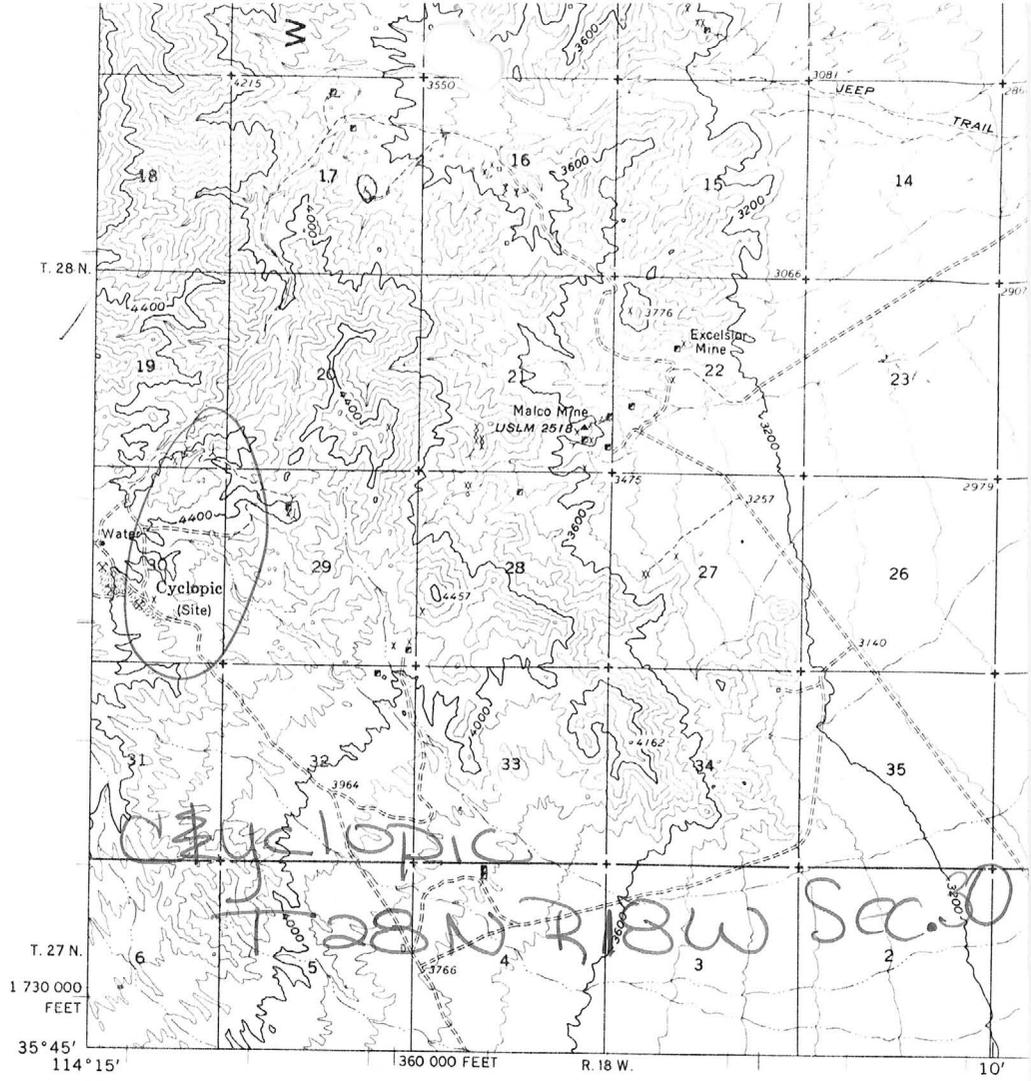
CURRENT STATUS: PAST PRODUCER

COMMODITY:

GOLD
SILVER

BIBLIOGRAPHY:

ADMMR CYCLOPIC MINE FILE
ADMMR MOHAVE CUSTOM MILL PROJECT MAPS
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MALACH, R "MOHAVE CTY PLACE NAMES" P 24, 1977
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AZ. BLM MINERAL CLAIMS FILE NO. 24466
WILSON, E.D. "AZ LODE GLD MNS" AZBM BULL 137
P 77, 1967
ALSO IN SEC. 19, S2S2, T28N-R18W
ADMMR CYCLOPIC MINE & MILL COLVO FILE
USGS PP1361, P. 137



(WHITE HILLS)

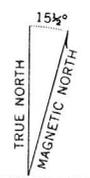
Mapped, edited, and published by the Geological Survey
Control by USGS and USC&GS

Topography from aerial photographs by photogrammetric methods
Aerial photographs taken 1958. Field check 1960

Underwater contours compiled from USDA maps
and later sedimentation studies

Polyconic projection. 1927 North American datum
10,000-foot grid based on Arizona coordinate system, west zone
1000-meter Universal Transverse Mercator grid ticks,
zone 11, shown in blue

Land lines unsurveyed in parts of T. 29 N.--R. 18 W.,
and T. 30 N.--Rs. 17 and 18 W.



APPROXIMATE MEAN
DECLINATION, 1960

Shirley Coté demonstrates the Museum's trinocular microscope with video camera attachment to visitors during Arizona Prospectors and Family Day at the Museum.

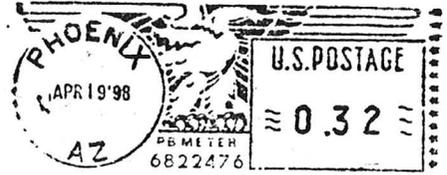
Ken C. Bennett -
Phoenix - Member

Alice Rosenfeld
Joe McIntosh
Ann Baker
Shirley Coté

CYCLOPIC



Arizona Department of Mines & Mineral Resources
1502 West Washington
Phoenix, Arizona 85007



Address Correction Requested



- Forwarding Order Expired
- Insufficient Address
- Moved, Left No Address
- Unclaimed Refused
- Attempted - Not Known
- No Such Street
- No Such Number
- Route No. Box
- City/initials

GONE

Now 3-22-98

Jack Bingham, Gen Mgr.
Nevada Pacific Mining, Cyclopic
707 Wells Road, #1
Boulder City, NV 89005

TODD OSMUNDSON, GEO.
NEVADA PACIFIC
BOX 61610

BOULDER CITY 89006
NV

702-294-1592

Home 702-263-0628

Comp. Fax 702-294-0070

702-294-1592 CNU

NOT IN SERVICE 3/27/98





ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

Fife Symington, Governor

Russell F. Rhoades, Director

NOTICE OF THE PRELIMINARY DECISION TO ISSUE AN INDIVIDUAL AQUIFER PROTECTION PERMIT

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

Public Notice No. 14-96AZAP
Cyclopic Gold Mine
Nevada Pacific Mining Company Inc.
707 Wells Road - Unit 1 *702 (294) 1592*
Boulder City, NV 89005
Aquifer Protection Permit No. P-102956

On or about April 8, 1996

Jack Bingham, Gov. Mgr.

The proposed Cyclopic Gold Mine facility is located approximately 19 road miles northwest from the town of Dolan Springs, Mohave County. The proposed facility is located over groundwater of the Hualapai Basin as described below using the Gila and Salt River Base Line and Meridian:

Township 28 North	Range 18 West,	Section 30	Quarter - All
Township 28 North	Range 18 West,	Section 19	Quarter - SE1/4
Township 28 North	Range 18 West,	Section 32	Quarter -NW1/4, SW1/4, SE 1/4
Township 28 North	Range 18 West,	Section 33	Quarter -SW1/4
Township 28 North	Range 18 West,	Section 34	Quarter -SE1/4
Township 28 North	Range 18 West,	Section 35	Quarter -SW1/4, SE1/4

Township 27 North	Range 18 West	Sections 3	Quarter -NW1/4, NE1/4
Township 27 North	Range 18 West	Sections 4	Quarter -NW1/4, NE1/4

Latitude 35° 47' 7" North and Longitude 114° 14' 54" West.

The Cyclopic Gold Mine will be authorized to operate an open pit mine, ore crushing and agglomeration operations, a lined heap leach pad, pregnant solution pond, barren solution pond, process plant with cyanide tank, fuel tank farm stormwater conveyance channels, process solution ditches and process pipelines, according to the design and operational plans approved by the Arizona Department of Environmental Quality (ADEQ) Aquifer Protection Program Section.

The facility will mine and leach a low-grade ore that will be deposited in two phases on a composite-lined heap leach pad. The area of Phase 1 of the heap leach operation will be 17 acres or 740,520 ft². The combined area of Phase 1 and Phase 2 of the heap leach operation

will be 34 acres or 1,481,040 ft². The heap leach pad has been designed to accommodate 4.7 million tons of ore. Nevada Pacific Mining estimates that 750,000 tons of ore will be placed per year for a period of 4 to 6 years. The heap leach pad will be constructed with a composite liner and leak detection system and will be operated not to discharge. The pregnant cyanide solution from the heap leach pad will be collected and transported to a lined pregnant solution pond. Solutions from the pregnant solution pond will be pumped to a series of carbon columns for extraction of the gold. Barren solution from the processing plant will drain by gravity to the barren solution pond. Both the pregnant and barren solution ponds will be constructed with double liners and leak detection systems and will be operated not to discharge.

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, Shirin Tolle, APP Mining Unit, Arizona Department of Environmental Quality, 3033 N. Central Ave., Phoenix AZ, 85012 within thirty (30) days from the date of this notice. Public hearing request must include the reason for such a request.

from: W.H. Crutchfield Jr. Mohave County Prospect Assessment Compilation (post 1982)

Name of Mine or Prospect: Cyclopic Mine	Township 28N	Range 18W	Section 30 d	Priority A
Principal Minerals: Gold	1:250,000 Quad Kingman		7.5' - 15' Quad Garnet Mtn. SW	
Associated Minerals: Hematite, Limonite, Quartz	District Gold Basin		Principal Product Gold	
Type of Operation: Underground and Surface	County Mohave	State AZ	Type of Deposit Vein	

Ownership or Controlling Interest:
T.C.King, Rt. 2, Box 7A, Florance, AZ (1980)

Access: Pierce Ferry road for 17.5 miles NE of US Hwy 93. Turn left (NW) onto unimproved dirt road for 6.5 miles to Cyclopic mine (marked on topographic map).

Structural Control or Geological Association:

"The country rock is a medium-grained coarsely porphyritic granite; the deposits consist of gold-bearing iron-stained breccia in strands of vein quartz, the material is cemented by silica and iron oxide; it trends N57°W in an area .75 mile in length and is approximately 200 feet in width."¹

"The Cyclopic mine is bordered on both sides by slightly porphyritic quartz monzonite. The zone of mineralization is cut by numerous low angle faults of unknown age. The zone is poorly exposed but appears to consist of granitic rocks and quartz veins which have been intensely brecciated, sheared and altered to sericite and clay minerals along the faults."⁴ Sample 80cj12 is a background sample of red weathering biotite quartz monzonite collected immediately northeast of the Cyclopic Mine.

Age of Mineralization:

Production History	Geochemical Analyses			
1000 feet or more of underground workings. ¹	"Low grade ore \$2.00 to \$8.00 ton." ²			
	Assay (1980) ⁴ .	Lab	Gold	Silver
	80cj12	U	Trace	0.1
		H	Trace	0.10
		P	0.02	0.8
P		None	0.6	

References

- 1) Schrader (1909) p. 124-125.
- 2) Mallach (1977) p. 53.
- 3) CETA map file Rack #5 and #26, claim, underground and assay maps.
- 4) Liggett, Childs and Crutchfield (1980) Field reconnaissance.

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES

VERBAL INFORMATION SUMMARY

1. Information from: Peter Loughead, Prime Exploration
2. Address: Tenth Floor, 808 W. Hastings St., Vancouver, B.C. V6C 2X4
3. Phone:
4. Mine or property name: Cyclopic
5. ADMMR Mine file: Cyclopic
6. County: Mohave
7. MILS number:
8. Operational Status: Exploration
9. Summary of information received, comments, etc.:

Mr. Loughead inquired about Water Resources Drilling permits. He knows they are required for reverse circulation drilling, but he could not get anyone there to understand what he needed. Helped him get the necessary applications. They plan to begin drilling this week on the Cyclopic property and the Red Cloud shaft area immediately to the south.

Prime Exploration is the management company of Murry Pezim's Prime Equity holding group of some 50 companies. Announcements will be made under the name of Consolidated Rhodes Resources for this project.

Date: Dec. 3, 1990

Ken A. Phillips, Chief Engineer

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES

VERBAL INFORMATION SUMMARY

1. Information from: Arden Larson
2. Address: 2340 Viewcrest, Henderson, NV 89014
3. Phone: 702-451-4600
4. Mine or property name: Cyclopic
5. ADMMR Mine file: Cyclopic
6. County: Mohave
7. MILS Number: 183A
8. Operational Status:
9. Summary of information received, comments, etc.:

Mr. Larson reported he is the owner of the Cyclopic Mine. He has had it leased to various groups over the years.

He is investigating the possibility of shipping silica flux to a copper smelter or shipping to Malartic Hygrade at the Congress Mine. He believes he can hold 0.2 tr oz Au/ton in quartz vein material.

Date: June 19, 1990

Ken A. Phillips 

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES

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Date: June 19, 1990

Ken A. Phillips



ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES

VERBAL INFORMATION SUMMARY

1. Mine file: CYCLOPIC
2. Mine name if different from above:
3. County: Mohave
4. Information from: Don Jenkins
Company: Gold River Resources
Address: P.O. Box 4106
Prescott, AZ 86302
Phone: 778-6160
5. Summary of information received, comments, etc.:

Mountain States Resources of Denver has the Cyclopic Mine back from OP&P Gold Inc. (c). Drill proven reserves for the property are 150,000 tons at .07 oz/ton Au. Mr. Jenkins is negotiating to lease the property for some Canadian juniors. He also reports Arden Larson and Saratoga Mines are no longer involved with the property.

Date: December 20, 1988

Nyal J. Niemuth, Mining Engineer

CYCLOPIC MINE

MOHAVE COUNTY

KAP WR 7/20/73: Mr. Chester F. Millar of C. F. Millar Limited, 1758 West 8th Avenue, Vancouver9, B. C. was in to look over files on various mines in the Oatman, and Kingman areas. He has recently finished drilling various properties in that area. Twenty 100' deep holes were drilled on the Cyclopic property (Ed Schultz, owner) in a four by five matrix with the holes on 100' centers. An assay was run on each 10' section. The assays averaged 0.07 oz/ton in gold with the highest 10' section running 0.48 oz/ton in gold. Mr. Millar estimates the average to be 0.04 oz/ton in gold when the 0.48 value is excluded. He estimates that there is 800,000 tons of the 0.04 oz/ton material.

CJH WR 9/17/80: Charles E. McIntyre, 5704 Baltimore Drive, No. 294, La Mesa, California 92041, phone (714) 464-8038, is sampling the Cyclopic Mine in Sec. 30, T28N R18W, Gold Basin Mining District, Mohave County.

RRB WR 3/27/81: Richard L. Nielsen, Nielson Geoconsultants Inc., Suite 9B, CSB Bldg. 3560 N. Highway 74, Evergreen, Colorado 80439, was in the office looking at several properties in Yuma, Maricopa, and Mohave Counties for Hecla. He had the files for the Cyclopic Mine, Mohave County, copied.

NJN WR 11/23/84: At the Cyclopic (f) Mohave County on the AGS field trip it was reported that AMOCO Minerals may be acquiring Saratoga's lease on the property. Observed in the field to the west of the Cyclopic is a series of drill pads (now "reclaimed") made by U.S. Borax within the last year. Situated on basalt flows these drill holes were made to test for detachment related mineralization down dip from those outcropping at the Cyclopic. The results of the drilling were not released.

NJN WR 4/12/85: Richard Ahearns, (c) reports that Corn & Ahern Consulting Geologists (yellow card) have a small gold reserve of about 100,000 tons of low grade defined on their GB Claims near the Cyclopic Mine (f) in Mohave County. They are willing to sell/lease it to someone who wants to develop it.

CYCLOPIC MINE

MOHAVE COUNTY

NJN WR 11/8/85: ~~Jim Loughry of~~ Metals Economic Group reported that Amoco Minerals (now Cyprus Mines) (c) drilled and dropped both the Buzzworm (f) and Cyclopic (f) properties Mohave Co. which they had leased from Saratoga Mines (c).

NJN WR 2/20/87: Russ Corn (c) reported that the Cyclopic (file) Mohave County property contains 50,000 tons of tailings which average .06 oz/ton Au. Recovery of the tails by heap leach by agglomeration. The property contains an additional large tonnage of low grade gold resource.

NJN WR 6/12/87: Jim Loughry (card) reports that Saratoga Mines (card) controls 96% of the unpatented claims that cover the Fry (file) and Cyclopic (file) Mohave County. Messrs. Wym^a and King now only retain a 4% interest in the properties.

NJN WR 9/25/87: ^{Yage} Omega Press and Produce have picked up the Cyclopic Mine (file) and the Pac Mine (file) Mohave County. The company is believed to have an office in ~~Bullhead~~ ^{BULLHEAD} City, reported Fred Johnson.

KAP WR 11/7/87: Fred Johnson, Durango, Colorado reported that Al J. Brown, Managing Director, OP&P (card) holds the Cyclopic Mine (file) Mohave County. Hecla Mines has dropped the property after completing some drilling.



SARATOGA MINES, INC.

RECEIVED

JAN 20 1984

DEPT. MINERAL RESOURCES
PHOENIX, ARIZONA

RAMS
K

December 31, 1983

P.O. Box V • BLACK HAWK, COLORADO 80422 • (303) 892-7125

Saratoga Mines and Gold Basin Mining
Announce Joint Venture Plans

BLACK HAWK--Arden Larson, President of Saratoga Mines, Inc. announced today a joint venture to develop the CYCLOPIC mine and surrounding properties in Mohave County, Arizona, with Gold Basin Mining, Inc., a private Colorado corporation. Saratoga Mines (NASDAQ Symbol SARA) owns and operates a heap leaching project in Central City, Colorado, which began bullion production in late 1983.

Saratoga Mines, Inc. acquired a 20 percent interest in the Arizona properties by contributing unpatented mining claims and by granting options to the joint venture for acquiring 7 Million shares of Saratoga's common stock for \$1.45 Million if fully exercised. Saratoga also agreed to issue 3 Million shares of its common stock upon Gold Basin Mining's funding of \$574,000. to the joint venture for exploration costs before December 31, 1984. The shares are to be issued pro rata as the exploration funds are provided by Gold Basin Mining, Inc.

For further information, contact Stephen H. Topel, Controller, 2700 Youngfield St., Lakewood, CO 80215; phone 303-892-7125.

MEMORANDUM FOR FILES

FROM: Ann Turney
DATE: 7/24/80

Mr. Charles E. McIntyre of 5704 Baltimore Drive, #294, La Mesa, California, 92041 (714) 464-8038, came in to get information on the Cyclops and Fry mines in Mohave County (T28N R18W Sec. 30, Gold Basin Mining District).

He said that he had leased these mines (unpatented claims [38]) from a Richard V. Wyman and a Tom King (see Intermountain Exploration Co. File), and was trying to get some background information on past work. I checked the cards and we did not have a file on either. There was some information on the Cyclops in USGS Bulletin 397 and he took copies of that. The only reference we had on Fry was in the Eagle Picher Confidential File and I told him that he would have to talk to Mr. Jett concerning that information. I also checked the MILS lists and called Marie for the references on the two mines which were listed, however, those particular sheets are missing from our book so could not get any further references. Janice suggested that he go to their office and ask Larry Dietz to show him the original sheets. I gave him their address and phone number and he said that he would go over there at a later date, that he did not have time today.

He said that they were planning to open up this mine if the assays ran good enough. So far he has taken over 100 assays (Walt Statler ran them) and only a couple were even promising. His brother is a Canadian mining engineer and he is helping him with the project. Also, he said all the samples were taken by his nephew who is a Canadian geologist.

I gave him Cliff's card and Mr. Jetts card and he said he would try to get in touch with one of them and let them know what they are doing up there. He said there would be very little done up there until it cooled off.

CHARLES E. MCINTYRE

5704 BALTIMORE DRIVE, #294
LA MESA, CALIFORNIA 92041
(714) 464-8038

Iron Mountain Exploration Co., Inc.

P. O. Box 473

Telephone 293-1098

Boulder City, Nevada 89005

June 12, 1976

Donald R. Aldrige
Supervisor, District 1
P.O.Box 390
Kingman, Ariz., 86401

Dear Mr. Aldridge:

Thank you for your letter of June 7th.

We own the Juno mine, and lease the Hercules-Badger group. Just recently we dug deep trenches and sampled our mine dumps with the idea of leaching these.

We estimate that the Juno mine, three claims, contains ^{50,000} ~~75,000~~ tons of material that will run over 0.03 Au and over 2.0 oz. Ag/ ton. This material also contains some lead but under 1%.

At the Hercules-Badger group, approximately ^{50,000} ~~50,000~~ tons contain over 0.05 oz. Au and over 3 oz. Ag/ton and over 2% Pb.

Doe, Inc. also owns the Rambler, which has a dump containing 3000 tons of 0.15 oz. Au/ton. This should be trenched and sampled.

In another partnership between myself and Tom King of Prescott, Ariz., we hold a large number of gold claims at Cyclopic. At this place we have two tailings dumps that assay over 0.10 oz. Au/ton that should be sampled. These together total about ^{50,000} ~~100,000~~ tons.

Please let me know if anything develops.

Yours truly,

Richard V. Wynn
Richard V. Wynn, President

~~ANY NEW DATA~~

~~ALL DATA~~

NEW TONNAGE FIGURES
Verbally given to JH Jett
By MR RICHARD WYNN
IN HIS OFFICE, JAN 18, 1977

JH Jett

used
Mr Wynn give permission to
use figures in our custom
mill calculations

VERNON DALE
EXPLORATION MINING GROUND WATER

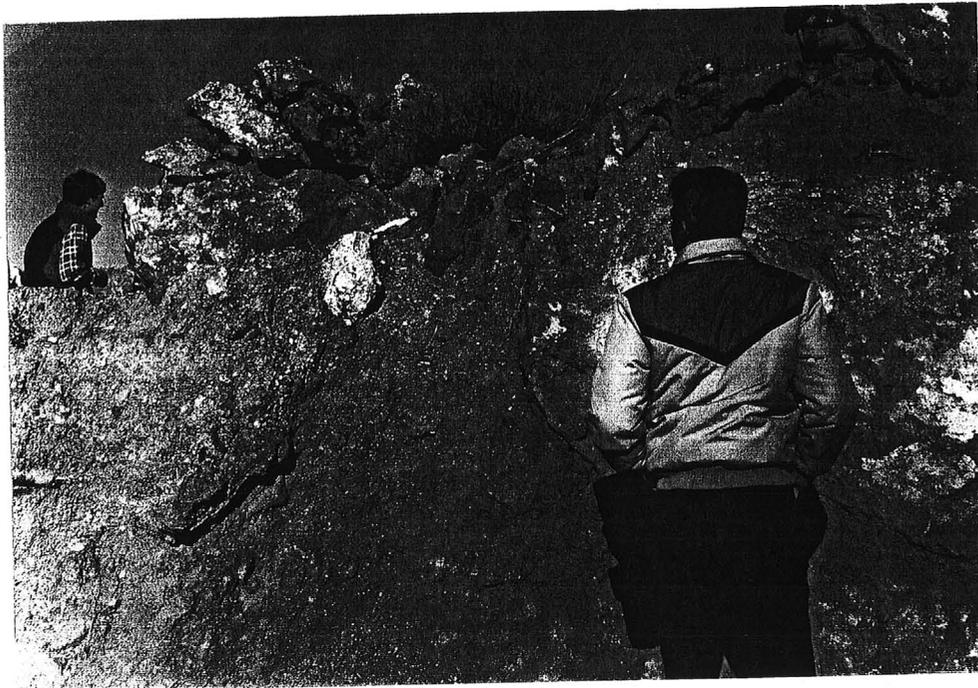
OVER

RICHARD V. WYMAN

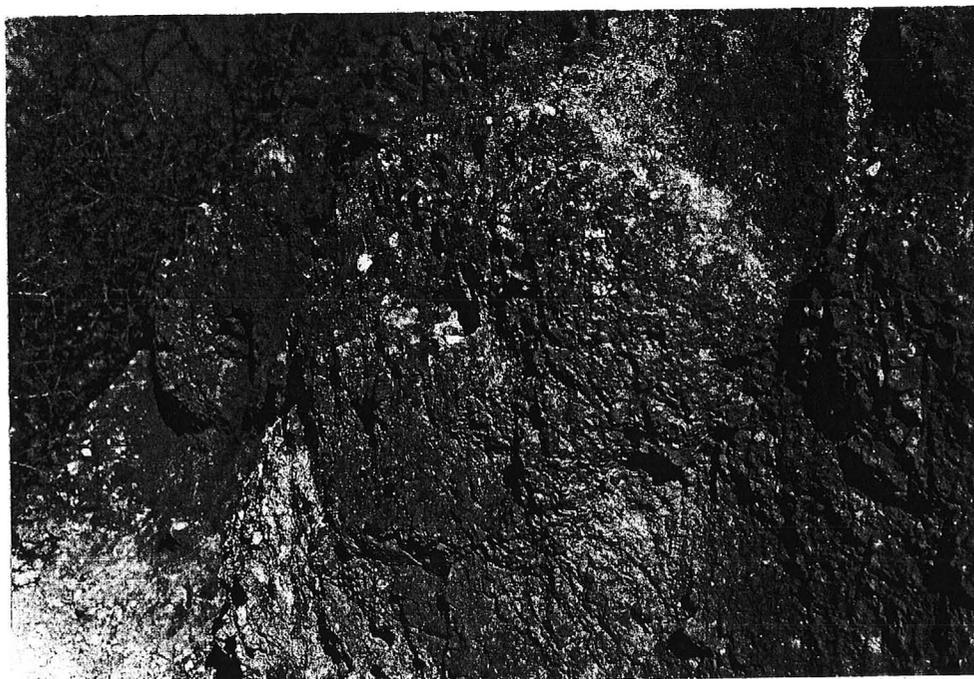
REGISTERED PROFESSIONAL GEOLOGICAL ENGINEER
NEVADA No. 2181

610 BRYANT CT.
BOULDER CITY, NEV. 89005 PHONE 293-1098

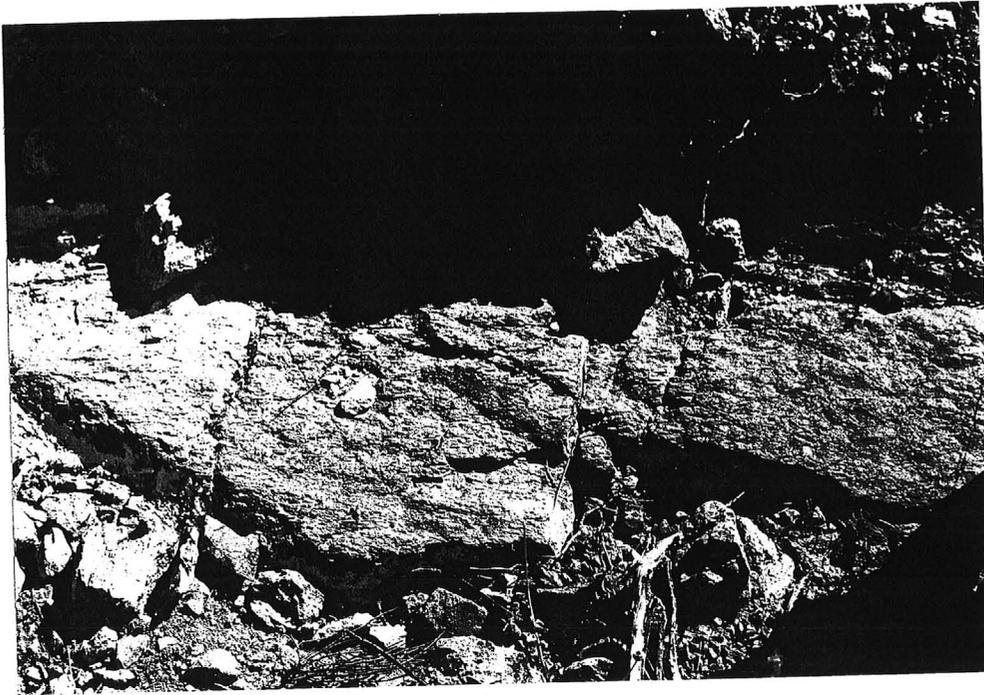
739-3274
number at University
Home 293 4178



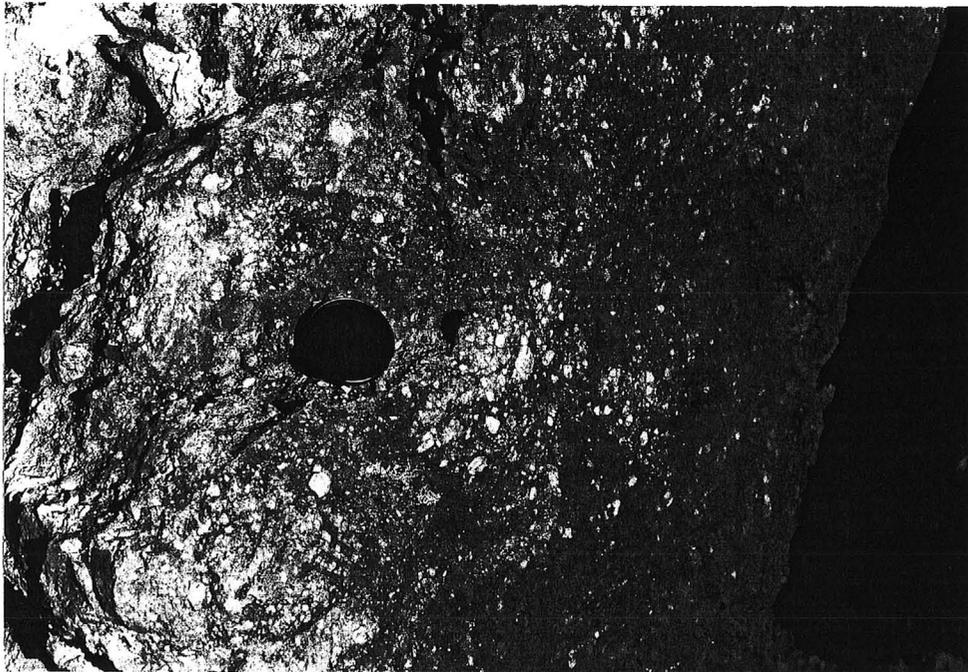
11/84
Antithetic view at Cyclopic
(Dip to East)
Brecciated



11/84
Sympathetic zone of ferric alt. and Silica Flooding
in Cyclopic pit.



11/84
Surface of basal detachment east of cyclopic pit
Dips east



11/84
Detail of brecciated antithetic vein at Cyclopic

Arizona Department of Environmental Quality
AQUIFER PROTECTION PERMIT NO. P- 102956
September 24, 1996

Facility: Cyclopic Gold Mine

Permitee: Nevada Pacific Mining Company, Inc.
707 Wells Road - Unit 1
Boulder City, NV 89005

Arizona Department of Environmental Quality

AQUIFER PROTECTION PERMIT NO. P- 102956

September 24, 1996

Facility: Cyclopic Gold Mine

**Permitee: Nevada Pacific Mining Company, Inc.
707 Wells Road - Unit 1
Boulder City, NV 89005**

AQUIFER PROTECTION PERMIT NO. P- 102956

RESPONSIVENESS SUMMARY

September 24, 1996

Facility: Cyclopic Gold Mine

Permittee: Nevada Pacific Mining Company, Inc.
707 Wells Road - Unit 1
Boulder City, NV 89005

Comments (C) and Responses (R):

Internal comments received during the public notice period resulted in the addition of two new sections at the beginning of the permit describing the facility and the best available demonstrated control technology (BADCT) to be used.

The Department received one external comment during the public comment period.

Comment (C) from Bill Hawes, Assistant Mine Inspector, Office of the Arizona State Mine Inspector; response (R) summarized by Shirin Tolle:

C1: The State Mine Inspector's Office has reviewed the referenced draft of the permit. We find everything to be in order from the perspective of our office and regulations we will be imposing. I would like to note a minor, non technical error on page 2 of 46 of the draft. At the top of the page (A - Discharge limitations). first line, the permittee will be operating a **precious metals** recovery facility, not base metal.

R1: The correction to the permit has been made.

HMC
KA ↓

File

*This document
contains considerable
information on the
planned operation.*

EXECUTIVE SUMMARY FOR PERMIT NO. P-102956

Facility Name:

Cyclopic Gold Mine

Facility Location:

The Cyclopic Gold Mine is located approximately 19 miles northeast from the town of Dolan Springs in Mojave County, Arizona. The proposed facility is located over groundwater of the Hualapai Basin as described below:

Township 28 North	Range 18 West,	Section 30	Quarter - All
Township 28 North	Range 18 West,	Section 19	Quarter - SE1/4
Township 28 North	Range 18 West,	Section 32	Quarter -NW1/4, SW1/4,SE 1/4
Township 28 North	Range 18 West,	Section 33	Quarter -SW1/4
Township 28 North	Range 18 West,	Section 34	Quarter -SE1/4
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Township 27 North	Range 18 West	Sections 3	Quarter -NW1/4, NE1/4
Township 27 North	Range 18 West	Sections 4	Quarter -NW1/4, NE1/4

Facility Description:

The proposed Cyclopic Gold Mine is an open pit gold mining and hydrometallurgical precious metal leaching operation. The mining operation will consist of an open pit mine, ore crushing and agglomeration operations, a lined heap leach pad, pregnant solution pond, barren solution pond, process plant with cyanide tank, fuel tank farm stormwater conveyance channels, process solution ditches and process pipelines, according to the design and operational plans approved by the Arizona Department of Environmental Quality (ADEQ) Aquifer Protection Program Section.

The facility will mine and leach a low-grade ore that will be deposited in two phases on a composite-lined heap leach pad. The combined area of Phase 1 and Phase 2 of the heap leach operation will be 34 acres. The heap leach pad has been designed to accommodate 4.7 million tons of ore. Nevada Pacific Mining Co. estimates that 750,000 tons of ore will be placed per year for a period of 4 to 6 years. The ore will be stacked on the leach pad in 20 foot lifts to a height of approximately 100 feet. Each lift will be leached for 30 to 60 days with a dilute solution of cyanide. The pregnant cyanide solution will be collected by a perforated piping network overlying the synthetic pad liner. The piping network will transport all flow from the leach pad to the pregnant solution pond. Solutions from the pregnant solution pond will be pumped to a series of carbon columns for extraction of the gold. Barren solution from the processing plant will drain by gravity to the barren solution pond.

Best Available Demonstrated Control Technology (BADCT):

The Cyclopic Gold Mine relies on engineered controls to demonstrate BADCT requirements. The heap leach facility and the process ponds have been designed and

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will be constructed to meet Prescriptive design criteria as outlined in the Draft Arizona Mining BADCT Guidance Manual.

Compliance With the Aquifer Water Quality Standards (AWQS):

Only limited information is available as to groundwater quality in the vicinity of the Cyclopic Gold Mine. Potential aquifer units in the area include the crystalline bedrock and Hualapai alluvial sediments. Nevada Pacific Mining Co. did not encounter groundwater in two exploratory borings at the mine site; one to a depth of 283 feet bgs and one to about 605 feet bgs. No water supply wells are located on the Cyclopic Mine property.

Monitoring well CMW-01 was drilled adjacent to the proposed heap leach pad and solution ponds to a depth of 605 feet bgs. An attempt was made to measure the water level in the monitoring well on June 28, 1995, and 30 days later. No water was detected in the well during either measurement.

Because of the depth to groundwater at the Cyclopic Gold Mine, it is impracticable to ascertain compliance with AWQS by monitoring groundwater. Monitoring well CMW-01 is likely to remain dry during mine operation. Compliance with AWQS at this site will be determined by checking for the presence of water in well CMW-01 on a monthly basis. If adequate water for a grab sample is found in well CMW-01, the permit will require monitoring for the parameters listed in Part IV, Table II.

Monitoring Requirements:

The heap leach and process pond leak detection systems shall be monitored according to the requirements outlined in PART IV, TABLES I.B.1. and I.B.2. An action leakage rate has been established for the process ponds and heap leach pad. Exceedances of the action leakage rate will require the Nevada Pacific Mine to submit a contingency plan to ADEQ within 30 days of discovery of the exceedance. The contingency plan will include the provisions in PART II.C.1. of the permit. Additionally, all the containment structures used for storage and handling will be subject to monitoring and periodic inspections to ensure their integrity as outlined in TABLE III of the permit.

During the operation of the Cyclopic Mine, the Nevada Pacific Mining Co. will maintain well CMW-01 as a Point of Compliance (POC) monitoring well. Well CMW-01 will be checked monthly for the presence of water. If water is detected within the well, Nevada Pacific shall immediately sample for the parameters listed in Part IV, Table II of the permit. The contingency plan in Part II.C. of the permit lists the actions to be taken by Nevada Pacific Mining Co. if monitoring shows that Aquifer Quality Limits (AQLs) are exceeded.

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Point(s) of Compliance:

Nevada Pacific has installed monitoring well CMW-01 at the point of compliance (POC) and will monitor it to verify compliance with Aquifer Water Quality Standards (AWQS).

Surface Water Considerations:

A series of diversion channels will transport upgradient stormwater runoff around the mine facilities and into existing natural drainages. The diversion channels were designed to contain the flow from a 100 year 24-hour storm event. The diversion system will consist of the North Diversion Channel, which will drain upgradient runoff from the center of the west side, The Central Diversion Channel and the South diversion Channel. The HEC-1 model was used to calculate peak runoff rates at points along the diversion channels. Additional surface water requirements are contained in the Nationwide Permit No. 954-0176-MB as authorized by Section 404 of the Clean Water Act (33 U.S.C. 1344).

Technical Capability:

The facility will be designed by Shepherd Miller Inc., a geotechnical and environmental engineering consultant, and will be operated by the Nevada Pacific Mining Company. The applicant has submitted the information required by the Arizona Administrative Code (A.A.C.) Section R18-9-108.B.7.a, b and c, to demonstrate the technical capability to design, construct and operate the facility.

Financial Capability:

The owner/applicant has provided the information required by A.A.C. Section R18-9-108.B.8.a, b and c, to demonstrate the financial capability to construct, operate, close and assure proper post-closure care. The applicant's availability of funds for closure and post-closure care of the facility will be established by the posting of a Surety bond of \$321,780.00. The Surety bond shall be administered by the U.S. Bureau of Land Management (BLM). The Surety bond must be posted by Nevada Pacific Mining Co. prior to receiving a "condition of approval" from the BLM. The "condition of approval" from BLM is required prior to commencement of operations at the mine.

Zoning Approval:

The applicant has submitted documentation required by A.A.C. Section R18-9-108.B.10 to demonstrate compliance with applicable zoning ordinances and regulations.

Compliance Schedule:

The permittee shall submit to the ADEQ, Aquifer Protection Program Section, within 30 days from the completion of construction, the construction drawings for the following: heap leach liner system, pregnant solution pond, barren solution pond, pipelines and process solution ditches associated with this facility, the assay lab, process plant, cyanide tank enclosure and fuel tank farm. All construction drawings must be signed and sealed by a professional engineer registered in the State of Arizona.

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The permittee shall, within 30 days of completion of construction of any facility referenced in Part II.G.2. of the aquifer protection permit, submit the results of all quality control/assurance testing to the ADEQ Aquifer Protection Program Section.

Within 30 days of the decision to open-pit mine the P& LM site, Nevada Pacific Mining Co. shall request an APP Determination of Applicability from ADEQ. A separate permit evaluation under the APP program is necessary for the P&LM site as it is not contiguous to the Cyclopic Gold Mine. Initial waste rock characterization results and a plan for subsequent waste rock characterization during operation of the open pit will be needed for the Determination of Applicability. Nevada Pacific Mining Co. will need to submit a stormwater management plan to the ADEQ stormwater coordinator in order to comply with Section 402 of the Clean Water Act.

All other Contingency Plan requirements are listed in Part II.C. of the permit.

STATE OF ARIZONA
AQUIFER PROTECTION PERMIT NO. P-102956

PART I. AUTHORIZATION TO DISCHARGE POLLUTANTS IN A MANNER SUCH THAT CURRENT AND REASONABLY FORESEEABLE FUTURE USES OF THE AQUIFER ARE PROTECTED

In compliance with the provisions of Arizona Revised Statutes (A.R.S.) Title 49, Chapter 2, Articles 1, 2 and 3; Arizona Administrative Code (A.A.C.) Title 18, Chapter 9, Article 1; A.A.C. Title 18, Chapter 11, Article 4; and conditions set forth in this permit:

Facility Name: Cyclopic Gold Mine

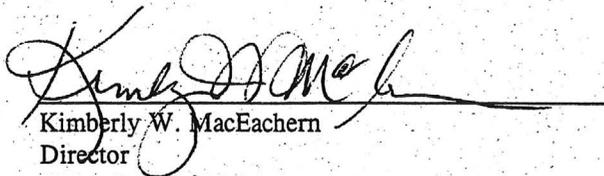
Owner and Operator:

Nevada Pacific Mining Company, Incorporated
707 Wells Road - Unit 1
Boulder City, NV 89005

is authorized to operate the Cyclopic Gold Mine facility located approximately 19 road miles northwest from the town of Dolan Springs, Mohave County, over groundwater of the Hualapai groundwater basin in Township 28 North, Range 18 West, Section 30 - Gila and Salt River Base Line and Meridian:

Latitude	35° 47' 7"	North
Longitude	114° 14' 54"	West

This permit shall become effective on the date of the Division Director's signature and shall be valid for the life of the facility (operational, closure, and post-closure periods) provided that the facility is constructed, operated, and maintained pursuant to all the conditions of this permit according to the design and operational information documented or referenced in PARTS I, II, III, IV, V, VI, and VII of this Permit, and such that Aquifer Water Quality Standards are not violated.



Kimberly W. MacEachern
Director

Water Quality Division

Arizona Department of Environmental Quality

Signed this 30th day of September, 1996.

PART II. SPECIFIC CONDITIONS

A. Facility Description

The proposed Cyclopic Gold Mine is an open pit gold mining and hydrometallurgical precious metal leaching operation. The mining operation will consist of an open pit mine, ore crushing and agglomeration operations, a lined heap leach pad, pregnant solution pond, barren solution pond, process plant with cyanide tank, fuel tank farm stormwater conveyance channels, process solution ditches and process pipelines, according to the design and operational plans approved by the Arizona Department of Environmental Quality (ADEQ) Aquifer Protection Program Section.

The facility will mine and leach a low-grade ore that will be deposited in two phases on a composite-lined heap leach pad. Phase 1 and Phase 2 will consist of 17 acres each. The heap leach pad has been designed to accommodate 4.7 million tons of ore. Nevada Pacific Mining Co. estimates that 750,000 tons of ore will be placed per year for a period of 4 to 6 years. The ore will be stacked on the leach pad in 20 foot lifts to a height of approximately 100 feet. Each lift will be leached for 30 to 60 days with a dilute solution of cyanide. The pregnant cyanide solution will be collected by a perforated piping network overlying the synthetic pad liner. The piping network will transport all flow from the leach pad to the pregnant solution pond. Solutions from the pregnant solution pond will be pumped to a series of carbon columns for extraction of the gold. Barren solution from the processing plant will drain by gravity to the barren solution pond.

B. Best Available Demonstrated Control Technology (BADCT)

The Cyclopic Gold Mine relies on engineered controls to demonstrate BADCT requirements. The heap leach facility and the process ponds have been designed and will be constructed to meet Prescriptive design criteria as outlined in the August 14, 1995, Draft Arizona Mining BADCT Guidance Manual.

The proposed heap leach pad liner will be a composite liner system consisting of an 80-mil textured HDPE geomembrane material overlying a bedding material consisting of locally available clay material. The liner bedding will be placed in two 6-inch lifts over a prepared subgrade and will be compacted in place to provide a maximum permeability of 1×10^{-6} cm/sec. A minimum of 2 feet of crushed, screened ore will be placed on the HDPE liner in order to protect the geomembrane from puncture.

The heap leach pad will be constructed with a leachate collection system and leak detection system. Two main leachate collector pipes will be used in both Phase 1 and Phase 2 of the heap leach pad. The main collector pipes drain by gravity to the secondary collection channel and then to the pregnant solution pond. The leak detection system, bedded in sand, will be placed in the clay bedding layer underneath the leachate collection system. Each of the four leak detection collection areas will drain to a separate 3-foot diameter leak detection sump.

The two solution ponds, pregnant and barren, will be double lined with a primary and secondary liner of 60-mil HDPE. A HDPE geonet will be placed between the two liners to act as a leak detection layer. Beneath the liner, a minimum of 6" of locally available clay material will be placed over a prepared subgrade and will be compacted in place to provide a maximum permeability of 1×10^{-6} cm/sec. In the event of a leak in the primary liner, the solution will be collected in the leak detection layer and transported by gravity to a sump. The sump will contain a 12" diameter leak detection pipe designed to allow pumping of collected solution. The ponds are designed to provide the containment needed for run-off from a 100-year, 24-hour storm event, solution accumulations resulting from a 24-hour power outage, and an 8 hour working volume at 500 gpm along with an additional three feet of freeboard. The Assay Lab will discharge inorganic wastes from assay testing into the barren solution pond. Organic wastes, such as solvents, will be collected in a glass container and disposed of as hazardous waste.

C. Permitted Activities

1. Permittee is authorized to operate a hydrometallurgical precious metal recovery facility as described in Part II.A..
2. Heap Leach Process
 - a. Heap leaching shall be restricted to the 34-acre heap leach pad, associated solution collection and transport ditches, pregnant solution pond, barren solution pond and process plant as specified in the approved plans and designs submitted with the APP application referenced in PART V.
 - b. The cyanide heap leach process shall be utilized as described in the approved plans submitted with the APP application referenced in PART V.
 - c. Discharge from the heap leach pad, pregnant solution pond, barren solution pond, solution collection and transport ditches, process plant, fuel tank enclosure, cyanide tank enclosure and equipment shop is not a permitted activity and is therefore prohibited.
 - d. Leached ore generated by heap leach processing shall not be removed from the heap leach pad. Removal or transfer of leached ore shall constitute a major modification to the facility.
3. Assay Laboratory
 - a. Permittee is authorized to dispose of inorganic liquid waste from the assay laboratory to the barren solution pond.
 - b. Disposal of organic waste from the assay laboratory to any on-site impoundment is prohibited.
 - c. Organic solvents used in the assay laboratory shall be collected in glass containers and disposed of as hazardous waste. The volumes and location of organic waste disposal from this facility shall be recorded and maintained at the site.
4. Discharges to the land surface from the 34-acre heap leach pad, associated solution collection and transport ditches, solution pipelines, pregnant solution pond, barren solution pond, cyanide tank, assay lab, fuel tank farm and process plant resulting from overtopping; abnormal operations; overfilling; rainfall; run-on; malfunction of level controllers; alarms; and/or human error are prohibited.
5. The unpermitted disposal and burial of municipal solid waste, non-hazardous solid waste and special waste as defined in the Arizona Revised Statutes (A.R.S.) Title 49, Chapter 4, Articles 1 and 9 is prohibited at the Cyclopic Gold Mine facility.
6. Stormwater diversion channels shall be constructed and maintained as required by Nationwide Permit Number 954-0176-MB authorized under Section 404 of the Clean Water Act (33 U.S.C. 1344).
7. Discharge to navigable waters as defined by 502(7) of the Clean Water Act (33 United States Code 1362(7)) is not a permitted activity and is therefore prohibited.

D. Monitoring Requirements

All monitoring required in this permit shall continue for the duration of the permit, regardless of the discharge or operational status of the facility, unless otherwise designated in this permit or an approved contingency plan. This monitoring program may be modified, including possible reduction of monitoring frequencies and parameters with Department approval after six months from the effective date of this permit. Requests for such changes must be written and include justification for the changes.

1. Discharge Monitoring

a. Process Pond Leak Detection System

A leak detection/collection system shall be incorporated into the design of the Pregnant and Barren Solution Ponds. This system shall be monitored in accordance to the terms and frequencies found in PART IV, TABLE I.A. Any liquids detected shall be pumped out and returned to the process ponds. Additionally, if the leakage rate for an impoundment exceeds 700 gpd, the permittee shall implement the contingency requirements under PART II.E.1.a of this permit.

b. Heap Leach Pad Leak Detection System Monitoring

The leak detection system shall be monitored in accordance with PART IV, TABLE I.B. Any liquids detected shall be pumped out and disposed of within the process ponds. Additionally, if the leakage rate exceeds 100 gpd for any one of the four leak detection sumps, the permittee shall implement the contingency requirements under PART II.E.1.b of this permit.

2. Groundwater Monitoring

a. Point of Compliance

The point of compliance designated for this facility shall be located at the downgradient edge of the property boundary in the uppermost aquifer, designated as:

Well Identification	Latitude	Longitude
MW-1	35° 47' 12" N	114° 14' 36" W

Monitoring at the above referenced point of compliance location shall be for hazardous and non-hazardous substances.

b. Ambient Groundwater Quality Monitoring

The point of compliance monitoring well shall be monitored on a monthly basis. Monitoring shall be conducted as specified in PART IV; TABLE II.A and TABLE II.B.

The alert level for the point of compliance monitoring well is established to be the presence of fluid within the well.

All monitoring wells shall be installed and located according to plans approved by the Arizona Department of Water Resources (ADWR) and the ADEQ Aquifer Protection Permit Program as referenced in PART V.A.

3. Operational Monitoring

a. Operational QA/QC Requirements

(1) Pre-operational Monitoring

Subgrade Preparation and Testing

Prior to installation of the surface impoundment liners and heap leach liner, the lining contractor or designated quality control engineering firm shall inspect the subgrade. The inspection must ensure that proper preparation and testing of the subgrade has been achieved according to the approved specifications submitted with the APP application, referenced in PART V of this permit. The subgrade shall be free of sharp objects of any kind that could puncture the liners. Ruts caused by the compaction equipment or by the geomembrane placement equipment must be leveled by hand.

Geomembrane Liner Testing

- (a) Nondestructive testing shall be conducted on 100% of all liner seams in accordance with ASTM D4437 (for field seams) or ASTM D4545 (for factory seams).
- (b) Destructive tests for shear and peel strength shall be conducted every 500 feet of linear seam in accordance with ASTM D413, Method A or ASTM D816, Method C (peel testing); and ASTM D816, Method B (shear testing). Additional shear and peel tests shall be conducted at the beginning of each seaming period and at least once each four (4) hours, for each production seaming apparatus used that day.
- (c) Conformance testing shall be conducted every 100,000 square feet of liner or each lot, whichever is less, with results available prior to installation. Conformance testing shall include thickness (ASTM D751), compound density (ASTM D1505), carbon black content (ASTM D1603), and melt index (ASTM D1238).

(2) Operational Monitoring

Inspections of the referenced operations shall be in accordance with the conditions specified in PART IV, TABLE III.

Solution Ponds

During operation, the pregnant and barren solution ponds must maintain a minimum of two feet freeboard to prevent overtopping resulting from normal or abnormal operations; overfilling; wind and wave action; rainfall; run-on; malfunctions of level controllers, alarms, and other equipment; and/or human error.

The ponds shall be inspected weekly and after storms for evidence of overtopping, sudden drops in liquid level, and deterioration of dikes or other containment devised as specified in PART IV, TABLE III.

Overburden and Waste Rock Material

Monitoring of the Cyclopic Gold Mine overburden and waste rock material shall be conducted. One sample from each overburden lithology will be taken each year during operation and analyzed for leachability (EPA method 1312 Synthetic Precipitation Leaching Procedure, SPLP) and acid generating potential using the Acid-Base Accounting method (British Columbia Acid Rock Drainage Manual method or equivalent).

b. Facility Maintenance Inspection

- (1) The pollution control structures shall be inspected for the items listed in PART IV, TABLE III. A log of these inspections shall be kept at the facility for the operating life of the facility, available for review by ADEQ personnel.
- (2) If any damage of the pollution control structures is identified during inspection, proper repair procedures shall be performed. All repair procedures and materials used shall be documented on the Self-Monitoring Report and Documentation Form and submitted quarterly to the ADEQ Aquifer Protection Permit Compliance Unit.

4. Sampling Protocols

a. Leach Solution and Groundwater Monitoring

- (1) Sampling procedures, preservation techniques and holding times shall be consistent with the most recent ADEQ Quality Assurance Project Plan.
- (2) Static water levels taken from the point of compliance monitoring well shall be measured and recorded prior to sampling. The well shall be purged of at least three borehole volumes (as calculated using the static water level) or until indicator parameters (pH, temperature, conductivity) are stable, whichever represents the greater volume. If evacuation results in the well going dry, the well should be allowed to recover to 80% of the original borehole volume, or for 24 hours, whichever is shorter, prior to sampling. If after 24 hours there is not sufficient water for sampling, the well will be recorded as dry for the monitoring event. An explanation for reduced pumping volumes, a record of the volume pumped, and modified sampling procedures shall be reported on the Self-Monitoring Report and Documentation Form.

b. Operational Monitoring

(1) Freeboard Monitoring

All freeboard measurements shall consist of the vertical distance between the fluid surface and the lowest point on the berm of the pond.

5. Installation and Maintenance of Monitoring Equipment

a. Monitoring Equipment

The permittee shall provide monitoring or sampling access, ports or devices at the facility for all monitoring required by this permit.

6. Monitoring Records

a. Process Solution, Discharge and Groundwater Monitoring Records

- (1) The following information associated with each sample, inspection or measurement and the name of each individual who performed the sampling or measurement should be included in the monitoring records:
 - (a) Date, time and exact place of sampling, inspection, or measurement and the name of each individual who performed the sampling or measurement.
 - (b) Procedures used to collect the sample or make the measurement.
 - (c) Date on which sample analysis was completed.
 - (d) Name of each individual and laboratory who performed the analysis.
 - (e) Analytical techniques or methods used to perform the sampling and analysis; laboratory detection limit for each test method performed; analytical variance for each parameter analyzed.
 - (f) Chain of custody records.
 - (g) Any field notes relating to the information described in subparagraphs (a) through (f) above.

(2) Monitoring Records for Facility Inspection

The following information shall be recorded for daily, weekly, monthly, biannual and yearly facility inspections and/or after a storm event:

Name of inspector, date and approximate time of inspection, and condition of facility components listed in PART IV, TABLE III, and any damage or malfunction and repairs performed.

(3) Process Solution Monitoring

The permittee shall record the information required in PART II D.6.a.(1)(a) through (g) for measurements of solution characteristics in the pregnant and barren solution ponds.

E. Contingency Plan Requirements

The permittee shall maintain at least one copy of the approved contingency plan at the location where day-to-day decisions regarding the operation of the facility are made. The permittee shall revise promptly all copies of the contingency plan to reflect approved changes. The permittee shall advise anyone responsible for the operation of the facility of the location of copies of all contingency and emergency plans.

In addition to the information contained in the approved contingency plan referenced in Part V.A, at a minimum, the following contingency requirements shall be implemented.

1. Leak Detection Sump Alert Level Exceedances

- a. Action Leakage Rate Exceedance for Leak Detection and Collection System in Surface Impoundments (Pregnant Solution Pond, Barren Solution Pond).

The permittee shall, at a minimum, initiate the following actions within five days of becoming aware of an exceedance of the leak detection/collection system action leakage rate:

- (1) Pump out all fluid collected in the leachate collection system,
- (2) Quantify and record the amount of fluid pumped from the leachate collection system,
- (3) An assessment of the potential for migration of liquids out of the containment system,
- (4) Statement of reason for leakage,
- (5) An assessment of the current conditions of the liner system.

Within 30 days of a confirmed exceedance of the action leakage rate alert level, the permittee shall submit a written report to the Department which includes the documentation specified in PART II.J.3.b of this permit. In addition to actions already taken, the report shall detail additional response actions to be taken for increased leakage rates.

Rapid and Large Leakage

Additional response actions based on leakage rates in excess of 2,000 gallons per acre per day shall, at a minimum, include:

- (6) Head reduction on the liner including emptying of the impoundment,
- (7) Visual inspections to identify areas of leakage,
- (8) Repair of all identified areas of leakage,
- (9) Closure or partial closure of the impoundment if identified areas of leakage cannot be repaired.

- b. Action Leakage Rate Exceedance in Heap Leach Pad

The permittee shall, at a minimum, initiate the following actions within five days of becoming aware of an exceedance of the leak detection/collection system action leakage rate:

- (1) Quantify and record the amount of fluid pumped from the leachate collection system,
- (2) Conduct an assessment of the potential for migration of liquids out of the containment system,
- (3) Determine the location of the leak and excavate the area to repair the liner,
- (4) A report on the responsive actions taken and the change in the leak rate.

- c. The permittee may be required to install additional groundwater monitoring well(s) if the above alert levels are exceeded and/or there is a large, sudden release of hazardous material from the process ponds, solution transport ditches or leach pad.
2. Groundwater Alert Level (AL) or Aquifer Quality Limit (AQL) Contingencies
 - a. AL or AQL Exceedance
 - (1) The permittee shall notify the Department at the address specified in PART II.J.1 within five days of becoming aware of the exceedance of the point of compliance monitoring well Alert Level.
 - (2) Verification sampling shall be conducted within five days of becoming aware that the Alert Level has been exceeded.
 - (3) Within five days of receiving the results of verification sampling from the laboratory, the permittee shall notify the Department of the results, at the address indicated in PART II.J.1.
 - (a) If the results of verification sampling indicate that an Aquifer Quality Limit has not been exceeded, the permittee shall continue to sample the point of compliance monitoring well on a quarterly basis for the parameters listed in PART IV, Table II.
 - (b) If the results verify that an AQL has been exceeded, the permittee shall, within 30 days of receiving the laboratory results verifying that an AQL has been exceeded, submit to the ADEQ, Aquifer Protection Permit Compliance Unit, either (i) or (ii) of the following:
 - (i) a written report which includes the documentation specified in PART II.J.3.b. Upon approval by the Department, the permittee shall initiate the actions necessary to mitigate the impacts of the exceedance. At a minimum, the plan shall include provisions for more frequent sampling until constituent concentration is below the AQL for two consecutive samples. The plan shall indicate if any additional parameters are to be tested for.
 - (ii) a demonstration that the AQL exceedance resulted from error(s) in sampling, analysis, or statistical evaluation.
 - (4) In the event of an AQL exceedance, the Department may require additional monitoring at the POC, installation of additional monitoring wells, studies, or remedial activities beyond those specified in this permit. In addition, if the permittee submits a demonstration that the AQL exceedance was due to error(s) in sampling, analysis, or statistical evaluation, and this demonstration is not accepted by the ADEQ, the Department may require that the permittee submit the documentation included in PART II.J.3.b.
 - a. Accidental Discharge
 - a. The permittee shall correct any failure that results in the violation of permit conditions and take the following actions:

- (1) Within 30 days of a spill that might cause the exceedance of an AQL, Alert Level or might cause imminent and substantial endangerment to public health or the environment, the permittee shall submit to the ADEQ Aquifer Protection Permit Compliance Unit a written report that includes the documentation required in PART II.J.3.b.
- (2) Upon review of the above required report, the Department may require additional monitoring and/or actions.

b. Spills/Unauthorized Discharge of Cyanide Solution

In the event of a spill of cyanide solution within a secondary containment area, the solution will be isolated and pumped to alternative storage containers within the heap leach circuit. The secondary containment structure will be detoxified with calcium hypochlorite or an equivalent and washed with water. The neutralized solution will be pumped into the heap leach pad.

If the spill occurs outside the secondary containment area, the affected area will be isolated and detoxified. An earthen berm will be constructed around the spill area. Calcium hypochlorite or an equivalent will be used to detoxify the spill and the neutralized solution will be pumped to the leach pad or solution pond. The area will be excavated to remove all contaminated material and the contaminated material will be placed on the leach pad.

c. Spills/Unauthorized Discharge of Hydrochloric Acid

Hydrochloric acid will be stored in its own secondary containment area. Spilled acid will be contained by the secondary system and pumped to the carbon acid wash tank for temporary storage while the primary storage vessel is fixed or replaced and the area is neutralized.

If the spill occurs outside the secondary containment area, the affected area will be isolated and detoxified. An earthen berm will be constructed around the spill area. The spill is to be diluted by flushing with water. The area will be excavated to remove all contaminated material and the contaminated material will be placed on the leach pad.

d. Spills/Unauthorized Discharge of Unidentified Material

In the event of any accidental spill or unauthorized discharge of suspected hazardous or toxic materials on the facility site the related area shall be promptly isolated and attempts to identify the material shall be made. Information on persons that may have been exposed to the material will be recorded. If the material is not identified with certainty, or is identified as being in the category of unacceptable waste, a qualified contractor shall remove and dispose of the material according to applicable federal, state and city regulations.

e. Emergency Response

- (1) The permittee shall provide for emergency response on a 24-hour basis in the event that a condition arises which results in imminent and substantial endangerment to public health or the environment. The plan shall be kept at the facility and provide for the following:
 - (a) designation of an emergency response coordinator who shall notify the ADEQ Hazardous Waste Emergency Response Unit and the ADEQ Aquifer Protection Permit Program and activate the necessary contingency plan in the event of an emergency;

- (b) a general description of the procedures, personnel and equipment to be used to assure appropriate mitigation of unauthorized discharges; and
- (c) a list of names, addresses and telephone numbers of persons to be contacted in the event of an emergency.

- (2) The emergency response coordinator shall notify the ADEQ Hazardous Waste Emergency Response Unit and the ADEQ Aquifer Protection Permit Program immediately in the event that emergency response measures are taken or those portions of the contingency plan that address an imminent and substantial endangerment to people, groundwater, surface water or the environment are activated.

4. Slope Failures

If a slope failure involving the heap leach pad, surface impoundments or liners occurs, the permittee shall promptly close the active area in the vicinity of the failure, and conduct a field investigation of the failure to analyze its origin and extent, its impact on the heap leach operations, temporary and permanent repairs and changes in operational plans considered necessary. Within 30 days of a slope failure involving a lined facility (surface impoundment or heap leach pad), the permittee shall submit a written report which includes the documentation specified in PART II.J.3.b of this permit. Upon approval by the Department, the permittee shall initiate the actions necessary to mitigate the impacts of the failure.

5. Drainage Structure Failure

If a drainage structure such as a ditch or diversion berm fails or is blocked the permittee shall promptly repair it. The temporary repairs shall be replaced by permanent repairs as soon as conditions allow. The repairs shall be designed to prevent future failures. Within 30 days of becoming aware of a ditch or diversion berm failure, the permittee shall submit to the ADEQ Aquifer Protection Permit Program, a written report indicating the actions taken.

F. Temporary Cessation

The permittee shall notify the ADEQ Aquifer Protection Permit Program in writing before temporary cessation of any operation at the facility. Notification of the temporary cessation does not relieve the permittee of any permit requirements unless otherwise specified in this permit.

Accompanying the notification shall be a description of any measures to be taken to maintain discharge control systems such that discharge is minimized during temporary cessation.

G. Closure

- 1. The permittee shall provide prior notification to the ADEQ, Aquifer Protection Permit Program of intent to cease, without intent to resume, an activity for which the facility was designed or operated. Within 90 days following notification, the permittee shall submit a closure plan to the ADEQ, Aquifer Protection Permit Program for approval. This plan shall be in addition to the approved closure methods contained in the Aquifer Protection Program permit application referenced in PART V.A of the permit. The plan shall describe the following details:
 - a. The approximate quantities and the chemical, biological, and physical characteristics of the materials to be removed from the facility;

- b. the destination of the materials to be removed from the facility and an indication that placement of the materials at that destination is approved;
 - c. the approximate quantities and the chemical, biological, and physical characteristics of the materials that will remain at the facility;
 - d. the methods to be used to treat any materials remaining at the facility;
 - e. the methods to be used to control the discharge of pollutants from the facility;
 - f. any limitations on future land or water uses created as a result of the facility's operations or closure activities;
 - g. the methods to be used to secure the facility;
 - h. an estimate of the cost of closure; and
 - i. a schedule for implementation of the closure plan and the submission of a post-closure plan.
2. Upon completion of closure activities, the permittee shall give written notice to ADEQ Aquifer Protection Permit Compliance indicating that the approved closure plan has been implemented fully, and shall provide proof of the inclusion in the deed to the property of complete information about the materials buried or discharged at the facility and any limitations on future land or water uses created as a result of the facility's operations or closure activities.
 3. APP closure activities shall comply with those required for Nationwide Permit No. 954-0176-MB, issued under the authority of Section 404 of the Clean Water Act (33 U.S.C. 1344).

H. Post-Closure

1. Post-closure requirements as determined by the ADEQ Aquifer Protection Permit Program will be based on the review of facility closure activities.
2. The post-closure plan shall ensure that any reasonable probability of further discharge from the facility, and of exceeding Aquifer Water Quality Standards at the applicable points of compliance, are eliminated, to the greatest extent practicable. If a modified post-closure plan is deemed to be necessary, the modified plan shall describe all of the following:
 - a. The duration of the post-closure care.
 - b. The monitoring procedures to be implemented by the permittee, including monitoring frequency, type, and location.
 - c. A description of the operating and maintenance procedures to be implemented for aquifer quality protection devices, such as liners, treatment systems, pump-back systems, and monitoring wells.
 - d. A schedule and description of physical inspections to be conducted at the facility following closure.
 - e. An estimate of the cost of post-closure maintenance and monitoring.

- f. A description of limitations on future land or water uses, or both, at the facility site as a result of facility operations.
3. The permittee shall notify the ADEQ Aquifer Protection Permit Program in writing when the post-closure activities have been completed.
4. At a minimum, post-closure requirements shall include maintenance and monitoring activities, as described in PART IV, TABLE III and the plans referenced in PART V.A of this permit. These activities shall consist of: periodic verification that all the containment and monitoring structures and facilities retain their integrity and their operability; appropriate repairs as necessary; and monitoring of groundwater and leachate. These activities will continue after closure for a period of time to be specified at closure and neither shall their frequency be modified nor the monitoring ceased without approval by the Department.

I. Compliance Schedule Requirements

1. A copy of the emergency response plan shall be submitted to ADEQ Aquifer Protection Permit Program within 30 days from the effective date of this permit. The plan will include the information referenced in Part II.E.3.e.
2. The permittee shall submit to the ADEQ Aquifer Protection Permit Program, within 30 days of the completion of construction, the construction design drawings for the heap leach liner system, pregnant and barren solution ponds, process plant, pipelines, process solution ditches, assay lab, tank farm, stormwater diversion structures and any aspects of the facility affecting discharge. As-built drawings shall reflect the design changes detailed in the December 4, 1995, correspondence between Shepherd Miller Inc. and Nevada Pacific Mining Co. All construction drawings shall be signed and sealed by a professional engineer registered in the State of Arizona.
3. The permittee shall, within 30 days of completion of construction of any facility referenced in PART II.C.2., submit the results of all quality control/assurance testing to the ADEQ, Aquifer Protection Permit Program.
4. The permittee shall, within 30 days prior to construction of the soil liner for the leach pad, provide a copy of the modified Project Specification and Construction Quality Assurance for the Heap Leach Pad and Solution Ponds. The modification shall include the geotechnical quality control and assurance procedures outlined in the September 25, 1995, correspondence between the ADEQ and the Nevada Pacific Mining Company.
5. The permittee shall, within 120 days after issuance of the individual Aquifer Protection Permit, provide a contingency plan for the disposal of overburden and waste rock materials found to be acid generating based on leachability (EPA method 1312 Synthetic Precipitation Leaching Procedure, SPLP) and/or the Acid-Base Accounting method (using the British Columbia Acid Rock Drainage Manual or acceptable equivalent method). Review and approval of the contingency plan by the Department must be completed prior to mine leaching operations.

Once the contingency plan is approved by the Department, the permit shall be modified to include the contingency plan. The referenced inclusion to the permit shall be deemed a minor modification to the permit pursuant to Title 18, Chapter 9, Section 121.D.4 of the Arizona Administrative Code.

6. In accordance with Title 18, Chapter 9, Section 121.F.1., the Director may suspend or revoke this permit for non-compliance by the permittee for any condition established in the above referenced compliance schedule.

J. Reporting Requirements**1. Reporting Location**

Signed copies of all reports required herein shall be submitted to the Department:

Arizona Department of Environmental Quality
Water Protection Approvals and Permits Section
3033 North Central Avenue
Phoenix, Arizona 85012
Phone Number : (602) 207-4675

2. Monitoring Reporting

- a. The permittee shall complete the Self-Monitoring Report and Documentation Form provided by the Department to reflect facility inspection requirements designated in PART IV, TABLE III and submit to the ADEQ, Water Pollution Compliance Unit quarterly along with other reports required by this permit. Facility inspection reports shall be submitted no less frequently than quarterly, regardless of operational status.
- b. PART IV, TABLE I.A., TABLE I.A.1, TABLE I.B.2, TABLE II.A and TABLE II.B contain the frequency for reporting results from discharge and groundwater monitoring requirements. Results shall be submitted in the Self-Monitoring Report Form. Monitoring methods shall be recorded and any deviations from the methods and frequencies prescribed in this permit shall be reported.
- c. The permittee shall complete the Self-Monitoring Report Forms, to be supplied by the Department, to the extent that the information reported may be entered on the form. The results of all monitoring required by this permit shall be submitted in such a format as to allow direct comparison with the limitations and requirements of the permit.

3. Permit Violation or Alert Level Exceedance Reporting

- a. The permittee shall notify the ADEQ Water Quality Enforcement Unit within five days of becoming aware of a violation of any permit condition or an Alert Level having been exceeded.
- b. The permittee shall submit a written report within 30 days after becoming aware of the violation of a permit condition or of an Alert Level having been exceeded. The report shall document all of the following:
 - (1) A description of the violation and its cause;
 - (2) the period of violation, including exact date(s) and time(s), if known, and the anticipated time period during which the violation is expected to continue;
 - (3) any action taken or planned to mitigate the effects or the violation, or to eliminate or prevent recurrence of the violation;
 - (4) any monitoring activity or other information which indicates that any pollutants would be reasonably expected to cause a violation of an Aquifer Water Quality Standard; and

(5) any malfunction or failure of pollution control devices or other equipment or process.

4. Modification Reporting

- a. All requests for permit modifications shall be done in accordance with PART VI.H.3., unless otherwise specified in this permit.
- b. Requests for a major modification to a facility (as defined in PART V.C.24.) shall be submitted at least 180 calendar days before making the major modification.

5. Operational Reporting

- a. The permittee shall report operational conditions listed in PART IV, TABLE III in the Self-Monitoring Report form quarterly. If none of the conditions occur, the report shall say "no event" for a particular reporting period. If the facility is not in operation, the permittee shall indicate that fact in the Self-Monitoring Report.
- b. The permittee shall submit data required in PART IV, TABLES I through IV regardless of the operating status of the facility unless otherwise approved by the Department or allowed in this permit.

6. Self-Monitoring Reports

The Self-Monitoring Report shall include: Copies of laboratory analysis forms, documentation on sampling date and time, name of sampler, static water level prior to sampling, sampling method, purging volume, indicator parameters, analytical method, method detection limit, date of analysis, preservation and transportation procedures, and analytical facility. Data shall be compiled on standardized forms which allow comparison with past reports.

7. Samples taken report due by:

Samples taken during quarter beginning	Quarterly Report due by
Jan.	Apr. 28
Apr.	Jul. 28
Jul.	Oct. 28
Oct.	Jan. 28

PART III. OTHER CONDITIONS

A. Analytical Methodology

The permittee may use any approved analytical method for each parameter required under this permit as long as the method detection limits are adequate for the regulatory limits specified for that parameter in the permit. The analysis shall be performed by a laboratory licensed by the Arizona Department of Health Services, Office of Laboratory Licensure & Certification for each parameter analyzed. For results to be considered valid, all analytical work shall meet quality control standards specified in the approved methods. A list of certified laboratories can be obtained at the address listed below:

Arizona Department of Health Services
Office of Laboratory Licensure & Certification
3443 North Central Avenue, Suite 810
Phoenix, Arizona 85012
Phone Number (602) 255-3454

B. Environmental Laboratory Contact

Upon submittal of the samples to a state-certified laboratory for analysis, the permittee shall forward a copy of the signed permit to the laboratory for reference.

PART IV. TABLES

DISCHARGE MONITORING

TABLE I.A
LEACHING PROCESS-LEAK DETECTION MONITORING

Sampling Point Number	Identification	Location
1	Barren Solution Pond Leak Detection Sump	LAT: 35° 47' 13" N LONG: 114° 14' 47" W
2	Pregnant Solution Pond Leak Detection Sump	LAT: 35° 47' 16" N LONG: 114° 14' 47" W

Parameter	Discharge Limit	Alert Level	Analytical Method	Monitoring Frequency	Reporting Frequency
Presence of Fluid	N/A	Reserved	Field Inspection	Daily during fluid containment	Quarterly
Volume Pumped	N/A	Reserved	Record volume pumped	As pumped	Quarterly
Rate Pumped	N/A	N/A	Record rate pumped	As pumped	Quarterly
Action Leakage Rate	N/A	700 gpd	calculation	Daily during fluid containment	Quarterly
Alert Level Exceedance	N/A	N/A	As indicated	If leakage rate exceeds 700 gpd implement contingency plan in PART II Section E.1.a.	Quarterly

**TABLE I.B
LEACHING PROCESS-LEAK DETECTION MONITORING**

Sampling Point Number	Identification	Location
3	Leach Pad Detection Sump Phase I - South	LAT: 35° 47' 16" N LONG: 114° 14' 47" W
4	Leach Pad Detection Sump Phase I - North	LAT: 35° 47' 16" N LONG: 114° 14' 47" W
5	Leach Pad Detection Sump Phase II - South	LAT: 35° 47' 16" N LONG: 114° 14' 47" W
6	Leach Pad Detection Sump Phase II - North	LAT: 35° 47' 16" N LONG: 114° 14' 47" W

Parameter	Discharge Limit	Alert Level	Analytical Method	Monitoring Frequency	Reporting Frequency
Presence of Fluid	N/A	Reserved	Field Inspection	Daily during leach operation	Quarterly
Volume Pumped	N/A	Reserved	Record volume pumped	As pumped	Quarterly
Rate Pumped	N/A	N/A	Record rate pumped	As pumped	Quarterly
Action Leakage Rate	N/A	100 gpd per sump	calculation	Daily during leach operation	Quarterly
Alert Level Exceedance	N/A	N/A	As indicated	If leakage rate exceeds 100 gpd implement contingency plan in PART II Section E.1.b	Quarterly

**TABLE II.A
AMBIENT GROUNDWATER MONITORING**

Monitoring Condition	Response
absence of fluid in well	report absence of fluid
presence of fluid in well	report alert level exceeded monitor for parameters in Part IV, Table II.B

**TABLE II.B
AMBIENT GROUNDWATER MONITORING**

Sampling Point Number	Well Number	Location (x-y-z)	Cadastral ADWR Registration Number	Latitude	Longitude
7	MW-1		55-54855 b	35° 47' 12" N	114° 14' 36" W

Parameter	AQL ¹²³	Analytical Method ⁴	Sampling Frequency	Reporting Frequency
Temperature			Monthly if ALR ⁵ in PART IV Table II.A exceeded	Quarterly
Specific Conductance	Reserved		"	"
pH	Reserved		"	"
Nitrate-Nitrite-N	10		"	"
Chloride	Reserved		"	"
Sodium	Reserved		"	"
Total Dissolved Solids	Reserved		"	"
Calcium	Reserved		"	"
Magnesium	Reserved		"	"
Sulfate	Reserved		"	"
Cyanide (free)	0.2		"	"
Cyanide (total)	Reserved		"	"
Alkalinity, Total	Reserved		"	"

Metals:

Parameter	AQL	Analytical Method	Sampling Frequency	Reporting Frequency
Antimony	0.006		Monthly if ALR in Table II.A exceeded	Quarterly
Arsenic	0.05		"	"
Barium	1.0		"	"
Beryllium	0.004		"	"
Chromium	0.1		"	"
Cadmium	0.005		"	"
Iron	Reserved		"	"

¹AQL = Aquifer Quality Limit. The AQL for a parameter is set at the Aquifer Water Quality Standard for that parameter.

²Reserved = Should a numeric standard for this parameter be adopted by the State, the value will be incorporated herein; otherwise it will be determined from measurements obtained during the ambient groundwater monitoring period.

³All AQLs are in mg/l unless otherwise noted

⁴ Any EPA approved method may be used to analyze for the parameters listed as long as the method provides the capability of achieving the lowest method detection limit or most precisely and accurately quantitates the concentration of the parameters listed.

⁵Action Leakage Rate

TABLE II.B (cont'd)
AMBIENT GROUNDWATER MONITORING

Parameter	AQL	Analytical Method	Sampling Frequency	Reporting Frequency
Lead	0.05		Monthly if ALR in Table II.A. exceeded	Quarterly
Manganese	Reserved		"	"
Mercury	0.002		"	"
Selenium	0.05		"	"
Thallium	0.002		"	"

Organics:

Parameter	AQL	Analytical Method	Sampling Frequency	Reporting Frequency
Total Phenol	Reserved		Monthly if Alert Level in Table II.A is exceeded	Quarterly
Benzene	0.005		"	"
Bromodichloromethane	Reserved		"	"
Bromoform	Reserved		"	"
Bromomethane	Reserved		"	"
Carbon tetrachloride	0.005		"	"
Chlorobenzene	Reserved		"	"
Chloroform	Reserved		"	"
Dichlorodifluoromethane	Reserved		"	"
1,1-Dichloroethane	Reserved		"	"
1,2-Dichloroethane	0.005		"	"
1,1-Dichloroethene	Reserved		"	"
trans-1,2-DCE	Reserved		"	"
1,2-Dichloropropane	0.005		"	"
Methylene Chloride	Reserved		"	"
1,1,2,-Trichloroethane	Reserved		"	"
Trichloroethene	Reserved		"	"
Trichlorofluoromethane	Reserved		"	"
Toluene	1.0		"	"
Napthalene	Reserved		"	"
1,2,3-Trichlorobenzene	Reserved		"	"
1,2,4'-Trichlorobenzene	0.07		"	"
Bromobenzene	Reserved		"	"
Isopropylbenzene	Reserved		"	"
N-Butyl benzene	Reserved		"	"
N-Propylbenzene	Reserved		"	"
Hexachlorobutadiene	Reserved		"	"
1,1,1,2-Tetrachloroethane	Reserved		"	"
Dibromomethane	Reserved		"	"
cis-1,2-Dichloromethane	Reserved		"	"
Tetrachloroethene	Reserved		"	"
tert-Butylbenzene	Reserved		"	"

**TABLE II.B (cont'd)
 AMBIENT GROUNDWATER MONITORING**

Parameter	AQL	Analytical Method	Sampling Frequency	Reporting Frequency
Xylene (total)	10.0		"	"
2-Chlorotoluene	Reserved		"	"
4-Chlorotoluene	Reserved		"	"
Styrene	0.1		"	"
1,2,3-Trichloropropane	Reserved		"	"
1,3-Dichloropropane	Reserved		"	"
2,2-Dichloropropane	Reserved		"	"
1,1-Dichloropropane	Reserved		"	"

**TABLE III
 OPERATIONAL MONITORING**

Parameter	Performance Levels	Inspection Frequency
Barren Solution and Pregnant Solution Ponds	No visible cracks or leaks in liner; Pumps and fittings maintained without leaks and in good working order; Minimum two-foot freeboard; No evidence of seepage	Daily
Berm Integrity	No substantial erosion; No evidence of seepage	Weekly and after storms
Heap Leach and Solution Pond Leak Detection Sumps	No impairment of access; pumps working properly; Level of liquids in sumps observed and recorded in on-site log	Daily
Solution Ditches	No evidence of spillage on the crest or outside the ditch embankment or leakage; No evidence of seepage; No visible cracks or leaks in liner; Minimum two-foot freeboard	Daily
Tanks	No evidence of spills or leakage; pumps and fittings maintained without leaks in good working order; log kept on-site for operation and maintenance	Annually
Process Plant and Assay Lab	No evidence of process solution discharge or seepage;	Weekly
Storm Water Diversion Ditches	No substantial erosion; No overgrowth of weeds; Free of obstruction and debris	Monthly

TABLE IV
CLOSURE/POST CLOSURE FINANCIAL DEMONSTRATION MONITORING

Within 30 days of receiving a Record of Decision from the Bureau of Land Management (BLM), the Nevada Pacific Mining Co. shall submit to ADEQ a copy of "the condition of approval". The "condition of approval" shall post a reclamation bond of \$321,000 to cover the costs of closure and post-closure at the Cyclopic Mine. Subsequent to the Record of Decision and within 30 days of receipt, Nevada Pacific Mining Co. shall send ADEQ a copy of BLM's formal bond release acceptance letter.

ADEQ will be notified within 30 days of Nevada Pacific Mining Co.'s appeal of the bond amount in the BLM Record of Decision. If a subsequent agreement between Nevada Pacific Mining Co. and BLM decreases the cost of the bond below \$321,000, ADEQ will be required to modify the permit. This action shall be considered a major modification of the permit. Modification to the permit shall require an assessment of closure and post-closure costs as applicable to the Aquifer Protection Program. Nevada Pacific Mining Co. may be required by ADEQ to post an additional bond to cover the costs of closure and post-closure care if bonding under the BLM is inadequate.

PART V. REFERENCES: PERTINENT INFORMATION

A. References

The terms and conditions set forth in this permit have been developed based upon the information contained in the following:

1. Field Inspection Form(s) dated _____
2. Permit Application dated August 21, 1995
3. Aquifer Impact Review dated _____
4. Inventory File Number 102956
5. Plan Approval by Aquifer Protection Section dated _____
6. Amendments to above No. 2 dated - November 12, 1996, December 13, 1995, December 14, 1995, November 20, 1995, October 27, 1995, October 25, 1995
7. Public Notice dated on or about April 8, 1996
8. Public Hearing comments, correspondence and any additional supplemental information contained in the permit file.

9. Other _____

B. Facility Information

1. Facility Contact Person: Alan Brown
2. Address: 707 Wells Road - Unit 1
Boulder City, NV 89005
3. Emergency Telephone Number: (702) 294-1592
(702) 294-2386

The Department shall be notified within 30 days of the change in facility contact person.

4. Landowner of Facility Site: Nevada Pacific Mining Company Inc.
Address: 707 Wells Road - Unit 1
Boulder City, NV 89005

C. Definitions

1. "**Alert Level (AL)**" means a numeric value, expressing either a concentration of a pollutant or a physical or chemical property of a pollutant, which is established in an individual Aquifer Protection Permit and which serves as an early warning indicating a potential violation of either an Aquifer Water Quality Standard at the applicable point of compliance, or any permit condition.
2. "**Applicant**" means the owner or operator of the facility.
3. "**Aquifer Protection Permit (APP)**" means an individual, or general permit issued pursuant to A.R.S. Section 49-203 and 49-241 through 251, and A.A.C. R18-9-101 et sec.
4. "**Aquifer Quality Limit (AQL)**" means the maximum amount of a given constituent which the permit conditions allow in the aquifer at the point of compliance.
5. "**Aquifer Water Quality Standard**" means a standard established pursuant to A.R.S. Section 49-221 and 49-223.
6. "**Areal composite sample**" means a set of samples collected from an area and combined into a single sample. The number and spacing shall be representative of the quality of the accumulated material.
7. "**BADCT**" means the Best Available Demonstrated Control Technology, processes, operating methods, or other alternatives to achieve the greatest degree of discharge reduction determined for a facility by the Director pursuant to A.R.S. Section 49-243.B and D.
8. "**Chain of Custody Form**" is used to maintain and document sample possession for enforcement purposes (User's Guide to the EPA Contract Laboratory Program).
9. "**Department**" means the Department of Environmental Quality.
10. "**Director**" means the Director of Environmental Quality or the Director's designee.
11. "**Discharge**" means, for purposes of the aquifer protection permit program prescribed by A.R.S. Title 49, Chapter 2, Article 3, the addition of a pollutant from a facility either directly to an aquifer or the land surface or the vadose zone in such a manner that there is a reasonable probability that the pollutant will reach an aquifer.
12. "**Discharge Impact Area**" means the potential areal extent of pollutant migration, as projected on the land surface, as the result of a discharge from a facility.
13. "**Discharge Limitation (DL)**" means any restriction, prohibition, limitation or criteria established by the Director, through a rule, permit or order, on quantities, characteristics of pollutants.
14. "**Drywell**" has the meaning ascribed to it in A.R.S. Section 49-331.3.
15. "**Environment**" means navigable waters, any other surface water, groundwater, drinking water supply, land surface, subsurface strata or ambient air, within or bordering on this state.
16. "**Exceedance**" means violation of environmental protection standards by exceeding allowable limits or concentration levels.

17. **"Existing facility"** means a facility on which construction began before September 26, 1989 and which is neither a new facility nor a closed facility. For purposes of this definition construction on a facility has begun if the facility owner or operator has either:
 - a. Begun, or cause to begin, as part of a continuous on-site construction program any placement, assembly or installation of a building, structure or equipment; or
 - b. Entered a binding contractual obligation to purchase a building, structure or equipment which is intended to be used in its operation within a reasonable time. Options to purchase or contracts which can be terminated or modified without substantial loss, and contracts for feasibility engineering and design studies, do not constitute a contractual obligation for purposes of this definition.
18. **"Facility"** means any land, building, installation, structure, equipment, device, conveyance, area, source activity or practice from which there is, or with reasonable probability may be, a discharge.
19. **"Groundwater Quality Protection Permit"** means a permit issued by the Arizona Department of Health Services or the Department pursuant to A.A.C. R9-20-208 prior to September 26, 1989.
20. **"Hazardous substance"** means:
 - a. Any substance designated pursuant to Section 311(b)(2)(a) and 307(a) of the Clean Water Act;
 - b. any element, compound, mixture solution or substance designated pursuant to Section 102 of CERCLA;
 - c. any hazardous waste having the characteristics identified under or listed pursuant to A.R.S. 49-922;
 - d. any hazardous air pollutant listed under 112 of the Federal Clean Air Act (42 United States Code Section 7412);
 - e. any imminently hazardous chemical substance or mixture with respect to which the administrator has taken action pursuant to Section 7 of the Federal Toxic Substances Control Act (15 United States Code Section 2606); and
 - f. any substance which the Director, by rule, either designates as a hazardous substance following the designation of the substance by the Administrator under the authority described in subdivisions (a) through (e) of this paragraph or designates as a hazardous substance on the basis of a determination that such a substance represents an imminent and substantial endangerment to public health.
21. **"Inert material"** means that which is insoluble in water and will not decompose or leach substances to water, such as broken concrete, brick, rock, gravel, sand, uncontaminated soils.
22. **"Injection well"** means a well which receives a discharge through pressure injection or gravity flow.
23. **"mg/l"** means milligrams per liter.

24. **"Major Modification(s) to a Facility"** means:
A physical change in an existing facility or change in its method of operation that results in a significant increase or adverse alteration in the characteristics or volume of the pollutants discharged, or the addition of a process or major piece of production equipment, building or structure that is physically separated from the existing operation and that causes a discharge provided that:
- a. a modification to a groundwater protection permit facility as defined in Section 49-241-01, subsection C, that would qualify for an area-wide permit pursuant to section 49-243, subsection P, consisting of an activity or structure listed in Section 49-241, subsection B, shall not constitute a major modification solely because of that listing.
 - b. For a groundwater protection permit facility as defined in section 49-241.01, subsection C, a physical expansion that is accomplished by lateral accretion or upward expansion within the pollutant management area of the existing facility or group of facilities shall not constitute a major modification if the accretion or expansion is accomplished through sound engineering practice in a manner compatible with existing facility design, taking into account safety, stability and risk of environmental release. For a facility described in Section 49-241.01, subsection C, paragraph 2, if the area of the contemplated expansion is not identified in the notice of disposal, the owner or operator of the facility shall submit the information required by Section 49-243, subsection A, paragraphs 1, 2, 3 and 7 to the director.
25. **"NPDES Permit"** means a permit issued by the United States Environmental Protection Agency for discharge to the waters of the United States as required by the Clean Water Act, as amended.
26. **"New Facility"** means a previously closed facility that resumes operation or a facility on which construction was begun after the effective date of this chapter on a site at which no other facility is located or to totally replace the process or production equipment that causes the discharge from an existing facility. A major modification to an existing facility is deemed a new facility to the extent that the criteria in A.R.S. 49-243, subsection B, paragraph 1 can be practicably applied to such modification. The following constitute major modification:
- a. A physical change in an existing facility or change in its method of operation that results in a significant alteration in the characteristics or volume of the pollutants discharged.
 - b. The addition of a process or major piece of production equipment, building or structure that is physically separated from the existing operation and that causes a discharge.
- For purposes of this definition construction on a facility has begun if the facility owner or operator has either:
- (1) Begun, or caused to begin as part of a continuous on-site construction program, and placement, assembly or installation of a building, structure or equipment.
 - (2) Entered a binding contractual obligation to purchase a building, structure or equipment which is intended to be used in its operation within a reasonable time. Options to purchase or contracts for feasibility engineering and design studies, do not constitute a contractual obligation for purposes of this definition.
27. **"Operator"** means any person who makes management decisions regarding facility operations governed by this permit.

28. **"Owner"** means any person holding legal or equitable title in any real property subject to this permit.
29. **"Point of Compliance"** means the designated point or points as determined by the Director pursuant to A.R.S. Title 49, Section 244.
30. **"Pollutant"** means fluids, contaminants, toxic wastes, toxic pollutants, dredged spoil, solid waste, substances and chemicals, pesticides, herbicides, fertilizers and other agricultural chemicals, incinerator residue, sewage, garbage, sewage sludge, munitions, petroleum products, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and mining, industrial, municipal and agricultural wastes or any other liquid, solid, gaseous or hazardous substances.
31. **"Recharge project"** has the meaning ascribed to it A.R.S. Section 45-651.5.
32. **"Regulation"** means A.A.C. Title 18, Chapter 9, Article 1, requirements for facilities affecting aquifer water quality.
33. **"Sewage"** means wastes from toilets, baths, sinks, lavatories, laundries, and other plumbing fixtures in residences, institutions, public and business building, mobile homes, watercraft, and other places or human habitation, employment, or recreation.
34. **"Sewage disposal system"** means a system for a sewage collection, treatment and discharge by surface or underground methods.
35. **"Surface impoundment"** means a pit, pond or lagoon, having a surface dimension that is equal to or greater than its depth, which is used for the storage, holding, settling, treatment or discharge of liquid pollutants containing free liquids.
36. **"Temporary cessation"** means any cessation or operation of a facility for a period of greater than 60 days but which is not intended to be permanent.
37. **"Toxic pollutant"** means a substance that will cause significant adverse reactions if ingested in drinking water. Significant adverse reactions are reactions that may indicate a tendency of a substance or mixture to cause long-lasting or irreversible damage to human health.
38. **"ug/l"** means micrograms per liter.
39. **"Underground storage and recovery project"** has the meaning ascribed to it in A.R.S. Section 45-802.6.
40. **"Vadose zone"** means the zone between the ground surface and any aquifer.
41. **"Well"** means a bored, drilled or driven shaft, pit or hole whose depth is greater than its largest surface dimension.

PART VI. GENERAL CONDITIONS: RESPONSIBILITIES

A. Preservation of Rights

This permit shall not be construed to abridge or alter causes or action or remedies under the common law or statutory law, criminal or civil, nor shall any provision of this permit, or any act done by virtue of this permit, be construed so as to stop any person, this State or any political subdivision of this site, or owners or land having groundwater or surface water rights or otherwise, from exercising their rights or, under the common law or statutory law, from suppressing nuisances or preventing injury due to discharges.

B. Monitoring Requirements

The permittee shall conduct any monitoring activity necessary to assure compliance with any permit condition, with Aquifer Water Quality Standards, and with A.R.S. 49-241 through 49-251:

1. The permittee shall install, use and maintain all monitoring equipment in acceptable condition or provide alternate methods approved by the Department; and
2. the permittee is required to conduct monitoring of a type and frequency sufficient to yield data, which are representative of the monitored activity and approved by the Department.

C. Reporting of Bankruptcy or Environmental Enforcement

The permittee shall notify the ADEQ, Water Pollution Compliance Unit within five (5) days after the occurrence of either:

1. The filing of bankruptcy by the permittee; or
2. the entry or any order or judgement against the permittee for the enforcement of any environmental protection statute and in which monetary damages or civil penalties are imposed.

D. Site Examination

1. On presentation of credentials, the Department may, if reasonably necessary, inspect the facility or an activity used for the generation, storage, treatment, collection or disposal of any waste or pollutant, and where records are kept for the purpose of ensuring compliance with A.R.S. Title 49, Chapter 2, A.A.C. R18-9-101 through 130 and this permit, or to verify information submitted in a permit application, or documented in a permit including any permit conditions.
2. The Department may:
 - a. Obtain samples;
 - b. analyze or cause to be analyzed any samples either on-site or at another location;
 - c. take photographs;
 - d. inspect equipment, activities, facilities and monitoring equipment or methods of monitoring; or
 - e. inspect and copy any records required to be maintained.

3. Any pertinent information required by the permit shall be available for on-site inspection during normal business hours. The owner or operator of the property shall be afforded the opportunity to accompany a Department inspector. Split samples, receipts, and copies of photographs will be provided to the facility owner or operator if the owner or operator requests them at the time the samples(s) is (are) obtained or the photograph(s) is (are) taken as the case may be. A copy of the results of any analyses made of samples, monitoring, or testing shall be furnished promptly to the owner or operator.
4. Inspections shall be conducted pursuant to the appropriate provisions of the Arizona Revised Statutes.

E. Proper Operation

1. The permittee shall at all times operate the facility so as to ensure the greatest degree of discharge reduction achievable through application of the best available demonstrated control technology, processes, operation methods or other alternatives, including, where practicable, no discharge of pollutants as determined in the application process.
2. The permittee shall operate the facility to ensure that pollutants discharged will in no event cause or contribute to a violation of aquifer water quality standards at the applicable point of compliance for the facility; or that no pollutants discharged will further degrade, at the applicable point of compliance, the quality of any aquifer, that already violates the aquifer quality standard for that pollutant.

F. Technical and Financial Capability

1. The permittee shall maintain the technical and financial capability necessary to fully carry out the terms of this permit.
2. Any bond, insurance policy or trust fund provided as a demonstration of financial capability in the permit application (R18-9-108.8.c.iii.) shall be in effect prior to any activity authorized by this permit and remain in effect for the duration of the permit.

G. Other Rules and Laws

The issuance of this permit does not waive any federal, state, county or local government rules, regulations or permits applicable to this facility.

H. Permit Actions

1. This permit may be modified, transferred, renewed or revoked under the rules of the Department. The filing of a request by the permittee for a permit action does not stay any existing permit condition.
2. The Director shall issue a public notice of all proposed permit actions pursuant to R18-9-124.
3. Permit Modification
 - a. Request for modification of a permit shall be made in writing by the permittee, the Department, or any affected person, and shall identify the specific item(s) to be considered for modification and the facts and reasons which justify the request.

- b. The permittee may be required to submit additional information pursuant to A.A.C. R18-9-108, including an updated permit application.
- c. The Director may modify an individual Aquifer Protection Permit if the Director determines any one or more of the following:
 - (1) That material and substantial alterations or additions to a permitted facility justify a change in permit conditions;
 - (2) that the discharge from the facility violates or could reasonably be expected to violate any Aquifer Water Quality Standard;
 - (3) that rule or statutory changes have occurred, such as to require a change in the permit; and/or
 - (4) that there has been a change of an applicable point of compliance.
- d. With written concurrence of the permittee, the Department may make minor modifications to a permit for any of the following reasons without giving public notice or conducting a public hearing:
 - (1) To correct typographical errors;
 - (2) increase the frequency of monitoring or reporting;
 - (3) change an interim compliance date in a compliance schedule if the permittee can show just cause and that the new date does not interfere with the attainment of a final compliance date requirement;
 - (4) change construction requirements, if the alteration complies with the requirements of these rules and provides equal or better performance; or
 - (5) replace monitoring equipment, including wells, if such replacement results in equal or greater monitoring effectiveness.

4. Permit Transfer

- a. The Director may transfer an individual Aquifer Protection Permit if the Director determines that the proposed transferee will comply with A.R.S. 49-241 through 49-251 and A.A.C. Chapter 9, Article 1, regardless of whether the permittee has sold or otherwise disposed of the facility, until the Director transfers the permit.
- b. The proposed transfer or and the transferee shall notify the Department within ten days after any change in the owner or operator of the facility. The notice shall include the name and signature of the transferor owner or operator, the name and signature of the transferee owner or operator; and the name and location of the facility.
- c. Information required in R18-9-108.A.1, 2, 3 and 6; B.7, 8, and 9; and D. shall be submitted about the transferee prior to transfer of the permit.

5. Permit Revocation and Suspension

The Director may suspend or revoke this permit for any of the following reasons:

- a. Noncompliance by the permittee with any applicable provision of Title 49, Chapter 2, Article 3 or the Arizona Revised Statutes, A.A.C. Title 18, Chapter 9, Article 1 or permit conditions;
- b. the permittee's misrepresentation or omission of any fact, information or data related to the permit application or permit;
- c. the Director determines that the permitted activity is causing or may cause a violation of any Aquifer Water Quality Standard; or
- d. a permitted discharge has the potential to cause or will cause imminent and substantial endangerment to public health or the environment.

I. Confidentiality of Information

1. Any information submitted to or obtained by the Department pursuant to A.R.S. 49-243 may be available to the public unless it is designated confidential. Information or a particular part of the information shall be considered confidential on either:
 - a. A showing, satisfactory to the Director, by any person that the information, or a particular part of the information, if made public, would divulge the trade secrets of the person; or
 - b. a determination by the attorney general that disclosure of the information or a particular part of the information would be detrimental to an ongoing criminal investigation or to an ongoing or contemplated civil enforcement action under A.R.S. Title 49, Chapter 2 in Superior Court.
2. Criteria for Determining Confidentiality
 - a. A confidentiality claim has been made at the time the information was submitted or obtained;
 - b. the facility owner or operator has shown that reasonable measures have been taken to protect the confidentiality of the information and intends to continue to take such measures;
 - c. the information is not, and has not been, reasonably obtainable without the facility owner or operator's consent by persons other than governmental bodies by use of legitimate means, other than discovery based on a showing of special need in a judicial or quasi-judicial proceeding;
 - d. no statute or rule specifically requires disclosure of the information; and
 - e. the facility owner or operator has shown that disclosure of the information is likely to cause harm to its competitive position.
3. Financial information required in the permit or permit application will be held confidential. Notwithstanding, the Director may disclose any records, reports or information obtained from any person in regard to this permit, including records, reports or information obtained by the Director or Department employees, to:
 - a. Other state employees concerned with administering A.R.S. Title 49, Chapter 2, or if the records, reports or information are relevant to any administrative or judicial proceeding under that chapter; and/or

- b. employees of the United States Environmental Protection Agency, if such information is necessary or required to administer and implement or comply with the Clean Water Act, and Safe Drinking Water Act, CERCLA or provisions and regulations relating to those acts.
4. Claims of confidentiality for the following information shall be denied:
- a. The name and address of any permit applicant or permittee;
 - b. the chemical constituents, concentrations and amounts of any pollutant discharge; or
 - c. the existence or level of a concentration of a pollutant in drinking water or in the environment.

J. Violations; Enforcement

Any person who owns or operates a facility contrary to the provisions of A.R.S. Title 49, Chapter 2, who violates the conditions specified in the A.A.C. Title 18, Chapter 9, Article 1, or this permit, is subject to the enforcement actions prescribed in A.R.S. Title 49, Chapter 2, Article 4 or the Arizona Revised Statutes.

PART VII. AQUIFER WATER QUALITY STANDARDS

A. General Standards Applicable to all Aquifers

1. A discharge shall not cause the concentration of a pollutant in an aquifer to exceed at an applicable point of compliance any one of the maximum concentrations prescribed in A.A.C. R18-11-406, unless a higher Aquifer Quality Limit has been established for this permit.
2. A discharge shall not cause a pollutant to be present in an aquifer classified for drinking water protected use in a concentration which endangers human health.
3. A discharge shall not cause a violation of a surface water quality standard established for a navigable water of the State.
4. A discharge shall not cause a pollutant to be present in an aquifer which impairs existing or reasonably foreseeable uses of water in an aquifer.

Copies to
Manta de Oro Mines Inc
CYCLOPIC MINE

See next page for name of mine

INTRODUCTION

The work done on the Cyclopic mine is as follows:
Field work--January 21, 22, 24, 25, 1938
Copying existing maps--January ~~23~~ 23; February 3 pars.
Report and map work--January 26, 27, 28, ~~29~~; February 1, 2, 3.

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MANTA DE ORO MINES INC.

CYCLOPIC MINE

GOLD BASIN MINING DISTRICT

MOHAVE COUNTY, ARIZONA

LOCATION

The Cyclopic mine is reached by driving 33.5 miles toward the Hoover dam from Kingman, then turning right on a fair to good gravel road (turn-off 3.5 miles north of the Pleasant Valley Texaco station) which is followed for 25 miles to the northeast by always staying on the main left road. The mill and offices are about one mile from the pits of the Cyclopic operation. The roads are marked by signs at this writing. The mine lies in Section 25⁵ T 28 N, R 19 W. It is approximately 15 miles north to the reservoir backed up by the Hoover dam.

The mine lies in an area of slight relief at an elevation of about 3500 feet judging from the quadrangle topographic map. Vegetation is sparse, and the climate moderate in winter and hot in summer. The gulches are dry except intermittently and drain down with increasing gradient to the deep washes that lead into Hualapai Wash and thence to the Colorado River.

OWNERSHIP

The Cyclopic ground includes ¹⁶~~29~~ claims: Climax group of three claims, Big Ledge claim, Gold Bar group of four claims (mill on Gold Bar No. 2), ~~Gold-Quartz-Jumbo group of three claims~~, and the main group or Denver-Bonanza group of eight claims. The total area is held by location and is said to aggregate within corners, ⁰300 acres.

The property belongs to Mr. Ira Parker of Chloride. The titles to claims are said to be unencumbered.

HISTORY & PRODUCTION

The Cyclopic mine was discovered by Patterson, Rowe, and Glen in the early eighties. It was leased to a Seattle company in 1896. In 1901, it was sold to Robbins and Walker of Minneapolis who milled some ore. In 1904, the property was acquired by the Cyclopic Gold Mining Co. of Denver, who produced some bullion. Most of the early mining was by chloriders and high grade pockets only were exploited. The property was taken over in 1919 by the present owner.

At present, the property is under lease and option to the Manta de Oro Inc., a closed corporation. Mr. E. H. Crabtree is president. Mr. Leon Sperry is in charge of sampling and mining; Mr. Christensen is mill superintendent; Mr. Cole is business manager.

The total production of the property is unknown. The Arizona Production Bulletin credits the property with 15,000 dollars in gold from 1901-1933. R. G. Billings credits the mine with a production of 200,000 dollars up to 1919. The present operating company has milled nearly 12,000 tons of ore since June, 1937 having an average tenor of 3.7⁰/₅ dollars per ton.

An estimate of tonnage produced is as follows. This tonnage undoubtedly includes some "clay" waste in the drag line pits. Underground stoping is a guess only.

Area 7 (NE)-- $\frac{170 \times 22 \times 15}{15} = 7740$ tons

Area 7 (SW)-- $\frac{200 \times 37 \times 20}{15} = 9866$ tons

Area 8 & 9 -- $\frac{240 \times 35 \times 7.5}{15} = 4560$ tons

Area 10 (NW)-- $\frac{100 \times 17 \times 7.5}{15} = 850$ tons

Area 10 (SE)- $\frac{160 \times 19 \times 12}{15} = 2432$ tons

Total 65248 tons from pits

Total from previous page -----	25,448 tons from pits
Estimated underground & minor pits- <u>2,552</u> tons-little data	
Total estimated	28,000 tons of ore.

The average grade of ore produced is unknown. It seems certain however, that the greater part of the pit production did not exceed an average value of 5.00 per ton; in fact the ^{of} half/the estimated pit tonnage produced during the past year was stated by Christensen and Sperry to average approximately 3.70 dollars per ton. A moderate tonnage produced by selective mining in the early days undoubtedly was held to the neighborhood of ~~a half~~ ounce/ton in gold. Selective mining by an expert contract miner is yielding about 12 tons per day of ore that averages about 10 dollars per ton. Some is considerably higher in grade and some considerably lower, but the average is about 10 dollars per ton over a period of some weeks. From these facts it is concluded that total ore produced has yielded in the neighborhood of 150,000 dollars during the life of the mine.

MINING METHODS

The greater part of the ore has been produced by power loading from surface pits. A drag-line is used at present. The use of a drag-line is naturally limited to the parts of the ore lenses outcropping or under shallow cover. If the present picture of the ore occurrence is correct, the lenses will pitch under a considerable thickness of barren overburden and wall rock except in the case of lenses that bottom at a shallow depth against the "sill". It seems unlikely that much of this more deeply buried ore can be mined by surface power machinery.

As part of the ore is hard quartz, blasting is necessary.

Very little can be seen of the mining methods used underground. Probably most of the ore taken out was go-phered. One irregular stope that yielded around 600 tons can be seen at the SE end of Area 7, south pit.

If the orebodies dip as tabular lenses at a low angle as now thought, it appears that underground mining where necessary will be difficult and more expensive.

The ore mined by drag-line is costing well under a dollar/ton according to Sperry. Considerable waste is milled however keeping the heads low. The selective mining by Mr. Larsen under contract yields a much better grade of ore. His contract calls for a minimum of 5 dollar rock to receive pay. A sliding scale is used for heads above 5 dollars, up to several dollars per ton. High grade ore is ^{for} paid/under his contract by giving him the maximum bracket per ton and half the remaining values per ton as shown by assays.

MILLING METHODS

The ore obtained thus far is very simple to treat. It is oxidized silicious ore varying from easily crushed material to hard silicified quartz breccia. Sulfides are very rare but a little steel galena was seen. Originally sulfides made up but a small part of the ore.

The ore is treated by simple cyanide leaching without agitation. Experiment has shown that the present crushing equipment allows best recovery if the ore is crushed to minus 9 mesh. There is much doubt that a combination sand and slime treatment would pay considering the good recovery made by the simple all sand leaching used at present.

The ore feeds directly from the storage bin to a jaw crusher. As about half of the ore is already fine, it appears to the writer that a by-pass grizzly should be in the circuit ahead of the jaw-crusher. The jaw crusher product then passes through rolls and a trommel to produce the final product for leaching.

Seven 120 ton tanks are used for the cyanide leach. Ore is trammed overhead into the tanks which are nearly filled. The solution used contains 2.5 lbs. cyanide on the average with a loss of 0.7 lbs. cyanide in the leach. Water consumed amounts to about 15% or 15 tons per 100 tons of ore treated. Five pounds of lime per ton of ore is used for protective alkalinity. Consumption of zinc in the shaving boxes is said to be moderate. The ore is laddy and the bullion produced contains considerable lead.

The assays of mill heads, tails, and cyanide solution before and after precipitation, indicate very low loss of soluble gold in the tails, and that average ore gives a consistent 0.70 dollar tail. Lower grade tails were always opposite low grade heads. A few high grade tanks gave a tailing of about 1.00 dollars/ton.

The cycle is one week at present. The tanks are leached for five days and washed and cleaned the remainder of the week. The tanks are cleaned by mucking through doors into cars below the tanks. The tails are trammed to the dump.

The mill and other related equipment probably does not represent an investment of over 25,000 dollars at present. The crushing department is not adequately equipped to handle the very hard, dense, silicious type of ore and this ore is fed in only limited amounts.

WATER

Water for mill, domestic, and other uses is obtained from wells that develop springs about 6 miles southwest of the Cyclopic mine. The water is pumped to an elevation 500 feet above the pumping plant to the crest of the divide, and stored in a tank. From the storage tank the water flows by gravity through a 2" pipe to the mine, mill and camp.

I was informed that the usage of water is well under the supply since the wells were cleaned and the gathering drift was extended.

Water could be obtained by pipe line to the reservoir of the Hoover dam some 15 mile northerly from the mine. The lift on water from this source would be considerable-in the neighborhood of 2,000 feet.

EQUIPMENT

In addition to the mill, ^{and power plant} and the old drag-line, there are two old trucks, a compressor, assay office and equipment, sampling equipment, and approximately 20 dwellings. The dwellings include small frame houses moved from Hoover dam and a number of canvas shacks. No formal inventory was made but there are in addition a number of sinker drills, steel, and miscellaneous tools.

PRESENT STATUS

It is known that a substantial down payment was made on the property and that some payment has been made from production by royalty.

The property is not operating at possible efficiency partly on account of equipment. I estimate that milling costs exceed one dollar per ton and that mining costs are close to one dollar per ton on the average.

Development is never much ahead of the drag-line. It appears that adequate development would give a much better opportunity for planned mining of the ores, and result in lower costs and better mill heads from the drag-line by better elimination of waste.

In view of the low average of the mill heads, it seems doubtful that the property is making a profit. At present, the mill heads are being sweetened by higher grade contract ore, at the expense however of the average grade of the material left.

The exact position of the claims is now hard to determine as the monuments are old. The old claim map available is very inaccurate and moreover is not on the proper meridian. This north is more nearly correct if it is assumed to be magnetic instead of true north.

GENERAL GEOLOGY

The rocks of the area are mainly of pre-Cambrian age. The most abundant rock is a highly porphyritic granite of coarse texture. Great euhedral phenocrysts of orthoclase occur abundantly in a coarse groundmass of quartz, biotite, and feldspars.

A somewhat heterogenous rock locally termed the "sill" occurs to the northeast of pits. This rock is in low angle fault contact with the porphyritic granite so far as can be learned. The main part of the "sill" is a fine-grained holocrystalline rock of granitic composition. The quartz content is low in some specimens and study of the feldspars and dark minerals indicate it to be somewhat monzonitic in composition. Locally it is con-

rendered schistose. In places are found coarser schistose granitic material that probably represents inclusions of granite. Basic rock of small size bodies is also seen.

Schist occurs as small inclusions in the porphyritic granite. The amount of schist and gneiss is small in the area studied.

The area shows one very strong fault of NW strike. A heavy gouge of clay and ground-up granite marks this fault. The fault itself is poorly exposed and data concerning its attitude is very limited. The relations seem to be as follows and as shown in the cross-sections. From the open pits, old churn drill holes, reports of miners, and surface observation, it is believed that the fault dips southwesterly at an angle of about 12°. Most of the pits exploit ore just above the fault zone or somewhat in it. The movement on the fault judging from the probable angle of dip and the great amount of clay and gritty gouge produced, was probably reversed, i.e. the hanging wall moved upwards over the footwall. Some movement at least was post-mineralization in age for hard kidneys of gold bearing quartz of greatly varying sizes are found within the clay gouge. It is thought probable that the pre-ore movement on this fault produced the flat to moderately dipping fractures that ^{now} carry ore in the hanging wall. These minor faults dip to the NE generally.

Besides the major fault mentioned, there are small cross faults that have offset the main fault to the left. These faults are probably of post-ore age.

Exposures are too poor to the SE to determine what happened to the ore zone in that direction.

The ore comprises silicious rock mineralized with a small amount of pyrite, a little lead, and gold. Silver is very low in the bullion. The ore is mostly to completely oxidized so far as development has progressed.

The sequence of events seems to be about as follows: A compressional stress in the area was relieved by formation of a flatly dipping thrust fault which brought porphyritic granite in the hanging wall over "sill" rock in the footwall. The movement produced a great deal of rock flour which in places is weathered partly or wholly to clay. It appears probable that the movement along the thrust fault of the hanging wall block caused somewhat irregular fracturing in the hanging wall, most of the fractures dipping in opposite direction to the major fault. Late~~r~~ mineralization occurred by primary rising solutions which penetrated into the minor hanging wall fractures but only slightly along the gouge sealed major thrust fault. The solutions first produced quartz possibly carrying some gold. Late~~r~~ renewed movement on the fractures, possibly due to renewal of movement on the major thrust fault, caused a slight to intense brecciation of the early quartz. Mineralizing solutions continued to bring in material and deposited pyrite, a little galena, and gold values, and cemented the porous parts of the breccia into a firm silicious rock of conglomeratic appearance. Sometime after the epoch of mineralization, strong renewed movement occurred along the major fault. This movement developed more gouge and broke the hard quartz ore in pieces. The pieces were moved to some extent near the fault plane near
or/minor splits from the fault plane, resulting in kidneys of quartz ore in the fault gouge.

When mining ore from the vicinity of the major fault or near the gouge zone, it is common to find "clay" (which is gouge) with small to large ^{fragments} kidneys of the brecciated-quartz ore.

The above picture of the relations and origin of the ore and ore-forms to structure is tentative. It should be understood that the ore zone is almost completely covered by several feet of transported gravel due to its position in a very wide flat wash. Moreover the exposures by pit mining ~~are~~ are limited and do not give a clear picture of the attitude and shape of the ore bodies. Nevertheless, the above hypothesis will serve until more data is acquired through development work.

An important result of the belief that the minor hanging wall fractures resulted from movement along the major thrust fault is that the orebodies will bottom against the major fault gouge. This has occurred at Area 10, and in Area 7 as seen underground. The fault plane itself is very probably a warped surface. The zone is wide and cannot be completely seen underground but appears to be nearly flat in places with many minor shears parallel and breaking off from it. A second possibility concerning the minor hanging wall fractures of the main fault zone is that they will probably be limited in extent measured by distance away from the major zone. This means that orebodies will probably not extend far from the thrust fault zone along the ~~minor~~ minor fractures, and moreover that as the thrust zone bites deeper from the present surface there is a chance that the short oreshoots will be blind.

The mineralization by gold appears to be restricted in intensity northwest of the southeast endline of the Denver No. 4 claim. Exposures are better in this area and while quartz outcrops, it is limited to ^{a few} narrow zones. To the southeast of Area 6 & 7, the wash covers everything and vein matter was not found on the strike of the zone (NW/SE) on a ridge downstream from the old mill tailings dump. Gold mineralization is regional however as there are a number of small producers and gold prospects in all directions from the Cyclopic mine.

So far as present development goes, the tonnage is very limited on the Denver No. 4 and Denver No. 5 claims along the main mineralized zone. The SE half of the Denver No. 2 and the NW half of the Bonanza Extension claims were the site of the most intense mineralization, and preparation for mineralization. It is possible that the short minor mineralized fractures present in the hanging wall of the thrust fault are mineralized for only 100 feet or so from the main thrust fault, in which case the area covering the down dip portion of the thrust fault becomes possible ground, since possible ore shoots would likely be blind.

KNOWN ORE SHOOTS

To make estimates of ore reserves with the amount of exploration thus far done would be more or less meaningless. Figures given have little definite information to give them weight. The irregularity of the ore bodies, the difficulty of discovering their exact attitudes and the unknown depth to the thrust fault in places are important factors. Blind ore shoots may occur also.

Area 6 & 7: The ore ~~is~~ is opened by two pits that are nearly parallel. Apparently two main zones are developed with two minor zones. Cross-sections AA, BB, CC, DD, and EE show the relations as interpreted at present. Some ore is going into the NW face of the south pit but it is not large. There is a moderate tonnage left in the bottom of the present pit. Most of the shoot seems to pinch out against clay gouge on northeast side of the pit. The ore shoot in the north pit is continuing a short distance into the pillar between the two pits but has apparently bottomed or been broken up in gouge on NE half of the pit. The prominent ledge that outcrops north of the pits is being stripped and mined at present. The thickness of the ledge is unknown. A heavy, dense, brecciated quartz forms the hanging wall side of the ledge. This quartz is dipping flatly to the NE. Underlying it is soft silicious material that assays several dollars higher in gold. This zone extends for a distance of about 400 feet, but was ^{too} inadequately developed to determine its thickness at the time of visit. The shoot will be limited in dip-length, if it continues its apparent northeasterly dip, by the shallow depth to the sill. Big lenses of gouge above the main fault zone are apt to be encountered at shallow depth. Assays made thus far indicate fair grade and if grade holds up consistently a fair tonnage should be obtained. An estimate ^{based} on entirely inadequate exploration gives 8,000 tons in the block thus far stripped. Several thousand tons of ore may be obtained from the existing pits of this Area by exploiting ore shown in the sections and plan map. A small lense on the bench of the north pit runs 20.00 dollars per ton; it stands steeply and must be hand mined.

Area 9: A broad pit exposes this ^{shoot.} ~~sill~~ the ore appears to be a nearly flat lense dipping to the northeast. The floor has not been completely exposed and ore can be seen in the central part of the pit. The grade is fair but good grade ore was taken out by hand mining at the southeast end of the pit. The relations and dotted interpretation is shown in Section FF. The depth to the "sill" is unknown except by assuming the 12° dip known near pit Area 6. Strong quartz outcrops and float extend to the northwest. It is ~~is not~~ impossible to determine the thickness of this lense at present, but it ~~is~~ appears that 15 feet is the maximum possible from the distribution of ore shown in Section FF. This lense outcrops at a considerable distance from the "sill" outcrop and if the flat dip continues, the shoot may have a depth length of 150 feet. It outcrops for a length of about 400 feet. These figures would indicate a possible tonnage of 60,000 tons assuming the gold values hold up. This is by far the largest block of ore that is partially developed. The attitude of the "sill" may be flatter than 12° however which would reduce the tonnage.

Area 10: The ore at Area 10 is mostly exploited by two drag-line pits. The gouge zone outcrops and cuts off the ore in the northwestern pit. The attitude of the ore in the NW pit is difficult to ascertain. At the south end ore shows with practically horizontal banding. This ore may extend to the southwest under the pit wall for some distance but there is no evidence as to how far. The cross-section HH indicates the ore to be dipping at a moderate angle to the NE and hence it seems unlikely that much tonnage remains, either to the NE or to the SW. The ore in the SE pit is definitely dipping NE and the probable position of the "sill" or thrust fault leaves

but little space for tonnage. It seems that only a few thousand tons can be obtained from the Area 10 lense in the neighborhood of the pits. Possibly the lense extends farther to the southeast than the SE pit in which case a moderate additional tonnage could be obtained.

Summary: The detailed sections and the writer's interpretation of the attitude and probable extent of the ore gives a possible tonnage of about 80,000 tons in the developed areas. It is reemphasized that data is meagre as to shape and attitude of the ore shoots. Some of the ore indicated above can be considered positive and probable ore.

Undeveloped and unprospected areas: The small pits and shallow shafts near the ^{SE} endline of the Denver No. 4 claim (i.e. west of Area 10 pits) expose narrow zones of quartz which carry 3 to 4 feet of commercial ore. The short incline ~~XXX~~ of the end of the NW pit of Area 10, shows a flat dipping quartz ledge one foot thick; this ledge is dipping SW. These showings are not very promising but some trenching is justified to see if ~~IX~~ considerable mineralization may not be covered by heavy gravel ~~XXXX~~float.

Between the Areas described under the last section, there is considerable ground covered by gravel float. It is possible that ore may be found though it seems likely that the heavy quartz would at least appear as slightly transported float if it actually does not outcrop. There is little evidence of ore below most of this ground but a long crosscut surface trench made by the dragline would give much information, if carried well through the surface mantle.

A feature that should be remembered if exploration is carried on is the possibility of blind shoots to the SW as previously discussed. Data should be acquired from new exploration to complete the present picture.

The old reports on the mine by Morrison, Billings, and Crabtree all give potential tonnages of 1,000,000 tons or more. The average grade of ore expected from the early sampling and pilot mill runs was given ^{as} 5 to 8 dollars per ton including the low grade samples; this on the old price of gold. However the milling of ores in the last year or two indicates the values to be much more restricted than thought at first, in fact the drag-line ore from pits restricted to the best and largest showings with some leaving of waste material, has averaged about 3.70 dollars per ton. The general interpretation by the writer is that a potential tonnage of over 100,000 tons on the basis of present development work is not justified. It has previously been indicated that this ore must be classified mainly as "possible" ore because of the restricted data available.

This belief of the writer's is not meant as criticism; it rather indicates that this uniquely odd ore deposit was too ~~XXXXX~~ undeveloped to be understood at all clearly at the time these estimates were made. It is not very clearly understood at present. The observations of the writer together with the attitude of poorly understood ore shoots as indicated by Mr. Larsen's hand mining, show the ore to occur mainly as lenses dipping flatly NE down toward the big gouge zone associated with ^{the} flatly dipping thrust fault zone; this limited mineralization, in contrast with the old belief that a 40 to 60 foot bed of ore lay continuously on the "sill", results in very great reduction of the potential or possible tonnage. Some quartz lenses dip steeply NE or vertically, and ore zones dipping SW can be seen, but the size of these ledges is small so far as present exposures are concerned.

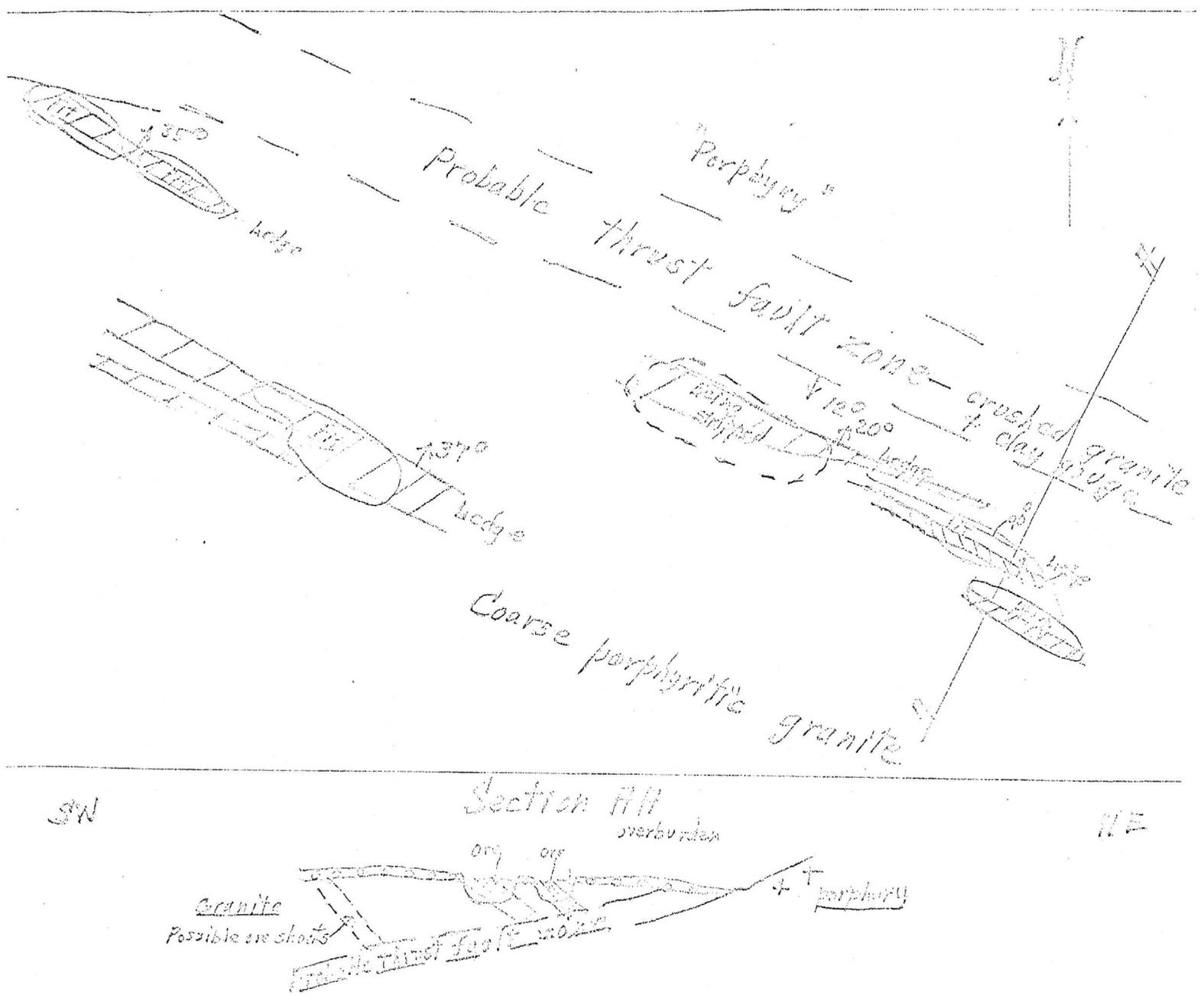
Another factor that cuts greatly into the tonnage and lowers the grade of the ore, is the occurrence of masses of "clay" which the writer believes represents partly to strongly decomposed granite flour produced by movement on the major thrust fault and on minor splits from this zone. This clay is particularly noticeable near the fault though also seen as ground-up granite in pit Area 8&9 probably well above the major thrust fault.

PROSPECTING & EXPLORATION

Inasmuch as a drag-line is on the job, it seems logical to explore the surface first in unprospected areas by cutting trenches through the transported alluvium in general NE-SW direction. This direction should cross-cut possible ore shoots. If ore shoots are found, the portions in depth must be explored by some other means, possibly short churn drill holes. The use of the churn drill would depend on establishing the generally flatly dipping attitude of the shoots, as is believed to be the case in the better shoots thus far partly explored or exploited. If steeply dipping shoots of side are located, it will be necessary to sink on them and do lateral work as the ground appears entirely unsuited to diamond drilling. Small veins of high grade ore have very limited extent according to Mr. Larsen, and some small shoots are very irregular in shape. These small shoots would be unimportant.

As blind ore shoots may extend up from the deeper portions of the SW dipping thrust fault, it might be worth while later to drill this area. Such drilling would necessarily be blind but if the shoots continue their flat dipping habit, the chances of a penetration would be good.

8. The following sketch map is included for convenience and is intended to replace the formal maps and sections. They represent present interpretations and make no distinction between known and believed relations.



Kingman, Arizona. November 21, 1919

PRELIMINARY REPORT

On

CYCLOPIC MINE AND MILL

LOCATION AND HOLDINGS:

This mine and mill are located about 35 miles, by auto, north of Chloride, Mohave County, Arizona, in the Southeastern section of the Gold Basin District, near the head of Cyclopic Wash. At about 4,000 feet elevation. It is reached by a good auto road from Chloride and Kingman is connected by telephone, the last 21 miles of the line being owned by the Cyclopic Mine and merging with the main line circuit.

The property consists of 8 mining claims, the surveys of which, on 2 of the claims overlap slightly thus reducing the area to about 150 acres.

In addition to the mining claims there are 4 mill-sites and water rights and several reservoir sites.

The title to all of the property is held by old locations, possession and usage and under U.S. mining laws.

The milling plant has a minimum crushing capacity of 150 tons per 24 hours, frequently crushing and tanking 50 tons in 6 hours. The equipment consists of 50 HP. oil engine, 2 sets of rolls, elevators, screens, repair shop, cars, trucks, tools etc., all in shape for operation; also 5 50 ton wood leaching tanks, tracks, cars, etc.

This cyanide-tank capacity being only equal to about one third of the crushing capacity.

The mining equipment consists of a small hoist, cars, track, tools, etc., mess-house, assay office, and a number of small houses. Ample water for 500 tons milling capacity is developed in 2 springs and owned by the mine and is piped about 4 miles; later, water can probably be developed by sinking in the vicinity of the mill.

HISTORY:

These mines were discovered in the early eighties; They were high-grade and chlorided for a number of years, shipments being made of sorted high-grade pockets, carrying up to \$175.00 per ton.

A considerable tonnage was hauled 16 miles to the Colorado River and then milled; later the ore was treated, on the ground, by arastras and later a small mill.

In 1904 the property was sold and worked in a limited, hap-hazard way and part of the present milling plant erected in this 12 years up to 1915; during this time something over \$100,000.00 worth of bullion was shipped. Altogether the property is credited with a bullion production of \$200,000.00 up to 1918. In 1919 the property was taken over by the present owner who has put the mine and mill in shape for production.

GEOLOGY:

U. S. Geological Survey Bulletin 397 states that "The country rock is a medium-grained coarsely porphyritic granite". It outcrops in association with the deposits and forms the foothills immediately on the southwest." The deposits consist of gold-bearing iron-stained breccias and sands of vein quartz, somewhat resembling conglomerate." "This material is cemented by silica and iron oxide, but is in part loosely coherent." "It trends, from a point near the mill N. 57° W up the wash and is contained in, and for the most part seems to occupy, an area 3/4 of a mile in length by about 200 feet or more in width". "The ore is of low grade and is said to mill on the average from 7 to 8 dollars a ton in gold and to cyanide well." "Mineral was first discovered here in the early eighties, but remoteness from the base of supplies together with the scarcity of water, rendered operations expensive and retarded development; nevertheless much ore has been produced and worked". "The company is reported to have recently computed about 1,000,000 tons of ore in sight." "This description, by Mr. Schrader of the U.S. Geological Survey was written in 1909 after a personal survey and inspection and partially from hearsay information. I have only quoted him in an abbreviated way; if he were to reexamine the mine now, with the faulting system practically demonstrated by 3000 feet of sinking, upraises, tunnels, cuts and drifts, he would probably add to his description, by calling the ore exposures and overflow or a faulted breakover from a contact fissure lying between the porphyritic granite and the schist, having a strike, with the main fault, or

about 80 degrees N. of W. and 20 degrees S. of E. His description of the character of the ore and a number of other favorable features, are correct and it may be that this large ore-body is a deposit, covering practically 3/4 of a mile in length with a demonstrated width of from 200 to 300 feet and a thickness of 40 to 75 feet, but only further work can determine this question of deposit or contact fissure.

ORE IN SIGHT, AVAILABLE ORE AND DEVELOPMENTS.

As this ore-body lies nearly flat, outcropping many places at the surface and with an overburden or surface covering of from a few inches to 10 feet, practically all of the 3,000 feet of developments is in ore. The main exploring and carrying incline shaft has its entrance near the mill just east of the ault. This opening driven on a 30-degree incline, taps the present bottom of the ore and from it, numerous drifts and stopes have been made and surface connecting shafts have been sunk, all in ore. An underground survey map may be forthcoming showing the numerous gropings and labyrinths made by the several operators since the mine was first opened, aggregating, as above stated, with open surface cuts, a total of about 3,000 feet of developments. A body of ground from which the last milling operations of about 1500 tons was broken, has been further proven by these drifts, upraises and shafts, as having a length of 250 feet, a width of 225 feet and an average thickness of 50 feet; this body of ore, after making an allowance for any waste, of which there is very little, as no sorting is done, and after allowing for what ore has been milled or is lying on the dumps, will show practically "in sight" 200,000 tons.

By driving the main drift about 500 feet west to a 65-foot shaft, sunk all in ore, from the surface, another block would be opened having a length of 600 feet, a width of 250 feet and an average thickness of 60 feet; this means an additional tonnage that can be cheaply put "in sight" of 650,000 tons. This can hardly be designated as conjecture as this ore-body is opened and exposed by numerous surface cuts, shafts and tunnels and there is no faulting or intrusive action cuts, shafts and tunnels and there is no faulting or intrusive action that would reduce this estimate; in fact for a distance of 2500 feet from where the ore first shows at the east edge of the fault, the ore-body appears to be getting wider, thicker and increasing in values as it strikes west, all within this Cyclopic Group which is protected in length and width, by the surveys and claims of these holdings.

A prospectus of these holdings might consistently set forth that the Company had a block of mineral ground 2500 feet long, 250 feet wide and 57 feet thick, that would furnish, after all reasonable deductions had been made, 2,500,000 tons of milling ore.

MILLING AND ORE VALUES:

Early in 1919, before the last milling operations were begun on this mine, there was taken, by the millman, not the miners, (in order to determine what he might expect for his mill) 86 samples of the ore-faces in the drifts and stopes; they averaged \$6.14 per ton, in gold and 25 cents in silver.

The assays on the heads and tails of the first 12 tanks milled, gave \$6.00 per ton; of this there was a recovery, in bullion, of 85% or \$5.10 per ton. The last 12 tanks of ore broken, in October and November 1919, from all the stopes and faces and some surface cuts, was intended for a correct general practical sample of the ore; no sorting was done and it was not considered the best ore as some of it came from near the fault; the assay was \$6.50 per ton. The recovery was \$5.50 per ton or 85%. The tailings from the tanks run from 50¢ to \$1 per ton, depending on the amount of solution used and the thoroughness of the wash. Many tests have been made on the extraction and leaching, with the different crushing meshes.

The tailings loss on 10 mesh show	\$1.25 per ton.
" " " " 12 " "	1.10 " "
" " " " 14 " "	1.00 " "
" " " " 16 " "	1.20 " "

As the crushing and mesh got finer above 14, or coarser, the losses increased and 14 mesh has been established for this coarse and cheap crushing, for the best net recoveries, with 72 hours for leaching and washing.

After reading the above thoroughly practical mining and milling tests made from the mine-run ore, it will be understood why an assay chart and a long list of assays is not furnished and is unnecessary.

MINING AND MILLING COSTS:

From many tests made, a daily practical operation after putting on every item of expense and mining and tramping the ore from every point in the ore bodies, it has been established that with the present limited equipment the cost of mining and delivering to the mill, 50 tons of ore in 8 hours is less than \$1.00 per ton. One man, recently broke in the mine, at various points, and

trammed 555 tons of ore in 20 days.

In the same way a close tab has been kept on the milling operations, the ore only requiring 3/4 of a pound of cyanide per ton and after charging up every item of expense the cost does not exceed \$1.00 per ton for milling.

The present mill has a crushing capacity of 200 tons per day, but it only has a tank capacity of 50 tons per day or by working two 16-hour shifts and one 8-hour, a capacity of 83 tons.

RECOMMENDATIONS:

The present main level should be extended 250 feet west and drifts north and south and one or two more up-raises made to the surface, 50 to 65 feet to serve as "glory holes". The ore could be mined up to this point very cheaply, by "glory holes", breaking at least 200 tons per day; At this point the mine would be ready, and a mill ought to be, to take care of at least 500 tons per day. The mining to be done by steam-shovel or cheap automatic loading into the mine cars. At this time a new mill, built along simple lines out of the earnings, could be ready to take care of this tonnage.

To begin mining and milling 200 tons per day from this ore-body, will not cost to exceed \$1.50 per ton, figuring all dead work which is cheaply done in this ore-body, and all overhead expenses.

To increase the present milling capacity up to 200 tons per day, will require 50 more tanks, with conveyor for tailings, one new larger elevator, 2 impact-screens, a new hoist at the mine-incline and other minor additions. This can be done for \$5,000.00. The additional work in the mine will be taken care of as dead work, provided for by the \$1.00 per ton cost. Also new conveyor for filling tanks.

CONCLUSIONS:

This ore-body will run \$6.00 per ton.

It will mill \$5.00 per ton.

It can be mined and milled for \$2.00 per ton.

It will net \$3.00 per ton or \$600.00 every 24 hours for 200 tons.

Later, after more work is done in the mine, I would expect, by intelligent analysis of the faulting system and by prospecting work, to uncover the contact vein fissure in which this ore originated. I am,

Very truly yours, R.G. BILLINGS.

OCTOBER 16, 1920.

I believe the main points of the above report are correct, as I have personally inspected the property several times and believe the ore body is almost unlimited and that to make it a good paying proposition a large tonnage should be treated as cheaply as possible, which I believe can be done.

Signed, R.K. Humphrey, M.E.

SYNOPSIS OF REPORT ON CYCLOPIC MINE

1935

LOCATION:

The Cyclopid Mine is situated in the Gold Basin Mining District, Mohave County, Arizona.

AREA:

The property comprises four groups of claims as follows:

Cyclopic Group	-	8	claims	-	160	acres
Climax Group	-	3	"	-	60	"
San Juan Group	-	4	"	-	80	"
Big Ledge Claim	-	1	"	-	20	"
						320 acres

TITLES:

Titles are held by right of location and are free from any liens or incumbrances of any character.

DEVELOPMENT:

The ore body of the Cyclopic Mine is developed by various intermittent workings along its trend for approximately 5,800 feet and at right angles to its trend or across the ore body for a distance of 400 feet. This indicates an ore body approximately 5,800 feet long, 400 feet wide and from 20 to 45' in thickness, lying on a southerly dipping sill of 12°.

TONNAGE:

Estimates of tonnage are as follows:

Proven or blocked tonnage	-	190,000 tons
Probable tonnage	-	150,000 tons
Potential tonnage	-	<u>1,590,000 tons</u>
Total	-	1,930,000 tons

One prominent and reliable engineer estimated $2\frac{1}{8}$ million tons but the writer conservatively makes an estimate as shown above.

ORE VALUES:

Several hundred samples taken throughout the extent of the ore body show an average of approximately \$8.00 per ton and as high, in places, as \$73.50 per ton. An actual average of samples taken showed \$11.38 but mill runs of several thousand tons did not stand up to that average throughout when mining the whole mass by open pit methods.

METALLURGY:

The ore is amenable to cyanidation and is an ideal ore for that process as has been demonstrated by treatment of several thousand tons in the cyanide plant at the property. Crushing to only 14 mesh and leaching for 72 hours makes a very satisfactory recovery. A cyanide solution of four pounds strength is used which shows a loss in cyanide of only .7 lbs and a moisture loss of 17%. Lime consumption is 5 lbs per ton of ore and zinc consumption is nominal. Precipitation is 100% perfect.

WATER:

An ample water supply is available three miles distant and is pumped by a well equipped pumping plant through a 2" pipe line for use at mill, mine and camp.

EQUIPMENT:

The property is equipped with a 50 ton cyanide plant, with crushing capacity and power for 100 tons daily. The plant can be increased to the 100 ton capacity by the addition of a few more tanks. The mine is equipped by compressor, hoist and 40' headframe. However, recent mining has been done by dragline in open pit operations, which method should be continued.

ESTIMATED PRODUCTION COSTS:

	<u>Par Ton</u>
Mining -----	0.382
Pumping -----	0.068
Milling -----	0.765
Miscellaneous -----	0.170
Safety Factor -----	0.277
	<u>\$1.662</u>

EARNINGS:

This property will show an earnings of at least \$4.00 per ton on a large operation and there is sufficient ore available to furnish a 300 ton mill indefinitely.

(signed) E.H. CRABTREE

ASSAY RESULTS OF RECENT SAMPLES - CYCLOPIC MINE

Sample No.	Block No.	Area No.	Location Miscellaneous	Sampling Width -Ft.	Ounces Gold	Value
C-201	3	7	Cactus Shaft Pit	3	0.33	\$11.70
C-202	3	7	Cactus Shaft Pit	16	0.14	4.90
C-203	3	7	Cactus Shaft Pit	6.5	0.53	18.55
C-204	Bet. 3&1	7	Mine Entrance	5.5	0.14	4.90
C-205	Bet. 3&1	7	Mine Entrance	8.6	0.50	17.50
C-206	Bet. 3&1	7	Mine Entrance	6.5	0.24	8.40
C-207	Bet. 3&1	7	Mine Entrance	5	0.42	14.70
C-208	3	7	SE Cor. Shovel Pit #1	5	0.28	9.80
C-209	3	7	SE Cor. Shovel Pit #1	4.5	0.22	7.70
C-210	3	7	S. Center " " "	12	0.06	2.10
C-211	3	7	Open Cut Croppings	5	0.19	6.55
C-212		8	E. end of Glory Hole	3	0.05	1.75
C-213		8	SE Co. Glory Hole	5	0.60	21.77
C-214		8	SE Cor. Glory Hole	4	0.06	2.10
C-215		8	N Side Glory Hole	6	0.03	1.05
C-216		8	S Side Glory Hole	8	0.02	0.70
C-217		9	Dump at N 11 E 19		1.19	41.65
C-218		10	Open Cut Above N 11 E 16	3	0.01	0.35
C-219		10	Pit No. 11 at N 13 E 16	3	0.16	5.60
C-220		8	W End Glory Hole	8	0.01	0.35
C-221		8	W End Shovel Pit No. 2	2.5	1.13	40.42
C-222		8	No. 8 Shaft-See Map	9	0.07	2.45
C-223		8	No. 8 Shaft-See Map	6.5	0.13	4.55
C-224		8	No. 8 Shaft-See Map	8	0.02	0.70
C-225		8	No. 8 Shaft-See Map	7.5	0.67	23.45
C-226		8	No. 8 Shaft-See Map	8	1.00	35.00
C-227		9	Dump at N 11 E 19		0.03	1.05
C-228		10	Dump at N 13 E 14		0.12	4.20
C-229		10	Open Cut at N 13 E 13	3	0.18	6.30
C-230		10	Open Cut at N 13 E 13	4	0.21	7.35
C-230 ¹		10	Shaft at N 12 E 13	3.5	0.13	4.55
C-231		10	Open Cut at N 12 E 13	3	0.06	2.10
C-232		10	Open Cut at N 12 E 13	3.5	0.03	1.05
C-233		10	Open Cut at N 12 E 13	3.5	0.03	1.05
C-234		10	Open Cut at N 11 E 12	2	0.26	9.10
C-235		10	Dump at N 11 E 13		0.04	1.40
C-236		10	Croppings at N 11 E 13		0.20	7.00
C-237			Lillian Workings - Map	7	0.17	5.95
C-238			" " "	5.5	0.10	3.50
C-239			" " "	7	0.08	2.80
C-240			" " Dump		0.04	1.40

Note: The widths shown on above samples are "sampling widths" of ore exposure at point of sampling and NOT width of vein.

Symbols such as N 11 E 19 indicate number of survey stake near point of sampling, such as North 11 East 19.

A dozen or more samples were taken from doubtful material and surface material which should not be classed as "ore".

However, all samples are included in computing the average value which shows:

Weighted Average -----\$8.11

Average sampling width of 5.8 feet.

SYNOPSIS OF REPORT ON CYCLOPIC MINE

1935

LOCATION:

The Cyclopid Mine is situated in the Gold Basin Mining District, Mohave County, Arizona.

AREA:

The property comprises four groups of claims as follows:

Cyclopic Group	-	8	claims	-	160	acres
Climax Group	-	3	"	-	60	"
San Juan Group	-	4	"	-	80	"
Big Ledge Claim	-	1	"	-	20	"
						<u>320 acres</u>

TITLES:

Titles are held by right of location and are free from any liens or incumbrances of any character.

DEVELOPMENT:

The ore body of the Cyclopic Mine is developed by various intermittent workings along its trend for approximately 5,800 feet and at right angles to its trend or across the ore body for a distance of 400 feet. This indicates an ore body approximately 5,800 feet long, 400 feet wide and from 20 to 45' in thickness, lying on a southerly dipping sill of 12°.

TONNAGE:

Estimates of tonnage are as follows:

Proven or blocked tonnage	-	190,000 tons
Probable tonnage	-	150,000 tons
Potential tonnage	-	<u>1,590,000 tons</u>
Total	-	1,930,000 tons

One prominent and reliable engineer estimated $2\frac{1}{2}$ million tons but the writer conservatively makes an estimate as shown above.

Brief Report on the

Cyclopic Mine

and Associated Properties

(the Climax and San Juan)

Compiled from Reports by J.E.Morrison, E.M.

E.H.Crabtree and R.S.Billings, E.M.

by

E. H. Crabtree

Chloride, Arizona,

October 4, 1935

I N D E X

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Brief Report on the Cyclopic Mine

and Associated Properties

* * * * *

The following data is compiled from reports on the Cyclopic Mine and associated properties made by J.E.Morrison, E.M. of San Diego, California, E.H.Crabtree and Robert S.Billings, E.M., of Denver, Colorado and is a condensed report embodying the substance of all three reports in order to avoid duplication of certain features contained in the different reports.

LOCATION: The mining properties which are the subject of this report are situated in the Gold Basin Mining District, Mohave County, Arizona. The nearest railroad point is Kingman, the County Seat, situated sixty miles south of the mines and is the principal supply point of the district. The Boulder Dam is located about twenty miles northwest.

AREA: The total area of the combined properties is 320 acres, covered by sixteen claims, as follows:

Cyclopic Group - - - -	8 claims	-	160	acres
Glimax Group - - - -	3	"	60	"
Gold Bar Group (San Juan)	4	"	30	"
Big Ledge Claim - - -	1	"	20	"
	<u>16</u>	"	<u>320</u>	"

TITLES: Titles to these properties are held by right of location and have been in possession of the owner for many years and are guaranteed by him.

ECONOMIC CONDITIONS: The properties are reached by a very good automobile road and are easily accessible either from Kingman or the Boulder Dam area.

Wages and cost of supplies are on an average with any other Western mining district and production costs can be held at a minimum.

GEOLOGY: The United States Geological Survey Bulletin No. 397 by Schrader describes the geology of the Cyclopic Mine and adjacent areas quite extensively but this subject will be only briefly touched upon in this report. Quoting this report, it says:

"The country rock is a coarse porphyritic granite. The Cyclopic ore body lies on a porphyry sill or bedding plane which dips at an angle of 12° to the south, the ore apparently becoming thicker on its southerly dip. The trend of the ore deposit is $N 70^{\circ} W$ and occupies an area approximately 5,800 feet long and from 250 to 400 feet wide as far as surface exposures can be determined. "The minerals contained in the Cyclopic ores are apparently deposited from solutions from adjacent rocks due to underground circulating waters as well as mineral solutions from vapors of deep seated magmas. The metallic content of the ore is probably connected with an intrusion of igneous rocks which are located adjacent to the present known and future prospective ore bodies. The ore deposits consist of gold bearing iron stained breccias and quartz cemented by silica and iron oxides and, in places, somewhat resembling conglomerate."

DEVELOPMENT: The development of the Cyclopic ore body is at present confined to the eastern half of the known ore bearing area altho intermittent ore exposures are opened up for over a mile in extent and it remains to be determined whether or not profitable ore bodies will be developed in the western half of the property altho all indications are favorable to this conclusion.

The deepest underground workings are only forty feet in depth and, at that point the bedding plane is encountered. However, the ore is known to be of greater thickness in other points thereby proving the unconformity of the plane with the surface which is practically flat.

The development of the CLIMAX MINE, which is another mine belonging to the same group of properties as the Cyclopic, is confined to several hundred feet of workings which have exposed a quartz fissure vein carrying good values in free gold.

The GOLD BAR MINE, another of the associated properties and better known as the SAN JUAN MINE, is developed by a number of miscellaneous workings over a somewhat wide area and quartz fissure veins have been opened which show free gold values of importance.

The BIG LEDGE Vein is a very large quartz cropping only opened by prospect work but showing fair values in free gold. These properties, all situated adjacent to the Cyclopic Mine and belonging to the property, are all well worthy of further development and, in their present stage of development, can produce a considerable tonnage to augment the production of the Cyclopic Mine.

TONNAGE: (Cyclopic Mine)

Tonnage estimates of the Cyclopic Mine have been made in the three reports mentioned above and are approximately as follows:

	<u>Proven</u> <u>Tonnage</u>	-	<u>Probable</u> <u>Tonnage</u>	-	<u>Potential</u> <u>Tonnage</u>
Morrison Report -	300,000	-		-	1,000,000
Grabtree Report -	179,000	-	150,000	-	1,090,000
Billings Report -	200,000	-		-	2,500,000

VALUES:

Morrison Report: 86 samples averaging \$16.40 - @ \$20.00 gold
144 " " " " 6.55 - @ \$20.00 "
600 tons mill run " 6.00 - @ 20.00 "
600 tons " " " 6.50 - @ 20.00 "
370 " " " " 6.49 - @ 20.00 "

Billings Report shows many samples which average approximately \$6.50 per ton gold at the old price of \$20.00 per ounce.

Crabtree report shows 141 samples taken over an average sampling width of 5.26' (width of ore exposure and not of the vein) which averaged just under \$7.00 per ton on the \$20.00 price of gold.

Later Crabtree data shows approximately \$7.00 average and as high as \$12.00 average on milling of approximately 6,000 tons of ore in the cyanide plant on the property.

(All above values refer to the Cyclopic Mine ore)

Crabtree Report also shows:

4 samples of Gold Bar (San Juan) ore averaging width of 4.55' - \$8.50
7 " " Climax Ore " " " 3.458- 6.87

Billings report shows an average of Cyclopic ore of \$6.49 at old price of gold. All results shown are for gold only as silver value is less than an ounce per ton and no other metals are contained in the ore.

During the past two months the writer has re-sampled the Cyclopic ore body with the following results:

41 samples over average sampling width of 5.8' - average \$8.11
31 " " " " " " 4.9' - " 7.64

The above are weighted averages. Gold at \$35.00

NOTE: Sampling widths are width of ore exposures and NOT vein widths. The above results include 33 samples of known low grade material which cannot be classed as ore but which were sampled and included in the general average. Excluding these from averages of profitable ore will bring the true average to \$11.00

METALLURGY:

The Cyclopic ore is amenable to treatment by cyanidation and this has been the practice up to this time.

Recent tests, however, have demonstrated that the ore may be successfully treated by flotation but this is a matter to be later determined as to the best process. Cyanidation calls for a four pound solution of sodium cyanide and a 72 hour cycle of treatment. Precipitation is made on zinc shavings and is 100% perfect. A high recovery can be made by this practice.

Cyanide consumption is .7 lbs and zinc consumption is nominal. Five pounds of lime are used per ton of ore.

WATER:

Water is available for all purposes from a pumping plant belonging to the property and situated four miles distant.

Water is obtained thru a two inch pipe line which is pumped two miles to an elevation about 500' above the pumping plant and from a storage tank at this point it goes by gravity to the mill, mine and camp. The supply is ample for all requirements.

EQUIPMENT:

The present equipment consists of a 50 ton cyanide plant, all leaching, which however is not sufficient for handling the tonnage that the Cyclopic mine can produce and is also somewhat antiquated.

Assay office, camp buildings and various other buildings are in good condition and ready for immediate use. The mine is equipped with headframe, hoist, etc, but should be put in condition for open pit mining with dragline or power shovel to obtain lowest mining costs and this has been the later practice.

PRODUCTION COSTS: Careful estimates as to costs of production show that the total expense, including all overhead and fixed charges will not exceed \$1.66 per ton.

This estimate is made on the basis of open pit mining methods with dragline or power shovel of not less than 100 tons per day. Details of this estimate will not be given here but are available for inspection at any time.

REQUIREMENTS: The Cyclopic property should be equipped at once with an all slime cyanide plant of 100 tons daily capacity or more if it is determined that the available tonnage should warrant a larger plant to start with. This plant would not only treat Cyclopic ores but will also successfully treat ores from the associated properties, the Climax and San Juan Mines or any other mines in the district, if desired, and a large tonnage could be obtained other than the Cyclopic ore if it was decided to treat other ores. Other ore from the associated properties, however, have considerable free coarse gold which should be first taken out by amalgamation before going to cyanidation.

As previous stated, the Cyclopic Mine should be equipped with the proper machinery for open pit mining operations.

CONCLUSION: From the above data estimates have been made as to the earning per ton of ore mined and treated and it seems reasonably certain that a profit of at least \$4.00 per ton can be made without particularly selective mining and probably a larger profit if the mining is accomplished with a special effort to eliminate the lower grade materials which may be found in some places thru the ore body.

Chloride, Arizona.

Respectfully submitted: 

Willcox, Arizona, Dec. 3, 1937.

To
Eagle-Picher Mining & Smelting Co.,
Tucson, Arizona.

Memo.
Cyclopios Mine
Mohave County, Arizona.

The Cyclopios mines are located 58.5 miles northwest from Kingman, Arizona, near White Hills, 29 miles off -- to the northeast -- the main highway between Kingman, Arizona and Las Vegas, Nevada, via Boulder Dam.

The mines are being operated by the Manta del Oro Mining Company, of which Mr. E. H. Crabtree is manager.

The ores, free gold in iron-stained quartz gangue, occur in a blanket deposit in a fault fissure, or shear zone, in porphyritic granite. The fault fissure, or shear zone, has a width of about 200 feet and shows mineralization, along the strike, for over one mile in length in a northwest-southeast direction. The deposit, consisting of a quartz breccia, or angular fragments of quartz cemented by silica and iron oxides, shows thickness of from 8 feet to greater than 20 feet where mined, and dips to the northeast where it is apparently out off, or bottomed, by an underlying formation, or fault plane, dipping to the southwest at a ^{vertical} depth of about 30' from the outcrop. The barren overburden varies in width from practically nothing at the outcrop to 10 and 15 feet.

The mines have been worked, intermittently, for many years, and a very large tonnage has been mined and milled, judging from the large excavations made and mill dumps of tailings. Mine work has been confined principally to an area about 200 feet wide by about 1500 feet long, near the lower, southeast, end of the deposit; the deposit is terminated, on the southeast, by intrusive rocks and faults.

No attempt was made to sample the deposit, but it is understood that gold values in the deposit, as mined by dragline now in operation, vary from \$4.00 to \$8.00 per ton as shown by mill returns, - at present price of \$35.00 per ounce for gold, - by using "stripping" and "more-or-less" selective mining methods. The gold is not uniform in occurrence, being found in shoots, or pockets, from the foot- to the hanging-wall side of the fissure in which the blanket occurs. The shoots are marked by iron stains and are easily followed.

At the present time a cyanide mill on the property treats from 80 to 100 tons of ore per 24 hours. This tonnage of ore is broken in one 8-hour shift by one miner using a jackhammer air drill, and delivered to trucks, for transportation to the mill about 1/2 mile distant, by a small, gasoline-power, drag line.

The ore is crushed to pass a 10-mesh screen and leached with cyanide solution (no agitation) for an extraction of gold values reported to be greater than 95% of the head value.

The outcrops of the blanket deposit occur along a gently sloping hill, or ridge, and the extent, and value, of the ore shoots can be satisfactorily determined by churn drilling.

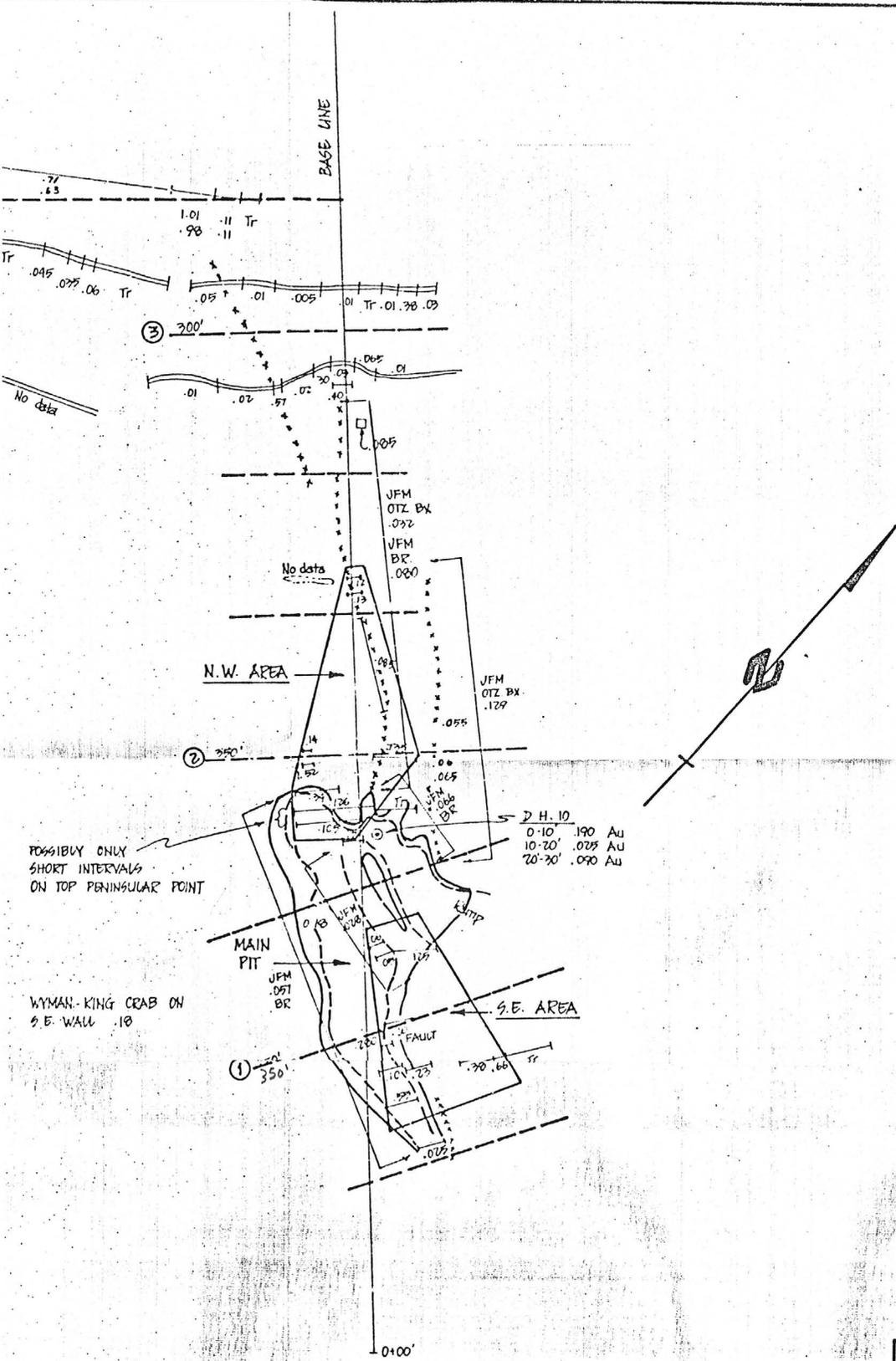
Cyclopias Mine, #2, 12/3/37.

Obviously from the amount of overburden that must be removed, and the more-or-less selective mine method that must be used to secure a product with a head mill value of approximately \$4.00 per ton, the present operation of 100 tons of ore, or less, per 24 hours, cannot be a highly profitable business.

The Cyclopias mines were visited by F. H. Lerchen Nov. 9th and 10th, 1937.

Yours truly,

F. H. Lerchen.



J.F. McINTYRE, P. Eng
 CONSULTANTS DELTA, & C.

CHARLES E. McINTYRE
 LA MESA CALIFORNIA

CYCLONIC GOLD MINE