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MINING PLAN OF OPERATIONS FOR THE GOLDEN EAGLE MINE MOHAVE COUNTY, ARIZONA

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JULY 1993

MINING PLAN OF OPERATIONS
MORGAN MINING COMPANY

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Mohave County, Arizona

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TABLE OF CONTENTS

		Page No.
1.0	**SUMMARY**	**1**
2.0	**INTRODUCTION**	**2**
2.1	Location	2
2.2	Project History	2
2.3	Geological Setting	3
2.3.1	Stratigraphy	3
2.3.2	Faults	3
2.3.3	Alteration	4
2.3.4	Mineralization	4
2.4	Project Description	5
2.5	General Information	5
2.5.1	Legal	5
2.5.2	Project	6
Table 1	Disturbed Acreage by Area	6
2.5.3	Required Authorizations	7
3.0	**PLANT CONSTRUCTION AND OPERATIONS**	**8**
3.1	Project Components	8
3.2	Preproduction Development and Construction	8
3.2.1	Road Requirements	8

TABLE OF CONTENTS (con't)

		Page No.
3.2.2	Project Access Roads	9
3.2.3	Waste Dump Sites	9
3.2.4	(ORE) Stockpile, Crushing and Process Plants	9
Table 2	Analysis of Waste Rock	10
3.2.5	Tailings Impoundment	11
Table 3	Depth to Groundwater	11-12
3.2.5.1	Tailing Impoundment Liner Installation	12
3.3	Construction Sequence	13
3.3.1	Internal Drainage	13
3.3.2	Description of Mining Operations	14
Table 4	Mining Equipment	14
3.3.3	Waste Rock Dumps	15
3.3.4	Crushing Plant	15
3.3.5	Grinding and Processing Plant	16
3.3.6	Flotation Circuit	16
3.3.7	Reagents	17
3.4	Tailings Deposition	17
3.4.1	Water Reclaim	18
3.5	Spill Containment and Leak Detection	18
3.5.1	Monitoring Program	19

TABLE OF CONTENTS (con't)

		Page No.
3.6	Ancillary Facilities	19
	3.6.1 Office	19
	3.6.2 Laboratory	19
	3.6.3 Parking Facilities	20
	3.6.4 Water System	20
	3.6.5 Sewage Facilities	20
	3.6.6 Refuse Disposal	20
	3.6.7 Electrical Power	20
	3.6.8 Diversion Structures	21
	3.6.9 Fencing and Wildlife Protection	21
	3.6.10 Communications	21
4.0	**RECLAMATION PLAN**	**22**
4.1	Coversoil Salvaging	22
	4.1.1 Removal and Storage	22
4.2	Mine Closure and Reclamation	23
	4.2.1 Temporary Closure	23
	4.2.2 Open Pit	23
	4.2.3 Waste Haul Road	23
	4.2.4 Processing and Crusher Plant Area	23
	4.2.5 Tailings Impoundment	23
	4.2.6 Water Reclaim Tank	24
	4.2.7 Refuse and Sewage Facilities	24

TABLE OF CONTENTS (con't)

		Page No.
	4.2.8 Water Diversions	24
	4.2.9 Fences	24
	4.2.10 Roads	24
	4.2.11 Well Abandonment	24
5.0	**ENVIRONMENTAL CONSIDERATIONS**	**25**
5.1	Physical Resources	25
	5.1.1 Physical and Visual Setting	25
	5.1.2 Soils	25
5.2	Air Resources	26
	5.2.1 Climate	26
Table 5	Average Climatological Data	27
Table 6	Storm Events	27
	5.2.2 Air Quality	28
5.3	Water Resources	28
	5.3.1 Surface Water Hydrology	28
	5.3.2 Groundwater Hydrology	28
5.4	Biological Resources	29
	5.4.1 Vegetation	29
	5.4.1.1 Vegetation Types	29
	5.4.1.2 Threatened, Endangered, and Sensitive Plant Species	30

TABLE OF CONTENTS (con't)

	Page No.
5.4.2 Wildlife	31
5.4.2.1 Threatened and Endangered Wildlife Species	33
5.5 Cultural Resources	33
5.6 Land Use and Socioeconomic	34
APPENDIXES	
6.0 APPENDIX A	**35**
Tailings Conceptual Design	
7.0 APPENDIX B	**46**
Detailed Facility Summary	
8.0 APPENDIX C	**53**
Details of Hazen Toxicology Test work on Waste Rock	
9.0 APPENDIX D	**60**
Details of Soil Studies	
10.0 APPENDIX E	**64**
Figure 1 General Project Location Map	
Figure 2 Project Area	
Figure 3 General Site Layout	
Figure 4 Surface Geology Map	
Figure 5 Geology Cross Section	
Figure 6 Mine Site Detail	
Figure 7 Tailing Section - A	
Figure 8 Tailing Section 200	
Figure 9 Tailing Section 500	
Figure 10 Tailing Impoundment Details	
Figure 11 Process Flow Diagram #1	
Figure 12 Process Flow Diagram #2	
Figure 13 Process General Arrangement	
Figure 14 Drainage Layout	
11.0 BIBLIOGRAPHY	**79**

1.0 SUMMARY

1.0 Summary

Morgan Mining Company (MMC) plans to mine and recover gold from an orebody located approximately 15 miles north of Kingman, Arizona (Figures 1 and 2, Appendix E). Development of mineral resources on public lands requires the approval of the Bureau of Land Management (BLM). This mining plan of operations is submitted pursuant to BLM's regulations as set forth in Title 43 CFR Part 3809.

MMC proposes to mine the orebody by open pit mining methods consisting of drilling, blasting, loading and hauling. Ore will be hauled by off-road trucks from the mine to the crushing plant for size reduction. Crushed ore will be transferred by conveyor to a ball mill for grinding and then pumped to a flotation circuit for recovery of precious metal values.

Flotation, utilizing surface active reagents, will remove the valuable contents from the finely ground ore (pulp). Gold and silver contained in a base metal concentrate will be shipped off the property as the final product. The tailings from the processing plant will be deposited in a tailings impoundment. The entire process will be a fully contained zero discharge facility.

MMC intends to process 100,000 tons per annum of ore over an initial projected two year plus mine life. Approximately 900,000 tons of waste rock will be mined per annum in conjunction with the ore. The waste rock will be hauled to the face of the existing Cyprus Mineral Park tailings impoundment.

The Golden Eagle Mine will disturb approximately 35 acres. Area disturbances associated with individual mine components are as follows:

Open pit	-	8 acres
Waste haul road	-	7 acres
Tailings Impoundment	-	12 acres
Plant site	-	3 acre
Other areas	-	5 acre

2.0 INTRODUCTION

2.0 INTRODUCTION

2.1 Location

MMC controls certain valid mining claims located in Section 31 T 23 N, R 17 W, Mohave County, Arizona. These claims form the Golden Eagle project area. The project is located approximately 15 miles north of Kingman (Figure 1, Appendix E). The claims are located on public lands administered by the Kingman Resource Area Office of the Bureau of Land Management (BLM). Figure 2 shows the project location.

The following unpatented claims are included in the property package:

Claim Name	BLM Serial No.
Golden Eagle #1	68000
Golden Eagle #2	68001
Golden Eagle #3	68002
Bob Cat	68003
Silver Eagle	68004
Silver Eagle #1	68005
Silver Eagle #2	68006

2.2 Project History

Discovery of the Wallapai district dates from 1863. In the early days, the district was exploited for its near-surface, oxidized, high-grade deposits of silver and gold. From about 1900 until the 1950's, lead and zinc were of primary interest with production of gold and silver as by-products. Most recently, the Ithaca Peak porphyry copper deposit has been mined. Increases in precious metal prices have also spurred exploration efforts at several of the old mines. Cyprus Mineral Park presently operates a copper leach facility at Mineral Park.

From 1904 to 1948 the value of all metals produced from the district is estimated at approximately $22,500,00 from 1,276,266 tons of ore (Dings, 1951). Gold and silver production during this period amounted to 124,491 and 4,063,757 ounces, respectively. No records are available, but production of gold and silver prior to 1904 is thought to amount to at least $5,000,000 (Dings, 1951). Since 1948 the only production of gold and silver has probably been as by-products from the mining of the Ithaca Peak porphyry copper deposit.

From 1904 to 1948 production from the Golden Eagle property was 1,772 ounces gold, 25,845 ounces silver, 890 pounds copper and 40,076 pounds lead (Dings). Production from the Golden Eagle from 1933 to 1941 is tabulated in a report by E. H. Lewis in 1962 as 2,583 tons averaging 0.35 opt gold and 6.14 opt silver. An additional 1,000 tons was reportedly shipped from the property but no records are available nor is the date given (Lewis, 1962).

2.3 Geological Setting

The following geological description of the property has been excerpted from a report by Kenneth T. Bondurant, prepared May, 1989 for Cyprus Minerals Company.

2.3.1 Stratigraphy

Rocks in the Wallapai district are chiefly pre-Cambrian crystalline units, primarily of granitic composition, that have been intruded by late Cretaceous to early Tertiary Ithaca Peak granite. The pre-Cambrian rocks consist of fine to medium-grained amphibolite made up of hornblende and plagioclase, granite gneiss with biotite-rich lenses and bands alternating with bands of quartz and feldspar hornblende and biotite schists, granites and gnessic granites (Dings, 1951). The Ithaca Peak granite of Dings is actually a quartz monzonite porphyry that has been dated at 71.5$\pm$ 2.6 m.y. In addition to the large mass at Mineral Park, many dikes, plugs, and small bodies of this rock are found throughout the district. The youngest rocks in the district are dikes of varying composition ranging from gabbro to rhyolite and apparently younger than the Ithaca Peak granite. Several rhyolite dikes are prominently exposed in the central part of the district and are thought to be genetically related to the Tertiary volcanic remnants found around the margins of the Cerbat mountains (Dolence, 1987).

In the mine area, the mineralized veins are hosted in a complex of near-vertical granite gneiss and amphibolite schist that alternate in bands from a few to tens of feet in width. East and west of the mine the bedrock is more massive, weakly foliated, gneissic granite without amphibolite bands. Minor granite, pegmatite, aplite, rhyolite and lamprophyre dikes occur in the mine area mainly within shear and fault zones and are quite abundant in the areas drilled (Dolence, 1987). Figure 4 , included in Appendix E, is a geologic map of the surface in the mine area.

2.3.2 Faults

The dominant structure in the mine area is a wide fault zone striking about N 30°W. From surface mapping, this zone appears to extend up to 800 feet east of the main shaft where it abruptly terminates in unsheared rock and up to 1,500 feet west where it weakens gradually. This fault zone cuts the district foliation at a low angle and is reflected on the surface in shearing, brecciation, and silicification (Dolence, 1987).

Veins emplaced along this fault zone tend to pinch and swell both along strike and dip and tend to parallel smaller faults which, in places, trend 20° to 30° to the strike of the main fault zone. Recurrent movement along these faults has sheared many of the veins and in the central part of the drilled area, post-mineral movement along a west-dipping fault appears to have offset the veins and dikes some tens of feet in a downdip direction (Dolence, 1987). Figure 5 is a typical geologic cross section through the center of the deposit and shows the stratigraphic and structural relationships as well as the mineralization encountered.

2.3.3 Alteration

Throughout the district, alteration is generally confined to the structures hosting the veins, except in the Ithaca Peak Mine area where the entire intrusion is extensively altered. In the Golden Eagle mine area, the amphibolite schists nearest the veins are altered to clay, sericite, and chlorite. Lewis (1962) notes that "the known alteration zone extends 40 feet east and 40 feet west of the shaft and trends north-northwest." Logs of drill holes almost always note the presence of weak to strong clay alteration in all zones containing mineralization.

2.3.4 Mineralization

Dings (1951) classifies the vein deposits of the district as mesothermal and places their age as younger than the dikes due to their cross-cutting relationships. He also believes the source of the vein-forming solutions to be the magnetic reservoir of the Ithaca Peak granite stock. Primary vein minerals consists mostly of sphalerite, galena, and pyrite with lesser arsenopyrite and chalcopyrite in a gangue of limonite, quartz, carbonate and clay. Common supergene vein minerals are anglesite, cerrusite, cerargyrite, and native silver and gold. Veins are usually oxidized to depths of 75 to 200 feet but, locally, pyrite is maybe found below 75 feet and essentially all of the oxidized portions of the known deposits have been exhausted.

According to Dings (1951), the paragenesis of the principal primary mineralization is quartz, pyrite, arsenopyrite, sphalerite, galena, and chalcopyrite. Much of the ore he examined showed a second generation of pyrite following galena and the introduction of quartz intermittently throughout the period of mineralization. "Valuable constituents" of the veins were probably deposited after a reopening of the veins subsequent to the initial deposition of quartz and pyrite (Dings, 1951).

Most of the gold and silver encountered in the Golden Eagle drilling appears to be associated with primary sulfide minerals in the veins and mineralized zones. No secondary ore minerals have been identified, but there could be minor areas of secondary enrichment at the tops of blind, unmined ore shoots, the primary portions of which were penetrated in the drilling. A minor portion of the ore is weakly to highly oxidized and consists of mixed iron oxides and sulfides.

Sulfides associated with the gold and silver values in the drill hole intercepts are pyrite, galena, arsenopyrite, and chalcopyrite. The drill logs give an estimate of the percent of pyrite and gray sulfides present by 5 foot sample interval and there does not appear to be a one-to-one relationship between sulfides and gold or silver values. Most of the holes encountered either separate quartz veins or portions of veins with trace to as high as 10 percent estimated total sulfides, some with no appreciable gold or silver values. On the other hand, all gold and silver values seem to be associated with sulfides to some degree, possible evidence of the multiple phases of mineralization noted by Dings.

Drilling in 1988 established the presence of gold and silver mineralization exceeding a 0.02 opt gold cutoff in veins and vein zones from 2 to 100 feet wide extending from about 400 feet south of the Golden Eagle shaft to a point some 250 feet north of the shaft along the trend mined in the past. Essentially barren holes at both ends of this trend indicate that while the structure persists, the veining and precious metals content is practically nil. The mineralized zone immediately north and south of the main shaft is composed of unmined portions of the veins above and below the old workings.

2.4 Project Description

The Golden Eagle Mine will produce approximately 11,000 ounces of gold and 65,000 ounces of silver per year. The current mine plan calls for 100,000 tons of ore and 900,000 tons of waste to be mined from the open pit annually. Mine life is anticipated to be just over two years, subject to market factors and ongoing exploration and development activities. The project will employ approximately 20 people and generate an estimated payroll of $600,000 annually. The basic activities of this operation will consist of the following:

- Open pit mining of ore and associated waste rock.
- Transportation by haul truck of the ore to the crushing plant.
- Transportation by haul truck of the waste rock to the face of the existing Cyprus tailings impoundment.
- Crushing and grinding of the ore to form a pulp.
- Flotation to recover gold, silver, and base metals.
- Thickening, filtration and shipping of the flotation concentrate to a facility off the property.
- Disposal of the flotation tailing in a zero discharge tailings impoundment.
- Reclamation and rehabilitation of disturbed areas following cessation of mining and processing operations.

2.5 General Information

The following general information will outline the corporate, legal, project information and the required authorizations for the Golden Eagle Mine.

2.5.1 Legal

Applicant:	Morgan Mining Company C/O Mr. Adrian W. Vander Pyl 2880 S. Locust #702-S Denver, Colorado 80222
Corporate Officer:	Mr. A.W. Vander Pyl

2.5.2 Project

Location: The Golden Eagle property is located on the west flank of the Cerbat mountains in T23N, R17W and T23N, R18W, Mohave County, Arizona.

Project Area: The project area is located in Section 31, T23N, R17W.

Access: Access to the project is from Kingman north on U.S. Highway 93, approximately ten miles to the Mineral Park Road, then east approximately 5 miles as shown on Figure 2.

Claimant: MMC through 100% ownership of claims or mineral leases on claims held by Cyprus Minerals.

Mining Claim Information: The MMC property position consists of 7 unpatented lode mining claims comprising approximately 104 acres. The location of the claim is shown on Figure 2. A complete listing of the unpatented mining claims names and BLM serial numbers can also be found in Section 2.1.

Area of Disturbance: The approximate acreage to be disturbed by operations authorized by the Plan are as follows:

TABLE 1 DISTURBED ACREAGE BY AREA

COMPONENT	ACRES
Open Pit	8
Waste Haul Road	7
Tailings Impoundment	12
Plant Site	3
Miscellaneous	5
Total	35

2.5.3 Required Authorizations

AGENCY	REQUIRED PERMIT
<u>Federal</u>	
Bureau of Land Management	• Mining Plan of Operations
Department of Labor	• MSHA Safety Training Plan
<u>State of Arizona</u>	
Department of Environmental Quality	• Aquifer Protection Permit • 401 Water Quality Certification • Air Quality Permit
Department of Water Resources	• Groundwater Removal Permit • Exploration and Monitor Well Drilling and Construction Permit
State Mine Inspector	• Safety Program
State Historic Preservation Office	• Approval to Proceed
State Land Department	• Right of Way Permit

3

3.0 PLANT CONSTRUCTION AND OPERATIONS

3.0 PLANT CONSTRUCTION AND OPERATIONS

Section 3.0 describes the construction and operation of the mining and processing facilities of the Golden Eagle Mine. Figure 6 is the proposed Mine Site Plan. The design of the tailings impoundment and process plant is subject to review and permit issuance by the Arizona Department of Environmental Quality (ADEQ). The crushing plant design is subject to review and permit issuance by ADEQ. Should any cultural resources be uncovered during the construction phase, activities effecting the cultural site will be suspended, the appropriate authorities notified and plan of action developed. Section 3.2 deals with the construction of various mine components as it relates to surface disturbances. Details concerning the design and function of these components is contained in Section 3.3.

3.1 Project Components

The principal mine components for the Golden Eagle project will consist of the following:

- Open pit mine
- Waste haul road
- Ore Haul road
- Run-of-Mine (ROM) ore stockpile
- Crushing plant
- Processing plant
- Tailings impoundment
- Diversion Ditches
- Coversoil stockpiles

3.2 Preproduction Development and Construction

Preproduction development will consist of:

- Construction of access and haul roads
- Stockpiling available coversoil
- Preproduction stripping of the pit and ore stockpiling
- Construction of the crushing and process plants
- Construction of the tailings impoundment
- Construction of the diversion ditches

3.2.1 Road Requirements

Roads required for the project consist of a project access road, process plant and tailings impoundment access roads, and haulage roads for ore and waste rock. Approximately 14,500 linear feet of roads will be constructed. Figure 3 show the locations of these roads. All roads will be signed to insure public safety and direct casual traffic away from ongoing operations.

3.2.2 Project Access Roads

Project site access will be via the Mineral Park Road, a Mohave County road, from its intersection with U.S. Highway 93, 15 miles north of Kingman as shown on Figure 2.

Access to the process plant will be provided by the improvement of a road beginning at the intersection with the haul road shown on Figure 3. The tailings impoundment will be accessed by a road originating east of the process plant. A gate will be placed across this road to prevent unauthorized access.

Road construction shall consist of excavating, shaping and compacting the subgrade for the haul roads. Compaction of the subgrade will consist of two passes of a vibratory smooth drum roller or approved equal. Prior to compaction, the subgrade shall be scarified and moisture conditioned to facilitate compaction.

3.2.3 Waste Dump Sites

Waste will be removed from the mine pit area and transported to the south-west corner of the existing Cyprus Mineral Park tailing dam. Cyprus will utilize the waste rock to armor the face of the dam for mitigation of wind and rain erosion. Morgan's responsibility will end once the rock has been delivered to the stockpile area at the dam. The chemical analysis of the waste rock was performed on three samples taken in the pit area. The results are summarized in Table 2 with details of the Hazen test work included as Appendix C. Clearly, the rock is non-toxic and non-acid forming. This material will be well suited for general armoring purposes on the Cyprus tailing dam facility.

In additional to use at the Cyprus tailing dam, some of the rock will be used for fill material (if necessary) when building the haul road, tailing impoundment, and the plant site. Approximately 2 cubic yards per linear foot of roadway will be utilized to place a base on the haul road and access road. The rock surface will be necessary to establish a surface suitable for heavy traffic.

3.2.4 (ORE) Stockpile, Crushing and Process Plants

Plant Construction

The Run of Mine (ROM) stockpile, crushing and process plant sites are located north of the pit (Figure 6). Site selection was based on the following criteria:

(1) close proximity to the pit;
(2) close proximity to the tailing impoundment facility;
(3) the area lacks ore bearing host environments;

After coversoil is stockpiled, the area will be graded, leveled, the crusher and process plant site will be compacted, concrete foundations poured and equipment installed.

TABLE 2 ANALYSIS OF WASTE ROCK				
	Waste Rock Sample No.			
Constituent	1 mg/l	2 mg/l	3 mg/l	Limit mg/l
Arsenic	0.2	0.1	<0.1	5.0
Barium	<0.5	0.8	<0.5	100
Cadmium	<0.02	<0.02	<0.02	1.0
Chromium	<0.05	<0.05	<0.05	5.0
Lead	<0.3	<0.3	<0.3	5.0
Mercury	<0.001	<0.001	<0.001	0.2
Potassium	3.12	6.27	8.75	N/A
Selenium	<0.02	<0.02	<0.02	1.0
Silver	<0.05	<0.05	<0.05	5.0
Potential Acidity (tons H^+/1000 tons soil)	<0.01	0.10	0.22	
Potential Acidity (tons $CaCO_3$ equiv./1000 tons soil)	<0.5	5.0	10.9	
Neutralization Potential (tons $CaCO_3$ equiv./1000 tons soil)	12.2	23.5	17.1	

The footprint of the plant site fill area will be included within the area that is the southern extension of the main tailing dam. Fill material will be excavated from within the basin of the tailing impoundment and will be augmented, if necessary, with waste rock from the mine pit. The fill material will be compacted in one-foot lifts in the areas that will be load bearing for the plant, particularly under the crushers, the ball mill foundations, and the crushed ore silo.

The processing plant will be constructed on a poured concrete pad that is bermed to control spills that might occur within the processing circuit. Material, including slurry, reagent solutions, and petroleum products will be contained, with sumps and pumps provided to return the material to the respective areas of usage.

3.2.5 Tailings Impoundment

The tailings impoundment system has been designed as a closed circuit, zero discharge facility. In addition to meeting design criteria and guidelines specified in the BLM Arizona State Office Cyanide Management Plan dated April 1992, the Arizona Department of Environmental Quality (ADEQ) must approve the geotechnical design of the impoundment system as part of the Aquifer Protection Permit (APP). Lyntek, Inc. of Denver, Colorado, has undertaken engineering and design work on the tailings impoundment facility. Appendix A, Tailings Conceptual Design, details the results of this work. Figure 6 shows a detailed site layout of the tailings impoundment. Figures 7 through 10 show cross-sections and details of the tailing impoundment area.

The area selected as the impoundment site is located in the southwest quarter of Section 31, T23N, R17W (Figure 3). This site has been chosen to minimize environmental concerns. Site selection of the tailings impoundment was based on the following:

(1) surface and subsurface hydrologic conditions of the site are favorable to the impoundment;
(2) the area lacks ore bearing host environments;
(3) small upstream catchment;
(4) availability of stable construction foundation; and
(5) the only area large enough to contain the tailings.

Distancing the impoundment from known groundwater sources was a prime consideration in selecting the site. Several drill holes had distance to groundwater logged when they were drilled. Table 3 summarizes the water table in the general site area. Six holes were drilled and logged with water encountered at 114 feet or greater. Water that was encountered created damp conditions in the holes but in no instance did water actually flow into the holes.

The impoundment will be situated between two low ridges. This will assist in minimizing surface disturbance required for construction and lower the overall visibility.

TABLE 3 DEPTH TO GROUNDWATER

Drill Hole No.	Total True Depth		Water Level		Description
	Feet	Elevation	Depth	Elevation	
E-1	172	4098			Dry
E-2	114	4136			Dry
E-3	194	4076	121	4149	Wet, not making water

TABLE 3 (con't) DEPTH TO GROUNDWATER					
Drill Hole No.	Total True Depth		Water Level		Description
	Feet	Elevation	Depth	Elevation	
E-4	123	4127			Dry
E-5	263	3947	169	4041	Wet, not making water
E-6	208	4052	177	4083	Wet, not making water

3.2.5.1 Tailings Impoundment Liner Installation

The materials supplied under these specifications shall first be quality products and manufactured specifically for the purpose of this work, and which have been satisfactorily demonstrated by prior use to be suitable and durable for such purposes. Certification test results showing that the sheeting meets the specifications shall be supplied upon request.

Installation of the lining shall be performed by a contractor that has previously installed a minimum of 2 million square feet of this material along with supervision from an independent engineering firm also with extensive experience in the installation of synthetic liners for tailings impoundment.

The installation of the liner is to follow the following specifications:

1) General Installment - The surface to receive the liner shall be smooth and free of protruding or sharp objects that could puncture the liner. All vegetation must be removed. A soil sterilant may be required at the discretion of the Engineer. The lining shall be placed in such a manner to insure minimal handling.

2) Field Joints - Lap joints will be used to seal factory fabricated panels of HDPE together in the field. Lap joints shall be formed by lapping the edges of panels a minimum of two inches. The contact surfaces of the panels shall be wiped clean to remove all dirt, dust or other foreign materials. Sufficient cold applied bonding adhesive shall be applied to the contact surfaces in the joint area and the two surfaces pressed together immediately. Any wrinkles shall be smoothed out. Field made splices shall have the strength of 80% of the specified sheet strength.

3) Joints To Structures - All curing components and coatings shall be completely removed from the joint area. Joining of the liner to concrete shall be made with HDPE to concrete adhesive and mechanically fastened. Unless otherwise specified the minimum joint of HDPE to concrete shall be 8 inches.

4) Repairs to HDPE - Any necessary repairs to the HDPE shall be patched with the lining material and cold applied adhesive. The splicing adhesive shall be applied to both surfaces to be joined and the two surfaces pressed together immediately. Any wrinkles shall be smoothed out.

All joints, on completion of the work, shall be tightly bonded and physically inspected. Any lining surface showing wear or injury due to scuffing, penetration due to foreign objects or distress from rough subgrade shall be repaired or replaced as directed by the supervising engineer.

3.3 Construction Sequence

Following stockpiling of topsoil, the surface of the impoundment area will be prepared and compacted to geotechnical specifications as per the APP permit. This will provide a firm foundation upon which an impermeable synthetic liner will be installed by a professional liner installation company.

The impoundment site selected is to be located in the upper reaches of a small catchment basin, reducing storage volume required for containing a 100 year flood event. Diversion ditches will be constructed on the north and south sides of the impoundment area to divert surface run-off away from the tailings impoundment area. These ditches will be connected to the natural drainage to the west of the proposed tailing dam. Figure 14 shows the locations of the ditches and the respective areas drained.

A geotechnical investigation was conducted through backhoe pits located in the area of the tailings impoundment dam. The results indicate that a stable foundation exists for the dam and that suitable low permeability soils exist in the area for constructing the secondary soil liner. The details of the soil characterization studies are included as Appendix D.

3.3.1 Internal Drainage

An internal drainage system will be constructed on top of the impoundment liner and tied to the reclaim pipe in the tailings dam. A perforated drainage pipe will be laid in the natural depressions formed by the current drainage pattern within the impoundment area. This pipe will then be covered with a layer of porous rock and geotextile. The internal drainage pipe will direct water discharge to the water reclaim tank via the reclaim pipeline. The internal drainage pipe will be of sufficient strength to withstand the weight of the tailings pile over the life of the mine.

3.3.2 Description of Mining Operations

Mining will commence along the upper pit limit as shown on Figure 6. The haul road will be extended to the uppermost limit of the pit.

Waste rock will be mined on twenty foot benches. Ore will be mined on benches ten feet high to optimize grade control. Pit slopes will vary due to the geometry of the orebody. Portions of the pit will be gentle while the high-wall will have an angle between 50° and 60°. Slope stability studies will be conducted concurrently with mining operations to insure safe operating conditions. Safety benches will be developed as conditions warrant. Haul roads will be constructed so a not to exceed a 10% grade and will be 40 feet wide, including a safety berm.

A list of potential mining equipment to be used at the project is presented in Table 4. As MMC intends to hire a contractor to mine the orebody, the equipment listed below is subject to change based upon contractor selection. Mining operations may be conducted 24 hours per day, 7 days per week. The actual rate will be dependent upon the needs of the process plant.

TABLE 4 MINING EQUIPMENT

EQUIPMENT TYPE	QUANTITY
Loaders CAT - 988D	2 each
Dozers CAT - D9N	2
Haul Trucks CAT - 773B	3
Motor Grader CAT - 14G	1
Water Truck CAT - G21	1
Rotary Drill	1
Service Truck	1
Mechanical Truck	1
Parts Trailer	1
Pickup Trucks	3

Blast holes will be drilled with a conventional blast hole rig. The holes will be approximately 6.5 inches in diameter and will be spaced so as to maximize fracturing and fragmentation. These holes are tentatively set to be drilled to a depth to depth of 24 feet in waste and 12-15 feet in ore. As blast holes are drilled, samples will be collected, assayed and results used to determine whether the material will be loaded as ore or waste.

Blasting will be accomplished using standard industry practices and materials. ANFO (Ammonium Nitrate Fuel Oil) will most likely be the primary explosive used. Scaled distance formulas (DuPont Blaster Handbook, 16th edition) will be used to establish

safe seismic disturbances and air blast limits. Blasting supplies will be stored in accordance with the regulations of MSHA and the Arizona State Mine Inspector. Overall mine safety practices will conform to Article 2 of the Arizona Mine Safety Code and MSHA regulations.

After blasting, areas of waste and ore will be segregated and flagged as per the blast hole assay information. The broken rock will then be loaded into haul trucks by front end loaders. Ore will be transported to the ROM stockpile, with waste trucked to the waste rock dump site at the Cyprus tailings dam. Dust generated on haul roads will be minimized by sprinkling water and/or the use of BLM approved chemical binders.

3.3.3 Waste Rock Dumps

Waste rock from the pit resulting from pre-stripping and production mining operations will be utilized for fill material as needed during construction of the tailing impoundment, plant site pad, and haul roads. The remainder of the waste rock will be hauled by truck to the face of the Cyprus tailing dam. The characteristics of the waste are shown in Table 2, Section 3.2.3.

3.3.4 Crushing Plant

The crusher and process plant components will be located as shown on Figure 6. Ore will be crushed at a rate of approximately 300 tons per day, slightly in excess of the process plants needs. The crushing plant will be designed to run a 8 hour a day, seven days a week basis. However, the excess capacity may allow for a reduced operating period. The period of operation will be determined by the process plant's needs.

Crushing Components

The crushing plant will consist of a ROM stockpile, an apron feeder, a primary jaw crusher, a vibrating screen, and a secondary cone crusher (Figure 11). The entire system is joined by a series of conveyor belts which move ore from one stage to the next. Dust emissions will be controlled by the use of dust filters and/or water spray bars at all important ore crushing or transfer points. Overall design and dust emission parameters are subject to review and permit issuance by the Mohave County Bureau of Air Pollution Control.

Crushing Process

Ore will be drawn from the ROM stockpile by a front end loader or end dumped directly to a dump pocket. An apron feeder will feed the ore through the primary jaw crusher. Ore that has passed through the primary crusher will be conveyor fed to the vibrating screen.

The screen will sort the ore according to size. Oversize ore from the screens will be gravity fed to the secondary cone crusher. The crusher product will be recycled to the screen. The final crusher circuit product will be crushed to approximately -3/8" in size. Crushed ore will then be conveyor fed to the fine ore bin feeding the grinding circuit.

3.3.5 Grinding and Process Plant

Grinding, flotation, and concentrate handling circuits are interlocking processes through which crushed gold ore will be processed to a final concentrate. The processing plant is designed to provide a safe, closed and contained process environment. The plant floor will be sloped to direct drainage into a floor sump. Each of these processing circuits are described below.

Grinding

The grinding circuit will consist of two ball mills each with one cyclone. The grinding circuit will be electrically powered and will have a capacity of approximately 300 tons per day. Crushed ore will be drawn from the fine ore bin by a belt feeder and conveyor fed to the ball mills where water will be added (Figure 11). The grinding circuit will reduce the crushed ore to a -200 mesh size.

The ball mills will operate in conjunction with one cyclone each which classify the ore by particle size. Cyclone overflow, containing ore which has been ground fine enough to pass to the next processing step, will be approximately 30% solids by mass. The resulting ground ore plus water, called pulp, will be pumped to the first flotation conditioner. Cyclone underflow will be returned to the ball mills for additional grinding. The concrete mill floor will be sloped to a containment sump. The sump will be fitted with a pump for clean up of fugitive solutions.

Reagents Used in the Grinding

The only reagents to be used in the grinding circuit will consist of a mixture of water and occasionally soda ash. Soda ash will be added dry by a small screw feeder with 50 pound capacity.

3.3.6 Flotation Circuit

This circuit will consist of a series of two stages of flotation. Pulp will be pumped from the grinding circuit to the first conditioning. Reagents will be metered to this tank to prepare a slurry for the flotation. The pulp will flow to the rougher flotation cells where a rough concentrate of valuable minerals will be removed from the slurry. The remaining pulp will be conditioned again and subjected to scavenger flotation to remove any remaining valuable minerals. The concentrates from the rougher and scavenger circuits will be combined and subjected to cleaner flotation to upgrade the concentrate.

The cleaner tail (reject) will cycle back to the rougher flotation #1 condition. The final concentrate will be dewatered by thickening and filtration before being loaded on trucks for transport off the property to a smelter.

The final tailing (reject from scavenger flotation) will be dewatered to 45% solids and pumped to the tailings impoundment.

3.3.7 Reagents

The following reagents will be used in the gold recovery process.

Soda Ash Na_2CO_3
Use: pH Adjust 7.0 to 8.0 Dosage: L.S lb/ton

A-208 Sodium diethyl and sodium di-secondary butyl dithiophosphate
Use: Collector Dosage: 0.10 lb/ton

A-350 Potassium amyl xanthate
Use: Collector Dosage: 0.08 lb/ton

COPPER SULFATE As: CuSO4.7H20
Use: Conditioner Dosage: 0.50 lb/ton

MIBC Methyl Isobutyl Carbinol
Use: Frother Dosage: 0.005 lb/ton

F-65 Generally Polyglycol
Use: Frother Dosage: 0.005 lb/ton

3.4 Tailings Deposition

The tailings impoundment site is located approximately 100 feet from the process plant (Figure 6). The principle components of this system are: a tailings pipeline; a lined impoundment area; runoff water diversion ditches; an impermeable tailings dam; a reclaim water collection drainage system; a reclaim water tank; and a water return pipeline (Figure 6). Lyntek, Inc., of Denver Colorado, has undertaken the engineering and design work on the tailings impoundment facility, Appendix A.

The first step in handling the tailings for disposal will be thickening, in which water not needed to pump the tails will be removed in high-rate thickener. The overflow from the thickener will be returned to the process plant for reuse in the grinding circuit.

The fine grind employed will produce material that will be unsuitable for building impoundment dams. Therefore, the entire tailing basin will be constructed prior to deposition of tailing.

The characteristics of the ore are such that a medium amount of slime (clay) will be produced in the grinding process. As a result, a substantial portion of the water contained in the slurry will quickly separate from the solids and enter the internal drainage system of the impoundment to be reclaimed for reuse in the processing circuit.

3.4.1 Water Reclaim

The water reclaim system will collect water in the tailings impoundment area for reuse in the processing plant. This system will consist of an internal drainage pipe, a reclaim water tank and a reclaim return pipeline. Details 4 and 5 on Figure 10, as well as Figures 6 and 7 show details of the layout and construction of the water reclaim system. All water flowing with the exception of the return pipeline is gravity driven. The pipe in the internal drainage system will collect water and direct flow into the reclaim pipe. The reclaim pipe will extend through the tailings dam , and direct water flow into the reclaim tank. Reclaimed water is then piped back to the process plant via the return pipeline.

The reclaim drainage pipe will have a water control gate to regulate the amount of water which can flow into the reclaim tank. This safety feature is provided to prevent the overflow of the water reclaim tank during a storm event.

The water reclaim tank will be constructed on a synthetic liner pad to control any spills that might occur around the tank and pumps. The tank will be surrounded by a fence to further protect wildlife and the public.

3.5 Spill Containment and Leak Detection

Safeguarding the environment has been a prime concern in the design of all aspects of the project. The entire facility will be engineered as a zero discharge system containing safeguards to insure that the integrity of the environment is not jeopardized.

Spill Containment

The process plant site has been designed to have secondary containment facilities in areas where reagents are used or stored. Containment areas will be built in parts of the plant where spills or leaks are possible. The sumps will be fitted with pumps to provide for clean up of solutions.

The pump stations and pipeline ditch of the tailing impoundment system will be lined and graded to facilitate drainage of any fugitive solutions into containment sumps or directly to the lined surface of the tailings impoundment area or to the processing plant floor sump.

Leak Detection

A monitoring well will be installed near the toe of the tailings dam. Collection ditches, pipes and diversion systems will be thoroughly examined on a routine basis to ensure that the integrity and performance of each system is maintained. Monitoring will be conducted on a regular basis.

3.5.1 Monitoring Program

A monitoring program is currently under development in conjunction with the ADEQ Aquifer Protection Permit. This program will be designed to: 1) demonstrate compliance with the regulatory requirements; 2) identify potential problems; and 3) to direct remedial action should a problem be detected. This monitoring plan will detail the location and construction of ground and surface water monitoring sites, sampling methods, frequency of sampling, chemical analyses to be performed, chain of sample custody documentation, a reporting schedule and threshold levels for remedial action.

As part of the monitoring program a notification schedule is being developed. This schedule will detail notification actions, time frames, containment, neutralization and cleanup procedures, cleanup equipment lists and availability, documentation and reporting methods which will be used in the event of a leak or spill. The entire monitoring program will be submitted to the BLM for approval prior to the start up of operations.

3.6 Ancillary Facilities

A wide variety of facilities are included within this section. The details of each are discussed below.

3.6.1 Office

The MMC administrative offices will be located on site in an office trailer near the processing plant. The mining contractor may wish to also have a small site office adjacent the process plant (Figure 13). These offices would be mobile trailers installed on the graded, compacted surface of the plant site. These trailers will utilize the portable septic facilities available for the process plant.

3.6.2 Laboratory

A sample preparation laboratory will be required to serve the needs of both the mine and process plant. This will be located adjacent to the process plant. It will be installed on a graded and compacted surface. The laboratory will contain space required for sample preparation only. Prepared samples will be transported to an off-site analytical laboratory for analysis.

3.6.3 Parking Facilities

Parking lots will be constructed near the plant facilities adjacent to the office trailers (Figure 6). The parking lot surfaces will be graded and compacted during ground preparation of the process plant site.

3.6.4 Water System

The project's average net process water requirement of approximately 26 gallons per minute (gpm) will be pumped from groundwater in the area. Appendix A, Tailings Conceptual Design, contains a detailed water balance. The necessary water use applications and filings will be made with the Arizona Department of Water Resources. Work is proceeding towards the development of the necessary well field.

The well field will be developed to supply the process plan's needs. This water will be pumped from wells to the process constant head water tank. The tank will be located above the process plant to utilize a gravity feed distribution system. Excess water will flow by gravity to the tailings reclaim water pond.

Potable bottled water will be supplied commercially. Dispensers will be placed within the facilities for personnel use.

3.6.5 Sewage Facilities

The project's sewage facilities will consist of portable facilities. The portable facilities will be chemical toilets which will be supplied and serviced by a local contractor. Waste from the chemical toilets will properly disposed of in either the septic system or hauled away by the vendor.

Waste process water used for cleanup and wash down will be collected by the plant sump and directed to the plant constant head tank.

3.6.6 Refuse Disposal

Nonhazardous refuse will be disposed of by a licensed waste disposal company. The waste disposal company will provide a container in which refuse will be stored prior to removal by the vendor.

3.6.7 Electrical Power

Electric power requirements for the construction and operation of the project will be provided by diesel generators located on-site. The genset will be located to minimize noise disturbance and operated to minimize exhaust emissions.

3.6.8 Diversion Structures

Tailings Impoundment Area

The diversion ditches on the north and south sides of the tailings impoundment area have been designed to divert any runoff from the upslope catchment area approximately 5 acres (Figure 14). Ditches will be sized to convey the 100 year, 24 hour recurrence interval duration flood of 4.20 inches. Rip-rap will be placed in the diversion ditch entrances and at places where erosion might occur during a storm event. The ADEQ will approve the design of the structures as part of the APP. Appendix A, Tailings Conceptual Design, contains the engineering details of the tailings diversion structures.

Access and Haul Roads

Surface runoff from the access roads will be directed to roadway ditches to prevent erosion.

3.6.9 Fencing and Wildlife Protection

The process plant, tailing impoundment and reclaim tank will be fenced with a combination of three strand barbed wire to preclude wildlife entry. Adequate signs will be installed on the fence alerting the public to the presence of active mining operations.

3.6.10 Communications

On site communications will be achieved through the use of hand held or vehicle mounted radios. Cellular phones will be used for off site communications including emergency communications. The use of cellular phones at the project site has been successfully field tested.

4

4.0 RECLAMATION PLAN

4.0 RECLAMATION PLAN

The goal of the Reclamation Plan is to establish a post operational environment that is compatible with existing land uses of the area. The long term stability of slopes, pit walls and other features following mining will be important aspect of reclamation. Also, efforts will be made to establish vegetation cover to enhance the visual characteristics of the site after mining operations cease. MMC believes the replacement of stockpiled coversoil and subsequent seeding will result in productive and stable post-mining land use. The ability of plants to pioneer will be enhanced by this effort.

In addition to recognizing non-mining uses, reclamation activities must also recognize the mineralized character of the area and provide for future mining of the resources still present. Therefore, it is MMC's intention to implement reclamation in such a manner as not to diminish future economic potential.

4.1 Coversoil Salvaging

The soils at the project site are described in Section 5.0. Coversoil salvage efforts will be directed toward recovering as much of the organic rich uppermost root zone as possible. Vegetation will be incorporated into the coversoil stockpiles. The net result of these efforts will be a soil media rich in organics with an attendant high water retention capacity. This will aid in replacing efforts and assist pioneering plants during the reclamation phase of operations.

4.1.1 Removal and Storage

Topsoil will be removed and stockpiled from the processing and crusher plant, waste haul road, open pit, and tailings impoundment sites. Topsoil salvage operations will utilize scrapers, graders, dozers and front end loaders to move the topsoil. Stockpiles will be constructed and located out of major drainages. Stockpiles will be designed so as to minimize erosional losses. Once constructed, rehandling of the stockpiles will be avoided until reclamation operations commence. The locations of the stockpiles are shown on Figure 6.

Coversoil from road cuts will be distributed along the cut slopes. Coversoil and side cast material from diversion ditches and pipeline trenches will be distributed along these disturbances. Vegetation by pioneering plants will improve visuals in the inter-mine period and reduce erosion. It is MMC's intention to use the coversoil stockpiles to mitigate the visual and audio effects of the operation where practical.

4.2 Mine Closure and Reclamation

Mine closure will involve removing the processing and ancillary facilities, reclamation of the waste haul road, tailings impoundment and open pit sites, and the reclamation and closure of access roads. Reclamation activities are subject to advancements in technology or operational changes. It is MMC's intention to use the best available developed control technologies at the time of reclamation.

4.2.1 Temporary Closure

Should operations be suspended for a period exceeding 60 days, BLM will be given a written 30 day advance notice. MMC will then comply with the temporary closure provisions contained in MMC's Aquifer Protection Permit.

4.2.2 Open Pit

As evaporation rates in the area exceed a 150 inches of water per year, standing water in the pit is not to expected to be a problem. The naturally fractured nature of the pit bottom will also inhibit the buildup of any standing water.

The pit walls have been designed to provide safe stable working conditions within the pit. Therefore, grading is not proposed.

Signs noting the pit's existence will be appropriately posted, access to the pit will be blocked, and the high wall perimeter of the pit fence.

Coversoil replacement is not proposed for the pit site. Grasses, shrubs and other plants are expected to pioneer this area over time as they have in other areas of historic mining disturbances. Disturbed areas peripheral to the pit will be smoothed, coversoil replaced and seeded.

4.2.3 Waste Haul Road

Reclamation of the haul road will be accomplished in the same manner as described in Section 4.3.10 (Roads).

4.2.4 Processing and Crusher Plant Area

This area includes the crusher, ROM stockpile and process plant sites. First, the buildings and processing equipment will be removed. Most of this equipment is semiportable and designed for easy removal and reuse at other mining projects. Foundations will be buried in-place.

Compacted surfaces will be ripped and graded. Available coversoil will be replaced and seeded.

4.2.5 Tailings Impoundment.

The tailings impoundment site will be stabilized and allowed to dry a sufficient time to permit safe access by heavy equipment. The surface will then be capped with waste rock to control fugitive dust. The face of the tailings dam will be stabilized to prevent dust generation and coversoil replaced and seeded as availability permits.

4.2.6 Water Reclaim Tank

The containment liner will be washed after the tank and ancillary structures have been removed. Rock and earth side cast during the construction of the tank containment pad along with the containment berms, will be back filled over the folded liner. When back filling and grading are completed, stockpiled coversoil will be replaced and seeded.

4.2.7 Refuse and Sewage Facilities

Portable sewage facilities will be removed from the site and returned to the vendor.

4.2.8 Water Diversions

Where culverts are removed, re-contouring and coversoil placement will be completed. The drainage diversions at the tailings impoundment and overburden site will be left in place and stabilized. Any remaining diversion will be re-contoured.

4.2.9 Fences

Fencing will be removed from all areas except from the open pit and the tailings impoundment sites. One year after reclamation is completed, all fences, except that portion around the high wall of the open pit, will be removed.

4.2.10 Roads

Unless otherwise requested by the BLM, roads will be closed and reclaimed. Access will be blocked by means of boulders or berms.

Grading to reestablish natural drainage ways will be conducted. All culverts will be removed and any crossing contoured back to a condition similar to that of the pre-existing area. Roads will be out sloped to permit natural drainage. This can be accomplished by back dragging the berm across the roadway and spreading it. Coversoil materials will be replaced and seeded.

4.2.11 Well Abandonment

The well field will be abandoned in accordance with regulations of the ADWR. Pipelines from the well field will be salvaged and then the well capped with a welded plate. Disturbances will be graded and coversoil replaced. As per BLM's request the ownership of the well revert to BLM following abandonment.

5

5.0 ENVIRONMENTAL CONSIDERATIONS

5.0 ENVIRONMENTAL CONSIDERATIONS

The purpose of this section is to describe the environmental resources within the project area and to evaluate the potential impact of the proposed project on these resources, thereby demonstrating that the operations proposed in this Plan will not result in any unnecessary or undue degradation of federal lands in accordance with 43 CFR 3809. The information presented in this section will serve as the basis for environmental assessment required under 43 CFR 3809.2.

5.1 Physical Resources

The physical resources section assesses the physical and visual setting and soils of the project area. The geological setting typically described in this section can be reviewed in Section 2.3.

5.1.1 Physical and Visual Setting

The project is located on the west flank of the Cerbat mountains in the northern part of Mohave County. The crest of the Cerbat Mountains approximately 1.25 miles eats of the project averages 6000 feet.

The Golden Eagle mine site is at the head of a northwest-southeast trending canyon. The low hills of the project area are characterized by Pre-Cambrian formations, primarily of granite composition (Bondurant 1989). The saddle just south of the mine has an elevation of 4660 feet and the elevation of the Golden Eagle Mine is 4400 feet.

There is little evidence of slope wash erosion at the site. Ephemeral drainages run east-west and drain into the main channel which heads northwest. There are rock outcrops higher on the slopes, with the general vegetation consisting of desert scrub.

5.1.2 Soils

Soil Characteristics

The study area is characterized by the Bakerville-Gaddes Rock Outcrop Association (U.S. Soil Conservation Service, 1974)$_1$. This association has very shallow to moderately deep soils and rock outcrops on granite hills and mountains. It occurs on the strongly sloping to steep higher granitic mountains in Mohave County. Slopes range from 15 to 60 percent or more. Parent rocks are mainly granite and gneiss, but a few areas of andesite, rhyolite and other igneous rocks are included. Elevations are predominantly 5000 to 6500 feet. Chaparral vegetation is dominant, consisting of oakbrush, ceanothus, juniper, mountain mahogany, and manzanita. A grass understory includes sideoats, blue gramas and needlegrass. Above 6500 feet, ponderosa, pinyon pine, and tree live oak are the main overstory species. Average annual air temperature

is 47 to 57 degrees F., and the frost-free season is about 120 to 190 days. This association comprises about 8 percent of the county.
Barkerville soils make up approximately 45 percent of the association; Gaddes soils, 15 percent; and rock outcrop, 15 percent. The remainder consists of areas of Mirabal soils above elevations of 7000 feet, Faraway and Luzena soils on rhyolite and andesite parent rocks, minor amounts of miscellaneous other soils, and recent alluvual soils in the drainageways.

Barkerville soils have dark grayish brown gravelly sandy loam surface layers 4 to 10 inches thick over yellowish brown strongly weathered granite which becomes hard and more consolidated at depths of 20 to 40 inches. Slopes are 15 to 60 percent. Gaddes soils have thin brown gravelly sandy loam surface layers and reddish brown gravelly clay loam subsoils. Strongly weathered granite occurs at depths of 20 to 40 inches and becomes less weathered and more consolidated below 30 to 40 inches. These soils occur mainly on toeslopes and saddles and have dominant slopes of 5 to 30 percent. Rock outcrop occurs as low ledges between soil areas, on escarpments, and along the mountain crests.

Range Conditions

The study area is in the Granite Hills range site (Stehly 1992). The grasses, shrubs and trees listed in this range site reasonably approximate those found on the study area. The total annual production for this range site in a favorable, normal, and unfavorable year, is 1200, 800, and 200 pounds per acre per year, respectively. The range of the study area appears to be in excellent condition.

5.2 Air Resources

5.2.1 Climate

In the proposed project area, summers are long and very hot. Winters are quite warm except for an occasional period when the nightly minimum temperature drops below freezing. Rainfall is scant in all months. Table 5 gives data on temperature and precipitation for the survey area as recorded at Kingman. Climate data has been prepared by the National Climate Center, as presented in the Soil Survey of Aguila-Carefree Area, Parts of Maricopa and Pinal Counties, Arizona.

TABLE 5 - AVERAGE CLIMATOLOGICAL DATA

MONTH	PRECIPITATION (INCHES)	TEMPERATURE DAILY MAX.	TEMPERATURE DAILY MIN.
January	1.03	75.0	32.1
February	0.89	82.0	33.9
March	1.02	90.0	36.9
April	0.74	97.0	44.2
May	0.23	103.0	51.3
June	0.17	109.0	59.1
July	0.74	111.0	68.0
August	1.49	111.0	66.2
September	0.72	108.0	58.8
October	0.64	98.0	49.4
November	0.77	90.0	38.7
December	0.96	77.0	33.1
Annual	9.40	96.0	47.6

Total annual precipitation in the project area is 9.4 inches. The duration and recurrence interval of calculated storm events is presented in Table 6. This data was calculated by Lyntek and included in Appendix A, Tailings Conceptual Design.

TABLE 6 - STORM EVENTS

RECURRENCE (YEARS)	6 HOUR DURATION	24 HOUR DURATION
2	1.2	1.5
10	2.0	2.5
25	2.7	3.2
50	2.9	3.6
100	3.2	4.2

5.2.2 Air Quality

The project is located in Mohave County which has been classified as an Attainment Area under provisions of the Clean Air Act.

Baseline air quality data has been projected from similar desert locations for which the Arizona Department of Environment Quality's (ADEQ) records and reports comply. As there are no sources of gaseous emissions in the vicinity of the project area, it can be assumed that gaseous pollutants (such as SO_2, NOx, etc.) are at or below detectable limits. Total suspended particulates (TSP) is at times high as dust storms are a characteristic of desert environments.

Construction and operation of the project would emit fugitive dust and minor amounts of gaseous pollutants. The amount of emissions from the project will be specifically regulated by ADEQ through their air quality permit programs. The largest source of emissions would be TSP resulting from crushing, conveying and other ore handling operations. Dust suppression measures for fugitive dust on the haul roads would be implemented.

5.3 Water Resources

5.3.1 Surface Water Hydrology

There are no perennial or intermittent water streams located on or adjacent to the project boundaries. The closest perennial surface water source is the tailings pond for Mineral Park, located approximately 1 1/2 miles northwest of the project.

The major drainages in the area are ephemeral surface water from and are the result of snowmelt or major precipitation events.

The project is located at the lead of a small drainage. Diversion ditches will be constructed to route runoff around the proposed facilities.

5.3.2 Groundwater Hydrology

Information on groundwater in the project area has been developed from data generated during the drilling program. In addition, there is a shaft and underground ground workers in the project which allow for a visual inspection of the underground geology and hydrology. Ground water data on local wells registered with the Arizona department of Water resourced has also been included.

Three exploration drill holes were placed in the approximate location of the tailings impoundment. One hole was dry, and the other two holes had damp earth at approximately 140 feet.

The underground mine (inspected and mapped in 1962) has not encountered significant quantities of water. The underground workings presently have four feet of water at the bottom of the shaft from recent storms (Dolence 1987). Once the mine pit is open, water in the pit will be routed to sumps and pumps to the mill for use as process water.

A search of the Department of Water Resource's files was made to determine the location of the nearest registered water wells.

Cyprus Minerals	2 wells	Section 31, T 22 N, R 17 W
State Lands	2 wells	Section 31 (SE 1/4), T 22 N, R 17 W
Gross Family		Section 1 (SE NW SE), T 22 N, R 18 W
Gamin Resources		Section 5, T 22 N, R 17 W

The Gross Family well is 120 feet deep with a water level of 30 feet from the surface, The Gamin Resource well is 600 feet deep. No information was available for the other wells.

5.4 Biological Resources

5.4.1 Vegetation

5.4.1.1 Vegetation Types

The study area is characterized by two major vegetation types plus a disturbed area resulting from historic mining activities. The very dry west and south-facing slopes are characterized by Mohave desert scrub, while the more mesic north-facing slopes represent a transitional to chaparral zone. Each community is described below from field observations.

Desert Scrub

The desert scrub vegetation type is characterized by a dense cover of low shrubs and succulents with numerous perennial grasses between the shrubs and succulents. Dominant shrub species include flattop buckwheat (Eriogonum fasciculatum) and turpentine bush (Haplopappus laricifolius). Other shrubs present include cat claw acacio (Acacia greggii), crucifixion thorn (Canotia holacantha), broom snakeweed (Gutierrezia sarothrae), Fremont lycium (Lycium fremontii), and purple sage (Salvia dorii). Engelmann prickly pear (Opuntia phaeacantha var. major) is very abundant while buckhorn cholla (Opuntia acanthrocarpa var. acanthrocarpa) is common. Less abundant succulents include hedgehog cactus (Echinocereus basilaris) and banana yucca (Yucca baccata). Conspicuous grasses include Fendler three-awn (Aristida fendleriana), desert neddlegrass (Stipa speciosa), and big galleta (Hilaria rigida) respectively. Common perennial forbs include lace-pod (Thysanocarpus laciniatus), groundsel (Senecio stygius), lupine (Lupinus palmeri), paintbrush (Castilleja chromosa), and deer vetch (Lotus rigida).

Chaparral

The chaparral vegetation type on the cooler north-facing slopes represents the lower elevational limit for chaparral in the area. The chaparral vegetation type is characterized by isolated individual and small park-like clumps of shrub live oak (Quercusturbinella) and amid a dense cover of low shrubs with perennial grasses and some forbs. Succulents are present, but are lower in number compared to the drier and warmer south and west-facing slopes. Flattop buckwheat and turpentine bush are the major low shrubs. Other shrubs present include white ratany (Krameria grayi), snakeweed, purple sage, and desert ceanothus (ceanothus greggii). Desert rabbitbrush (Chrysothamnus paniculatus), and crucifixion thorn. Single-leaf pine trees (Pinus monophylla) occur infrequently as young saplings. Infrequent succulents present include Engelmann prickly pear, buckhorn cholla, hedgehog cactus, banana yucca, and sotol (Dasylirion wheeleri). Common grasses include Parish three-awn (Aristida parishii), desert needlegrass, and sideoats grama (Bouteloua curtipendula). Conspicuous forbs are theylpodium (Thelypodium cooperi), vervain (Verbena ciliata), rock cress (Arabis perennans), spring parsley (Cymopteris purpurescens), globe-mallow (Sphaeralcea cf. parvifolia), paintbrush, and heron bill (Erodium cicutarium).

Disturbed Area

Disturbed habitats have been colonized by numerous species of shrubs and forbs. Grasses and succulents have been less successful colonizers. Shrubs present in disturbed habitats, respectively, include snakeweed, turpentine bush, flattop buckwheat, Acton brittlebush (Encelia farinosa), desert rabbitbrush, desert ceanothus, and cat claw acacia. Beavertail and Engelmann prickly pear are the only cacti present in disturbed habitats. Forbs present include milkvetch (Astragalus newberryi), miners candle (Cryptantha inaequanta), groundsel, heron bill, globe-mallow, lupine, and deer vetch. Red brome (Bromus rubens) fluffgrass (Tridens pulchellus), Parish three-awn, and desert needlegrass are also present.

5.4.1.2 Threatened, Endangered, and Sensitive Plant Species

There are no known populations of threatened or endangered plants in the study area and none were observed during the field inventory. Freckled milkvetch (Astragalus lentiginosus), a Category 2 (C2) plant, was found north of the study area near Chloride in 1941, but has not been found since. It was not observed on the study area. The only milkvetch found on the project site was Newberry milkvetch.

Another perennial forb (Penstemon bicolor ssp. roseus), also a C2 listing, is potentially present in the study area (Peck 1992). However, no Penstemon specimens were found on the project site.

Two horsebrush shrubs (Tetradymia argyaea) and (T. stenolepis), state sensitive plants are potentially present in the study area (Anderson 1992). However, no horsebrush shrubs were found during the field inventory.

Ron Christofferson of the Arizona Game and Fish Department did not list any plant species of concern for the study area.

5.4.2 Wildlife

Wildlife present on the project area are typical of the site's acreage and habitat types present in this proportion of the Cerbat Mountains. The local wildlife community has been adversely and beneficially affected by past mining activities. Adverse impacts include habitat losses to roads and other mine-related facilities totaling less than 10 acres. Recreationalists use of the road through the canyon probably results in minor, short-term, seasonal displacement of some wildlife species, such as mule deer and feral horses. Beneficial effects due to mining include limited bat use of tunnels, and possibly shafts, and lizard use of microhabitats under mine facility debris (e.g., collapsed cabins, boards, barrels, etc.). Many of the wildlife species inhabiting the project area and surrounding habitats are nocturnal. The local wildlife community is described below by taxonomic group.

The eastern fence lizard (Sceloporus undulatus) was common and the most conspicuous lizard on-site, associated with small to large rock outcrops in all plant communities. Desert night lizards(Xantusia vigilis arizonae) were also considered common, although they were only located under boards and other historic mining debris scattered around the project area, generally in Opuntia-Yucca communities. They are also known to be associated with banana yuccas, which are abundant on-site. While this species has no official state or federal status, it is a species of interest to local BLM biologists because specific surveys are typically required to detect it and little is known of its local distribution and status. Although no snakes were observed during the March surveys, a wide variety of snakes, including rattlesnakes (Crotalus ssp.), whipsnakes (Masticophis spp.), kingsnakes (Lampropeltis spp.), and others probably occur on site. The desert tortoise (Gopherus [=Xerobates] agassizii) is discussed below in "Threatened and Endangered Species".

The lack of any permanent or sizeable, temporary pools of water on the project area restricts amphibian presence. No evidence of amphibians were detected during surveys along the length of the intermittent stream on the project area, or along the larger stream to the north, which runs into the Cyprus Minerals tailings pond. This latter stream was surveyed from a point north of the access road into Golden Eagle Mine to its confluence with Dry Spring Creek in Section 36.

There are no fish or fish habitat present on site or downstream within the project's area of influence.

Local avifauna richness and abundance on site is characteristic of the site's small size and two habitats present. Trees within the chaparral-pinyon-juniper woodland provide a structural diversity supporting such species as pygmy nuthatches (Sitta pygmaea), ladder-backed (Picoides scalaris) and gila woodpeckers (Melanerpes uropygialis), and chipping sparrows (Spizella passerina). The adjacent chaparral-mohave desert scrubcommunity supports such characteristic species as black-throated sparrows

(Amphispiza bilineata), and rock (Saloinctes obsoletus) and canyon (Catherpes mexicanus) wrens. Say's phoebes (Sayornis saya) are also present and use shallow mine adit supports and other historic mine structures for nest sites. Species with larger home ranges overlapping both plant communities include the common raven (Corvus corax), American kestrel (Falco sparverius), red-tailed hawk (Buteo jamaicensis), turkey vulture (Cathartes aura), great horned owl (Bubo virginianus), and prairie falcon (F. mexicanus). Surveys done in March of cliffs and large outcrops in and adjacent to the canyon containing the project area did not locate any raptor nests. The project area is not located within a major waterfowl flyway and there is no waterfowl or shorebird use of the project area, although migratory waterfowl seasonally utilize the adjacent Cyprus Minerals tailings pond.

A variety of bats probably hunt on the project area and may seasonally roost in natural rock outcrops and the historic mine workings. Of all audits examined, including the mine in the next canyon to the north that could be affected by an expanded mine entrance/haul road, only three audits contained evidence of present or former bat use. One adit, just uphill of the tipple, contained two hibernating Townsend's big-eared bats (Plecotus townsendii). A slope off a lateral drift near the back of the mine had collapsed, exposing the outside environment and creating moderate ventilation through the mine's main drift. Internal mine temperature at one bat's location was 43 degrees F. These are characteristic environmental conditions for a winter Plecoyus roost. No other mine surveyed contained these conditions or any bats. Evidence of bat use in the two other mines included small scatterings of Plecotus guano and moth wings characteristic of a lightly used summer roost. Bat use of these historic mine workings appears to be extremely limited. Although the surveys done in March were conducted during a transitional period for bats, there was no evidence located suggesting more than light use occurs during winter and summer.

Nongame and small mammals inhabiting the site include mice (e.g., Peromyscus spp.), pocket mice (Perognthus spp.), kangaroo rats (e.g., Dipodomys merriami), Harris' antelope squirrels (Ammospermophilus harrisii), rock squirrels (Spermopholus variegatus), desert cottontails (Sylvilagus audubonii). Predators in the area include bobcats (Felis rufus), coyotes (Canis latrans), grey (Urocyon cinereoargenteus) and kit (Vulpes macrotus) fox, badgers (Taxidea taxus), skunks (Mephitus mephitus, Conepatus mesoleucus, and Spilogale gracilis), and ringtails (Bassariscus astutus). Mountain lion (Felis concolor) may occasionally range across the project area.

Mule deer (Odocoileus hemionus) are the most common big game species on the project area. The AGFD considers most of the Cerbat Mountains, including the project area, as significant mule deer habitat because the area contains a stable, healthy population. The project area does not appear to be any more or less important than other surrounding habitats in the Cerbats. Brooming of shrubs on the west side of the canyon suggests at least portions of the project area are moderately used during the year. A few beavertail and prickly pear cactus on the project area showed characteristic evidence of javelina (Tayassu tajacu) browsing. Javelinas are sparsely distributed in the Cerbat Mountains.

Approximately 135 feral horses are present in the Cerbat Mountains that are managed by the BLM (R. Peck, BLM, pers. comm.) and protected under the Wild Horse and Burro Act. Tracks observed during March surveys suggest that the range of these horses overlaps the project area.

5.4.2.1 Threatened and Endangered Wildlife Species

There are no federal or state endangered, threatened, candidate or sensitive species known to seasonally inhabit the project area or any adjacent areas that could potentially be affected by the project. The desert tortoise was the only species identified during an AGFD Heritage Data Management System run as possibly occurring in the project's vicinity. More detailed tortoise data were obtained from the BLM. The project area is outside of any Habitat Category Areas (HCA). Clark Canyon III (approximately seven miles south-southeast) and Black Mountains North III (approximately seven miles to the west) are the closest HCA's. A local BLM biologist (R. Peck, pers. comm.) has indicated that there has been considerable mining and other BLM activities in the vicinity of the project area and no evidence of tortoises has ever been found, although there may be some captive releases in the area. The closest tortoise sighting was that of a single tortoise in Johnson Canyon, just northwest of Kingman, approximately seven miles south of the project site. The elevation of the project area is at the upper elevation of the tortoise's range. If tortoises did occur in the area, they could exist only in small, isolated pockets.

Bald eagles (Haliaeetus leucocephalus) and peregrine falcons (F. peregrinus) probably migrate through the general area, however these birds should not have particular affinity to habitats on the project area.

A loggerhead shrike (Lanius ludovicianus) was observed during March 1992. Surveys in a mohave desert scrub community approximately two miles west of the project area. This bird is a federal candidate species. It is unknown, but possible, that this species could occur on site.

5.5 Cultural Resources

A BIM Class III Cultural Resource Survey was completed in April 1992 by SWCA Environmental Consultants. The report was submitted to the BLM Kingman Resource Area Office.

The survey covered approximately 120 acres which includes the entire claim block. Several historic sites were located which relate to the old Golden Eagle mine. A stone structure was found, but after a recent survey, it appears that this site is outside of the claim block. A mitigation plan will be developed in conjunction with the BLM archeologist at Kingman.

5.6 Land Use and Socioeconomic

Discovery of the Wallapai Mining District dates from 1863. In the early days, the district was exploited for its near-surface, oxidized, high-grade deposits of silver and gold. From about 1900 until the 1950's, lead and zinc were of primary interest with production of gold and solver by-products.

The Golden Eagle unpatented mining claims have been explored and mined since 1900. The most recent drilling activity was in 1988 by Cyprus Minerals.
The area surrounding the Golden Eagle property is covered with unpatented mining claims controlled by other companies.

There is also cattle grazing in the area.

6.0 APPENDIX A
TAILINGS CONCEPTUAL DESIGN

TABLE OF CONTENTS

6.0 TAILINGS CONCEPTUAL DESIGN 35

6.1 Summary 35

6.2 Design Elements 35

6.2.1 Facility Description 36
6.2.2 Siting 36
6.2.3 Climate 37
6.2.4 Tailings Deposition Practices 37

Table 1 Climatoloigical Data Survey and Water Balance 38

6.2.5 Tailings Impoundment Capacity 39
6.2.6 Tailings Impoundment Construction 39

6.3 Discharge Control Components 40

6.3.1 Surface Water Diversion 40

Table 2 Details of Precipitation Event 41

Table 3 Runoff From The 100 Year 24 Hour Precipitation Event 42

6.3.2 Liner System 42
6.3.3 Tailings Impoundment Area 43
6.3.4 Recirculation Tank and Collection Line 43

Table 4 Volumes Required for Operation of Recirculation Tank 44

6.3.5 Reclaim Water Collection System 44

6.0 TAILINGS CONCEPTUAL DESIGN

6.1 Summary

The following is a summary of the primary design elements regarding the tailings impoundment area and reclaim water recirculation tank for Morgan Mining Company's Golden Eagle Mine. Arizona Best Available Demonstrated Control Technology (BADCT) criteria has been considered during the design of all of the elements contained within the tailings impoundment area.

The area has been designed to contain 244,000 tons with the general design criteria including tailings disposal capacity for 100,000 tons per year. The facility will be constructed in one phase. The construction will include the reclaim water recirculation system, diversion ditches, the main dam for the t•1
ailings impoundment, and wing dams to a crest elevation of 4,320 feet.

The tailings impoundment will have a single 40 mil synthetic HDPE liner placed over compacted earth fill. The recirculation system will consist of a 50,000 gallon tank with a pumpback circuit. Reclaim water will gravity drain from the tailings impoundment area via the perforated underdrain collection pipe within the lined tailings area.

The construction of the tailings impoundment will include sufficient freeboard to contain the 100 year, 24 hour storm event. The recirculation system will employ an operator controlled valve on the underdrain collection line to allow for holding of the water from the 100 year, 24 hour precipitation event within the impoundment area.

The diversion ditch system will be capable of diverting the runoff of the surrounding area from the tailings impoundment in a 100 year, 24 hour precipitation event. These ditches will have small cross sections due to the very limited upslope areas above the impoundment basin.

6.2 Design Elements

Morgan Mining Company requested that a conceptual design report be prepared by Lyntek, Inc. of Denver, Colorado for a tailings impoundment facility to be located in Section 31, T23N, R17W, Mohave County, Arizona. Figures 1 and 2, included in Appendix E, show the general location of the Golden Eagle minesite. The purpose of this report is to provide the basic design elements and discharge control components which will meet the BADCT requirements of the Arizona Department of Environmental Quality (ADEQ). This report will augment the Pre-Application Work Plan developed by Morgan Mining Company.

It is Lyntek's understanding that general tailing and waste rock characterization studies have been conducted by other consulting firms and Morgan Mining. Lyntek has, however, supervised the excavation of four backhoe test pits in the vicinity proposed main tailings dam. The results of the tailing and waste rock characterization studies and soil study are included in Appendix C of this report. This report is restricted to the conceptual design of the tailings impoundment facility. A discussion of climatological factors and their affects on the discharge control components and design of the surface water diversion, liner, reclaim water collection and tailings dam system are also detailed. Preliminary drawings of each system are included in Appendix E.

6.2.1 Facility Description

Ore will be extracted by conventional open pit mining methods at a rate of 100,000 tons per year. Ore material will be crushed to minus 3/8 inch prior to milling (utilizing two parallel ball mills) to 80% passing 200 mesh. Each mill will be rated at about 6.25 tons per hour based on 24 hour per day operation. Recycled water from the tailings impoundment will be utilized to dilute the slurry to approximately 30% solids for feed to the flotation circuit.

Flotation will be accomplished in standard cell to cell machines producing a rougher concentrate from the bulk feed. The rougher tailing will be subjected to scavenger flotation to remove residual values prior to transport to the tailings impoundment area. Water in excess of that necessary to transport the tailings will be removed by a thickener prior to the tailings being pumped, via a containment enclosed pipeline, to the impoundment area.

The rougher and scavenger concentrates will be further processed by cleaner flotation to produce a final up-graded concentrate that will be dewatered by a thickener/filter system and shipped off the site by trucks for further processing. A more in depth process description is included in Appendix B, Detailed Facility Summary

Tailings water will be recovered and pumped back to the processing area from the recirculation system as process conditions require. The tailing impoundment will have the required capacity to contain the 100 year, 24 hour precipitation event.

6.2.2 Siting

The tailings impoundment facility is located on a rather steep hillside which is well suited for containment due to its natural contours and limited up-slope extent as shown on Figures 3 and 6 included in Appendix E of this report. Morgan Mining has conducted independent site characterization studies to determine the optimal siting area for the tailings impoundment facility. Inspection of the site has indicated that the area chosen for the tailings impoundment is the only possible area within the property boundary large enough to hold the required volume of tailings.

6.2.3 Climate

The climate in the area of the proposed site is typical of the Northern Arizona desert regions with monthly mean temperatures ranging from a maximum of 97.5 degrees Fahrenheit in July to a low of 56 degrees Fahrenheit in January. The mean evaporation rate ranges from a high of 19.36 inches in July to a minimum 6.87 inches in January, with an average yearly total evaporation of 150.36 inches. This data has been gathered from the "Climatological Data Annual Summary", Arizona, 1988, Volume 92, Number 13, published by the National Oceanic and Atmospheric Administration, National Climatological Data Center, Asheville, North Carolina. Temperature and precipitation data is from Phoenix District-Kingman Resource Area, Kingman station (4639). Evaporation data is from Davis Dam #2 (2439). Table 1 details data excerpted from the NOAA publication, as well as the projected water balance for the Golden Eagle mine site.

The water balance (Task 1) indicates that the overall water use exceeds precipitation so that additional water will be required from wells. The projected balance shows a requirement of an average of 38,145 gallons per day or 26 gallons per minute. The highest flow required will be about 39 gpm in June and the lowest will be about 17 gpm in January.

6.2.4 Tailings Depositional Practices

The tailing material will be finely ground ore that is 80% passing 200 mesh. It will, however, contain few true slimes. The first step in handling the tailings for disposal will be thickening, wherein excess water not needed to transport and cyclone the solids will be reclaimed in the processing plant.
The underflow from the thickener will be pumped to the impoundment area where it will be deposited by a series of pipes perpendicular to the tailing header placed around the perimeter of the impoundment basin. By depositing tailings through several of these spigots at a time and rotating the deposition points, the uniformity of the deposited tailings will be maximized, allowing the most effective drainage of water from the ponded slurry into the reclaim system.

Table 1 - Climatological Data Survey and Water Balance

		JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	ANNUAL
MAX. DAILY TEMP. (F)	DEGREE F	75	82	90	97	103	109	111	111	108	98	90	77	95.9
MEAN TEMPERATURE (F)	DEGREE F	56	60.3	65.1	73.4	82.3	91.6	97.5	94.9	90.8	80.5	65.6	57.5	76.3
MIN. DAILY TEMP. (F)	DEGREE F	32.1	33.9	36.9	44.2	51.3	59.1	68	66.2	58.8	49.4	38.7	33.1	47.6
MEAN PPTL TOTAL (IN.)	INCHES	1.03	0.89	1.02	0.74	0.23	0.17	0.74	1.49	0.72	0.64	0.77	0.96	9.4
GREATEST MONTHLY PRECIP.	INCHES	3.18	4.48	3.6	4.04	0.91	0.93	2.43	6.57	9.85	2.64	3.08	3.89	3.8
MEAN EVAPORATION RATE	INCHES	6.87	7.31	9.89	12.59	16.43	18.95	19.36	17.5	14.18	11.5	8.33	7.45	150.36
MOISTURE OF ORE	PERCENT	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	
ORE PROCESSING RATE (TPM)	TONS/MONTH	9,066	9,066	9,066	9,066	9,066	9,066	9,066	9,066	9,066	9,066	9,066	9,066	108,789
FINAL MOISTURE CONTENT	PERCENT	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	
SOLUTION REQ. FOR ORE	GALLONS	369,884	369,884	369,884	369,884	369,884	369,052	369,884	369,884	369,884	369,884	369,884	369,884	4,438,605
AVG. SOL'N IN SLURRY	GALLONS	2,176,657	2,176,657	2,176,657	2,176,657	2,176,657	2,176,657	2,176,657	2,176,657	2,176,657	2,176,657	2,176,657	2,176,657	26,119,888
TOTAL PPT. COLLECTED	GALLONS	119,379	103,152	118,220	85,767	26,657	19,703	85,767	172,693	83,449	74,177	89,244	111,266	1,089,475
TOTAL EVAPORATIVE LOSS	GALLONS	265,415	282,414	382,089	486,400	634,754	732,112	747,952	676,093	547,828	444,284	321,820	287,822	5,808,988
DUST CONTROL - ROADS	GALLONS	217,626	231,565	313,293	398,824	520,466	600,294	613,282	554,362	449,191	364,295	263,876	263,000	4,763,074
RECYCLABLE WATER	GALLONS	1,806,620	1,806,620	1,806,620	1,806,620	1,806,620	1,806,620	1,806,620	1,806,620	1,806,620	1,806,620	1,806,620	1,806,620	21,679,441
SOLUTION RETURNED TO MILL	GALLONS	1,660,584	1,627,359	1,542,751	1,405,987	1,198,523	1,094,212	1,144,436	1,303,221	1,342,241	1,436,508	1,574,044	1,630,063	16,959,927
NET WATER REQUIREMENTS	GALLONS	733,693	780,856	947,193	1,169,487	1,498,594	1,682,733	1,645,497	1,427,791	1,283,601	1,463,508	866,483	782,587	13,922,955
NET GPM	GPM	17	18	22	27	35	39	38	33	30	26	20	18	26

The water will be reclaimed through an underdrain that will be placed in the bottom of the valley within the tailings disposal area as shown on Figure 6 and Figure 8, Detail 8. The reclaim water collection line will be perforated and wrapped with non-woven geotextile of high hydraulic conductivity and covered in gravel. Water that pools against the perimeter farthest from the dam crest as well as water that seeps out of the emplaced tailings, will be allowed to flow into the line through the geotextile and gravel blanket to be collected in the recirculation tank located below the dam.

The reclaimed water will be pumped from the recirculation tank to the plant area for re-use in the ore processing operations. The recirculation tank will be sited on a bermed area that will be covered with the 40 mil. HDPE synthetic liner. The containment will have a capacity to contain 110% of the volume of the tank plus precipitation collected within the containment. The return line will be enclosed in a containment pipe of larger diameter that drains back to the bermed containment should a break occur in the underdrain line.

6.2.5 Tailings Impoundment Capacity

The area selected for tailings disposal will be in Section 31, T23N, R17W. The tailings will be deposited at a rate of 100,000 tons per year to a projected total of 244,000 tons. The elevation of the upper fringe of the liner and the crest elevation of the dam will be the same at 4330 feet.

The nature of the mill tailing, namely the fineness of grind, and lack of structural stability of stocked tailings, requires that the entire volume of tailings be contained within a structurally sound facility. Due to the relief encountered on the minesite, a significant amount of excavation is required to develop the volume necessary to store the required tonnage for the life of the project.

A monitor well, designated as MW1, will be located at the property boundary in the draw below the recirculation tank as shown on Figures 6 and 14. This monitor well will be at the Point of Compliance (POC) for groundwater monitoring for the entire operation.

6.2.6 Tailings Impoundment Construction

The location of components of the impoundment basin are shown on Figure 6. The foot print of the tailing dam and other cut and fill areas will be prepared by clearing and grubbing of the area with vegetation being burned and the topsoil removed to a topsoil stockpile.

Excavation of the keyway for the dam will be made on both sides of the draw that the dam will span. Earth will be removed to bedrock, providing a slot in which to anchor the sides and bottom of the dam. The dam has been sited up hill from a group of abandoned underground mine openings, both shafts and adits. Avoiding openings will ensure a stable foundation for the structure.

A series of backhoe pits, identified by MBH designations, were dug in the dam area as shown on Figure 6. The results of the soil work are shown in Appendix D. The soil foundation will support the dam structure and the uppermost layer will provide sufficient clayey material of low permeability for use as the secondary soil liner.

Excavation of the cut portion of the main basin will commence to provide fill material for construction of the main dam. Material will be bulldozer ripped where possible and drilled and blasted where necessary to allow removal of burden.

Once the subgrade has been prepared, clayey material will be imported from a topsoil stockpile, spread in a six-inch layer, and compacted to a low permeability. A second six-inch layer will then be spread and compacted to the same permeability. The 40 mil. synthetic HDPE liner will then be laid down on top of the compacted layer and keyed in around the entire perimeter of the impoundment basin. This design utilizes the Best Available Demonstrated Control Technology (BADCT) for this particular application, taking into consideration the terrain and composition of the tailing.

6.3 Discharge Control Components

Another principle area of design which must meet BADCT requirements consists of the discharge control components. The under-drainage reclaim water collection system is designed to rapidly transfer solution from the impoundment liner to the recirculation tank. This serves the multiple purposes of minimizing ponding on the tailing surface thereby reducing evaporation and conserving water and lessening the hydraulic head on the dam and liner systems. The absence of ponding will also make the area less attractive to wildlife.

The liner systems of the tailings impoundment and containment for the recirculation tank will be constructed of synthetic material (40 mil HDPE) installed on a compacted base of natural materials. The tailings dam system will be designed to impound all runoff within the lined area and deliver it to the recirculation tank.

6.3.1 Surface Water Diversion

The tailings impoundment facility is located in the uppermost portion of a catchment basin which is well suited for containment due to its natural contours of the draw and limited up-slope extent as shown on Figure 3. However, to further limit the size of the catchment basin, diversion ditches have been designed to channel runoff away from the impoundment area. They are placed to limit the size of the catchment basin that would be affected by the 100 year, 24 hour precipitation event. Figure 14 shows the locations of the diversion ditches and the areas collected in each ditch. The ditches are designated by the upslope areas collected.

Surface water is limited to ephemeral run-off from rain fall. Surface water run-off and sediment transport are typical of the general region. Figure 10, Detail 7 shows the cross section of a typical diversion ditch to be employed.

Table 2 details the various events that probably could take place at the Golden Eagle mine site. The 100 year, 24 hour data presented has been extracted directly from the Isopluvial charts for Arizona published by NOAA in "Atlas of Precipitation Frequencies, Western U.S., Volume VIII", prepared by the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service, Office of Hydrology. The charts were prepared for U.S. Department of Agriculture, Soil Conservation Service, Engineering Division.

TABLE 2 DETAILS OF PRECIPITATION EVENTS

FREQUENCY OF EVENT - YEARS	24 HOURS INCHES	6 HOURS INCHES	1 HOUR INCHES
2	1.5	1.2	0.9
10	2.5	2.0	1.5
25	3.2	2.7	1.8
50	3.6	2.9	2.0
100	4.2	3.2	2.3

Table 3 details the volumes of run-off collected on the various areas involved, for the maximum 100 year, 24 hour event. Runoff is directly related to the soil characteristics of the area. The 24 hour precipitation event will result in 4.2 inches of rain falling in the area. The resultant runoff, calculated with soil characteristics taken into account, is equivalent to 1.05 inches of precipitation. These run-off calculations were performed utilizing methods published by the Soil Conservation Service National Engineering Handbook as well as supplements to Technical Release No. 55, Urban Hydrology for Small Watersheds.

The surface water run-off from the 100 year, 24 hour rainfall event will be directed around the tailings impoundment by diversion ditches constructed on the north and south sides of the lined area, as shown on Figure 14.

TABLE 3 RUNOFF FROM THE 100 YEAR, 24 HOUR PRECIPITATION EVENT

MAXIMUM 100 YEAR EVENT

AREA	AREA (FT2)	PPT (IN.)	RUNOFF (IN.)	RUNOFF-100 YR (GAL.)
B-1	281,137	4.2	1.05	184,004
B-2	143,300	4.2	1.05	93,789
C-1	116,925	4.2	1.05	76,527
C-2	245,368	4.2	1.05	160,593
D	399,279	4.2	1.05	261,328
E	1,041,975	4.2	1.05	681,972
F	571,921	4.2	1.05	374,322

The tailing impoundment area will be protected by diversion ditches, with one set of ditches to be constructed within the tailings impoundment basin. These ditches will pass through the dam structure where cut meets fill. The purpose of this design is to drain the disturbed cut area within the basin. These ditches are designed to divert areas C-1 and B-1 as shown on Figure 14.

The second set of ditches will be placed to intersect runoff from the hillside above the disturbed cut area of the impoundment basin. This design will prevent runoff from the hillside from entering the improved area within the basin. These ditches are designed to divert areas D, E, and F. They intersect the C-1 and B-1 ditches outside of the basin at the outer section of the cut and the fill portion of the impoundment structure.

6.3.2 Liner System

The tailings impoundment area and containment for the recirculation tank will be covered with an impermeable liner. The liner under the tailings basin will consist of an impermeable 40 mil HDPE synthetic liner installed over compacted materials. The impoundment basin will be subject to grading and reshaping prior to laying down the liner. The recirculation system will consists of a main underdrain collection pipeline connected to the collection tank, and penetrating the main toe dam. This pipe will collect all water contained within the lined tailings impoundment. The tank in turn will be connected to a pump and pipe line that will return recovered water to the mill. BADCT guidelines have been considered regarding the design of the liner systems. Typical construction details are shown on Figures 7 and 10, and are discussed in more detail in the following paragraphs.

6.3.3 Tailings Impoundment Area

The tailings impoundment area will be constructed according to the following general guidelines. The impoundment area will be cleared and grubbed with the clayey top layer moved to a topsoil stockpile for later use in producing the compacted secondary liner system. The site will be reshaped and graded to normalize slopes that will be covered by liner.

The primary liner will consist of a 40 mil thick layer of High Density Polyethylene (HDPE) installed directly on top of the reworked low permeability bedding layer in accordance with the manufacturer's specifications. The synthetic membrane liner will be secured with typical anchor trenches at the sides of the basin as shown in Figure 10, Detail 2.

6.3.4 Recirculation Tank and Collection Line

The tailings water recirculation tank will be built at the toe of the tailings facility to catch water that seeps out of the deposited tailings. Precipitation that falls within the lined area will also be collected in the recirculation tank. All water collected in the recirculation tank will be pumped to the processing facility.

The recirculation tank is designed to collect all drainback from the tailings impoundment area. The runoff resulting from rainfall within the inside perimeter of the tailing diversion ditches will be stored within the impoundment and gradually bled back into the recirculation tank. The underdrain collection pipeline will be placed in the basin in the lowest part of the valley. This system will quickly drain water away from the impounded tailings, reducing the hydraulic head on the liner. Perforated ADS pipe will be utilized. The pipe will be covered by blanket of highly permeable geotextile fabric and buried in minus 2-inch gravel. Details of the assembly can be seen on Figure 8, Detail 8.

The underdrainage collection piping will be equipped with a butterfly valve on the discharge end as shown on Figure 10, Detail 5, to allow for the flow to be cut off during the 100 yr, 24 hour precipitation event. The volume of excess water accumulating within the impoundment basin during the 100 year, 24 hour precipitation event will be stored within the impoundment and will be discharged by bleed through the recirculation tank for reuse in the processing plant.

Table 4 details the volumes that are required to be available in the recirculation tank. The level will be
maintained at 15,000 gallons during normal operations. Volume is then available to contain the drain-down comprising 22,000 gallons while maintaining freeboard of approximately five feet.

TABLE 4 VOLUMES REQUIRED FOR OPERATION OF RECIRCULATION TANK

DESCRIPTION OF VOLUME	RECIRCULATION TANK - GALLONS
Operating Volume	15,000
24 Hour Draindown	22,000
Freeboard - 5 Feet	13,000
TOTAL VOLUME	**50,000**

The dimensions of the recirculation tank is 20 feet in diameter by 20 feet high.

The recirculation tank will be operated with a floating level controller to insure the return of solution to the processing facility. The level controller will activate the pump when the level of the tank reaches a preset level. This will insure that the tank never becomes too full. The level switch will also shut down the pump if the level of the tank become to low for the pump to operate effectively.

As this system will be operating with a tank as opposed to a pond it will prevent excessive loss of water to evaporation and preclude waterfowl from coming in contact with the contained water.

6.3.5 Reclaim Water Collection System

A valley floor reclaim water collection drain will be installed to collect seepage through the tailings and deliver it to the recirculation tank. The general layout of the drain follows Arizona BADCT criteria, and can be seen on Figure 6.

The reclaim water collection drain will generally be placed in the lowest depression within the lined area. Adjacent ground will be graded so that all water entering the geotextile drain blanket will flow by gravity to the reclaim water collection drain. Some shaping of the ground may be necessary to prevent pockets from being formed that would trap water. The general placement of the reclaim water collection drain pipe on top of the synthetic liner is shown in the detail on Figure 8, Detail 8.

The underdrain collection pipeline will be ADS slotted type pipe having sufficient strength to withstand the compressive forces of the tailing column emplaced on top of it. The pipe will be completely wrapped with non-woven, high permeability geotextile before being installed. The installed pipe will be covered with a one foot thick layer of porous drain rock. The upstream end of the reclaim water collection drain line will be kept accessible, making it easy to attach more lengths of pipe to the string as the tailings level in the impoundment rises.

The reclaim water collection drain pipes will be connected to a solid drain pipe that will extend through the toe dam and discharge into the recirculation tank as shown on Figure 7 and Figure 10, Details 4 and 5. A solid boot anchored on a concrete footer will be provided at the liner penetration point on the inside of the main dam surface. The discharge end of the drain pipe will be provided with a butterfly valve on the outside toe of the main toe dam prior to entering the recirculation tank. The closing of this valve during periods of high infiltration of water will allow excessive water to be stored within the tailings impoundment.

7

7.0 APPENDIX B
PROPOSED FACILITY SUMMARY

TABLE OF CONTENTS

7.0 PROPOSED FACILITY SUMMARY **46**

7.1 Introduction 46

7.2 Process Summary 47

7.3 Mining and Crushing 48

7.4 Process Plant 48

7.5 Tailings Impoundment 49

7.6 Reagents 50

7.7 Spill Containment 51

7.7.1 Spill Containment 51
7.7.2 Leak Detection 52

7.8 Diversion Structures 52

7.8.1 Tailing Impoundment Area 52
7.8.2 Open Pit Area 52
7.8.3 Water Conservation 52

7.0 PROPOSED FACILITY SUMMARY

7.1 Introduction

Morgan Mining Company (MMC) is currently developing the Golden Eagle Mine in Mohave County, Arizona (Figures 1 and 2). The project is located approximately 15 miles north of Kingman, Arizona. The mine site is located in Section 31, T 23 N, R 17 W, with a segment of the haul road in Section 36,T 23 N, R18 W.

The Golden Eagle Mine project is based upon the design of an environmentally acceptable facility. Zero water discharge, water management, and the use of best available demonstrated control technology (BADCT) have been the primary design considerations throughout the project.

Mining will utilize open pit methods with ore delivered to the crusher stock pile and waste delivered to the face of Cyprus tailing impoundment located approximately 1 1/2 miles east of the Golden Eagle Mine site. The detailed mine plan was developed by Mr. Ed Torgersen. The pit outline is shown on Figure 3.
Design work addressing flow parameters, material balances and engineering studies on the grinding and processing plant have been undertaken on behalf of MMC by Lyntek, Inc. of Denver, Colorado. The results of this design and engineering work are shown in the accompanying process diagrams in Appendix E (Figures 11,12 and 13).

Lyntek, Inc. has also completed the conceptual design and preliminary engineering study on the tailings impoundment facility. Apendix A titled Tailing Conceptual Design details the various components of the proposed tailings impoundment facility.

7.2 Process Summary

The Golden eagle Mine will produce approximately 11,000 ounces of gold and 65,000 ounces of silver per year. The current mine plan calls for processing approximately 100,000 tons of ore annually. The overall strip ratio under the current mine plan is 9 to 1, waste rock to ore. Initial mine life is anticipated to be just over two years, subject to market factors and ongoing exploration and development activities. The project will employ approximately 25 people.

The basic activities of this operation will consist of the following:

- Open pit mining of ore and associated waste rock.
- Haul truck transportation of the ore to the crusher facility and waste rock to the Cyprus tailings facility.
- Crushing and grinding of the ore to form a pulp.
- Recovery of gold and silver by flotation technology into a concentrate that will be shipped off the property.
- Disposal of the flotation tailing in a zero discharge tailings impoundment.

Figure 3 is a site plan showing the general layout of the proposed project. Figures 11 and 12 are flow charts of the above processes. Figure 13 is a general arrangement of the processing facilities. MMC intends to utilize a contract mining company for the mining portion of the operation. MMC will operate the process plant.

7.3 Mining and Crushing

The mine will be developed by open pit mining methods. Figure 3 also shows the location and outline of the proposed pit. The site will be cleared and grubbed with vegetation kept separate from the topsoil and burned after being removed. The topsoil encountered during the grubbing operations will be stockpiled for use after mining to cover the reclaimed surfaces of the mined out area. Figure 3 shows the locations of the topsoil stockpiles.

Starting at the highest elevation of the mine pit area, a bench will be drilled and blasted to loosen the rock. Waste areas will be mined utilizing 20 foot high benches and zones containing ore will be mined in 10 foot benches to allow for close grade control and separation of the ore from the waste.

The waste will be loaded from the mine face by a 6 to 8 cubic yard wheel-loader into off-highway style trucks of the 35 to 65 ton class for transport to the vicinity of the abandoned Cyprus tailing pond. Cyprus Minerals will use the waste rock for armoring the downhill face of the tailing dam.

The ore received at the stockpile will be fed into the dump pocket of the crusher by a 3 to 4 cubic yard wheel-loader. The ore will be crushed to 80% passing 3/8 inch by two stages of crushing. The feed rate to the crusher will be approximately 30 to 40 tons per hour during day shift only. The total daily tonnage processed will be 300 tons per hour.

The crushing system will consist of a jaw crusher operating in open circuit to produce a crushed product of approximately minus 2-1/2 inches. This product will feed to a double deck screen making a split at 1/2 inch. The oversize material will pass through a cone crusher with the cone discharge returning to the screen. The final product will be 80% passing 3/8 inch and will be delivered to a 300 ton fine ore bin ahead of the ball mill circuit.

7.4 Process Plant

The crushing and process facilities will be located south of and adjacent to the tailing impoundment area. The pad will be 150 feet x 300 feet and will be constructed of waste rock fill generated by waste stripping and excess tailing impoundment excavation rock. The pad location is shown on Figure 3. More detail showing diversion ditches. roads and pipeline corridors is included as Figure 6.

The milling circuit consists of two parallel ball mills closed with cyclones producing 300 tons per day of 80% minus 200 mesh (74 microns) flotation feed. Each mill will be rated at about 6.25 tons per hour based on 24 hour per day operation. Recycled water from the tailings impoundment will be utilized to dilute the slurry to approximately 30% solids for feed to flotation. Figure 11 details the grinding section of the processing plant.

Flotation will be accomplished in standard cell to cell machines producing a rougher concentrate from the bulk feed. The rougher tailing will be subjected to scavenger flotation to remove residual values prior to transport to the tailings impoundment area. Water in excess of that needed to transport the tailings will be removed by a thickener prior to the tailings being pumped via pipeline to the impoundment area. The tailing pipeline will be enclosed in a secondary containment pipe to control potential leaks or spills. Figure 12 details the flotation and tailings section of the processing plant.

The rougher and scavenger concentrates will be further processed by cleaner flotation to produce a final up-graded concentrate that will be dewatered by a thickener/filter system and shipped off the property by truck for further processing.

7.5 Tailings Impoundment

The tailings impoundment system will be designed as a closed circuit, zero discharge facility. The principle components of the system are: runoff water diversion ditches; an impermeable tailings dam and impoundment, a water collection/internal drainage system, a reclaim water tank, and a water return pipeline.

Lyntek, Inc., of Denver, Colorado has completed a conceptual design study of the tailings impoundment facility, Appendix A. Lyntek's engineering studies have focused on the design of a tailings impoundment which combines the design components of solution containment, run-off water control, and recycle of process water. Details of Lyntek's design parameters and engineering studies are contained in Appendix A,Tailings Conceptual Design.

The partially de-watered tailings will be stockpiled in an adjacent valley, Figure 3 shows the general location of the tailings impoundment facility and topsoil stockpile. The tailings will be very finely ground (80% passing 74 microns). Current tailing deposition practice dictates that dams normally cannot be constructed from this material. Therefore, the impoundment will be built with rock fill dams to contain the entire volume within and below the crest of the dams. This design will require approximately 100,000 cubic yards of material to be excavated from within the impoundment. Part of the excavated material will be utilized for dam and plant pad construction with the remainder transported as waste rock.

A main dam and wing dams will be constructed in a compacted fill manner to contain the entire volume of tailings within the valley. The dam will be approximately 40 feet high and 200 feet wide at the widest point. The slopes will be approximately 2:1 with a 20 foot wide roadway access across the top.

The area will be prepared by clearing and grubbing with vegetation being burned and topsoil stockpiled. The ground surface will then be prepared by scarifying to a depth of one foot. Six inches will be removed with the remaining six inches compacted to a low permeability, followed by compaction of the second six inch layer and careful smoothing out of the surface. High permeability geo-fabric will then be laid on top of the prepared surface. A plastic 40 mil High Density Polyethylene (HDPE) liner is then placed to manufacturers specifications within the basin and on the inside face of the main and wing dams.

Perforated pipe will be placed on top of the HDPE liner to deliver water draining through the impounded tailings to a recycle water collection tank at the toe of the main dam. The reclaimed water will then be pumped from the recycle water collection tank back to the processing facility in a lined corridor or within a secondary containment pipe.

The tailing impoundment will have the capacity to contain the 100 year - 24 hour precipitation event collected within the lined area. Diversion ditches will be constructed as needed to divert other runoff away from the tailings impoundment. The basin has a very small watershed area, therefore excess runoff is not expected.

7.6 Reagents

The following is a list of the possible reagents that might be utilized in the processing plant. The dosage amounts listed are typical for this type of flotation circuit and may vary some in practice.

A-208 Sodium diethyl and sodium di-secondary butly dithiophosphate
Use: Collector Dosage: 0.10 lb/ton

A-350 Potassium amyl xanthate
Use: Collector Dosage: 0.08 lb/ton

COPPER SULFATE As: $CuSO_4.7H_2O$
Use: Conditioner Dosage: 0.50 lb/ton

MIBC Methyl Isobutyl Carbinol
Use: Frother Dosage: 0.005 lb/ton

F-65 Generally Polyglycol
Use: Frother Dosage: 0.005 lb/ton

LIME CaO

Use: pH Adjust 7.0 to 8.0 Dosage: <0.5 lb/ton

7.7 Spill Containment and Leak Detection

Safeguarding the environment has been a prime concern in the design of all aspects of the project to date. The entire facility will be engineered as a zero discharge system containing safeguards to insure that the integrity of the environment will not be jeopardized. Secondary containment for the tailing and recycle water pipelines, the liner system for impoundment and extensive diversion ditches are some of the items that have been specifically designed to demonstrate awareness of BADCT requirements in the state of Arizona.

7.7.1 Spill Containment

The process plant site will be designed, engineered and built with secondary containment features in areas where reagents are used or stored. Containment facilities will be constructed to provide for clean up of solutions.

Secondary containment structures will be designed to hold 110% of the volume of the largest tank within the containment area. In areas where tanks are not enclosed by a building, the containment facility will be designed to accommodate the run off generated by a 100 year, 24 hour storm event within its drainage area in addition to the 110% tank volume.

The pump station and pipeline ditch of the tailing impoundment system will be lined with a synthetic HDPE liner. The liner will be laid on a prepared, graded sub-base. The low point in the pipeline will be constructed with a sump for fluid containment.

The tailing impoundment area will be lined with a synthetic HDPE liner laid on a prepared low-permeability sub-base. The inner surface of the tailings dam will be lined in conjunction with the tailings impoundment. The internal drainage system will prevent the build up of hydraulic head in the tailings impoundment. Additional details on the tailings impoundment liner system are contained in Appendix A, Tailings Conceptual Design.

The water reclaim tank is the only component of the tailings impoundment system which will have a significant fluid head. Therefore this tank will be built with a containment system consisting of bermed earth lined with a single HDPE liner with the capacity to hold 110% of the tank volume.

7.7.2 Leak Detection

Leak detection and monitoring practices will begin prior to the commencement of operations. The integrity of all seams in the tailing impoundment liner will be tested during installation as part of a Quality Control program to be developed by MMC's engineering firm.

A monitor well will be completed at the point of compliance (POC) near the water reclaim tank. The specific POC will be determined from studies conducted during the Work Plan phase of the Aquifer Protection Permit. The approximate location of the monitor well is shown as MW1 on Figure 6 and 14.

7.8 Diversion Structures

7.8.1 Tailing Impoundment Area

Diversion ditches will be constructed on the north and south sides of the proposed tailings impoundment area. These diversion ditches will direct runoff away from the tailings impoundment area. Ditches will be sized to convey a 100 year, 24 hour storm event. The Appendix A,Tailings Conceptual Design, details the location of the ditches and the calculated peak discharges for various effected areas. Figure 14 shows the overall diversion and drainage plan for the proposed facilities.

Erosion of the diversion ditches will be controlled by placing rip-rap at ditch entrances and other erosion sensitive points. Inspection of diversion ditches will be conducted on a regular basis.

7.8.2 Open Pit Area

Diversion ditches will be constructed on all uphill drainages in the open pit area. The channels will be constructed to control run off generated by a 100 year, 24 hour storm event. This measure will be taken to avoid any temporary flooding of the pit during intense storm events. The slope above the processing plant will have a diversion ditch to divert run-off into the open pit diversion system.

7.8.3 Water Conservation

The facility has been designed to optimize net water usage by recycling of process water. Water conservation, together with zero discharge conditions were the primary conservation concerns in the tailing impoundment facility.

By thickening the tailings prior to pumping them to the tailings impoundment a significant portion of process water is reclaimed within the process plant. Once tailings are deposited in the tailings impoundment the physical properties of the tails should allow for a rapid drain down, reducing water ponding and water evaporation. This relatively rapid separation of water from the tailings should allow the internal drainage system to effectively transport water to the reclaim tank via the reclaim pipe. This process is described in greater detail in Appendix A, Tailings Conceptual Design.

8

8.0 APPENDIX C

8.0 APPENDIX C

Section 8.0 contains results of the tailings waste rock chemical analysis. Also shown are the results of toxicity leaching characteristics preformed on a flotation tailing sample from bench scale testwork on the Golden Eagle Ores

Included in this section are chemical analysis of three different samples taken 1from the surface pit area. These samples are intended to represent the waste rock that will be generated during the mining operations. The rock will be utilized for general construction fills and for armoring the face of the Cyprus tailing dam against erosion.

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DATE	June 9, 1992
HRI PROJECT	002-78H
HRI SERIES NO.	E189/92-1
DATE RECD.	05/11/92
CUST P.O.#	

Morgan Mining, Ltd.
Adrian Vander Pyl
2880 South Locust, Apt. 702S
Denver, CO 80222

REPORT OF ANALYSIS

Synthetic Precipitation Leaching Procedure

SAMPLE NO. E189/92-1
SAMPLE IDENTIFICATION: 5-6 #1

	Result mg/l	Limit mg/l	Spike Recovery,%	Method	Date Completed
Arsenic	0.2	5.0	99	EPA 206.4	05/21/92
Barium	<0.5	100	104	SW846 6010	06/02/92
Cadmium	<0.02	1.0	102	SW846 7130	05/21/92
Chromium	<0.05	5.0	119	SW846 7190	05/21/92
Lead	<0.3	5.0	104	SW846 7420	05/21/92
Mercury	<0.001	0.2	95	SW846 1312	05/15/92
Potassium	3.12	NA	101	SW846 7610	06/03/92
Selenium	<0.02	1.0	69	SW846 7740	06/03/92
Silver	<0.05	5.0	102	SW846 7760	05/21/92

Extraction Fluid Used: pH 5
Date Extraction Started: 05/13/92
Final pH: 7.68

By:
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NOTE: The leach was done according to SW846 Method 1312.

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DATE	June 9, 1992
HRI PROJECT	002-78H
HRI SERIES NO.	E189/92-2
DATE RECD.	05/11/92
CUST P.O.#	

Morgan Mining, Ltd.
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REPORT OF ANALYSIS

Synthetic Precipitation Leaching Procedure

SAMPLE NO. E189/92-2
SAMPLE IDENTIFICATION: 5-6 #2

	Result mg/l	Limit mg/l	Spike Recovery,%	Method	Date Completed
Arsenic	0.1	5.0	92	EPA 206.4	05/21/92
Barium	0.8	100	102	SW846 6010	06/02/92
Cadmium	<0.02	1.0	101	SW846 7130	05/21/92
Chromium	<0.05	5.0	118	SW846 7190	05/21/92
Lead	<0.3	5.0	103	SW846 7420	05/21/92
Mercury	<0.001	0.2	95	SW846 1312	05/15/92
Potassium	6.27	NA	106	SW846 7610	06/03/92
Selenium	<0.02	1.0	58	SW846 7740	06/03/92
Silver	<0.05	5.0	100	SW846 7760	05/21/92

Extraction Fluid Used: pH 5
Date Extraction Started: 05/13/92
Final pH: 7.52

By: Robert Rostad
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NOTE: The leach was done according to SW846 Method 1312.

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DATE	June 9, 1992
HRI PROJECT	002-78H
HRI SERIES NO.	E189/92-3
DATE RECD.	05/11/92
CUST P.O.#	

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REPORT OF ANALYSIS

Synthetic Precipitation Leaching Procedure

SAMPLE NO. E189/92-3
SAMPLE IDENTIFICATION: 5-6 #3

	Result mg/l	Limit mg/l	Spike Recovery,%	Method	Date Completed
Arsenic	<0.1	5.0	90	EPA 206.4	05/21/92
Barium	<0.5	100	101	SW846 6010	06/02/92
Cadmium	<0.02	1.0	100	SW846 7130	05/21/92
Chromium	<0.05	5.0	115	SW846 7190	05/21/92
Lead	<0.3	5.0	102	SW846 7420	05/21/92
Mercury	<0.001	0.2	95	SW846 1312	05/15/92
Potassium	8.75	NA	68	SW846 7610	06/03/92
Selenium	<0.02	1.0	58	SW846 7740	06/03/92
Silver	<0.05	5.0	100	SW846 7760	05/21/92

Extraction Fluid Used: pH 5
Date Extraction Started: 05/13/92
Final pH: 7.75

By: Robert Rostad
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NOTE: The leach was done according to SW846 Method 1312.

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DATE	June 9, 1992
HRI PROJECT	002-78H
HRI SERIES NO.	E189/92-4
DATE RECD.	05/11/92
CUST P.O.#	

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REPORT OF ANALYSIS

SAMPLE NO. E189/92-1
SAMPLE IDENTIFICATION: 5-6 #1

Potential Acidity, tons H^+/1000 tons Soil	<0.01
Potential Acidity, tons $CaCO_3$ equivalent/1000 tons Soil	<0.5
Neutralization Potential, tons $CaCO_3$ equivalent/1000 tons Soil	12.2

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DATE	June 9, 1992
HRI PROJECT	002-78H
HRI SERIES NO.	E189/92-5
DATE RECD.	05/11/92
CUST P.O.#	

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REPORT OF ANALYSIS

SAMPLE NO. E189/92-2
SAMPLE IDENTIFICATION: 5-6 #2

Potential Acidity, tons H^+/1000 tons Soil	0.10
Potential Acidity, tons $CaCO_3$ equivalent/1000 tons Soil	5.0
Neutralization Potential, tons $CaCO_3$ equivalent/1000 tons Soil	23.5

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DATE	June 9, 1992
HRI PROJECT	002-78H
HRI SERIES NO.	E189/92-6
DATE RECD.	05/11/92
CUST P.O.#	

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REPORT OF ANALYSIS

SAMPLE NO. E189/92-3
SAMPLE IDENTIFICATION: 5-6 #3

Potential Acidity, tons H^+/1000 tons Soil	0.22
Potential Acidity, tons $CaCO_3$ equivalent/1000 tons Soil	10.9
Neutralization Potential, tons $CaCO_3$ equivalent/1000 tons Soil	17.1

By:
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9

9.0 APPENDIX D

9.0 APPENDIX D

Section 9 contains soil classifications data from backhoe test pits they excavated in the vicinity of the tailings impoundment and plant site. Figure 6 shows the locations of the backhoe pits, designated MBH1 through 4. The samples from MHB1 and MHB4 indicated the pressure of clayey materials that might be utilized for secondary liner construction. MBH2 and MBH3 were very rocky, with a little clay, and were not subjected to classification testing

The results of the soil studies on samples MBH1 and MBH4 are shown in Table 9.1. The laboratory testwork was conducted by Landmark Laboratories Ltd. under the supervision of Shepherd Miller, Inc., both of Fort Collins, Colorado.

Table 9.2 shows the results of additional classification tests for permeability, liquid limit and particle size performed on MBH (0.0 - 2.7 feet). Figure 9.1 shows the Proctor Curve for the sample requirement.

TABLE 9.1
SOIL CLASSIFICATION RESULTS

		SIEVE ANALYSIS (% PASSING)								
SAMPLE I.D.	NATURAL MOISTURE (%)	3/4"	#4	#10	#40	#200	LIQUID LIMIT	PLASTICITY INDEX	UNIFIED SOIL CLASS.	SOIL DESCRIPTION
MBH-1	5.6	96	76	63	44	20.1	48	27	SC	Clayey Sand with Gravel
MBH-4 @ 0-2'	7.3	100	93	86	73	31.4	56	33	SC	Clayey Sand
MBH-4 @ 2-3.5'	6.7	96	76	65	48	15.7		N.P.	SM	Silty Sand W\Gravel (Decomposed Schist)
MBH-4 @ 3.5-6'	3.5	81	47	29	13	2.3		N.P.	GW	Well Graded Gravel W\Sand (Decomposed Schist)

TABLE 9.2
RESULTS OF PERMEABILITY TESTS

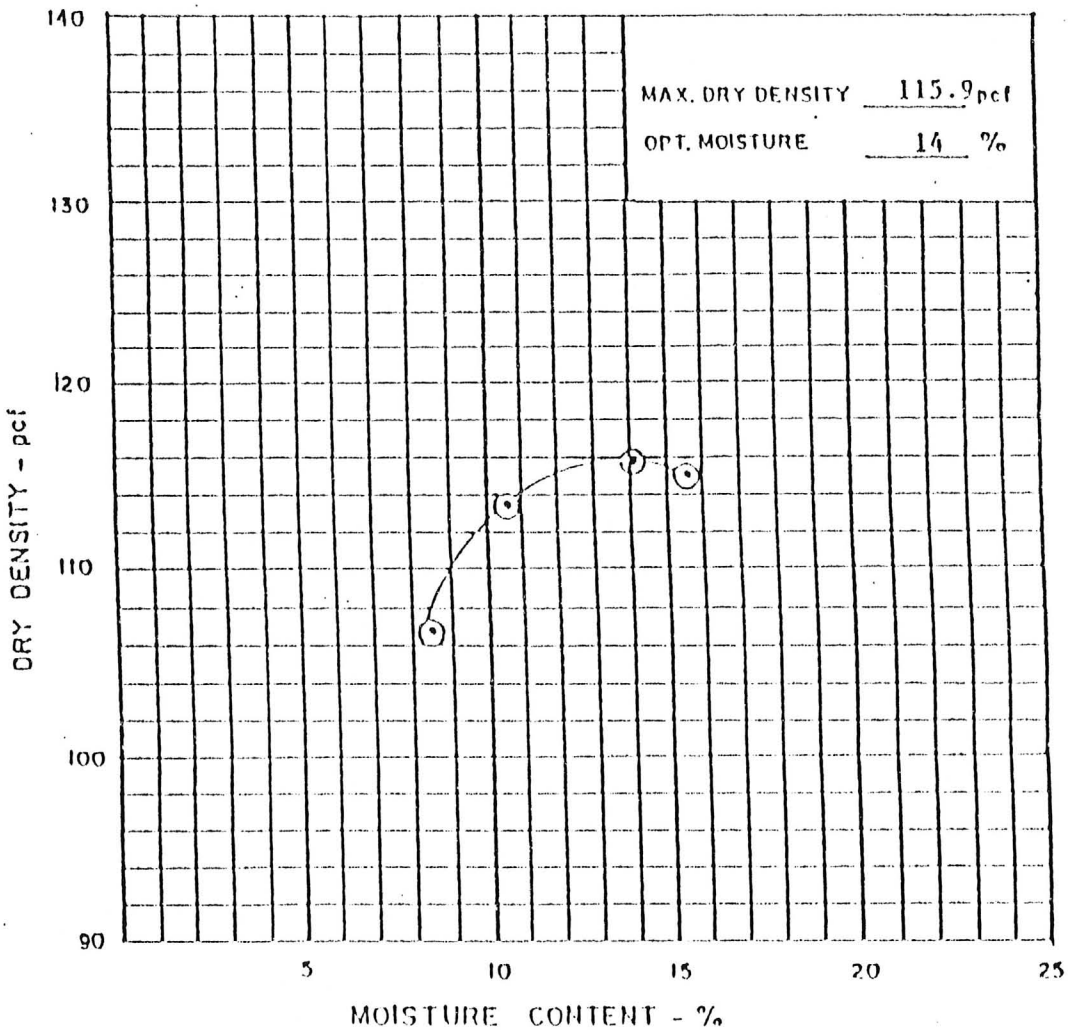
COMPOSITE MATERIAL	LL	PI	#4	#200	UNIFIED SOIL CLASS	MAX DRY DENSITY	OPT. MOISTURE	PERMEABILITY
C-3 MBH-1 0.0-2.7'	48	27	76	20.1	SC	115.9	14	2.06X10-6

MOISTURE - DENSITY RELATIONS	Landmark LABORATORIES LTD.

PROCTOR CURVE NO. C-3

PROCTOR CURVE - MBH1 (0.0-2.7 FEET)

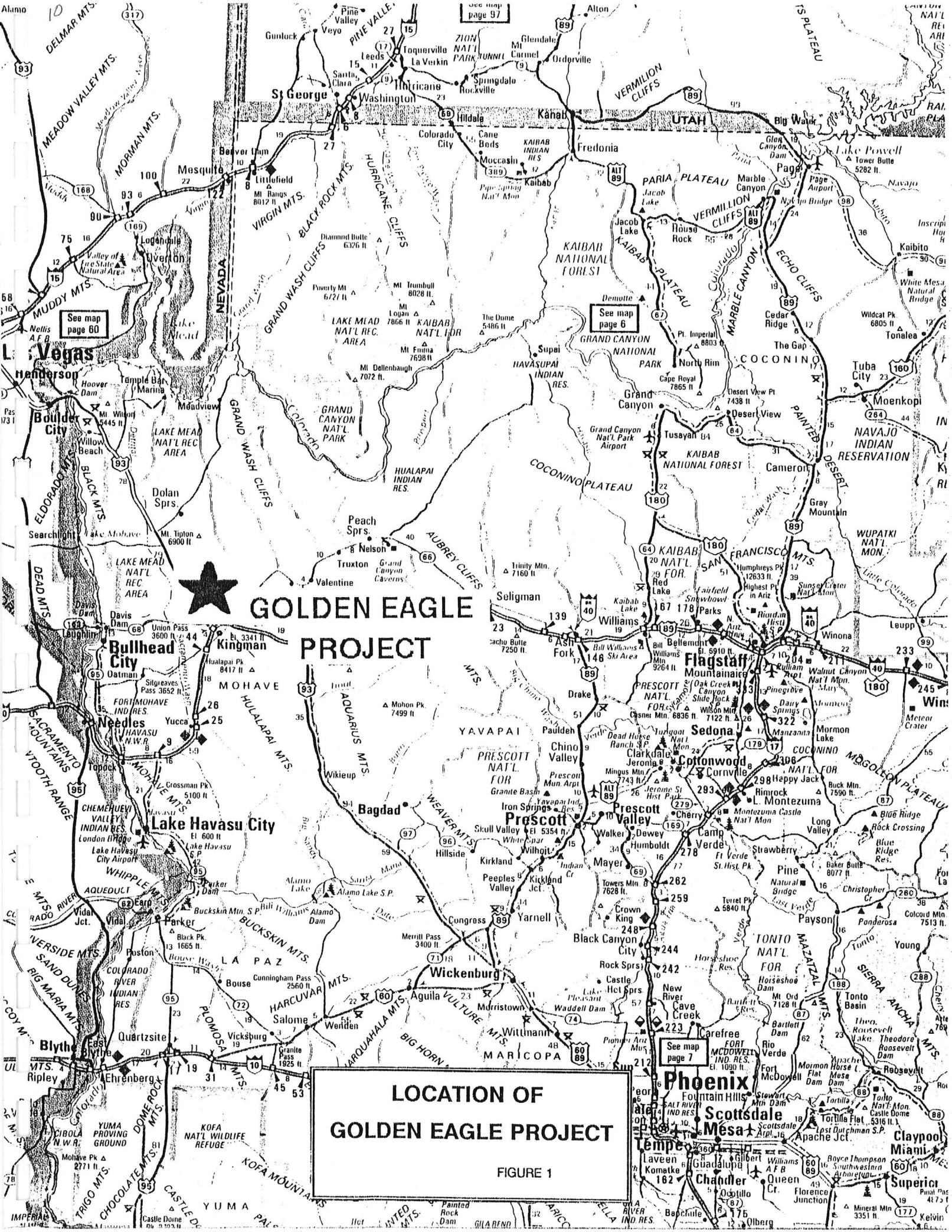
CLIENT S.M.I.	JOB NO. SHEMI-920781-04-702
PROJECT - #325 & 327	DATE TESTED 8-19-92



METHOD ASTM D 698 Method A	RAMMER
PREPARATION PROCEDURE MOIST	ORIGIN Composite Sample #3
MATERIAL MBH-1 @ 0 - 2.7'	

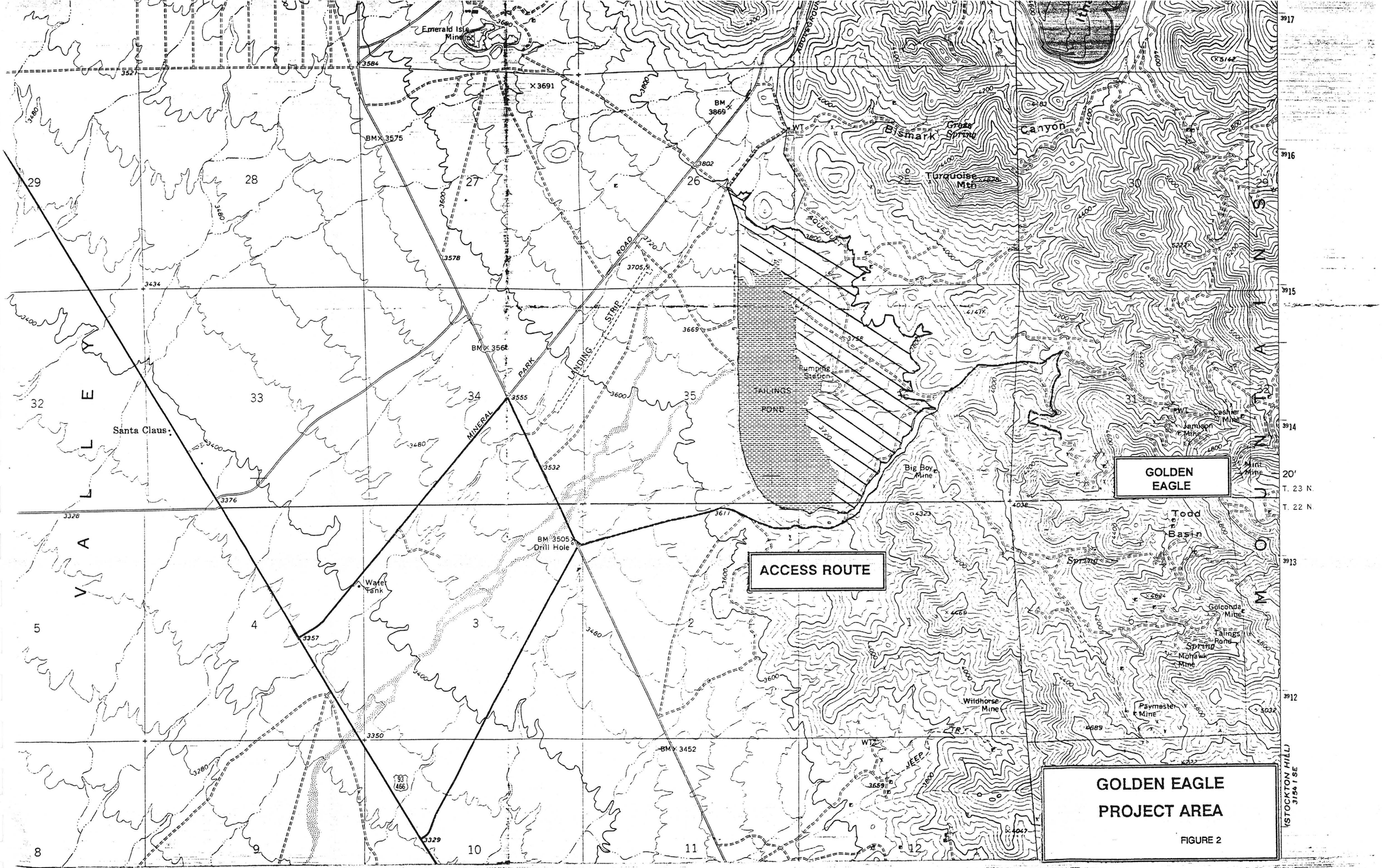
Falling Head Permeability @ 95% Std. Proctor & Opt. Moisture = 2.06 x 10^{-6} cm/sec

Note: Proctor & Permeability performed on -#4 material only



LOCATION OF GOLDEN EAGLE PROJECT

FIGURE 1


GOLDEN EAGLE
ACCESS ROUTE
GOLDEN EAGLE PROJECT AREA
FIGURE 2
Emerald Isle Mine
Santa Claus
Water Tank
BM 3505 Drill Hole
MINERAL PARK
LANDING STRIP ROAD
TAILINGS POND
Pumping Station
Big Boy Mine
Bismark Spring
Turquoise Mtn
Canyon
Cashier Mine
Jamison Mine
Mint Mine
Todd Basin
Golconda Mine
Tailings Pond
Mohawk Mine
Paymester Mine
Wildhorse Mine
JEEP TR
(STOCKTON HILL)
T. 23 N.
T. 22 N.
20'

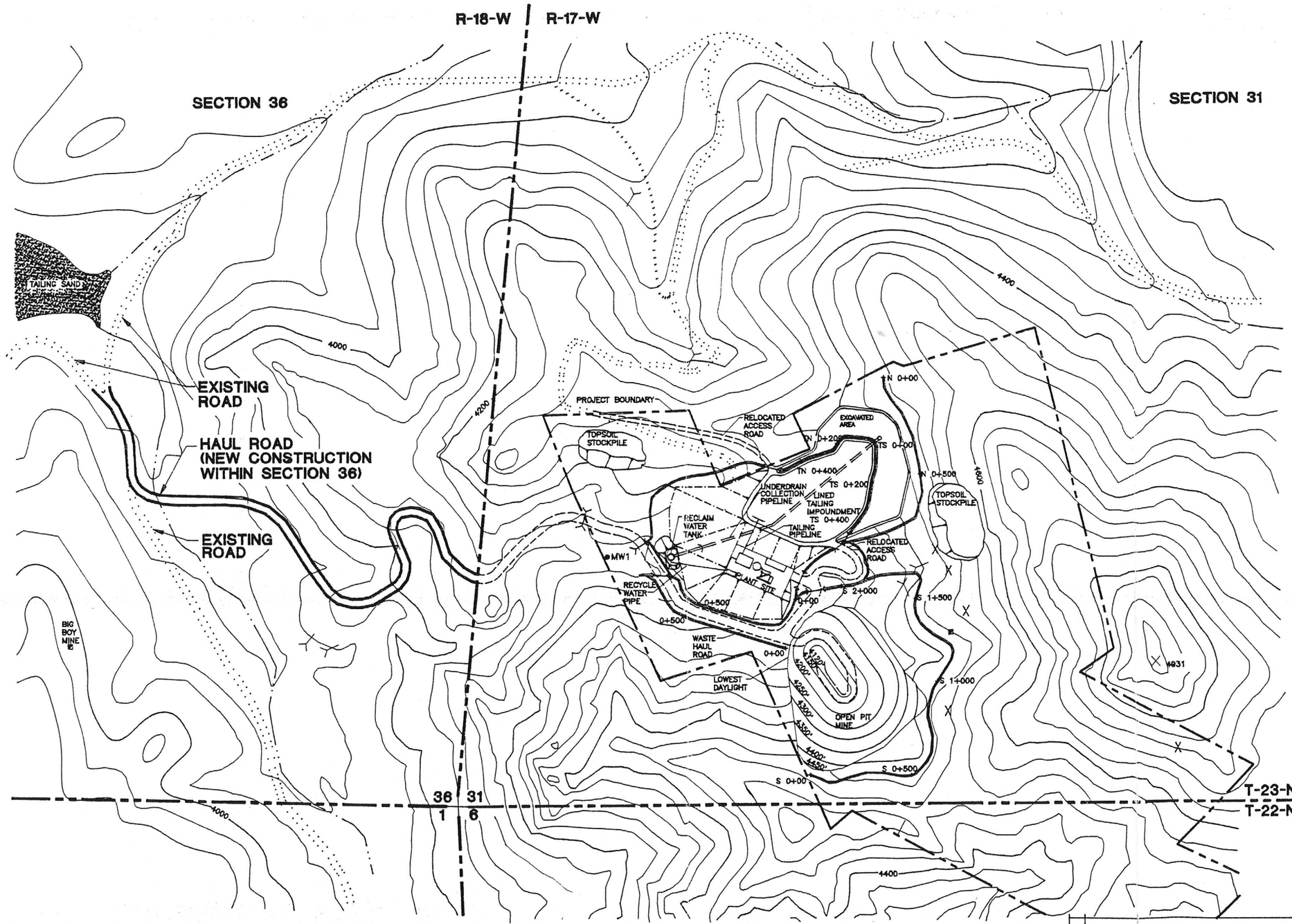


Figure 3
General Site Layout

NO.	REVISIONS	BY	APP'D
A	ADDED EXCAVATED AREA	DJG	TR

MORGAN MINING
GOLDEN EAGLE PROJECT

GENERAL SITE LAYOUT

LYNTEK INC.
775 MARIPOSA DENVER, CO. 80204
PH. (303)-623-8365
FAX (303) 623-0342

NO.	DWG. NO.	DRAWING TITLE
		REFERENCE DRAWINGS

DO NOT SCALE DRAWING | DWG. SIZE B

CAD-OP	LYNTEK	931001.0930
CKD.	–	
APP'D	–	DRAWING NO. / REV.
DATE	11-11-92	9238-400 A
SCALE	1"=500'	

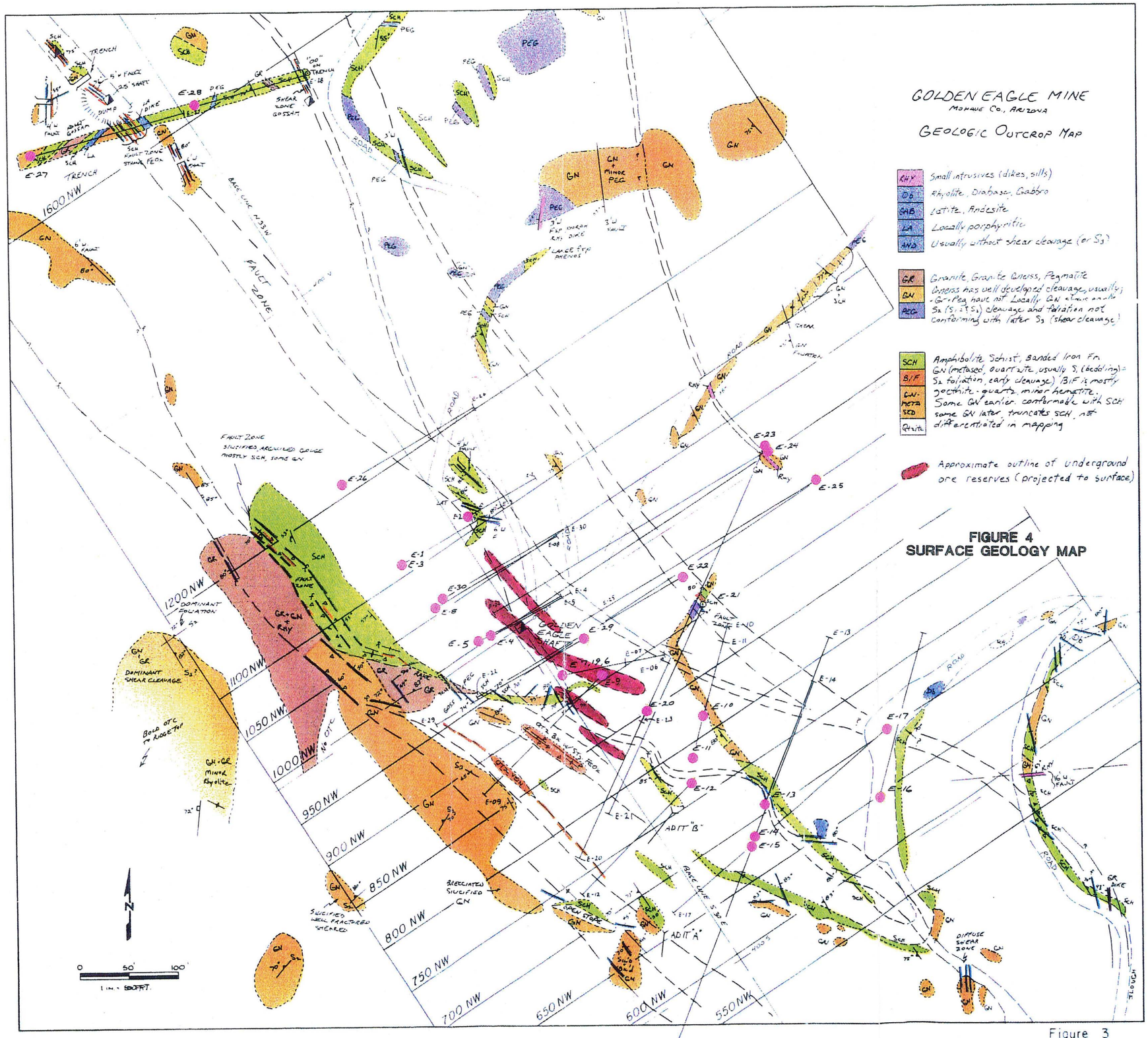

GOLDEN EAGLE MINE
MOHAVE CO., ARIZONA
GEOLOGIC OUTCROP MAP
RHY Small intrusives (dikes, sills)
DB Rhyolite, Diabase, Gabbro
GAB Latite, Andesite
LA Locally porphyritic
AND Usually without shear cleavage (or S3)
GR Granite, Granite Gneiss, Pegmatite
GN Gneiss has well developed cleavage, usually;
PEG Gr-Peg have not. Locally GN
S2 (S1 ? S3) cleavage and foliation not
conforming with later S3 (shear cleavage)
SCH Amphibolite Schist, Banded Iron Fm.
B/F GN (metased. quartzite, usually S1 (bedding) =
GN-META S2 foliation, early cleavage) B/F is mostly
SCD gethite - quartz, minor hematite.
Some GN earlier, conformable with SCH
same GN later, truncates SCH, not
differentiated in mapping
Approximate outline of underground
ore reserves (projected to surface)
FIGURE 4
SURFACE GEOLOGY MAP
GOLDEN EAGLE SHAFT
ADIT "B"
ADIT "A"
FAULT ZONE
1600 NW
1200 NW
1100 NW
1050 NW
1000 NW
950 NW
900 NW
850 NW
800 NW
750 NW
700 NW
650 NW
600 NW
550 NW
0 50' 100'
1 IN. = 50 FT.

Figure 3

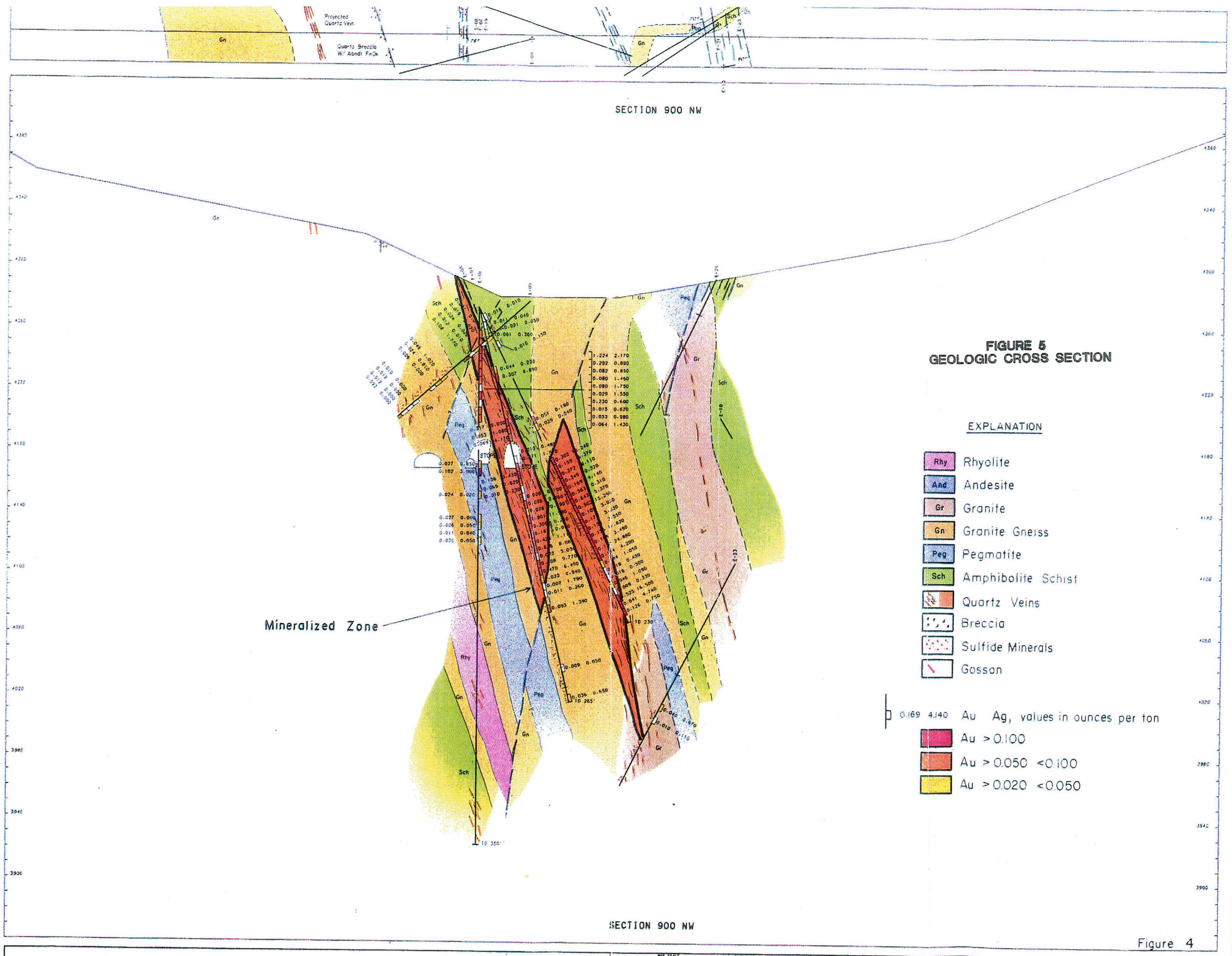


Figure 4

MAP SCALE

REVISIONS	DATE	MADE BY	DESCRIPTION
1			
2			
3			
4			
5			

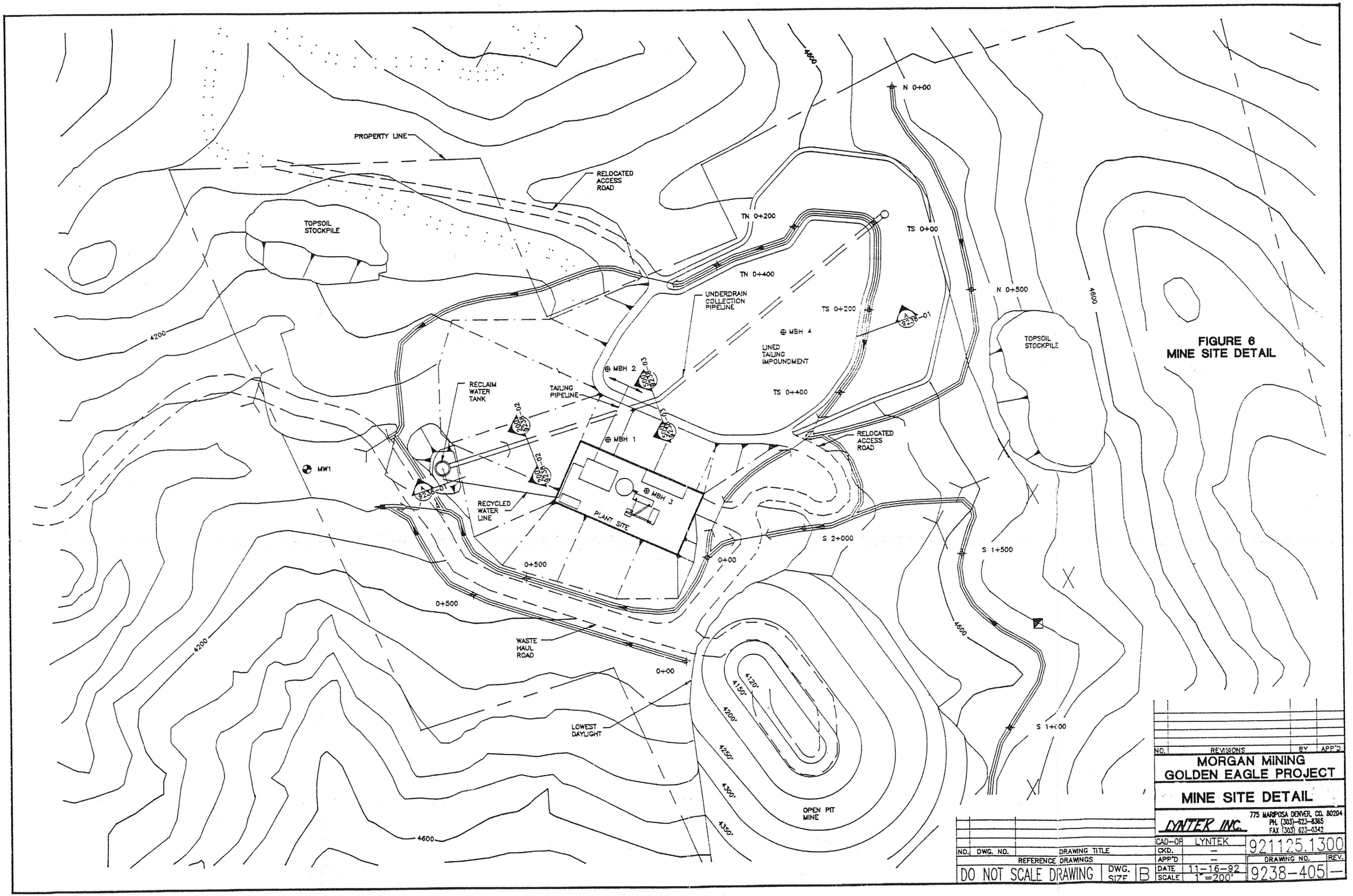
DATE	DRAWN BY	CHECKED	APPROVED
04/26/88			

CYPRUS MINERALS COMPANY
CYPRUS GOLD DIVISION
ENGLEWOOD, COLORADO

OFFICE | DEPARTMENT

GOLDEN EAGLE
MOHAVE COUNTY, ARIZONA

MAP / INDEX NUMBER | SCALE | DRAWING NUMBER



NO.	REVISIONS	BY	APP'D

MORGAN MINING
GOLDEN EAGLE PROJECT

MINE SITE DETAIL

LYNTER INC.
775 MARIPOSA DENVER, CO. 80204
PH. (303)-623-8365
FAX (303) 623-0342

NO.	DWG. NO.	DRAWING TITLE				
		REFERENCE DRAWINGS				
DO NOT SCALE DRAWING			DWG. SIZE	B		

CAD-OR	LYNTEK	921125.1300	
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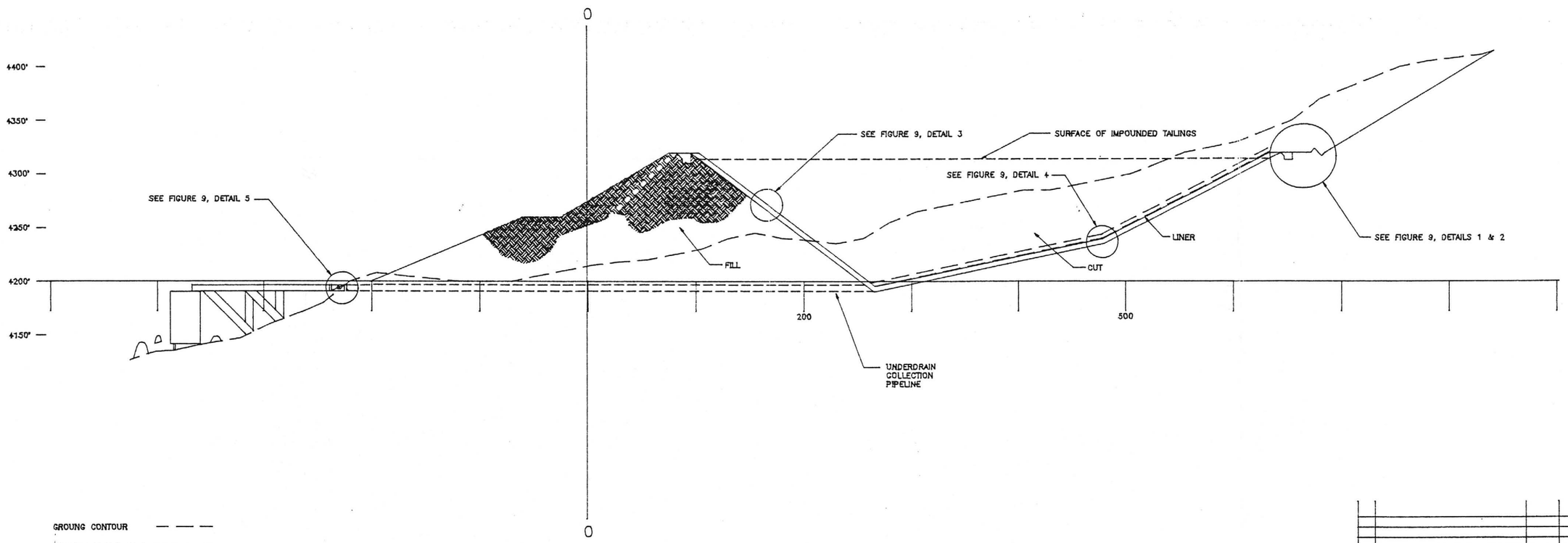
APP'D	–	DRAWING NO.	REV.
DATE	11-16-92	9238-405	–
SCALE	1"=200'		



NO.	REVISIONS	BY	APP'D

MORGAN MINING
GOLDEN EAGLE PROJECT

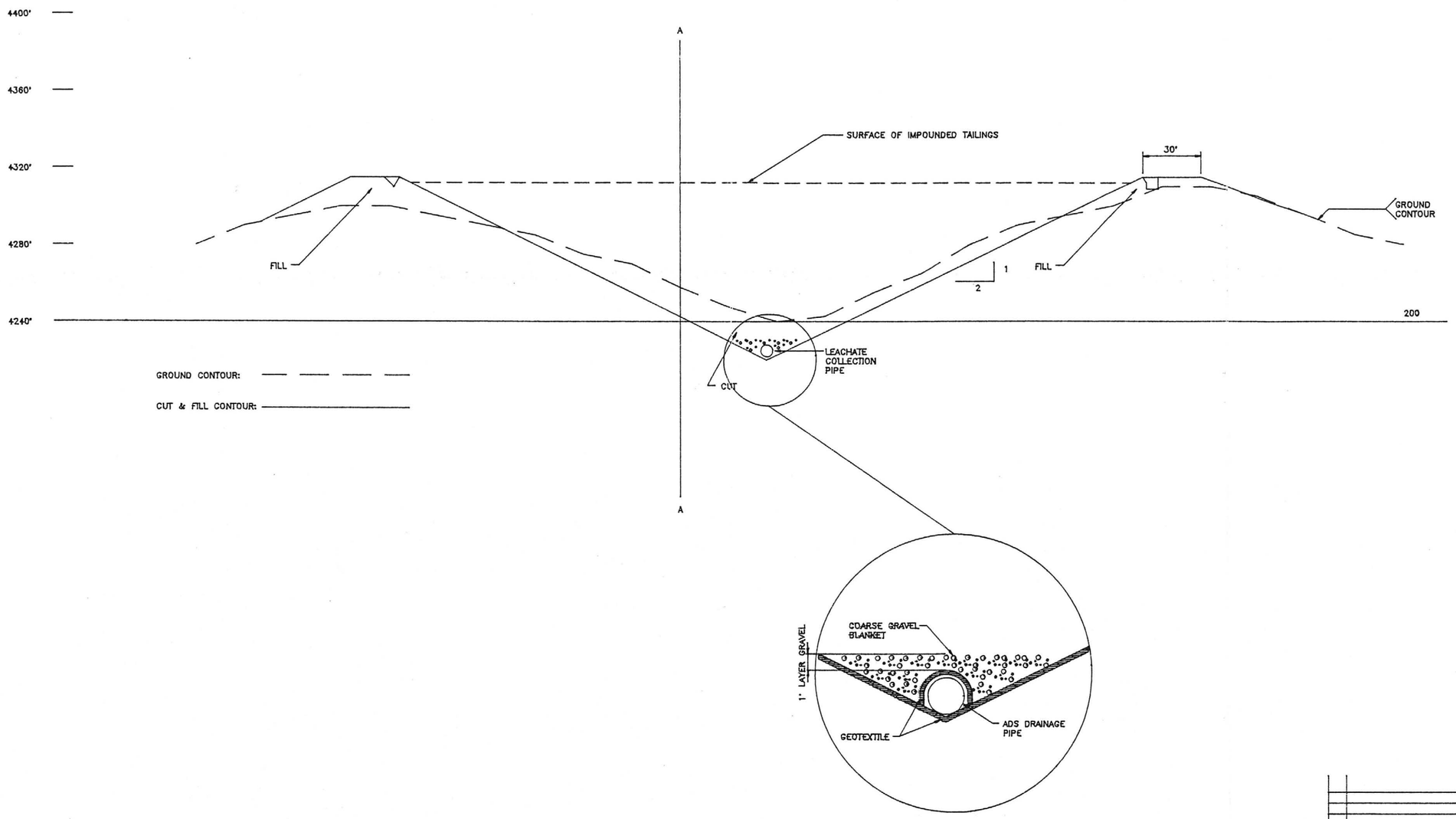
TAILING SECTION - A

LYNTEK INC.

NO.	DWG. NO.	DRAWING TITLE
		REFERENCE DRAWINGS

DO NOT SCALE DRAWING | DWG. SIZE | B

CAD-OP	LYNTEK	930527.1130	
CKD.	–		
APP'D	–	DRAWING NO.	REV.
DATE	09-11-92		
SCALE	1"=200'-0"	9238-01	–



DETAIL 8

NO.	REVISIONS	BY	APP'D

MORGAN MINING
GOLDEN EAGLE PROJECT

TAILING SECTION 200

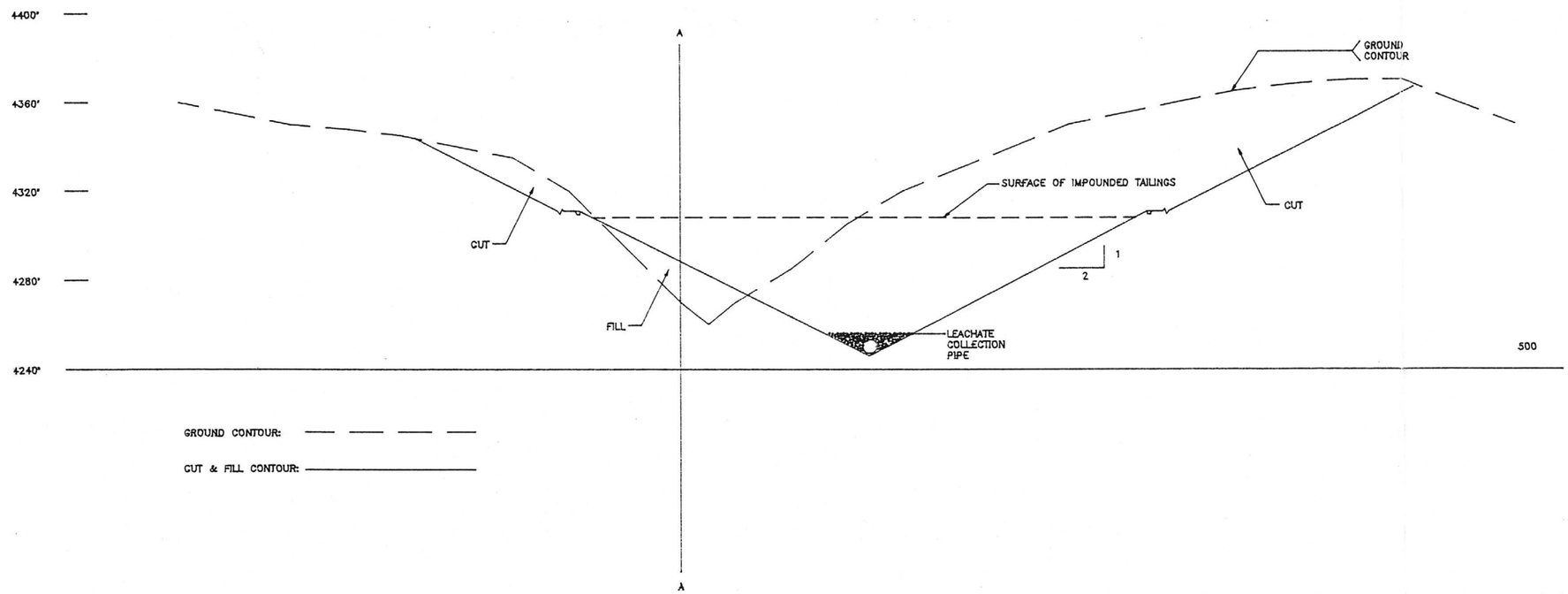
LYNTEK INC.

NO.	DWG. NO.	DRAWING TITLE
		REFERENCE DRAWINGS

DO NOT SCALE DRAWING

DWG. SIZE B

CAD-OP	LYNTEK	930527.1200
CKD.	–	
APP'D	–	DRAWING NO. / REV.
DATE	09-11-92	9238-02 –
SCALE	1"=60'	



GROUND CONTOUR: — — — —

CUT & FILL CONTOUR: ————————

NO.	REVISIONS	BY	APP'D

MORGAN MINING
GOLDEN EAGLE PROJECT

TAILING SECTION 500

LYNTEK INC.

NO.	DWG. NO.	DRAWING TITLE			
		REFERENCE DRAWINGS			
DO NOT SCALE DRAWING			DWG. SIZE	B	

CAD-DP	LYNTEK	930527.1215	
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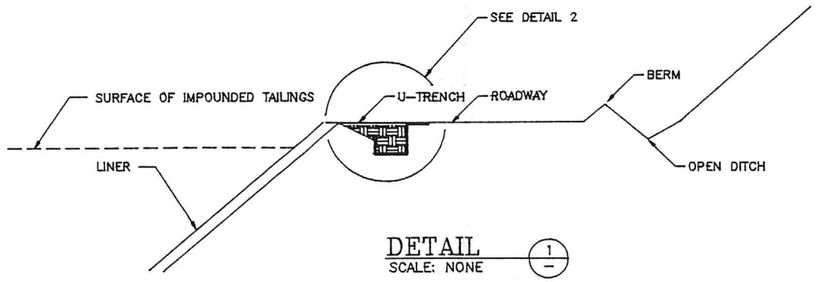
APP'D	–	DRAWING NO.	REV.
DATE	09-11-92	9238-03	–
SCALE	1"=60'		



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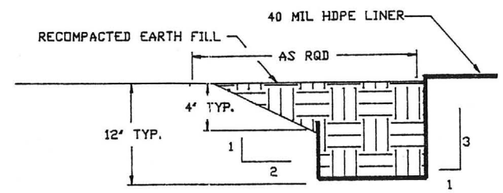
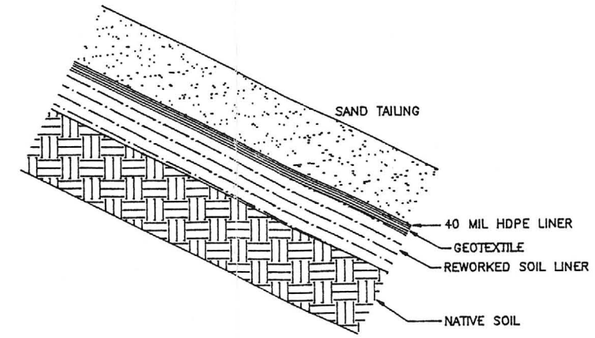


Liner U-Trench

DETAIL 2
SCALE: NONE



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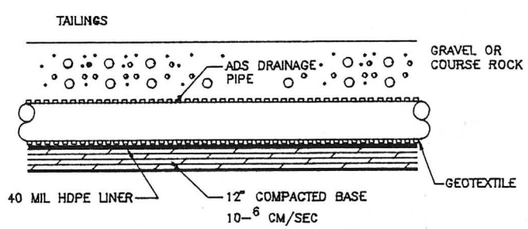

DETAIL 4
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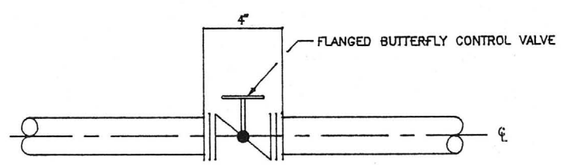

DETAIL 5
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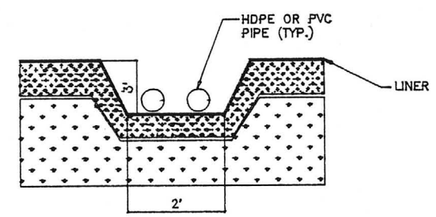
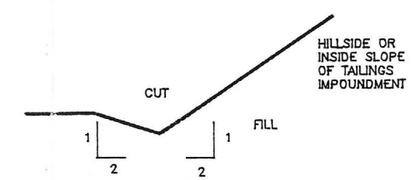


PIPING TRENCH
CONTAINING LEACHATE COLLECTION OR MAIN TAILINGS LINE FROM PROCESS PLANT TO IMPOUNDMENT

DETAIL 6
SCALE: NONE



DETAIL 7
SCALE: NONE

NO.	REVISIONS	BY	APP'D

MORGAN MINING
GOLDEN EAGLE PROJECT

DETAILS
TAILINGS IMPOUNDMENT

LYNTEK INC.

NO.	DWG. NO.	DRAWING TITLE			
		REFERENCE DRAWINGS			
DO NOT SCALE DRAWING			DWG. SIZE	B	

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APP'D	–	DRAWING NO. / REV.
DATE	09-11-92	9238-04 / –
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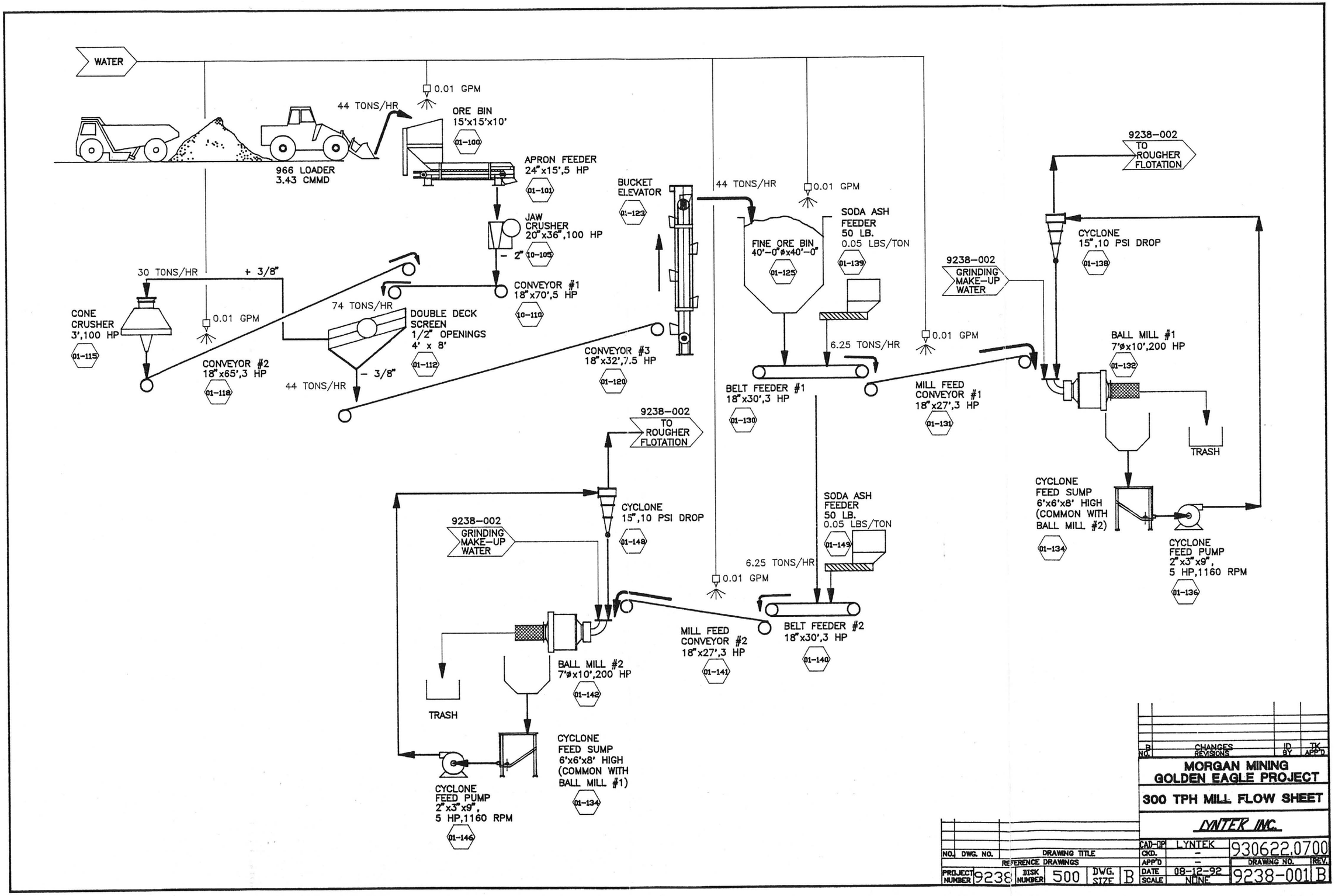
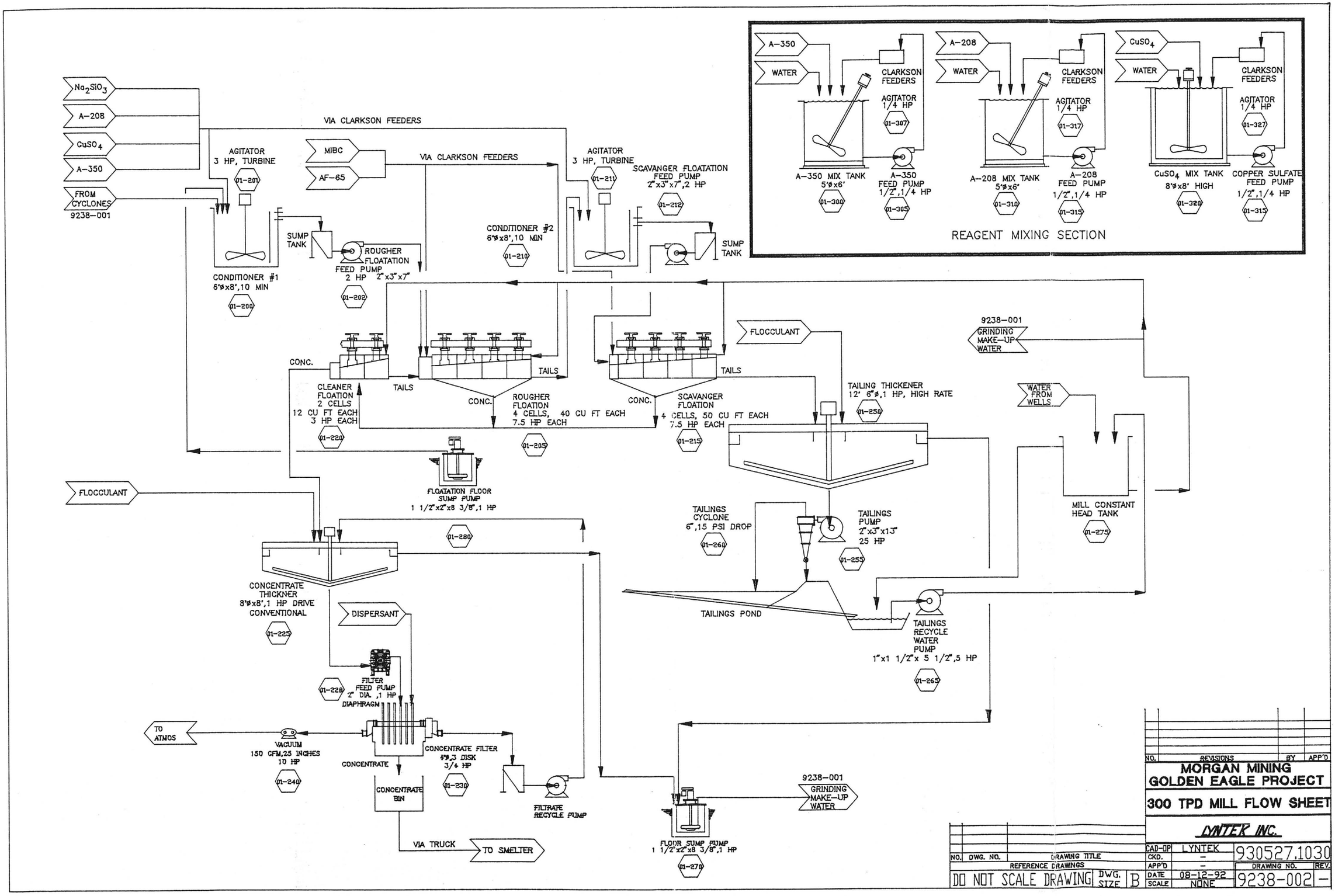
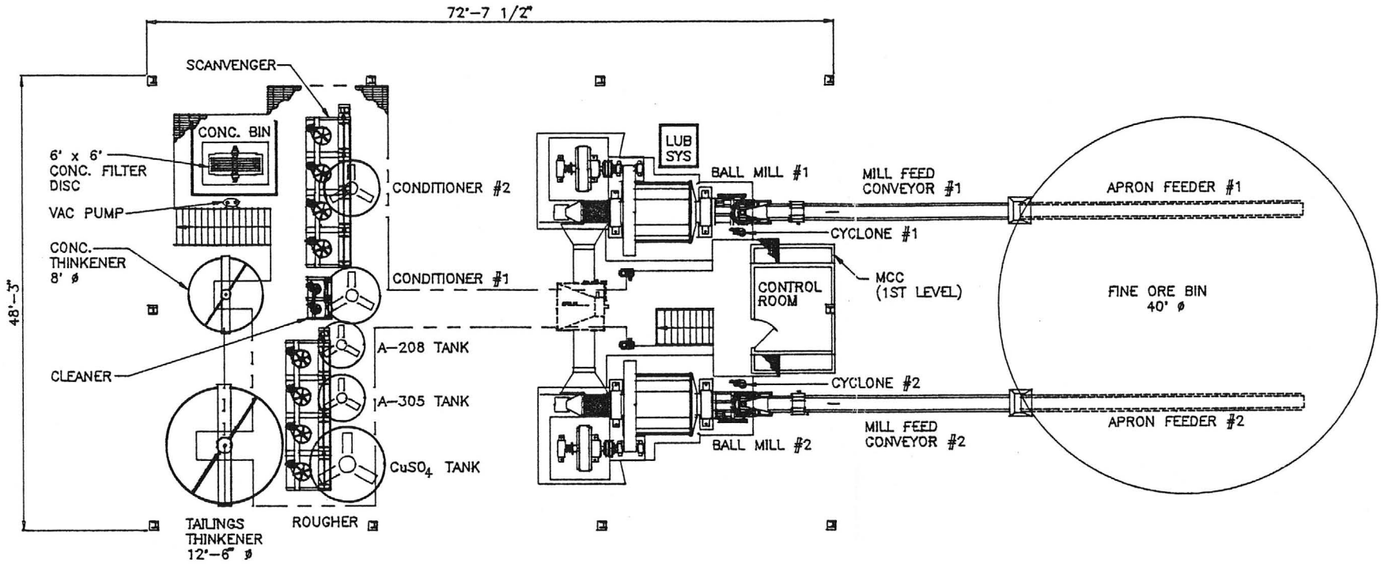
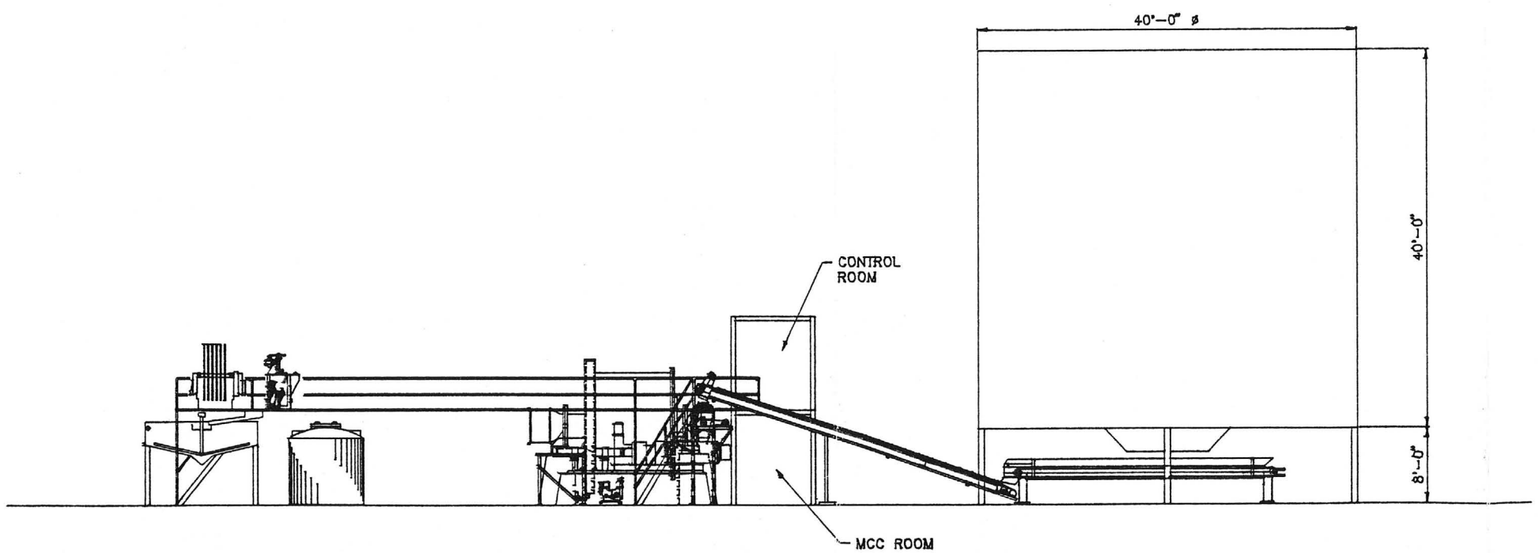

WATER
0.01 GPM
44 TONS/HR
ORE BIN
15'x15'x10'
01-100
966 LOADER
3.43 CMMD
APRON FEEDER
24"x15',5 HP
01-101
JAW
CRUSHER
20"x36",100 HP
- 2"
10-105
CONVEYOR #1
18"x70',5 HP
10-110
30 TONS/HR
+ 3/8"
CONE
CRUSHER
3',100 HP
01-115
0.01 GPM
74 TONS/HR
DOUBLE DECK
SCREEN
1/2" OPENINGS
4' x 8'
01-112
CONVEYOR #2
18"x65',3 HP
01-118
44 TONS/HR
- 3/8"
CONVEYOR #3
18"x32',7.5 HP
01-120
BUCKET
ELEVATOR
01-123
44 TONS/HR
0.01 GPM
FINE ORE BIN
40'-0"ø x40'-0"
01-125
SODA ASH
FEEDER
50 LB.
0.05 LBS/TON
01-139
6.25 TONS/HR
0.01 GPM
BELT FEEDER #1
18"x30',3 HP
01-130
MILL FEED
CONVEYOR #1
18"x27',3 HP
01-131
9238-002
TO
ROUGHER
FLOTATION
9238-002
GRINDING
MAKE-UP
WATER
CYCLONE
15",10 PSI DROP
01-138
BALL MILL #1
7'ø x10',200 HP
01-132
TRASH
CYCLONE
FEED SUMP
6'x6'x8' HIGH
(COMMON WITH
BALL MILL #2)
01-134
CYCLONE
FEED PUMP
2"x3"x9",
5 HP,1160 RPM
01-136
9238-002
TO
ROUGHER
FLOTATION
CYCLONE
15",10 PSI DROP
01-148
9238-002
GRINDING
MAKE-UP
WATER
SODA ASH
FEEDER
50 LB.
0.05 LBS/TON
01-149
6.25 TONS/HR
0.01 GPM
MILL FEED
CONVEYOR #2
18"x27',3 HP
01-141
BELT FEEDER #2
18"x30',3 HP
01-140
BALL MILL #2
7'ø x10',200 HP
01-142
TRASH
CYCLONE
FEED SUMP
6'x6'x8' HIGH
(COMMON WITH
BALL MILL #1)
01-134
CYCLONE
FEED PUMP
2"x3"x9",
5 HP,1160 RPM
01-146
NO. CHANGES REVISIONS BY APP'D
MORGAN MINING
GOLDEN EAGLE PROJECT
300 TPH MILL FLOW SHEET
LYNTEK INC.
NO. DWG. NO. DRAWING TITLE
REFERENCE DRAWINGS
PROJECT NUMBER 9238 DISK NUMBER 500 DWG. SIZE B
CAD-OP LYNTEK
CKD. -
APP'D -
DATE 08-12-92
SCALE NONE
930622.0700
DRAWING NO. 9238-001 REV. B


Na_2SiO_3
A-208
$CuSO_4$
A-350
FROM CYCLONES 9238-001
VIA CLARKSON FEEDERS
AGITATOR 3 HP, TURBINE
01-201
MIBC
AF-65
VIA CLARKSON FEEDERS
AGITATOR 3 HP, TURBINE
01-211
SCAVANGER FLOATATION FEED PUMP 2"x3"x7",2 HP
01-212
SUMP TANK
ROUGHER FLOATATION FEED PUMP 2 HP 2"x3"x7"
01-202
CONDITIONER #1 6'ø x8',10 MIN
01-200
CONDITIONER #2 6'ø x8',10 MIN
01-210
SUMP TANK
A-350
WATER
CLARKSON FEEDERS
AGITATOR 1/4 HP
01-307
A-350 MIX TANK 5'ø x6'
01-300
A-350 FEED PUMP 1/2",1/4 HP
01-305
A-208
WATER
CLARKSON FEEDERS
AGITATOR 1/4 HP
01-317
A-208 MIX TANK 5'ø x6'
01-310
A-208 FEED PUMP 1/2",1/4 HP
01-315
$CuSO_4$
WATER
CLARKSON FEEDERS
AGITATOR 1/4 HP
01-327
$CuSO_4$ MIX TANK 8'ø x8' HIGH
01-320
COPPER SULFATE FEED PUMP 1/2",1/4 HP
01-315
REAGENT MIXING SECTION
FLOCCULANT
9238-001
GRINDING MAKE-UP WATER
CONC.
TAILS
CLEANER FLOATION 2 CELLS 12 CU FT EACH 3 HP EACH
01-220
TAILS
CONC.
ROUGHER FLOATION 4 CELLS, 40 CU FT EACH 7.5 HP EACH
01-205
CONC.
SCAVANGER FLOATION 4 CELLS, 50 CU FT EACH 7.5 HP EACH
01-215
TAILS
TAILING THICKENER 12' 6"ø,1 HP, HIGH RATE
01-250
WATER FROM WELLS
FLOATATION FLOOR SUMP PUMP 1 1/2"x2"x8 3/8",1 HP
01-280
FLOCCULANT
TAILINGS CYCLONE 6",15 PSI DROP
01-260
TAILINGS PUMP 2"x3"x13" 25 HP
01-255
MILL CONSTANT HEAD TANK
01-275
CONCENTRATE THICKNER 8'ø x8',1 HP DRIVE CONVENTIONAL
01-225
TAILINGS POND
TAILINGS RECYCLE WATER PUMP 1"x1 1/2"x 5 1/2",5 HP
01-265
DISPERSANT
FILTER FEED PUMP 2" DIA. ,1 HP DIAPHRAGM
01-228
TO ATMOS
VACUUM 150 CFM,25 INCHES 10 HP
01-240
CONCENTRATE
CONCENTRATE FILTER 4'ø,3 DISK 3/4 HP
01-230
CONCENTRATE BIN
FILTRATE RECYCLE PUMP
VIA TRUCK
TO SMELTER
9238-001
GRINDING MAKE-UP WATER
FLOOR SUMP PUMP 1 1/2"x2"x8 3/8",1 HP
01-270
NO. REVISIONS BY APP'D
MORGAN MINING
GOLDEN EAGLE PROJECT
300 TPD MILL FLOW SHEET
LYNTEK INC.
NO. DWG. NO. DRAWING TITLE
REFERENCE DRAWINGS
DO NOT SCALE DRAWING
DWG. SIZE B
CAD-OP LYNTEK
CKD. –
APP'D –
DATE 08-12-92
SCALE NONE
930527.1030
DRAWING NO. 9238-002
REV. –



PLAN VIEW
SCALE: 1/16"=1'-0"



SECTION
SCALE: 1/16"=1'-0"

NO.	REVISIONS	BY	APP'D

MORGAN MINING
GOLDEN EAGLE PROJECT

MILL BUILDING G.A.

LYNTEK INC.

NO.	DWG. NO.	DRAWING TITLE
		REFERENCE DRAWINGS

DO NOT SCALE DRAWING | DWG. SIZE B

CAD-OP	LYNTEK	930527.1100
CKD.	–	
APP'D	–	DRAWING NO. / REV.
DATE	11-24-92	
SCALE	1/16"=1'-0"	9238-003 / –

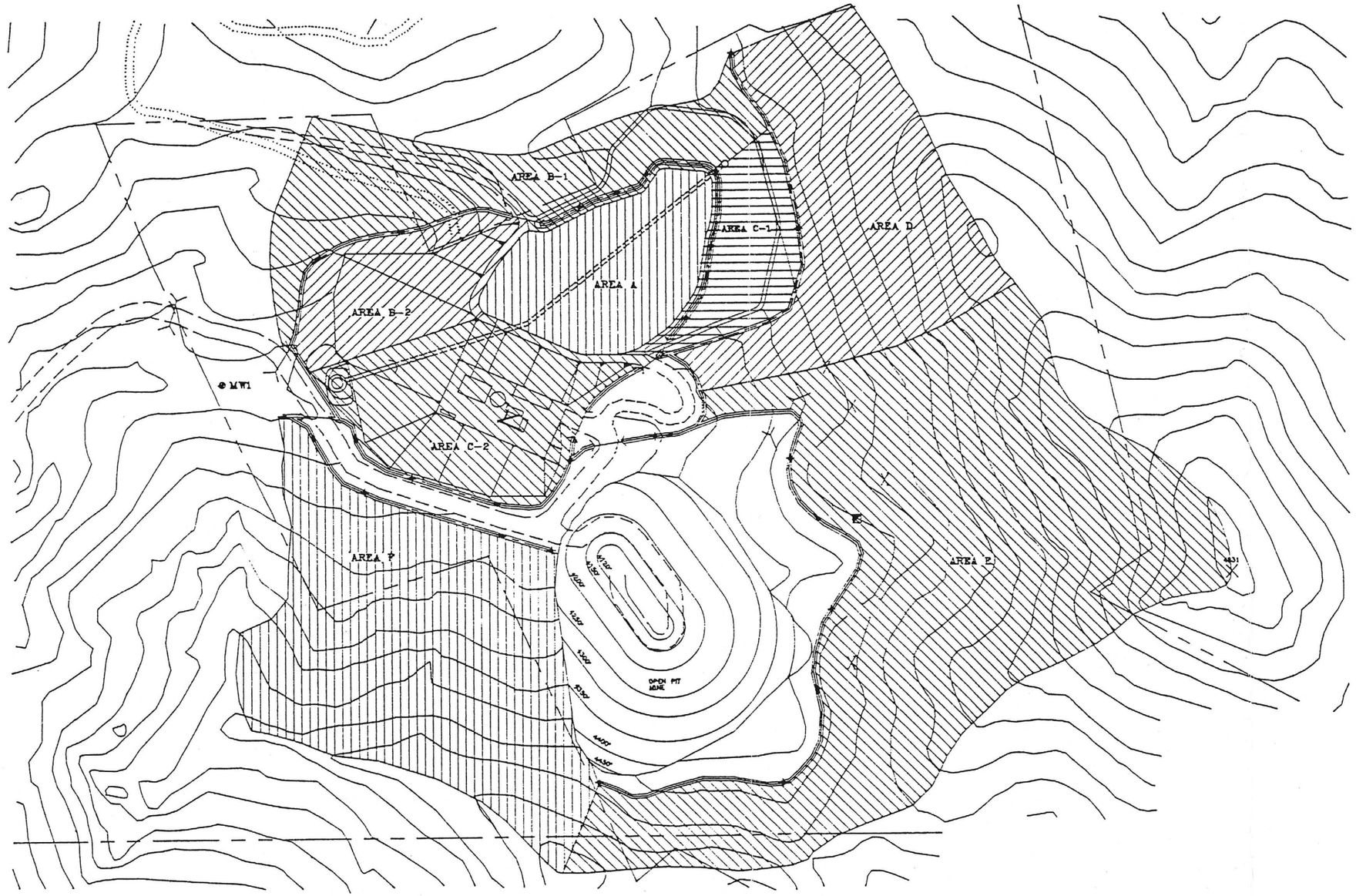


FIGURE 14
DRAINAGE LAYOUT

NO.	REVISIONS	BY	APP'D

MORGAN MINING
GOLDEN EAGLE PROJECT

DRAINAGE LAYOUT

LYNTEK INC.
775 MARIPOSA DENVER, CO 80204
(303) 623-8365
FAX (303) 623-0347

NO.	DWG. NO.	DRAWING TITLE				
REFERENCE DRAWINGS				CAD-OP	LYNTEK	921228.1100
				CKD.		
				APP'D		DRAWING NO. / REV.
DO NOT SCALE DRAWING		DWG. SIZE	B	DATE	11-09-92	9238-403 —
				SCALE	1" = 300'	

11.0 BIBLIOGRAPHY

BIBLIOGRAPHY

1. *BAKERVILLE-GADDES ROCK OUTCROP ASSOCIATION STUDY*; (U.S. Soil Consevation Service 1974)