CONTACT INFORMATION
Mining Records Curator
Arizona Geological Survey
1520 West Adams St.
Phoenix, AZ 85007
602-771-1601
http://www.azgs.az.gov
inquiries@azgs.az.gov

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ENVIROMENTAL ASSESSMENT FOR THE GOLDEN EAGLE MINE MOHAVE COUNTY, ARIZONA

PREPARED FOR

MORGAN MINING COMPANY
c/o Mr. A.W. Vander Pyl
2880 SOUTH LOCUST
Apt. 702-S
DENVER, COLORADO 80222
(303) 757-2070

PREPARED BY

LYNTEK
775 Mariposa Denver, Colorado 80204
(303) 623-8365 FAX (303) 623-0342

JULY 1993

ENVIRONMENTAL ASSESSMENT
GOLDEN EAGLE MINE
MORGAN MINING COMPANY

EA NO. _____

Mohave County

Lead Agency:	U.S. Department of the Interior Bureau of Land Management Phoenix District Office Kingman Resource Area Phoenix, Arizona 85027
Third Party Contractor:	Lyntek, Inc. 775 Mariposa Street Denver, Colorado 80204 (303) 623-8365
Comments on this EA should be directed to:	Ken R. Drew Area Manager Kingman Resource Area Bureau of Land Management 2475 Beverly Ave Kingman, Arizona 86401 (602) 757-3161
Completion Date	July 16,1993

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Thomas K. Randall
Project Engineer

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1.0 SUMMARY

1.0 SUMMARY

Morgan Mining Company, Golden Eagle Mine, has submitted a Mining Plan of Operations to the Bureau of Land Management (BLM) to develop a gold mine on public lands located approximately 15 miles north of Kingman, Arizona. The proposed project will affect a total of approximately 35 acres, including an open pit mine, a processing plant utilizing flotation, tailings impoundment, access roads and haul road to remove mine overburden to the face of the existing Cyprus Mineral Park tailings dam. The affected public lands are in Section 31, T23N, R17W, Section 36, T23N, and R18W.

Environmental baseline surveys were conducted, and an impact analysis was performed for each environmental resource. No cumulative or significant adverse impacts were identified during the evaluation. The proposed mitigation program, including reclamation, was determined to be satisfactory for each environmental resource.

2.0 INTRODUCTION

2.0 Introduction

The Environmental Assessment, prepared in compliance with the National Environmental Policy Act (NEPA) of 1969, describes the environmental affects of Morgan Mining Company (MMC) proposed action for the Golden Eagle Mine. MMC prepared and submitted a Plan of Operations to the Kingman Resource Area Office, Phoenix District, of the U.S. Bureau of Land Management (BLM). The following sections describe the project, the purpose and need for the federal action.

2.1 Project Location

The general location of the project is indicated on Figure 1. MMC controls approximately 104 acres, as indicated on Figure 2. The property boundary encompasses unpatented mining claims. The proposed project will affect 35 acres of unpatented mining claims predominately in portions of Section 31, T23N, R17W.

MMC proposes to: develop an open pit gold mine which will affect eight (8) acres; construct a 300 ton/day flotation processing facility on three (3) acres; stack waste rock on the face of the existing Cyprus Mineral Park tailings impoundment; dispose of tailings on twelve (12) acres; build an additional seven (7) acres of roads; and affect approximately five (5) acres with miscellaneous surface disturbance activities, for a total of 35 acres.

2.2 Purpose and Need

The purpose of this action is to analyze MMC's Plan of Operation and to consider reasonable alternatives which may avoid, minimize or rectify significant environmental impacts. The BLM determined that an Environmental Assessment was necessary to comply with existing laws and regulations and to fully evaluate the proposed action and reasonable alternatives as required by NEPA.

BLM, as the federal land manager, must evaluate proposed actions on public lands to ensure that federal laws are complied with, and that potential multiple use problems can be resolved or mitigated. The BLM must review the proposed action and alternatives to ensure that:

1. Adequate provisions are included to prevent unnecessary or undue degradation of federal lands;

2. Measures are included to provide for reasonable reclamation; and

3. Proposed operations would comply with other applicable federal and state laws and regulations.

2.3 Authorizing Actions

In addition to the EA, implementation of the proposed Golden Eagle Project or the reasonable alternatives would require authorizing actions from the BLM and state agencies with jurisdiction over the project. Authorizing actions include land use and environmental permits and approvals required for project construction and operation. Table 1-1 summarizes the principal authorizing actions required for the proposed Golden Eagle Project.

Table 2-1
AUTHORIZING AGENCIES

AUTHORIZING AGENCY	REGULATORY DOCUMENT/APPROVAL
Bureau of Land Management	- Mining Plan of Operations - National Environmental Policy Act - National Historic Preservation Act - American Indian Religious Freedom Act - Endangered Species Act
Arizona Department of Environmental Quality	- Aquifer Protection Permit - Air Quality Permit
Arizona Department of Water Resources	- Dam Safety Permit - Well Permits
Arizona State Land Office	- Right of Way Permit

3.0 PROPOSED ACTION AND ALTERNATIVES

3.0 Proposed Action And Alternatives

The proposed action and the "No Action" alternative, are described in the following sub-sections. Alternatives considered but rejected are briefly described, along with reasons for their elimination.

Consideration has been given to policy or legal constraints which affect the proposal, including the Endangered Species Act and the National Historic Preservation Act.

3.1 Proposed Action

The Golden Eagle Project is located approximately 15 miles north of Kingman in Mohave County, Arizona (Figure 1). It is being developed by Morgan Mining Company (MMC) on 104 acres of unpatented mining claims on federal lands under the jurisdiction of the BLM. MMC controls approximately 104 acres as indicated by the property boundary on Figure 3.

The ore will be mined and processed using conventional open pit mining techniques and mining equipment. The planned ore mining rate is approximately 100,000 tons/year. Waste rock will be mined at an average rate 900,000 tons/year. The final pit will cover approximately eight (8) acres. The project life of the mine is just over two (2) years. Construction and final reclamation will add one (1) year to the project activities.

Ore from the pit will be transported to the crushing plant prior to being conveyed to the grinding mills. The crushing plant is designed at a maximum through-put rate of 300 tons per day on a one shift per day operation. The mill is designed for a maximum of 300 tons per day 24 hour operation. The mill will produce about 11,000 ounces of gold and 65,000 ounces of silver per year, using a flotation process. Tailings from the mill will be pumped to a tailings disposal area for final placement and reclamation (Figures 4 and 5, Process Flow Sheets #1 and #2).

3.1.1 Existing Access Route

The proposed access will be along the existing access road. The project area can be reached following U.S. Highway 93 north from Kingman approximately 10 miles to the Mineral Park Road. The route proceeds north on the Mineral Park Road for three (3) miles to an improved, easterly road that skirts the tailings dam to the south. The route follows this road 2 3/4 miles to a turnoff to the south. The route then travels one (1) mile south over the ridge to the Golden Eagle Mine site (Figure 2, Area Map).

3.1.2 Exploration History and Existing Surface Disturbance

The Golden Eagle Project is located in the Wallapai Mining District. Gold was first discovered in the district in the late 1800's. Records indicate that mining within the project area began in 1933. Production of gold, silver and associated base metals continued intermittently into the 1940's.

During the 1960's and 1970's several companies examined the property primarily from and underground mining perspective. In 1986, CYPRUS Minerals leased the property and conducted exploration activities. CYPRUS decided to farm out further development of the property due to its limited size.

In 1990, Morgan Mining leased the Golden Eagle Mine property from CYPRUS Minerals and has subsequently developed an open pit mining and flotation processing plan.

Existing surface disturbance at the project site is moderate. The area has been explored and mined in the past, providing some access roads. A small abandoned mill as well as an old tailings pond is on the site. Small mine waste dumps are also present. An estimate of the existing surface disturbance is two (2) acres.

MMC has developed a general site plan (Figure 3) to indicate the major areas of proposed disturbance. The maximum surface area disturbances are listed in Table 3-1.

Table 3-1
PROPOSED SURFACE DISTURBANCE

	Acres
Open Pit	8
Tailings	12
Roads	7
Plant	3
Miscellaneous	5
TOTAL	35

3.1.3 Mining Operations (MMC, Mining Plan of Operations, 1992)

The Golden Eagle orebody will be mined using conventional open-pit mining techniques and standard mining equipment, as listed in Table 3-2. MMC plans to use a contract mining company. The actual equipment, manufacturer, and capabilities may vary with the contractor's selection of specific equipment.

Table 3-2
MINING EQUIPMENT

Type of Equipment	Quantity
Loader - Cat 988D	2
Dozers - Cat D8	2
Haul Trucks - Cat 773B	4
Motor Grader - Cat 14G	1
Rotary Drill	1
Service Trucks	2
Pick-up Trucks	4

3.1.3.1 Open Pit

Pit slopes will vary according to the geometry of the orebody. The steepest portions of the highwall will be 60° to 70°. Waste rock will be mined on 20 foot benches, and the ore will be mined on 10 foot benches to optimize ore grade control. Drill holes will be spaced to maximize fracturing and prevent over breakage.

3.1.3.2 Drilling and Blasting Procedures

Drill patterns will be laid out in accordance with a monthly mine plan. A rotary blast hole drilling rig will drill a 6-inch to 8-inch hole to a depth of 20 to 25 feet in waste and 12 to 15 feet in ore. Blast holes will be loaded with an ammonium nitrate based blasting agent, plus a high-explosive primer. Blasting will only occur between 8:00 am and 5:00 pm. There will be no blasting during night time hours (MSHA).

All explosives required for blasting will be stored in a barricaded magazine. The storage area will be designed to meet the standards of the Mine Safety and Health Administration.

3.1.3.3 Waste Rock Disposal

The mining operation will utilize three waste rock disposal areas. The initial waste rock dump will be at the plant site. The material will be used as fill as needed to level the 200' x 300' plant and crusher site pad. Additional waste will be used as needed to build the main tailings dam and subsequent enclosing wing dams in the tailing impoundment area. The remaining rock will be dumped on the existing CYPRUS tailing dam face with CYPRUS taking possession at that point.

Under the current mine plan, production of waste rock is projected at approximately 900,000 tons annually. The waste rock will be hauled using end-dump trucks.

3.1.3.4 Waste Haul Road

The haul road will be 45 feet wide with a safety berm. The maximum slope will be 10%. The haul road used for hauling waste rock will be watered and/or chemically treated with a BLM-approved dust suppressant. The haul road will be constructed from waste material. A grader will be used to keep the surface smooth.

3.1.3.5 Ore Mining and Stockpiling

Annual ore production is expected to be 100,000 tons, or 8,500 tons per month. Ore resources are estimated at just over 200,000 tons. After blasting, the ore will be loaded into haul trucks. The haul road to the plant will be 45 feet wide with a safety berm. This haul road will be watered and graded to minimize dust.

Ore will be placed in an ore stockpile or will be dumped directly to the primary crusher. The stockpile will have a sufficient volume to run the mill during periods of non-operation of the mine.

3.1.3.6 Crushing Plant

The crushing plant will operate 7 days per week, 10 hours per day. The feed rate to the crushing plant is 300 tons per day. The plant is designed with excess capacity to allow for maintenance and periods of non-operation. The plant will have a stationary grizzly screen; primary, and secondary crushers; conveyors; and an undersize screen (Figure 5, Process Flow Diagram #1).

To meet Arizona Department of Environmental Quality (ADEQ) requirements, dust will be controlled by the use of water sprays. Overall design and dust emission parameters are subject to review and permit issuance by ADEQ.

3.1.3.7 Processing Plant

Grinding, flotation, concentrate dewatering, and tailing dewatering circuits are interconnected processes for gold recovery. The processing plant is designed to provide a safe, closed and contained gold recovery environment. Flotation reagents in very small quantities will be mixed, stored, and delivered within the confines of the processing plant slab. Tanks and piping are designed and constructed to enable a visual inspection to check for potential leaks. The concrete retaining walls of the plant act as a secondary containment if one of the tanks would rupture. The concrete floor is sloped to a sump. Any leaks or spills would be pumped from the sump back to the processing circuit (Figure 5).

3.1.3.8 Tailings Disposal

The tailings impoundment is located in Section 31 approximately 100 feet from the processing plant (Figure 6). Tailings will be pumped through a pipe to the tailings area. The pipe will be placed in a lined ditch or inside a secondary pipe to contain any leaks. Visual inspection of the pipeline will be made daily.

The impoundment has been designed to protect surface water and groundwater. The impoundment design must be approved by the BLM and Arizona Department of Environmental Quality.

The tailings impoundment will be built in one stage. There will be a 40-mil synthetic HDPE liner laid over a compacted native soil sub-base. The synthetic liner sheets will be welded at the seams to provide one continuous barrier. An underdrain collection pipeline system will be laid on top of the liner to drain and transport the process solution to the reclaim/recycle tank.

The tailings will be deposited around the perimeter of the impoundment by horizontal pipes. Process solution and finer tailings will flow toward the upper end of the liner and drainage pipe system. The impoundment has been engineered to gravity-drain the tailings with minimal ponding. The tailings area will be enclosed by a 6 to 8 foot chain link or HDPE mesh fence. A tight wire mesh will be attached along the bottom two feet of the chain link.

Additionally, the process solution is recycled to the processing plant; therefore, evaporation is greatly reduced. Fresh water is required as part of the make-up water for processing, since 100% recycling cannot be achieved.

A reclaim/recycle pipeline will be installed in the lined ditch containing the tailings pipeline. The reclaim/recycle pipe will allow process solution to be pumped back to the processing facility constant head tank from the reclaim/recycle tank.

Diversion ditches will be constructed above the tailings impoundment to divert surface runoff away from the impoundment basin (Figure 7, Drainage Layout). The diversion ditches will be designed to channel runoff from a 100-year, 24-hour storm event. The tailings impoundment basin is designed to hold the runoff from a 100-year, 24-hour storm event which would fall within the impoundment area. A valve system will be placed on the drainage pipeline in the tailings impoundment to regulate major storm event flow between the tailing impoundment and the reclaim recycle tank (Figure 7).

The applicant will prepare a surface water/groundwater monitoring program. The program will outline the places, times and sampling procedures for the environmental technician. Each area designated in the program will be sampled and logged by the technician , showing the date, time, and analytical results. The daily log will be made part of the permanent record for environmental monitoring.

The monitoring program will include visual inspections of pipes, tanks, ditches, process solution structures and the monitoring well.

Action levels will be established for quantity and quality of solution found in leak detection sumps or monitoring wells. In addition, reporting and chain-of-command custody steps will be outlined in the program, with responsible persons and telephone numbers listed.

This strong mitigation program will minimize potential impacts to the surface water and groundwater.

3.1.4 Mine Support Facilities

3.1.4.1 Buildings

The major on-site building will be the processing plant. The metallurgical lab will be located within the processing plant area, in its own building or trailer. Mobile trailers will be used in lieu of permanent buildings for the mining contractor's office, change facilities, and MMC personnel. No permanent maintenance building will be required. The MMC administrative office will be located in the trailer adjacent to the processing plant.

3.1.4.2 Reagent and Fuel Storage

Reagent Storage

Reagents will be stored and handled within the confines of the process plant curbed slab or immediately adjacent to the plant on dedicated bermed slabs draining to the plant sumps.

Fuel Storage

Diesel and gasoline will be stored in above-ground tanks. The tanks will be placed in a bermed and synthetically lined area. A sump will be provided within the lined area to allow for the removal of water or spilled fuels.

3.1.4.3 Reagent and Fuel Consumption

Reagent Consumption

Reagent consumption per ton of ore as detailed in Mining Plan of Operation, under separate cover. Annual estimated reagent usages are listed below:

A-208 Sodium diethyl and Sodium di-secondary butyl dithiophosphate
Use: Collector Consumption: 10,000 lb/year

A-350 Potassium amyl xanthate
Use: Collector — Consumption: 8,000 lb/year

Copper Sulfate As CuSO4.7H2O
Use: Conditioner — Consumption: 50,000 lb/year

MIBC Methyl isobutyl Carbinol
Use: Frother — Consumption: 500 lb/year

F-65 Generally Polyglycol
Use: Frother — Consumption: 500 lb/year

Lime CaO
Use: pH adjust — Consumption: 50,000 lb/year

Fuel Consumption

The fuel consumption estimate is based on data for haul trucks and other equipment, for an average production year. Diesel fuel consumption will average around 200,000 gallons per year and gasoline consumption will average around 8,000 gallons per year over the life of the project.

3.1.4.4 Electrical Power

Electrical power will be supplied by an on-site diesel generator. The fuel will come from a dedicated fuel tank located within a bermed and lined area next to the processing plant.

3.1.4.5 Water Source and Use

Groundwater is available on the project site or from the existing surface water impoundment at the existing Cyprus tailing pond. Should wells be required as a source of make up water, a series of test borings will be completed to assure an adequate supply of groundwater. The project's average net process water requirements are 26 gpm. The highest water requirements will be about 39 gpm in June, and the lowest will be about 17 gpm in December and January. Groundwater use permits will be filed with the Arizona Department of Water Resources (Table 3-3), should this source be required.

3.1.4.6 Access Roads

Existing Access roads will be used to reach the project area. A new waste haul road will be constructed north and west of the pit to reach the county road north of the tailings impoundment. This haul road will become the main access to the site during operations.

3.1.4.7 Drainage Control

The entire project area will be designed for drainage control. Diversion ditches will be placed to protect structures and handle the 100-year, 24-hour storm event. Culverts will be installed where the access road and the waste haulage road cross drainages (Figure 7, Drainage Layout).

3.1.4.8 Sanitation and Solid Waste Disposal

Septic tank and leach field systems are not planned at the process plant. Portable toilets will be located around the area. A contractor will periodically empty the portable toilets. Solid waste will be hauled to a Mohave County landfill as required.

3.1.4.9 Fire Protection

The large fresh water storage tank at the processing plant will maintain a reserve of water to be used for fire protection. Fire extinguishers will also be present in buildings and on vehicles.

Table 3-3 - 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

3.1.5 Reclamation and Closure Plan

3.1.5.1 Reclamation Goals

The long-term objective of the reclamation plan is to establish a post-operational environment compatible with the post-mining land use of the site. Specific goals of the reclamation plan are to:

- Create stable land forms against erosion for tailings, waste rock constructed areas, and other disturbances;
- Divert ephemeral drainages around the tailings, waste rock areas, and mine pit;
- Eliminate safety hazards by covering the tailings impoundment and by fencing the mine pit's high wall;
- Grade disturbed areas to blend with the adjacent natural topography and revegetate all disturbances;
- Restore the land to long-term multiple use.

3.1.5.2 Decommissioning

Concrete Foundations

Foundations of the buildings and crushers will either be removed and buried elsewhere on site or buried in place. Facility areas will be recontoured to promote drainage.

Groundwater Wells

Groundwater wells, if existing, may be considered for use in range or wildlife projects by the BLM. Wells not needed for this purpose outside the pit will be plugged to meet Arizona's hole plugging standards, as regulated by Arizona Department of Water Resources.

Reclaim/Recycle Tank

The reclaim/recycle tank will be drained, and the solution will be disposed of in conjunction with overall mine reclamation. Excess solutions present at closure may be disposed of by:

a. Reduction through evaporation;
b. Physical removal from the mine site to an approved site via Department of Transportation approved methods;
c. A combination of a. and b., or;
d. Other acceptable methods.

The reclaim/recycle tank and fencing will be removed and the area will be graded to the surrounding area's contour and seeded. The underdrain collection pipeline will be capped and buried to inhibit any migration of containment of water within the impoundment area.

Tailings Impoundment

Upon termination of the active use of the tailings impoundment, representative samples of the material deposited in the impoundment will be collected and characterized. The tailings will be stabilized during the final closure of a facility.

Sampling of tailings solids may be necessary to evaluate residual reagent and metal content. Capping with low permeability material may be necessary if tailings are difficult to wash and represent a substantial environmental threat. All ponded solution in tailings impoundments will be removed during reclamation. The area will be reshaped so as not to collect and pond precipitation.

Equipment Disposal

All containers and barrels will be disposed of under applicable state regulations. The processing plant, vats, and tanks will be washed, dismantled, and removed from the site.

3.1.5.3 Final Contours and Slopes

Plant Site

The top surface of the areas will be built to slope gently (1% to 4%) from the crests to the hillside at the uphill edge. The backslope is designed to keep storm runoff from running over the crests and eroding the side slopes. The tops of the areas will be maintained with a fairly smooth surface for later application of coversoil. The side slopes will be constructed at the angle of repose and no additional grading is proposed. The side slopes will naturally stabilize, however they may appear prominent for several years.

Tailings Impoundment

Tailings material will be resloped after draining prior to placement of the soil cover. Grades will be sufficient to allow coversoil replacement, allow vegetation establishment, and to prevent erosion and exposure of finely ground tailing material.

Diversion ditches will remain in place around the tailings impoundment after reclamation. These ditches have been designed to pass runoff from a 100-year, 24-hour storm event.

The post reclamation configuration of the tailings impoundments will include a point adequate for representative monitoring any leachate that may be generated. This collection point has been designated MW1 and will be maintained during the post reclamation monitoring period. The location of MW1 can been seen on Figure 3.

Mine Pit

No final contouring is planned for the mine pit. Roads, slopes, benches and rims will be maintained during the life of the operation and will be in stable condition when operations cease. The design slopes are 50° to 60° depending on rock type. The benches will be left intact.

Diversion Ditches

Several diversion ditches will remain in place after operations to control runoff. Ditches that will not be required after operations cease will be graded and contoured. The edges of the ditches will be rolled in and compacted. The contour or slope will match the surrounding area.

Roads

Roads which are to be reclaimed will not be sloped or contoured; however, they will be ripped before coversoil is spread over the surface.

Waste Haul Road

The waste haul road will be reclaimed by ripping, watering and seeding with an acceptable locally compatible seed mixture.

3.1.5.4 Revegetation Plan

Coversoil Salvage and Replacement

Coversoil will be salvaged from all areas to be disturbed. The coversoil will be stockpiled in areas where wind and water erosion can be minimized (Figure 3). After operations cease, coversoil will be spread over the tailings impoundment, processing plant site and roads constructed for the operation.

Sediment Control

The diversion ditches, channels and sediment traps will be left in place. The area will require several years to stabilize and regain erosion-reducing vegetation. Most of the diversion ditches should naturally revegetate during the operation life of the project. The ditches will be designed to have a gentle grade, which will minimize erosion in the ditch bottoms.

The sediment control ponds can be used for wildlife and cattle watering tanks, and should be beneficial to the area. The BLM will determine which structures should be maintained and which should be reclaimed prior to the closure of the project.

Surface Preparation

Prior to application of the soil, compacted areas will be ripped on 1.5 to 2.0 feet centers and to a depth of 12 to 18 inches to increase water infiltration, decrease the potential from erosion and enhance plant root penetration.

Schedule

Seeding will occur in the early summer prior to the onset of the rainy period. Table 3-4 lists possible species to be used to revegetate the disturbed areas.

Table 3-4 Plant Species Potentially Used for Revegetation

SCIENTIFIC NAME	COMMON NAME	FAMILY	NATIVE (N) INTRODUCED (I)
TREES			
Juniperus Osteosperma	Utah Juniper	Cupressaceae	N
Pinus Monophylla	Single-leaf Pinyon	Pinaceae	N
SHRUBS			
Acacia Greggii	Cat Claw Acacia	Fabaceae	N
Baccharis Glutinosa	Seep Willow	Asteraceae	
Baccharis Sarothroides	Broom Baccharis	Asteraceae	N
Canotia Holacantha	Crucifixion Thorn	Celastraceae	N
Ceanothus Greggii	Desert Ceanothus	Rhamnaceae	N
Chrysothamnus Paniculatus	Desert Rabbitbrush	Asteraceae	N
Encelia Farinosa	Acton Brittlebush	Asteraceae	
Encelia Frutescens	Green Brittlebush	Asteraceae	N
Eriodictyon Angustifolium	Yerba Santa	Hydrophyllaceae	N
Eriogonum Sp.	Buckwheat	Polygonaceae	-
Eriogonum Fasciculatum	Flattop Buckwheat	Polygonaceae	N
Gutierrezia Sarothrae	Broom Snakeweed	Asteraceae	N
Haplopappus Laricifolius	Turpentine Brush	Asteraceae	N
Krameria Gravi	White Ratany	Fabaceae	N
Lycium Fremontii	Fremont Lycium	Solanaceae	N
Quercus Turbinella	Shrub Live Oak	Fagaceae	N
Rhus Aromatica Var. Trilobata	Skunkbush	Anacardiaceae	N
Salvia Dorii	Purple Sage	Lamiaceae	N
Senecio Sp.	Groundsel	Asteraceae	-
Tamarix Pentandra	Salt Cedar	Tamaricaceae	I
SUCCULENTS			
Dasylirion Wheeleri	Sotol	Liliaceae	N
Echinocereus Engelmannii Var. Chrysocentrus	Hedgehog Cactus	Cactaceae	N
Ferocactus Acanthodes Var. Lecontei	Barrel Cactus	Cactaceae	N
Mammilaria Sp.	Fishkook Cactus	Cactaceae	-
Opuntia Acanthrocarpa Var. Acanthrocarpa	Buckhorn Cholla	Cactaceae	N
Opuntia Basilaris	Beavertail Cactus	Cactaceae	N
Opuntia Phaeacantha Var. Major	Engelmann Prickly Pear	Cactaceae	N
PERENNIAL GRAMINOIDS			
Aristida Fendleriana	Fender Three-awn	Poaceae	N
Aristida Parishii	Parish Three-awn	Poaceae	N
Bouteloua Curtipendula	Side Oats Grama	Poaceae	N
Bromus Rubens	Red Brome	Poaceae	I
Hilaria Rigida	Big Galleta	Poaceae	N
Sitanion Hystrix	Squirreltail	Poaceae	N
Sporobolus Cryptandrus	Sand Dropseed	Poaceae	N
Stipa Speciosa	Desert Needlegrass	Poaceae	N
Tridens Pulchellus	Fluffgrass	Poaceae	N

Table 3-4 Plant Species Potentially Used for Revegetaion (con't)

SCIENTIFIC NAME	COMMON NAME	FAMILY	NATIVE (N) INTRODUCED (I)
PERENNIAL FORBS			
Arabis Perennans	Rock Cress	Brassicaceae	N
Astragalus Newberryi	Milkvetch	Fabaceae	N
Castilleja Chromosa	Paintbrush	Scrophulariaceae	N
Cryptantha Inaequata	Miner's Candle	Boraginaceae	N
Cryptantha Nevadensis	Nevada Miner's Candle	Boraginaceae	N
Cymopterus Purpurascens	Spring Parsley	Apiaceae	N
Euphorbia Sp.	Spurge	Euphorbiaceae	-
Lotus Rigidus	Deer Vetch	Fabaceae	N
Lupinus Palmeri	Lupine	Fabaceae	N
Oxybaphus (Allionia) Incarnata	Trailing Four O'clock	Nyctaginaceae	N
Melampodium Leucanthemum	Melampodium	Asteraceae	
Senecio Monoensis	Groundsel	Asteraceae	N
Senecio Stygius	Groundsel	Asteraceae	N
Sphaeralcea Cf. Parvifolia	Globe-mallow	Malvaceae	N
Thysanocarpus Laciniatus	Lace-pod	Brassicaceae	N
Verbena Ciliata	Vervain	Verbenaceae	N
Yucca Baccata	Banana Yucca	Liliaceae	N
ANNUAL/BIENNIAL FORBS			
Eriogonum Inflatum	Desert Trumpet	Polygonaceae	N
Erodium Cicutarium	Heron Bill	Geraniaceae	I
Nama Demissum	Purple Mat	Hydrophyllaceae	N
Pectocarya Setosa	Pectocarya	Boraginaceae	N
Thelypodium Cooperi	Thelypodium	Brassicaceae	N

Management

The newly seeded area will be protected from livestock grazing for a period of 3-5 years after seeding. The new seedings may require supplemental nitrogen the second or third year and may also require weed control. The reclaimed areas will be monitored to determine areas that may need reseeding or repairs from wind or water erosion. Once the vegetation is established remaining fences will be removed.

3.2 Alternatives to the Proposed Action

An alternative to the proposed action, which was considered is:

- No Action alternative

Alternatives which were eliminated from consideration and from detailed analysis include:

- Underground mining;
- Backfilling the pit; and
- Processing using a cyanidation process.

3.2.1 No Action Alternative

The No Action Alternative is required to be included in a discussion of alternatives by NEPA and the regulations enforcing it [40 CFR Part 1502.14(d)]. The No Action Alternative serves as the baseline for comparing and evaluating the environmental consequences of the proposed action and the various alternatives. The No Action Alternative would allow no further mineral development on the public lands in question.

The BLM can disallow proposed mineral development activities only if they would violate applicable state and federal regulations and/or BLM standards.

3.2.2 Alternatives Eliminated from Consideration

This section discusses alternatives to the proposed action or portions of the project which were eliminated from further consideration and analysis in the environmental assessment. Eliminated alternatives include: underground mining; backfilling the pit; and processing using cyanidation.

3.2.2.1 Underground Mining

The alternative of mining the deposit by underground methods has been eliminated from any further consideration. The ore deposit outcrops on the surface and is a low grade deposit. In order to mine the deposit underground, a large portion of ore would be left on or near the surface to prevent subsidence. The structure of the rock is such that large underground excavations would likely collapse, making mining extremely unsafe. The overall project as evaluated for underground mining is economically and technically not feasible.

3.2.2.2 Backfilling the Pit

Backfilling of waste rock into the open pit during mine closure was evaluated and determined to be unfeasible based upon economics and environmental issues. Approximately 900,000 tons of waste rock would removed from the pit annually. At an estimated cost of $1/ton, based on current loading and hauling costs, the cost of backfilling the pit with waste rock would be $900,000 annually. Such increased project costs would render the project uneconomical.

Backfilling of the pit was also eliminated from further consideration based on 43 CFR 3809.0-5(j), which states that reclamation may not be required where the retention of a stable highwall or other mine workings is needed to preserve evidence of mineralization.

3.2.2.3 Processing Using Cyanidation

The processing operation was evaluated using a cyanidation recovery method. The cyanidation has definite economic benefits over a mill, because of the lower capital costs to construct the cyanidation facilities. However, metallurgical tests indicate that the ore does not adequately release the gold in the cyanidation process, making it economically unviable.

The recovery of gold would be less than 50%, compared with 85% in the mill. The use of cyanide for a project of this scale would also create many problems relating to wildlife exposure, detoxification and closure of the tailings area, and general regulatory involvement would make the project uneconomical. Therefore, the cyanidation was eliminated.

4.0 ENVIRONMENTAL CONSIDERATIONS

4.0 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. This section is a discussion of the Vegetation, Wildlife and Soils data gathered and reported by Western Resource Development in their report dated May 1992 included as Appendix A, Section 7 of this dociment.

4.1 Physical Resources

The physical resources section assesses the physical and visual setting and soils of the project area.

4.1.1 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 east 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.

4.1.2 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 48 to 96 degrees F.

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.

4.2 Air Resources

4.2.1 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 4-1 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 4-1 - 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 4-2.

TABLE 4-2 - 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

4.2.2 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 will be implemented.

4.3 Water Resources

4.3.1 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 head of a small drainage. Diversion ditches will be constructed to route runoff around the proposed facilities.

4.3.2 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 workings in the project area which allow for a visual inspection of the underground geology and hydrology.

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.

4.4 Biological Resources

4.4.1 Vegetation

4.4.1.1 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.

4.4.1.2 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.

4.4.2 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. Recreational 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.

4.4.2.1 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.

4.5 Cultural Resources

A BlM 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.

4.6 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.

5.0 ENVIRONMENTAL CONSEQUENCES

5.1 Air Resources

5.1.1 Proposed Action

Potential air resource impacts would result in the increase of particulates in the air. Analysis of the air quality indicates that the area is classified as attainment and the potential generation of particulates will not affect this classification.

5.1.2 No Action Alternative

Under the No Action Alternative, there will be no impact to the air quality.

5.1.3 Impacts

The facility has been designed to comply to BLM and ADEQ BADCT standards for particulate emissions.

No cumulative or significant adverse impacts have been identified.

5.2 Geology and Mineral Resources.

5.2.1 Proposed Action

The proposed action will remove slightly more than 200,000 tons of ore, process the material, and pump approximately 200,000 tons of tailings to be the permanent impoundment. Approximately 11,000 ounces of gold and 65,000 ounces of silver will be removed each year, for a total in excess of 22,000 ounces of gold and 130,000 ounces of silver over the two year plus life expectancy.

Waste rock will be left on the face of the CYPRUS Mineral Park tailing impoundment. The open pit will be left in a stable condition, but the pit will not be backfilled.

5.2.2 No Action Alternative

Under the no action alternative, the ore deposit would not be mined, and gold would not be recovered.

5.2.3 Impacts

Approximately 2.0 million tons of waste rock will be removed from the pit and placed on the face of the CYPRUS Mineral Park tailing Impoundment. A potential of just over 200,00 tons of ore could be removed, processed, and placed in the tailings impoundment. The final pit will be about eight (8) acres in size, with a highwall on the southwest side, and haul road access from the north.

The pit will not be backfilled, thereby leaving the mineralized exposure for potential future development. The highwall side of the pit will be fenced and posted.

No cumulative or significant adverse impacts have been identified.

5.3 Water Resources

5.3.1 Surface Water

There are no perennial streams on or near the project area. The drainages which traverse the project area are ephemeral, and only flow during major precipitation events.

5.3.1.1 Proposed Action

Potential surface water impacts would result of runoff from sedimentation as a result of runoff from the waste rock dumps and adjacent disturbed areas. Preliminary analysis indicates that the leachate produced in the dumps will not contain heavy metals in excess of allowable drinking water standards. The dumps will not be a source of acid drainage, because of the oxide nature of the waste rock and the fact that sulfides have been removed from the site as a concentrate.

Diversion ditches will be constructed around the areas of disturbance to channel runoff. The major diversion ditches are above the tailings impoundment. The ditches are designed for the 100-year, 24-hour storm event. The tailings area below the diversion ditches is designed to capture the runoff and contain it in with the tailings then release it to the reclaim/recycle tank just below the tailings impoundment basin (Figure 7, Drainage Layout).

Table 5-1 details the various events that 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 5-1 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 5-2 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 7.

TABLE 5-2 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

There is no surface water near the project area. As a result of analyzing the safeguards, leak detection, and monitoring, there will be medium, short-term impacts to surface water. The project is designed for the 100-year, 24-hour storm event and is a zero surface discharge facility.

5.3.1.2 No Action Alternative

Under the No Action alternative, there would be no impact to surface water.

5.3.1.3 Impacts

The proposed project will disturb 35 acres. Diversion ditches will route runoff away from disturbed sites. All precipitation captured inside the disturbed areas will be retained in the process or will be routed to sedimentation ponds where the runoff will seep into the ground.

No cumulative or significant adverse impacts have been identified.

5.3.2 Groundwater

5.3.2.1 Proposed Action

The tailings impoundment and reclaim/recycle tank are designed and constructed to prevent a discharge to the groundwater. Compacted soil foundations, 40 mil HDPE synthetic liners, and leak detection systems provide the best available demonstrated control technology (BADCT) for protection of groundwater. Potential impacts to groundwater quality, as a result of the proposed facilities, have been eliminated or reduced to a minimum. This is achieved using impermeable synthetic liners and leak detection below the liner. Site characterization indicates that one liner would be sufficient; however, as an added precaution, the proposed design utilizes a secondary, compacted soil base liner.

Depth to groundwater in the tailings and reclaim/recycle tank area is 360 feet, with approximately 200 feet of volcanic rock above the water table. A monitor well (MW1) is proposed downgradient from the impoundment, and it will establish a Point of Compliance for the overall tailings facility.

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 5-3 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 5-3 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
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

Exploration drilling in the pit area did not encounter groundwater at the projected bottom of the pit. Because of the nature of the tertiary volcanic rock in the pit, no groundwater should be encountered.

The plant facility will require, an average of 26 gpm of process water along with the water obtained from the reclaim/recycle tank. The makeup process water will be obtained either from a near by well field or ponded water within the Cyprus tailing pond. It will be pumped to the site.

5.3.2.2 No Action Alternative

Under the No Action alternative, there would be no impact to groundwater quality or quantity.

5.3.2.3 Impacts

The system is designed to meet the BLM Mining Management Plan and Arizona Department of Environmental Quality BADCT standards. Groundwater or surface water is available near the project area to be developed for a beneficial use, either through adjudication or purchase.

No cumulative or significant adverse impacts have been identified.

5.4 Soils

5.4.1 Proposed Action

Surface disturbance associated with the mine, waste rock, dumps, plant site, roads, and tailings impoundment would impact approximately 35 acres. An estimated two (2) acres have already been effected by earlier exploration and mining activities. The proposed action will disturb an additional 33 acres.

Coversoil will be removed and stockpiled for later use in reclamation. An estimated 3 to 6 inches of coversoil will be salvaged. Coversoil will be spread over the waste haulroad (7 acres), tailings impoundment (12 acres), plant site (3 acre), and other minor disturbances, for a total of approximately 22 acres receiving coversoil after final grading. However, available coversoil may actually be less than estimated, thereby causing some disturbances to remain uncovered.

5.4.2 No Action Alternative

The No Action alternative would cause no further disturbance to soil resources beyond that which has been impacted by previous exploration and mining activities.

5.4.3 Impacts

The project will disturb approximately 35 acres, of which approximately two (2) acres have been previously disturbed. Coversoil will be removed from the pit, tailings, and plant areas. Revegetation will minimize impacts to soils.

No cumulative or significant adverse impacts have been identified.

5.5 Vegetation

5.5.1 Proposed Action

The proposed action will effect approximately 35 acres, at least two (2) of which have been previously disturbed. Should vegetation which is protected by the Arizona Native Plant "Law (ARS Chapter 7) be encountered, it will be removed before surface disturbance activities commence. The plants will be transported to the cover soil stockpiles for later transplanting to the waste haulroad, plant site, and tailings impoundment areas. Vegetation not transplanted will be salvaged with the coversoil and placed in the coversoil stockpiles, thereby providing additional organic material as well as native seed in the stockpiles.

Mechanical reseeding, may be proposed or recommended by the BLM, however the lack of precipitation must be considered. When the coversoil is respread, the native seed will have an excellent opportunity to reestablish. Transplanted vegetation should quickly mitigate impacts to large , cleared areas, and will assist in creating a natural appearance to the disturbed sites.

5.5.2 No Action

Under the No Action alternative, no new surface disturbances would be allowed. Natural revegetation of existing disturbed areas would continue.

5.5.3 Impacts

Vegetation on the 35 acres is sparse. Protected plants, if any, will be removed and placed in the coversoil stockpiles until they are transplanted to their permanent locations. No threatened or endangered plant species were identified on the 100 acres surveyed (WRA, 1992).

Native seed will be salvaged with the coversoil. When the coversoil is spread, the native seed can naturally revegetate the disturbed ares. Salvaged plants, if any, will be transplanted to the coversoil areas in the plant and tailings site. Some will also be placed on the waste haulraod. Mechanical seeding will enhance natural reseeding.

No cumulative or significant adverse impacts have been identified for vegetation.

5.6 Wildlife

5.6.1 Proposed Action

The most biologically significant impact resulting from implementation of the proposed action is the short term loss of 35 acres of undisturbed and disturbed wildlife habitats. The habitats that are disturbed will be at least partially reclaimed to former productivity in the years following mining activities. Impacts to desert washes, which are the most valuable habitat on-site from a wildlife perspective, have been greatly minimized through sensitive facilities siting.

Cattle grazing can continue in the area, although portions of the project will be fenced to exclude cattle. The project will have no significant impact on wild burros.

5.6.2 No Action Alternative

Under the no action alternative, overall wildlife use of the project would increase slightly. Low levels of hunting and other wildlife-oriented recreational activities would continue at intensities dictated by the interests and the numbers of the local human population.

5.6.3 Impacts

Loss of habitats will occur, however no threatened or endangered species will be affected.

The two (2) year life of the mine project is too short in relation to the life of any of the widely disturbed species to affect its survival or genetic character. When the mine site is reclaimed, the flow of individuals and genetic information will resume.

No cumulative or significant adverse impacts were identified.

5.7 Land Use

5.7.1 Proposed Action

The proposed project area is located on public lands open to mineral development. The project will not interfere with the recreation potential of the general area, although the mine site will be posted, and access will be restricted for public health and safety.

There are no wilderness areas which would be impacted.

5.7.2 No Action Alternative

Under the No Action alternative, there would be no change to the existing land use.

5.7.3 Impacts

No cumulative or significant adverse impacts were identified.

5.8 Cultural Resources

5.8.1 Proposed Action

The cultural resource survey identified prehistoric sites and historic sites. The proposed project will impact three sites which will be mitigated under a separate agreement with the BLM.

5.8.2 No Action Alternative

Under the No Action alternative, these sites would not be impacted.

5.8.3 Impacts

No cumulative or significant adverse impacts have been identified. Impacts would be low and short-term

5.9 Aesthetics

5.9.1 Proposed Action

The proposed action will increase the visual and noise impacts in the project area. The project area will be screened by natural topography and only a portion of the mine site will be visible from the highway.

5.9.2 No Action Alternative

Under the No Action alternative, there would be no aesthetic impacts to the area.

5.9.3 Impacts

The project facilities have been designed to minimize visual impacts from the highway. Noise levels will be shielded by topography. Blasting will occur between 8:00 am and 5:00 pm.

A dust suppression program has been outlined, and air quality permit with restrictions will be issued by ADEQ.

No cumulative or significant adverse impacts have been identified.

5.10 Socioeconomics

5.10.1 Proposed Action

The Golden Eagle Mine would contribute 25 jobs and personal income of $750,000 annually to the economy of the Kingman area during its 2 years plus of full production. The mine also would provide $100,000 each year directly to local businesses in purchases of products and services, and about $100,000 each year on local government revenues. Most of the latter would go directly to the Kingman School District. The accumulated direct and indirect impact on the local economy would exceed (1) one million dollars per year.

Business firms elsewhere in the state, most of them in the Kingman area, could receive income of about one million dollars each year from purchases by the mine. State and local governments throughout Arizona could receive a total of about $400,000 each year. The total direct impact on the Arizona economy could amount to about 2.4 million dollars annually.

5.10.2 No Action Alternative

The No Action alternative would prevent 25 new jobs with corresponding increases in annual income and tax revenues.

5.10.3 Impacts

The socioeconomic study indicates that there may not be a large labor pool available in the Kingman area to supply the project needs. As many as 15 new employees and their families may move into the area.

The annual payroll of about 0.8 million dollars would stimulate the local economy.

No cumulative or significant adverse impacts have been identified.

5.11 Transportation

5.11.1 Proposed Action

Construction materials and operational supplies will be purchased in Kingman where possible and hauled to the site using existing roads and highways.

5.11.2 No Action Alternative

The No Action Alternative would produce no additional truck traffic on U.S. Highway 93.

5.11.3 Impacts

No cumulative or significant adverse impacts have been identified.

5.12 Unavoidable Adverse Effects

Implementation of the proposed action would cause some adverse effects during the life of the project which cannot be avoided. The intensity of these unavoidable effects will be lessened by mitigation measures. In this discussion, short-term is defined as the life of the project (two-three years); long-term is defined as beyond the proposed life of the project. Adverse effects which cannot be entirely mitigated include short-term and long-term alteration of landforms and surface drainage patterns. Short-term consumption of groundwater by the operation will not affect current groundwater users.

Local air quality will be affected over the short-term by particulates created by mining and processing operations. However, such impact would be minor, and resulting air quality would not violate Arizona or federal air quality standards.

Increased soil erosion from wind and water would occur over the short-term at the project site. The proposed erosion control program will minimize this erosion to acceptable levels but cannot completely eliminate such erosion.

For the short-term, impacts to vegetation cannot be mitigated. The length of time that these impacts remain unmitigated will depend on the specific component location, the length of the mining operation, and the time necessary to re-establish vegetation. This time period would extend from initial disturbance through the successful establishment of a self-sustaining vegetation community. Vegetation will be disturbed or removed from approximately 35 acres. Revegetation will be implemented on approximately 27 acres, but the resulting vegetation communities will be different from original communities for the long-term.

Wildlife communities will be affected in both the short-term and long-term. Site development will displace wildlife to adjacent habitats in the short-term. Following closure and revegetation, wildlife would be expected to return to the site.

There will be a long-term alteration of viewshed caused by the introduction of the project of contrasting colors, lines, and landforms. Over time, these introduced elements will become less noticeable.

Increases traffic, including industrial trucks, will have an adverse, short-term impact on traffic and safety and the human environment.

5.13 Short-Term Use Versus Long-Term Productivity

This section discusses the balance between the short-term use of the site by the project and long-term productivity provided by the site without the project. In this discussion, short-term is defined as the life of the project (two-three years); long term is defined as beyond the proposed life of the project.

The current uses of the site include mineral exploration, cattle grazing, and wildlife habitat. Proposed productivity from the site includes production of gold and silver concentrates, approximately 25 jobs with annual payroll of approximately $750,000.

If the Golden Eagle Mine is implemented, some of the short-term uses of the site would be changed or altered for the two-three year life of the project. Wildlife habitat would be reduced, as the site disturbances would cause a loss of forage.

Following closure and revegetation, land use and productivity of the site would be similar to the conditions that existed prior to project construction. The open pit would be permanently removed from vegetation production, but the remainder of the site would be revegetated with a native seed mix approved by the BLM; a seed mix which may include species that are more productive than those presently on site. Therefore, there is the potential that vegetation productivity may equal or exceed pre-project levels.

5.14 Irreversible and Irretrievable Commitment of Resources

An irreversible commitment of resources results when actions alter an area to the point where it cannot ever be restored to its undisturbed condition. Also a commitment that completely consumes or removes a non-renewable resource is considered an irretrievable commitment of that resource. The following section discusses irreversible or irretrievable commitments on the proposed action.

The excavation of approximately two million tons of waste rock and ore from the open pit would be an irreversible commitment of public land resources as a result of project implementation. The gold and silver contained in the ore would be irreversibly committed, but would be retrieved and placed in long-term use in the world.

Soil losses from handling, stockpiling, and erosion from coversoil stockpiles would be irreversible. With about three coversoil stockpiles on the project site. Some erosional losses would occur but would be minimized by seeding the stockpiles for stabilization,by minimizing handling operations, and by implementing MMC's proposed erosion control procedures.

The pit would not be reclaimed. Exposed benches and slopes will rely on natural vegetation. This represents an irreversible, long term loss of vegetation production and wildlife habitat on approximately eight acres.

Mitigation stipulations have been proposed as part of the project approval which will satisfy the historic preservation requirements for the irretrievable loss of cultural resources.

6.0 PERSONS AND AGENCIES CONSULTED

6.0 PERSONS AND AGENCIES CONSULTED

6.1 Contacts

The following agencies were consulted as part of the preparation of this Environmental Assessment.

Federal Agencies

Department of the Interior - Fish and Wildlife Service
Environmental Protection Agency
U.S. Army Corps of Engineers

Arizona State Agencies

Arizona Commission of Agriculture and Horticulture
Arizona Department of Environmental Quality
Arizona Game and Fish Department
Arizona Mine Inspector's Office
Arizona State Land Department
Arizona Water Resources Department

6.2 Preparers

The following individuals were involved in the preparation and/or review of this Environmental Assessment.

Third Party Contractor

LYNTEK, INC.

Nicholas S. Lynn	B.S. and M.S. Chemical Engineering
Thomas Randall	B.S. Metallurgical Engineering
Ken Smith	B.S. Environmental Health, Minor Chemistry

7.0 APPENDIX A

GOLDEN EAGLE MINE

Vegetation, Wildlife, and Soils

Mohave County, Arizona

prepared by

Western Resource Development
711 Walnut Street
Boulder, Colorado 80302

May, 1992

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SECTION 1.0

LOCATION

1.0 LOCATION

The Golden Eagle Mine Project is located in Mohave County, Arizona about 10 miles northwest of Kingman and about 5 miles east of U.S. Highway 93 in the Wallapai Mining District. Mining for gold and silver began in this area in 1863 and continued sporadically until the 1950's. Two old, abandoned underground mines are located on the project site.

SECTION 2.0

ENVIRONMENTAL SETTING

2.0 ENVIRONMENTAL SETTING

The project area is located just west of the Cerbat Mountains, a northwest-southwest trending range. The low hills of the study area are characterized by Pre-Cambrian formations, primarily of granite composition (Bondurant 1989). There are no permanent streams on site or in the region.

The topography of the project area consists of steep sloping low hills draining to the northwest via a gulch which has water only following precipitation events. Major slope exposures occur to the west and north. Minor ridges have slopes to the south and east. Elevations range from 4220 to 4700 feet.

The precipitation of this region is low and the evaporation rate is high. The mean January minimum temperature at Kingman is 35° F and the mean July maximum temperature is 97° F (Rowland, et al. 1982).

Floristically, the project site is in the southeast corner of the Mojave Desert near its junction with the Sonoran Desert. Lowe and Brown (1973) refer to the vegetation of the eastern Mojave Desert in the region of the study area as desert scrub.

SECTION 3.0

METHODS

3.0 METHODS

3.1 Vegetation

3.1.1 Vegetation Type Identification

A plant ecologist conducted a reconnaissance of the study areas and identified vegetation types based upon vegetation structure and species dominance.

3.1.2 Plant Species Inventory

Plant species were collected during field activities in March and identified in the field and laboratory by a plant taxonomist. Identification and nomenclature of plants respectively follows Benson (1969 and 1982), Benson and Darrow (1981), McDougall (1973), and Kearney et al. (1951).

3.1.3 Description of Vegetation

Each of the vegetation types is qualitatively described from field observations. Descriptions include observations of the vegetation composition, dominant species, characteristic topography, and interspersion and relationship to other vegetation types.

3.1.4 Threatened, Endangered, and Sensitive Plants

Special attention was directed to the location of the federally listed threatened and endangered plants, federal candidate plants, and state sensitive species. Biologists of the U.S. Bureau of Land Management (BLM) in Kingman and Phoenix were contacted to determine species of special concern. Species of concern were looked for during the field reconnaissance to identify vegetation types and identify and collect plants.

Additionally, Ron Christofferson, Habitat Evaluation Specialist, of the Arizona Game and Fish Department, was contacted regarding threatened, endangered, and sensitive plants.

3.2 Wildlife

The wildlife analysis delineated below was based, in part, on existing, site-specific and general information on wildlife use of the project area provided by local BLM (Rebecca Peck and Bob - March 17 meeting) and AGFD biologists (Steve Ferrell, Mary Jo Croonquist, and Eric Gardner). The AGFD's Heritage Data Management System was also accessed in an attempt to obtain any known occurrences of federal or state threatened, endangered, candidate, and sensitive plant and animal species in the vicinity of the project area (Appendix A). These existing data sources were supplemented with March 17-18 surveys of the project area and surrounding habitats to develop an ecological understanding of the site, delineate local habitat types, and obtain more specific data on existing and potential wildlife use.

3.3 Soils

Soils information for the study area is from the General Soils Map and Interpretations, Mohave County, Arizona (1974) and from discussions with Tom Stehly, Soil Conservationist.

SECTION 4.0

VEGETATION

4.0 VEGETATION

4.1 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.

4.1.1 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 acacia (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 engelmannii var. chrysocentrus), beavertail cactus (Opuntia basilaris) and banana yucca (Yucca baccata). Conspicuous grasses include Fendler three-awn (Aristida fendleriana), desert needlegrass (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).

4.1.2 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 (Quercus turbinella) amid a dense cover of low shrubs with perennial grasses and some forbs. Succulents are present, but have a low abundance 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).

4.1.3 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), miner's candle (Cryptantha inaequata), 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.

4.1.4 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 horsebush shrubs (Tetradymia argyaea) and (T. stenolepis), state sensitive plants are potentially present in the study area (Anderson 1992). However, no horsebush 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.

Table 1
Plant Species List

SCIENTIFIC NAME	COMMON NAME	FAMILY	NATIVE (N) INTRODUCED (I)
TREES			
Juniperus osteosperma	Utah juniper	Cupressaceae	N
Pinus monophylla	Single-leaf pinyon	Pinaceae	N
SHRUBS			
Acacia greggii	Cat claw acacia	Fabaceae	N
Baccharis glutinosa	Seep willow	Asteraceae	N
Baccharis sarothroides	Broom baccharis	Asteraceae	N
Canotia holacantha	Crucifixion thorn	Celastraceae	N
Ceanothus greggii	Desert ceanothus	Rhamnaceae	N
Chrysothamnus paniculatus	Desert rabbitbrush	Asteraceae	N
Encelia farinosa	Acton brittlebush	Asteraceae	N
Encelia frutescens	Green brittlebush	Asteraceae	N
Eriodictyon angustifolium	Yerba santa	Hydrophyllaceae	N
Eriogonum sp.	Buckwheat	Polygonaceae	-
Eriogonum fasciculatum	Flattop buckwheat	Polygonaceae	N
Gutierrezia sarothrae	Broom snakeweed	Asteraceae	N
Haplopappus laricifolius	Turpentine brush	Asteraceae	N
Krameria grayi	White ratany	Fabaceae	N
Lycium fremontii	Fremont lycium	Solanaceae	N
Quercus turbinella	Shrub live oak	Fagaceae	N
Rhus aromatica var. trilobata	Skunkbush	Anacardiaceae	N
Salvia dorii	Purple sage	Lamiaceae	N
Senecio sp.	Groundsel	Asteraceae	-
Tamarix pentandra	Salt cedar	Tamaricaceae	I

Table 1 (Continued)
Plant Species List

SCIENTIFIC NAME	COMMON NAME	FAMILY	NATIVE (N) INTRODUCED (I)
SUCCULENTS			
Dasylirion wheeleri	Sotol	Liliaceae	N
Echinocereus engelmannii var. chrysocentrus	Hedgehog cactus	Cactaceae	N
Ferocactus acanthodes var. lecontei	Barrel cactus	Cactaceae	N
Mammilaria sp.	Fishhook cactus	Cactaceae	-
Opuntia acanthrocarpa var. acanthrocarpa	Buckhorn cholla	Cactaceae	N
Opuntia basilaris	Beavertail cactus	Cactaceae	N
Opuntia phaeacantha var. major	Engelmann prickly pear	Cactaceae	N
PERENNIAL GRAMINOIDS			
Aristida fendleriana	Fendler three-awn	Poaceae	N
Aristida parishii	Parish three-awn	Poaceae	N
Bouteloua curtipendula	Side oats grama	Poaceae	N
Bromus rubens	Red brome	Poaceae	I
Hilaria rigida	Big galleta	Poaceae	N
Sitanion hystrix	Squirreltail	Poaceae	N
Sporobolus cryptandrus	Sand dropseed	Poaceae	N
Stipa speciosa	Desert needlegrass	Poaceae	N
Tridens pulchellus	Fluffgrass	Poaceae	N
PERENNIAL FORBS			
Arabis perennans	Rock cress	Brassicaceae	N
Astragalus newberryi	Milkvetch	Fabaceae	N
Castilleja chromosa	Paintbrush	Scrophulariaceae	N
Cryptantha inaequata	Miner's candle	Boraginaceae	N

Table 1 (Continued)
Plant Species List

SCIENTIFIC NAME	COMMON NAME	FAMILY	NATIVE (N) INTRODUCED (I)
PERENNIAL FORBS (Continued)			
Cryptantha nevadensis	Nevada miner's candle	Boraginaceae	N
Cymopterus purpurascens	Spring parsley	Apiaceae	N
Euphorbia sp.	Spurge	Euphorbiaceae	-
Lotus rigidus	Deer vetch	Fabaceae	N
Lupinus palmeri	Lupine	Fabaceae	N
Oxybaphus (Allionia) incarnata		Trailing four o'clock	
Nyctaginaceae	N		
Melampodium leucanthemum	Melampodium	Asteraceae	N
Senecio monoensis	Groundsel	Asteraceae	N
Senecio stygius	Groundsel	Asteraceae	N
Sphaeralcea cf. parvifolia	Globe-mallow	Malvaceae	N
Thysanocarpus laciniatus	Lace-pod	Brassicaceae	N
Verbena ciliata	Vervain	Verbenaceae	N
Yucca baccata	Banana yucca	Liliaceae	N
ANNUAL/BIENNIAL FORBS			
Eriogonum inflatum	Desert trumpet	Polygonaceae	N
Erodium cicutarium	Heron bill	Geraniaceae	I
Nama demissum	Purple mat	Hydrophyllaceae	N
Pectocarya setosa	Pectocarya	Boraginaceae	N
Thelypodium cooperi	Thelypodium	Brassicaceae	N

SECTION 5.0

WILDLIFE

5.0 WILDLIFE

5.1 Wildlife Habitat

The Golden Eagle Project area is located on the western slope of the Cerbat Mountains in the chaparral vegetative community (Lowe and Brown 1973, Brown 1973). The proposed mine site is located between a 4,240-4,520 foot elevation, in a canyon approximately 1.5 miles east of the Cerbat's western toeslope, and approximately 800 feet above the Detrital Valley. This small mountain range shows extensive evidence of historic to recent mining activity. Few canyons in the range have not been affected to some degree by mining. The project area is also within an allotment grazed by cattle.

Vegetation in the steep, southeast-northwest running canyon is strongly influenced by aspect and elevation. Steep, north-northeast-facing slopes support a transitional chaparral-pinyon-juniper woodland, while the opposite south-southwest-facing slopes support a transitional chaparral-mohave desert scrub community. However, the species composing these communities are present on both slopes, although in different frequencies. These are the two principal communities dominating the west slope of the Cerbat Mountains. Dominant vegetative species characterizing these communities are described in Section 3.5, Vegetation.

Bisecting these communities is a narrow, spring-fed stream channel that is dry for most of the year. With heavy (2.6 inches) rainfall in the area during the week preceding the mid-March, 1992 site visit, an average 8-12 inches of the channel (width) was wetted and flowing less than one inch deep over a bedrock substrate, although water would occasionally expand into small pools up to several inches deep and a yard or more across. The wetted channel began approximately 210 feet below the existing mine tipple. Vegetation along this intermittent stream is composed of the same chaparral species present in adjacent uplands, although in more vigorous condition.

Several small seeps were also located on the north-facing canyon hillside during mid-March, 1992 surveys. The majority of the affected areas contained only moist soil with visibly wet surfaces extending, at most, 15 feet downslope. Although there was no discernable flows, water detained in cracks of rocks was probably adequate for small rodents to take occasional drinks before these sites dried up. These seeps probably only occur after heavy rains. There was no phreatophytic vegetation associated with any of these seeps.

Other habitats present in the canyon include an unpaved road running through the canyon and similar roads connecting over a dozen historic mine tunnels, shafts, and ancillary structures

(e.g., tipple, storage shed, collapsed houses, etc.). All tunnels were surveyed for bats and other wildlife during mid-March, 1992 surveys; shafts were not surveyed because of safety considerations. Ridges defining the canyon support exposed, bedrock outcrops up to forty feet tall.

5.2 Wildlife Species

Wildlife present on the project area are typical of the site's acreage and habitat types present in this portion 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. Recreationist 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 of 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 spp.), whipsnakes (Masticophis spp.), kingsnakes (Lampropeltis spp.), and others probably occur on-site. The desert tortoise (Gopherus [=Xerobates] agassizii) is discussed below in section 3.6.3, Threatened and Endangered Species.

The lack of any permanent or sizeable, temporary pools 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 the 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 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 scrub community supports such characteristic species as black-throated sparrows (Amphispiza bilineata), and rock (Salpinctes obsoletus) and canyon wrens (Catherpes mexicanus). 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). March surveys 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 adits examined, including the mine in the next canyon to the north that could be affected by an expanded mine entrance/ haul road, only three adits contained evidence of present or former bat use. One addit, just uphill of the tipple, contained two hibernating Townsend's big-eared bats (Plecotus townsendii). A stope 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°F. These are characteristic environmental conditions for a winter Plecotus 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 March surveys 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 (Perognathus spp.), kangaroo rats (e.g., Dipodomys merriami), Harris' antelope squirrels (Ammospermophilus harrisii), rock squirrels (Spermophilus variegatus), desert cottontails (Sylvilagus audubonii). Predators in the area include bobcats (Felis rufus), coyotes (Canis latrans),

grey (Urocyon cinereoargenteus) and kit fox (Vulpes macrotus), 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.

5.3 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 potential 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 (Appendix A). More detailed tortoise data were obtained from the BLM. The project area is outside of any Habitat Category Areas (HCA). Clack 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 would exist in small, isolated pockets.

Bald eagles (Haliaeetus leucocephalus) and peregrine falcons (F. peregrinus) probably migrate through the general area, however these birds should have no particular affinity to habitats on the project area.

A loggerhead shrike (Lanius ludovicianus) was observed during March 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.

SECTION 6.0

SOILS

6.0 SOILS

6.1 Soil Characteristics

The study area is characterized by the Barkerville-Gaddes Rock outcrop association (U.S. Soil Conservation Service 1974). 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 dominantly 5000 to 6500 feet. Chaparral vegetation is dominant, consisting of oakbrush, ceanothus, juniper, mountain mahogany, and manzanita. A grass understory includes sideoats and blue gramas and needlegrass. Above about 6500 feet, ponderosa and pinyon pine and tree live oak are the main overstory species. Average annual precipitation is 12 to 20 inches, mean annual air temperature is 47 to 57° 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 about 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 about 7000 feet, Faraway and Luzena soils on rhyolite and andesite parent rocks, minor amounts of miscellaneous other soils, and recent alluvial 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. Table 2 provides additional information on the soils of the Barkerville-Gaddes-Rock outcrop association.

6.2 Range Conditions

The study area is in the Granite Hills range site (Stehly 1992). The grasses, forbs, shrubs, and trees listed in this range site reasonably approximate those found on the study area (Appendix B). 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.

Table 2
Barkerville-Gaddes-Rock Outcrop Association

Map Symbol & Major Soil Components	Estimated Properties of the Soils						Suitablility as a source of:		
	Soil Depth[1] (inches)	Perme-ability	Avail. Water Capacity	Shrink-Swell Potential	Soil Reaction (pH)	Hydro-logic Soil	Road Fill	Sand & Gravel	Topsoil
Barkerville-Gaddes-Rock Outcrop association									
Barkerville gravelly sandy loam 15 to 60 percent slopes (45% of unit)	20 to 40" to consol-idated rock	Moderately rapid	Very low	low	6.1-7.3	C thin layer, slope	Poor. Depth to bedrock	Unsuited gravelly, thin layer, slope.	Poor. Too
Gaddes gravelly sandy loam 5 to 30 percent slopes (15% of unit)	20 to 40" to consol-idated rock	slow	low	moderate	6.1-7.3	C High shrink-swell, thin layer	Fair. Depth to bedrock	Poor gravelly.	Poor. Too
Rock outcrop, 15 to 60 percent slopes. (15% of unit)	NA[2]	NA	NA	NA	NA D	NA	NA	NA	

1 Depth is to bedrock unless otherwise noted.

2 Not applicable

SECTION 7.0

LITERATURE CITED

7.0 LITERATURE CITED

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SECTION 8.0

APPENDICES

APPENDIX A

THREATENED AND ENDANGERED SPECIES AGENCY CORRESPONDENCE

Western Ecosystems, Inc.
Ecological Consultants
905 West Coach Road, Boulder, CO 80302 (303) 442-6144

April 13, 1992

Mr. Ron Kristofferson
Arizona Game and Fish Department
2221 West Greenway Road
Phoenix, AZ 85023-4312

Fax transmittal: 602-789-3920

Dear Ron,

I am preparing the baseline wildlife evaluation and analysis for the proposed Golden Eagle gold mine located in the Cerbat Mountains, north-northwest of Kingman. The mine is located in SW 1/4, S31, T23N, R17W, on BLM land. An EA will be required by the BLM for mine permitting. Ms. Mary Jo Croonquist of your Kingman office suggested that I contact you for a list of Federal and State threatened, endangered, candidate, and sensitive animal (and plant?) species that are potentially present in the vicinity of the proposed mine. I would also be interested in any information on important seasonal habitats for local game species.

I understand that such requests normally require a 30-day turnaround. Unfortunately, my analysis is required by the client by the end of April. Could you possibly fast-track the computer run and fax or mail the results to me by April 24?

Please phone if you have any questions or need more information. Thank you for your help.

Sincerely,

Richard W. Thompson
Certified Wildlife Biologist
Western Ecosystems, Inc.

RWT/s

cc: D. Johnson, WRDC

THE STATE OF ARIZONA

GAME & FISH DEPARTMENT

2221 West Greenway Road, Phoenix, Arizona 85023-4312 (602) 942-3000

Governor
Fife Symington

Commissioners:
Phillip W. Ashcroft, Eagar, Chairman
Gordon K. Whiting, Klondyke
Larry Taylor, Yuma
Elizabeth T. Woodin, Tucson
Thomas G. Woods, Jr., Phoenix

Director
Duane L. Shroufe

Deputy Director
Thomas W. Spalding

April 27, 1992

Mr. Richard W. Thompson
Certified Wildlife Biologist
Western Ecosystems, Inc.
905 West Coach Road
Boulder, Colorado 80302

Dear Mr. Thompson:

Re: Special Status Species; Proposed Golden Eagle Gold Mine

The Arizona Game and Fish Department has reviewed your letter of April 13, 1992, regarding the presence of special status species near a proposed mine in Section 31, Township 23 North, Range 17 West, northwest of Kingman, and the following comments are provided.

The Department's Heritage Data Management System has been accessed and current records indicate that **desert tortoise** (Gopherus agassizii) has been documented as occurring in the vicinity of the above-referenced legal description. The desert tortoise is listed as Category 2 Candidate by the U.S. Fish and Wildlife Service under the Endangered Species Act, and is a State Candidate on the Department's listing of **Threatened Native Wildlife in Arizona.** We recommend that this species be considered during the planning and implementation of the proposed project.

Thank you for the opportunity to provide this information. If you have any questions, please contact me at (602)789-3605.

Sincerely,

Ron Christofferson

Ron Christofferson
Habitat Evaluation Specialist
Habitat Branch

RAC:rc

cc: Steve Ferrell, Regional Supervisor, Kingman Regional Office

APPENDIX B

GRANITE HILL RANGE SITE DESCRIPTION

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

_____, Arizona Field Office

GRANITIC HILLS, 8-12" p.z.
RANGE SITE DESCRIPTION
Major Land Resource Areas:
D30-3

Date: _____

Approved by: _____

A. PHYSICAL CHARACTERISTICS

1. Physiographic Features

This site occurs in an upland position which does not benefit from run-in moisture. It may experience excessive run-off due to steepness of slopes. Slopes range from 3-35%. Elevations range from 2,000-4,500 feet. This site is mostly composed of mountainous country dissected by numerous canyons and washes.

2. Soils

a. The soils in this range site are shallow to moderately deep, well drained and formed in place on granite. The surface texture ranges from gravelly sandy loam to cobbly loam. The underlying material ranges from very gravelly sandy loam to stony clay loam. Permeability ranges from moderately rapid to moderately slow. Infiltration rates are moderate. Plant-soil moisture relationships are fair to good. The hazard of erosion is slight to moderate and the hazard of soil blowing is slight. The pH ranges from 6.1 to 8.4 and the content of soluble salts is low. Coarse fragment content ranges from 20 to 60 percent.

b. Major soils associated with this site are:

Soil Taxonomic Unit

Cellar cobbly loam, loam sand
Barkerville gravelly sand loam
Gaddes gravelly sand loam

Additional information may be found in Section II of the Field Office Technical Guide.

3. Climatic Features

a. This area receives on the average 8 to 12 inches of precipitation annually. Generally 45% of this moisture comes from December to March. Snow from winter storms is not uncommon but only remains on the ground a day or two. Winter storms come from moist air bodies moving in off the coast of Southern California. Summer moisture generally comes from thunder storms originating in the Gulf of Mexico. Summer precipitation is light because this range site lies too far west to receive strong gulf flows.

b. Mean temperatures for the hottest month (July) is 82° F. The coldest month is January when a mean temperature of 43° F. is experienced. Extreme temperatures of 111° F. for a high and 6° F. for a low have been recorded in Kingman. Long periods, when little or no effective moisture is received, occur frequently. Frost free period ranges from 200 to 230 days.

c. Cool season grasses generally green up between February and April and set seed by late spring to early summer depending on the year. Warm season grasses will come on in mid summer and remain green well into fall. This range site occurs in a transition zone between the mesic pine forests to the east and the xeric mojave desert to the west. This results in strong dry winds blowing a large part of the time desiccating both plants and soil. These winds are especially strong in the spring and fall.

4. Native (potential or climax) vegetation

a. This site has the potential to be a heavy grass producer with fairly high amounts of cool season grasses present. The grass production may be masked somewhat by a nearly even amount of shrubs and forbs. The presence of numerous large rocks and boulders facilitates production by concentrating precipitation on small areas of soil.

b. As retrogression progresses, the following plants will increase: threeawns, red brome, paperflower, haplopappus, broom snakeweed, turbinella oak and pricklypear cactus. The sub-climax plants community may be inadequate to protect the resource base from degradation resulting in increased erosion. The invader species on this site are few. Those which do occur will be directly related to the adjacent range site and its current or past condition.

c. The following is a list of plants that are found in the potential plant community. Range condition of areas within this site is determined by comparing the present plant community with that of this potential plant community. Count as potential no more than the maximum percent shown on the guide for any species. Four condition classes are used to express this degree of comparison of the present plant community to that of the potential:

Excellent	76-100
Good	51- 75
Fair	26- 50
Poor	0- 25

Relative percentage of total plant community by weight:

Grasses and Grasslike (40-60%)	Percent	Grasses and Grasslike (40-60%)	Percent
black grama (BOER4)	5-20	sideoats grama (BOCU)	1-5
desert needlegrass (STSP3)	5-15	redbrome (BRRU2)	1-3
bush muhly (MUPO2)	1-10	cane bluestem (ANBA)	0-3
big galleta (HIRI)	0-15	arizona cottontop (TRCA2)	0-3
parish threeawn (ARPAIO)	0-15	fluffgrass (TRPU2)	0-1
slim tridens (TRMU)	1- 5		
Forbs (5-10%)	**Percent**	**Forbs (5-10%)**	**Percent**
annual forbs (AAFF)	0-5	deervetch (LOTUS)	0-3
paperflower (PSILO3)	0-5	globemallow (SPHAE)	0-3
perennial forbs (PPFP)	0-3		
Shrubs and Trees (30-60%)	**Percent**	**Shrubs and Trees (30-60%)**	**Percent**
flattop buckwheat (ERFA2)	0-15	mormontea (EPHED)	0-5
turbinella oak (QUTU2)	0-10	twinberry (MENOD)	0-3
catclaw acacia (ACGR)	1- 5	broom snakeweed (GUSA2)	0-3
ratany (KRAME)	1- 5	bladdersage (SAME)	1-3
goldenweed (HAPLO2)	0- 5	hedgehog cactus (ECHIN3)	0-1
cholla cactus (OPUNT)	0- 5	barrel cactus (ECAC)	0-1
		brittlebush (ENFA)	0-1

This list of plants and their relative proportions are based on near normal years. Fluctuations in species composition and relative production may change from year to year dependent upon abnormal precipitation or other climatic factors.

The potential (climax) plant community has been determined by study of range relict areas, or areas protected from excessive grazing. Trends in plant communities going from heavily grazed areas to lightly grazed areas, seasonal use pastures and historical accounts have also been used.

5. Total Annual Production

In excellent condition this site will produce approximately the following amounts of air dry herbage per acre in:

favorable year	1200	lbs.
normal year	800	lbs.
unfavorable year	200	lbs.

B. MAJOR USES

1. Livestock

a. Site factors influencing management

This site is suitable for yearlong grazing by either cattle and calves or stocker cattle, and is easily traversed by all classes of livestock. The main limitations are the steep slopes and rough terrain which inhibit livestock movement. During the cooler parts of the year cattle will move higher up the slopes to graze. Cattle prefer this site in the winter for shelter protection and key forage. Distribution will be more difficult with yearlong grazing. Fencing and water developments may be key management concerns.

b. Guide to Initial Stocking Rate

The following stocking rates may be used as a guide to establish a safe starting stocking, but should be evaluated and livestock numbers adjusted based on actual use experience and climatic fluctuations.

Condition Class	Percent Climax Vegetation	AC/AUM	AUM/AC
Excellent	76-100	4-5	.20-.25
Good	51- 75	5-8	.13-.20
Fair	26- 50	8-12	.08-.13
Poor	0- 25	12-20	.05-.08

2. Wildlife

a. Site factors influencing wildlife.

This site has the potential to be a good wildlife area, because of the wide diversity in the plant community and the ruggedness of the terrain. Free water can be a limiting factor.

b. Guide to site plant use by wildlife species.

	Selected Wildlife Species					
Plant Species	Desert Cottontail	Rock Squirrel	Antelope	Mule Deer	Blacktail Jackrabbit	Gamble Quail
sideoats grama	G)foliage	G)seed	G)foliage	F)foliage	G)foliage	G)seed
black grama	G)foliage		G)foliage	F)foliage	G)foliage	G)seed
big galleta	G)foliage				F)when green	
bush muhly	G)foliage				G)foliage	G)seed
globemallow		G)seed	F)foliage			G)seed
twinberry		G)seed	G)foliage	F)foliage		
cholla		G)fruit				X)seed
mormontea			G)foliage	G)stems		
flattop buckwheat				G)foliage		X)seed
hedgehog cactus		G)fruit				
tubnella oak		G)fruit		G)foliage		
c :law acacia		G)fruit		X)foliage	X)foliage	X)seed
bladdersage						
broom snakeweed			G)foliage		G)foliage	

G=Good F=Fair P=Poor X=Used but degree of utilization not known

3. Recreation and Natural Beauty

a. Land form - This site is located moderately in steep rocky terrain.

b. Landscape quality - This site supports a highly diversified plant community. In a wet spring it will be covered with flowers. Thickets of brush may be frequent.

c. Climate - Summers are hot and winters can be quite cool. Spring and fall are likely to be quite windy. Most anytime but midsummer the weather can be quite pleasant.

d. Activities - Horseback riding, hiking, rock climbing, hunting, wildlife observation, and photography are the major recreational activities for which this site is suited.

4. Other Uses - Mining gold, silver, uranium, copper turquoise.

C. THREATENED OR ENDANGERED PLANTS AND ANIMALS

1. Plants -

2. Animals -

D. LOCATION OF TYPICAL EXAMPLE OF THE SITE

1. State location - Sec 13, T22N, R18W

a.
b.

2. Field office site location -

E. FIELD OFFICES

1. Kingman

2. Fredonia

3. Prescott

4. Flagstaff

8.0 APPENDIX B

HAZEN

Hazen Research, Inc.
4601 Indiana St. • Golden, Colo. 80403
Tel: (303) 279-4501 • Telex 45-860
FAX: (303) 278-1528

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:
Robert Rostad
Laboratory Manager

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

Hazen Research, Inc.
4601 Indiana St. • Golden, Colo. 80403
Tel: (303) 279-4501 • Telex 45-860
FAX: (303) 278-1528

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

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
Laboratory Manager

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

Hazen Research, Inc.
4601 Indiana St. • Golden, Colo. 80403
Tel: (303) 279-4501 • Telex 45-860
FAX: (303) 278-1528

DATE June 9, 1992
HRI PROJECT 002-78H
HRI SERIES NO. E189/92-3
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. E189/92-3
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
Laboratory Manager

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

HAZEN

Hazen Research, Inc.
4601 Indiana St. • Golden, Colo. 80403
Tel: (303) 279-4501 • Telex 45-860
FAX: (303) 278-1528

DATE	June 9, 1992
HRI PROJECT	002-78H
HRI SERIES NO.	E189/92-4
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

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

By:
Robert Rostad
Laboratory Manager

Hazen Research, Inc.
4601 Indiana St. • Golden, Colo. 80403
Tel: (303) 279-4501 • Telex 45-860
FAX: (303) 278-1528

DATE	June 9, 1992
HRI PROJECT	002-78H
HRI SERIES NO.	E189/92-5
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

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

By:
Robert Rostad
Laboratory Manager

Hazen Research, Inc.
4601 Indiana St. • Golden, Colo. 80403
Tel: (303) 279-4501 • Telex 45-860
FAX: (303) 278-1528

DATE	June 9, 1992
HRI PROJECT	002-78H
HRI SERIES NO.	E189/92-6
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

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:
Robert Rostad
Laboratory Manager

SMI
Shepherd Miller, Inc.

CONSULTING ENVIRONMENTAL
& GEOTECHNICAL ENGINEERS

August 27, 1992

Mr. Thomas K. Randall
LYNTEK, Inc.
775 Mariposa
Denver, Co. 80204

Dear Tom:

The backhoe sample test results of the tailings impoundment area for Morgan Gold Mine are summarized below. The samples taken were first analyzed for soil classification. Based on those results, samples were grouped together for permeability testing, compacted at 95% standard Proctor and optimum moisture content.

Composite Material	LL	PI	#4	#200	Unified Soil Class	Max. Dry Density	Opt. Moisture	Permeability (cm/sec)
C-3 MBH-1 0.0-2.7'	48	27	76	20.1	SC	115.9	14	2.06 x 10-6

Note: Test analysis performed on the SIDE WALL -6 sample indicated the sample was composed of material similar to cemented soil. No sieve analysis could be correctly performed due to the sample's composition.

Sincerely,
SHEPHERD MILLER, INC.

Nicole High

Nicole High
Project Engineer

1600 Specht Point Drive, Suite F, Fort Collins, Colorado 80525 • Tel (303) 484-4114 • Fax (303) 484-7540

LANDMARK LABORATORIES LTD.

SOIL CLASSIFICATION SUMMARY SHEET

CLIENT: Shepherd Miller, Inc. PROJECT: #325 & 327 PROJECT NO. SHEMI-92078I-04-702 DATE: 8-7-92

Sieve Analysis (% Passing)

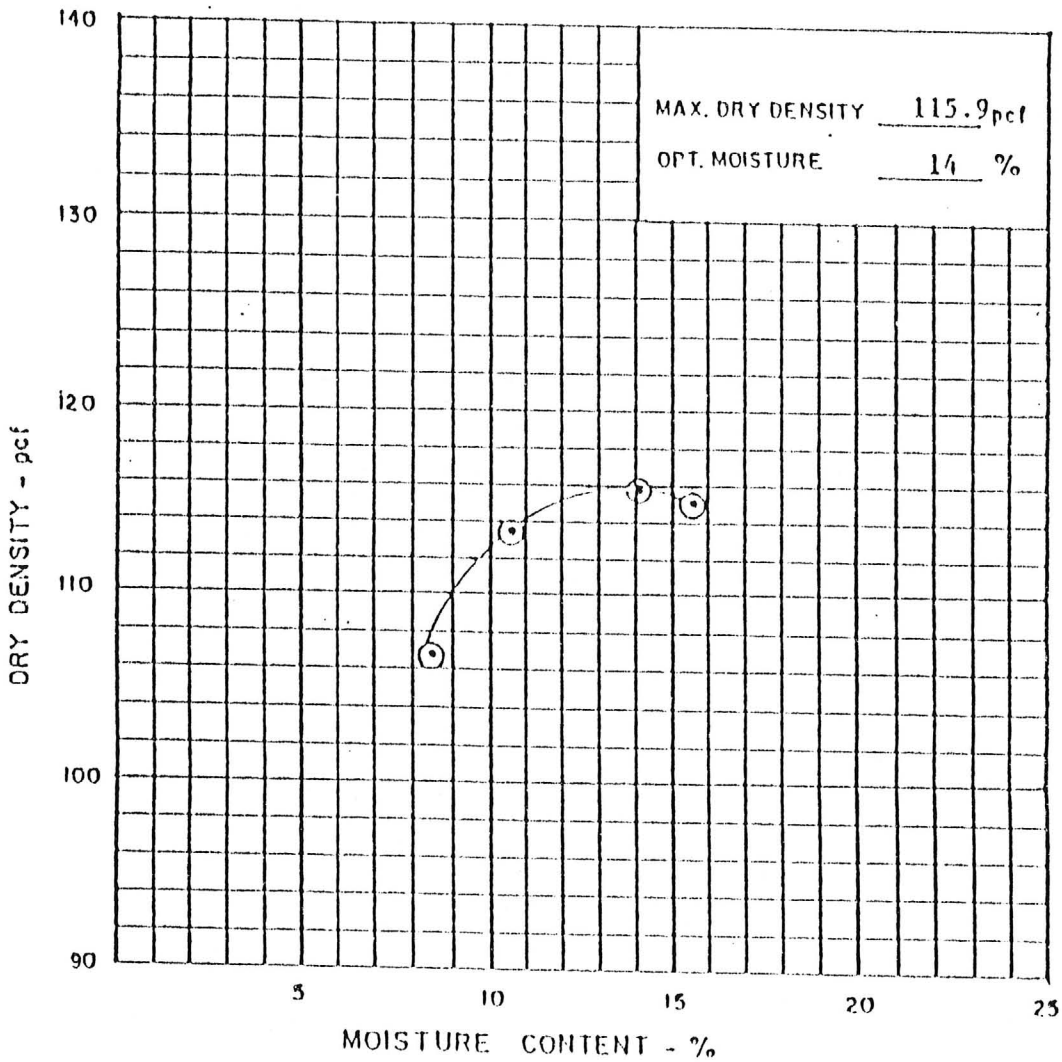
SAMPLE I.D.	NATURAL MOISTURE %	3/4"	#4	#10	#40	#200	Liquid Limit	Plasticity Index	Unified Soil Class.	Soil Description
MBH-1	5.6	96	76	63	44	20.1	48	27	SC	Clayey Sand W/Gravel
MBH-4 @ 0-2'	7.3	100	93	86	73	31.4	56	33	SC	Clayey Sand
MBH-4 @ 2-3.5'	6.7	96	76	65	48	15.7		N.P.	SM	Silty Sand W/Gravel (Decomposed Schist)
MBH-4 @ 3.5-6'	3.5	81	47	29	13	2.3		N.P.	GW	Well Graded Gravel W/Sand (Decomposed Schist)

MOISTURE - DENSITY RELATIONS

Landmark LABORATORIES LTD.

PROCTOR CURVE NO. C-3

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

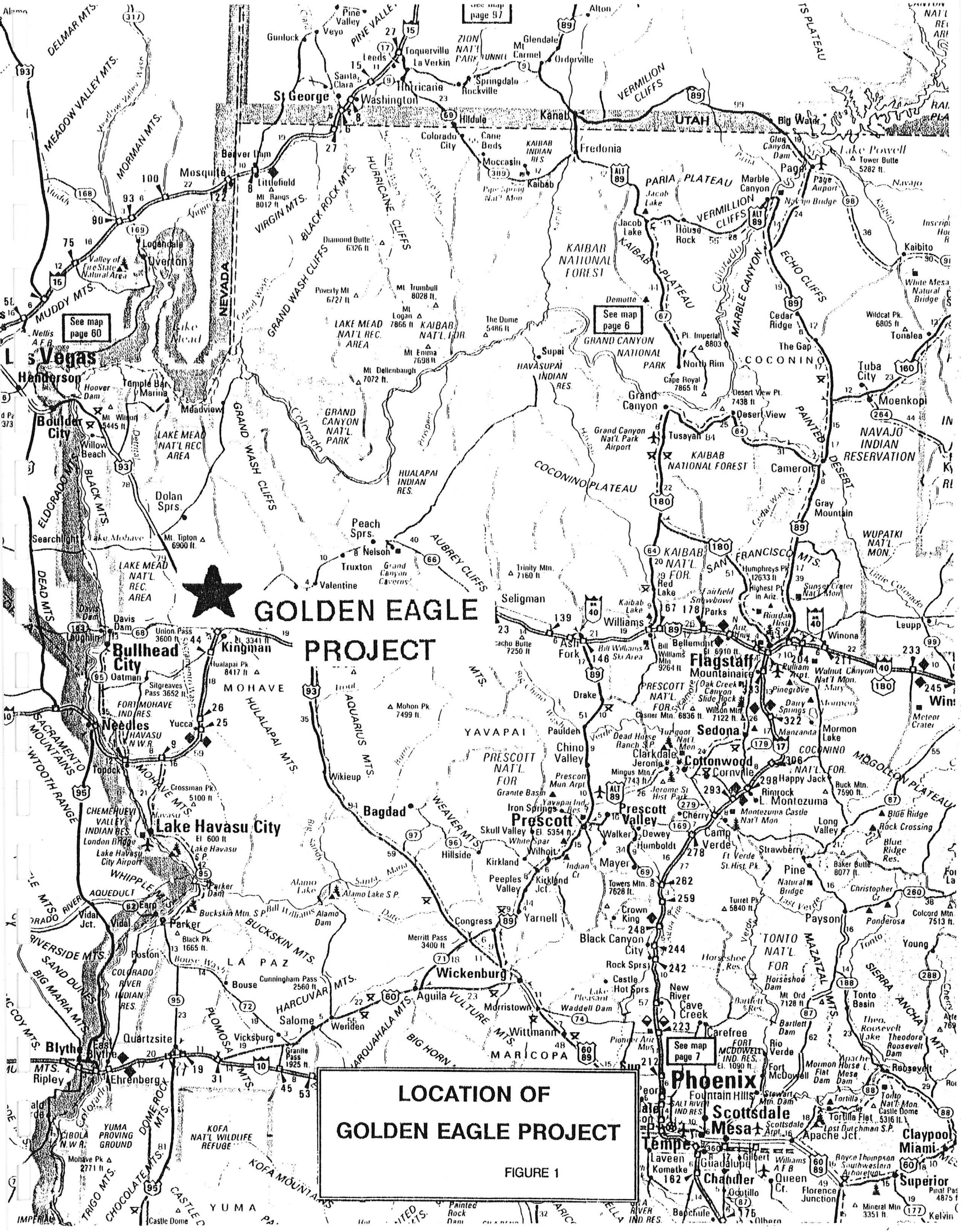


METHOD ASTM D 698 Method A	RAMMER (MANUAL
PREPARATION PROCEDURE (MOIST)	ORIGIN Composite Sample #3
MATERIAL MBH-1 @ 0 - 2.7'	

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

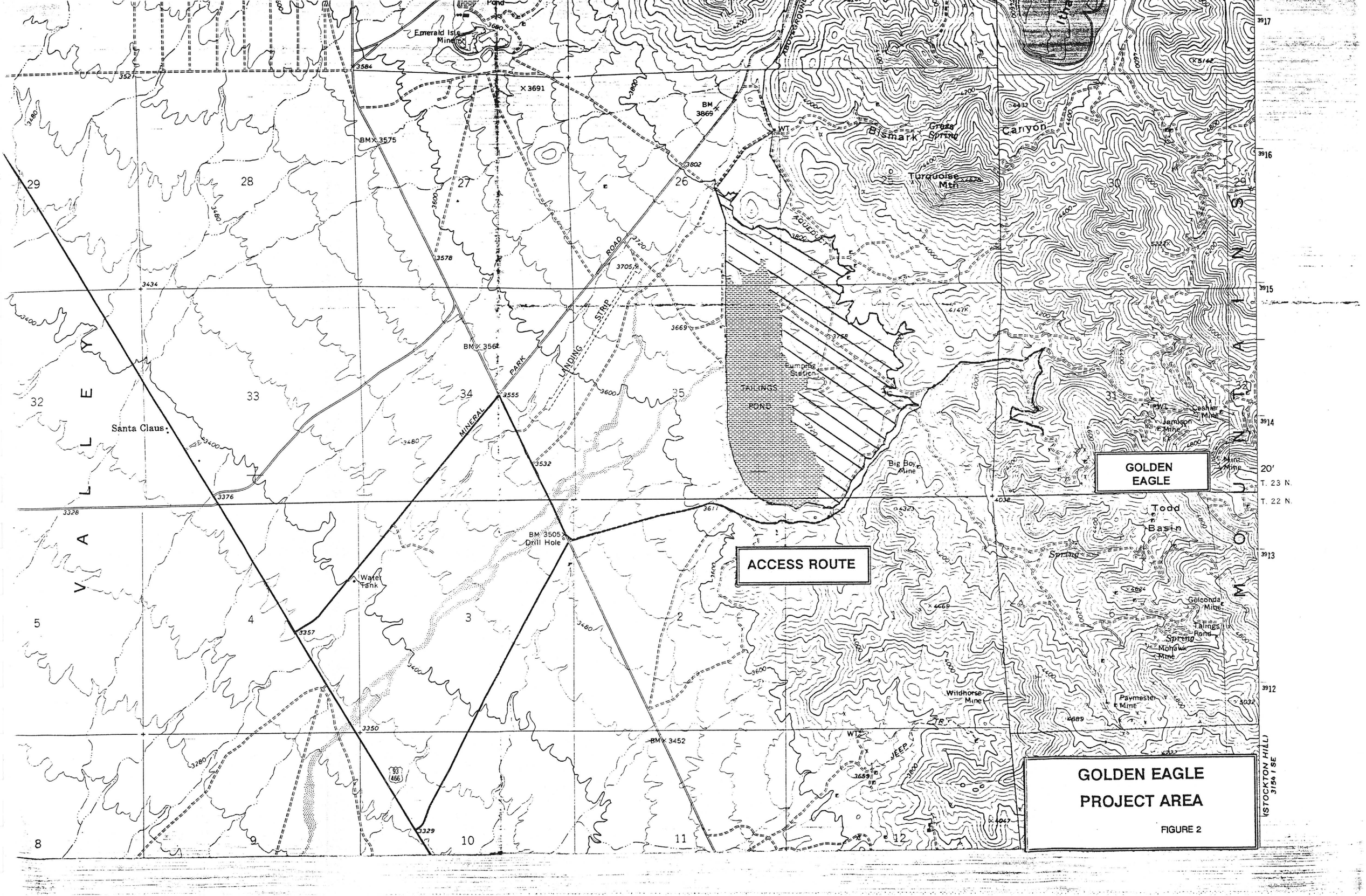
Note: Proctor & Permeability performed on -#4 material only

9.0 APPENDIX C



LOCATION OF GOLDEN EAGLE PROJECT

FIGURE 1



GOLDEN EAGLE PROJECT AREA

FIGURE 2

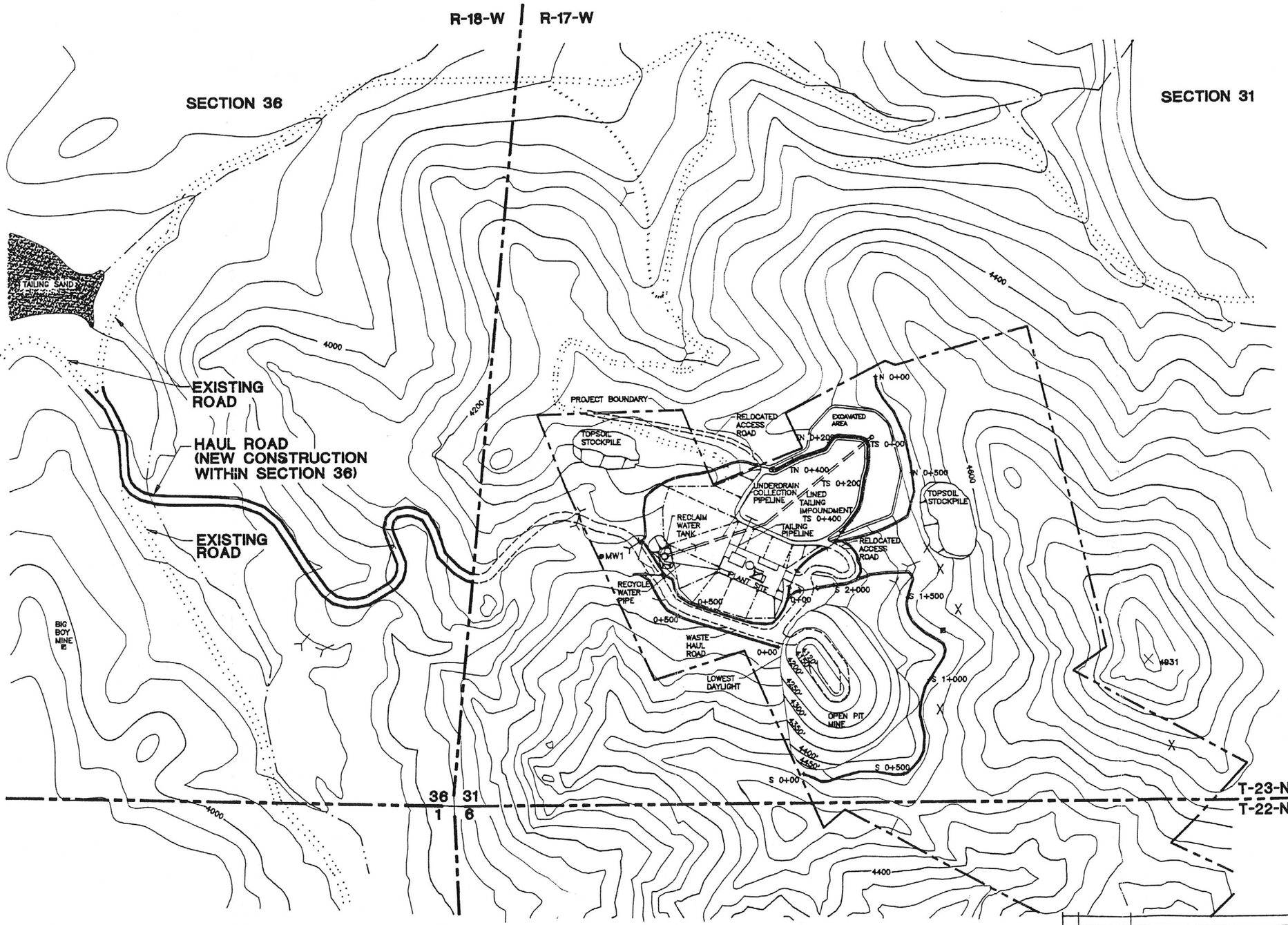


Figure 3
General Site Layout

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

MORGAN MINING
GOLDEN EAGLE PROJECT

GENERAL SITE LAYOUT

LYNTER INC.
775 MARIPOSA DENVER, CO. 80204
PH. (303)-623-8385
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'		

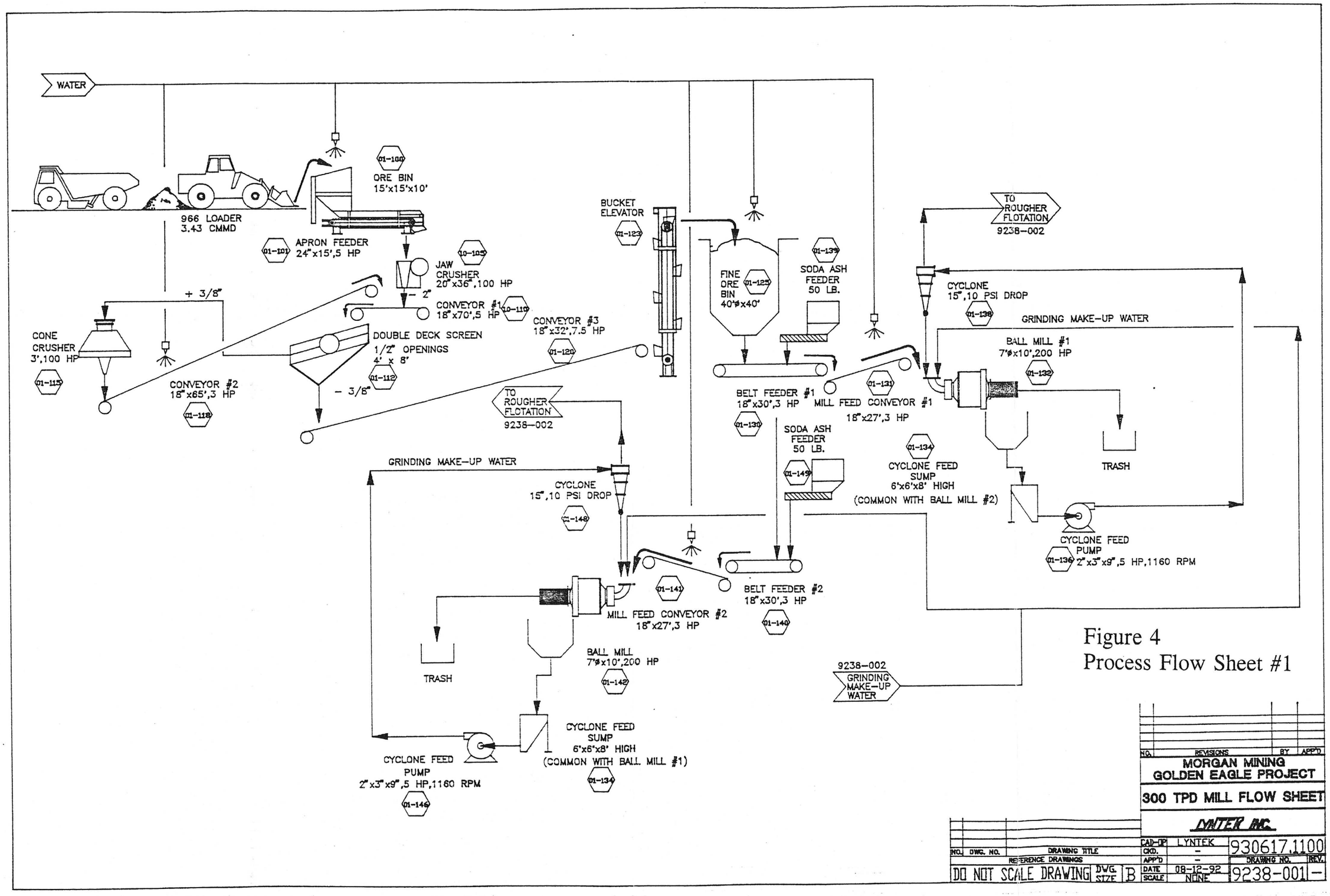


Figure 4
Process Flow Sheet #1

NO.	REVISIONS	BY	APP'D

MORGAN MINING
GOLDEN EAGLE PROJECT

300 TPD MILL FLOW SHEET

LYNTEK INC.

NO.	DWG. NO.	DRAWING TITLE		
		REFERENCE DRAWINGS		

CAD-ID	LYNTEK	930617.1100	
CKD.	-		
APP'D	-	DRAWING NO.	REV.
DATE	08-12-92	9238-001	-
SCALE	NONE		

DO NOT SCALE DRAWING | DWG. SIZE B

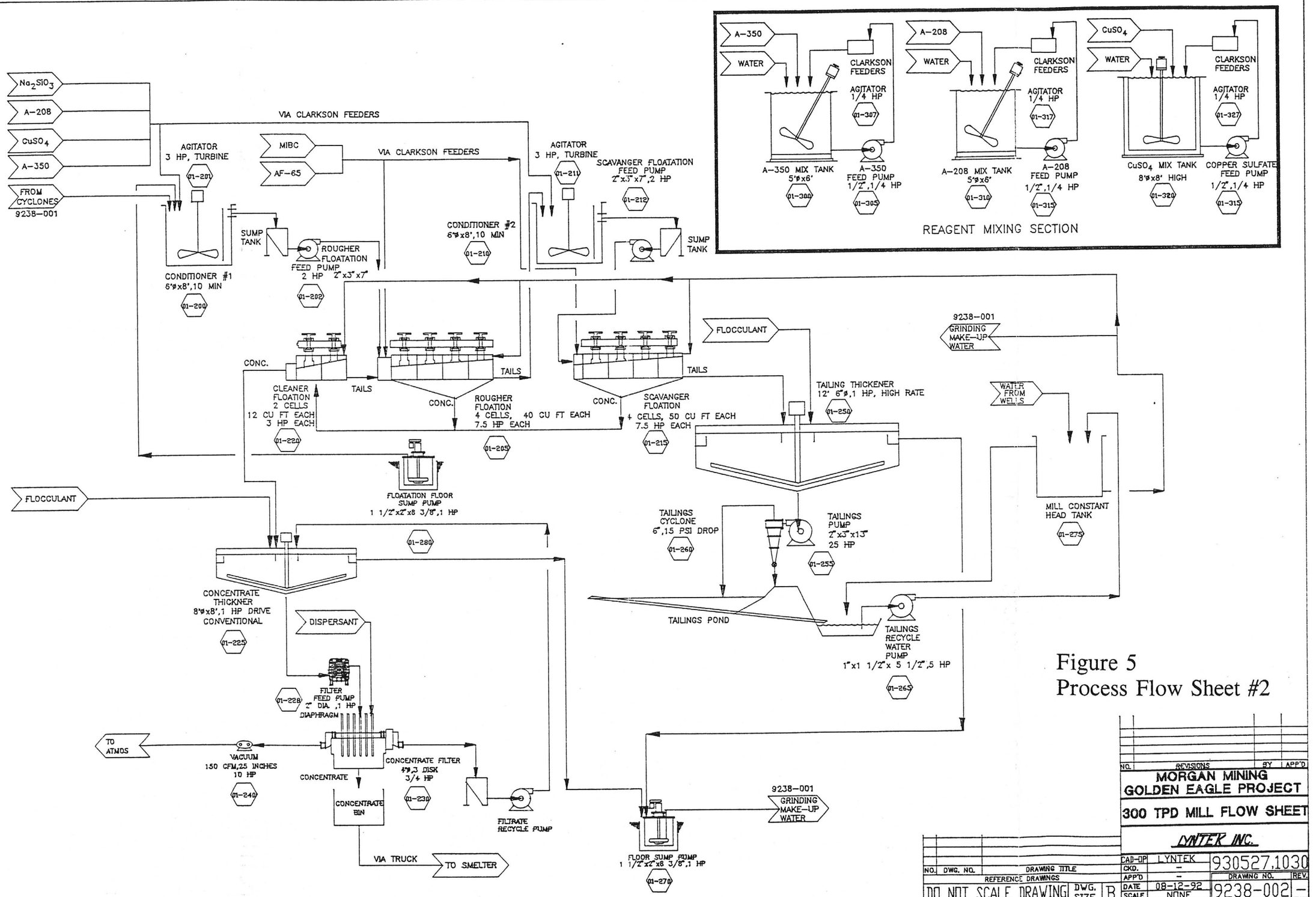


Figure 5
Process Flow Sheet #2

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-DP	LYNTEK	930527.1030
CKD.	-	
APP'D	-	DRAWING NO. REV.
DATE	08-12-92	9238-002 -
SCALE	NONE	

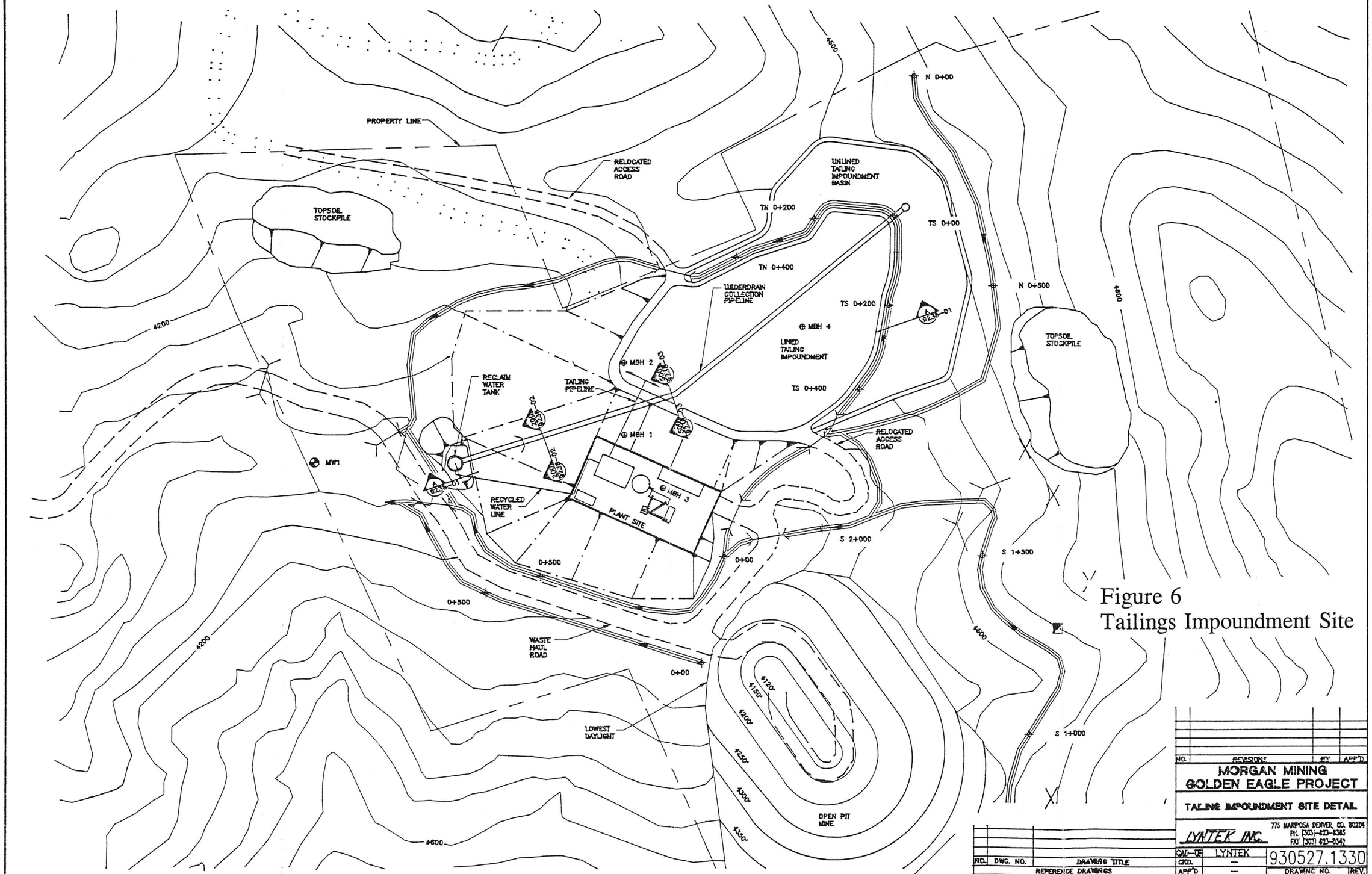


Figure 6
Tailings Impoundment Site

NO.	REVISIONS	BY	APP'D

MORGAN MINING
GOLDEN EAGLE PROJECT

TAILING IMPOUNDMENT SITE DETAIL

LYNTEK INC.
775 MARIPOSA DENVER, CO. 80204
PH. (303)-623-3345
FAX (303) 623-3342

NO.	DWG. NO.	DRAWING TITLE
		REFERENCE DRAWINGS

DO NOT SCALE DRAWING | DWG. SIZE B

CAD-ID	LYNTEK
GRD.	—
APP'D	—
DATE	11-16-92
SCALE	1"=200'

DRAWING NO. 930527.1330
9238-405 REV. —

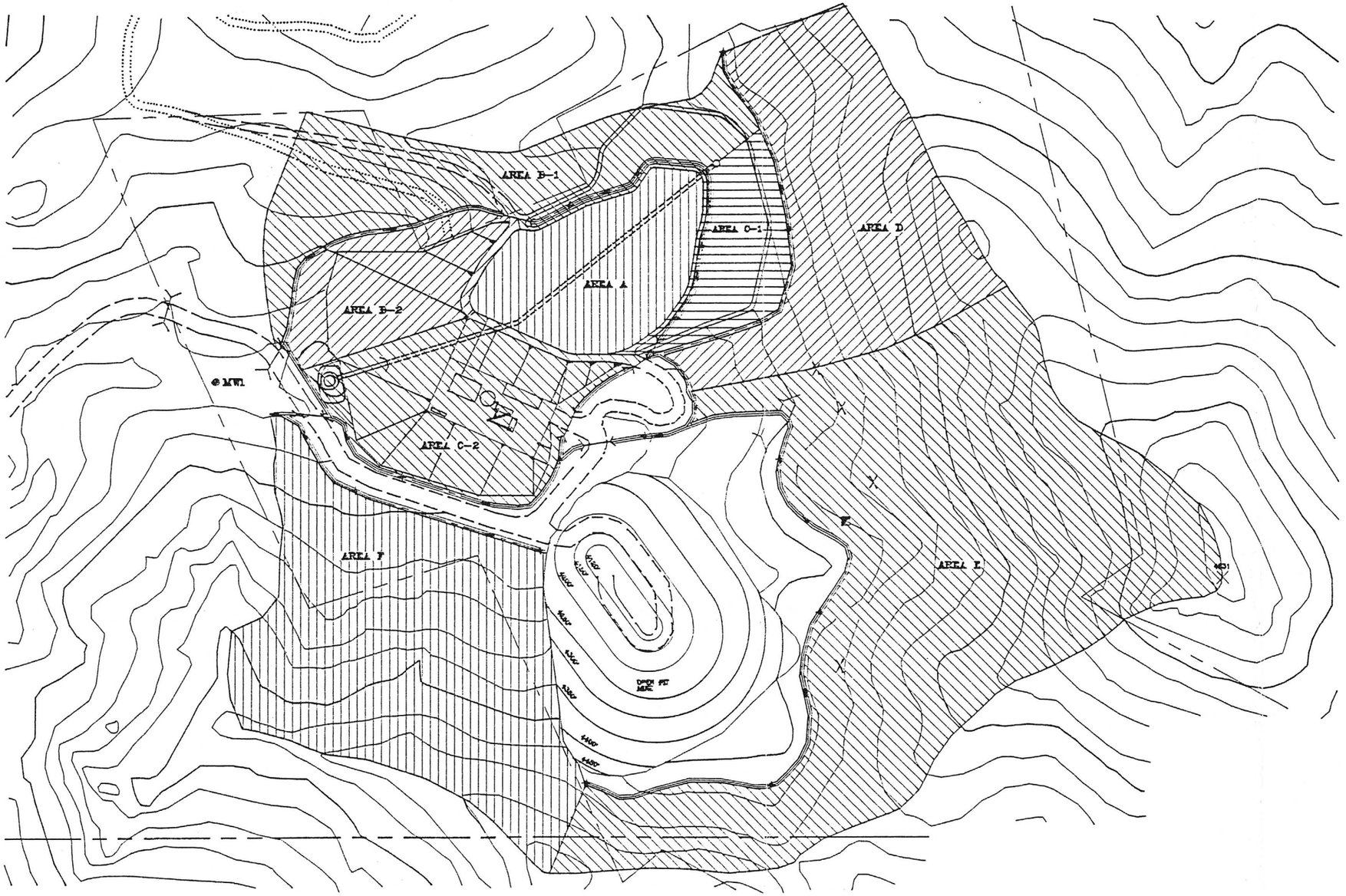


Figure 7
Drainage Layout

NO.	REVISIONS	BY	APP'D

MORGAN MINING
GOLDEN EAGLE PROJECT

DRAINAGE LAYOUT

LYNTEK INC.
775 MARIPOSA DENVER, CO 80204
(303) 623-8365
FAX (303) 623-0392

NO.	DWG. NO.	DRAWING TITLE
		REFERENCE DRAWINGS

DO NOT SCALE DRAWING | DWG. SIZE B

CAD-OP	LYNTEK
CKD.	
APP'D	
DATE	11-09-92
SCALE	1"=300'

930527.1300
DRAWING NO. 9238-4031- REV.