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VOLUME III - ORE PROCESSING

VOLUME III INTRODUCTION

This feasibility study report is a compilation and summation of three years of investigations by Minerals Exploration Company and their consultants for the purpose of evaluating the economic viability of the Anderson Project, Yavapai County, Arizona. The study is reported in three volumes:

- Volume I - Executive Summary
- Volume II - Geology and Mining
- Volume III - Ore Processing

Volumes I and III were written jointly by Minerals Exploration Company and Morrison-Knudsen Company. Minerals' staff authored Volume II, and Morrison-Knudsen edited and compiled all three volumes. Volume III describes the ore processing, tailing disposal, ancillary and environmental design considerations for the proposed 2000 tpd Anderson Uranium Mill.

The major processing steps include semiautogenous and rod mill grinding, sulfuric acid leaching, countercurrent decantation (CCD), solvent extraction (S-X) and precipitation of a uranium concentrate with anhydrous ammonia. The flowsheets for this process are presented in both the pictoral and block diagram formation in Exhibit III-A. The millsite perspective is presented as an isometric drawing in Exhibit III-A, to help the reader visualize the millsite layout.

The results of all the investigations to date are incorporated into a Financial Analysis presented in Volume I. The remainder of the report describes the design basis and operating philosophy used to estimate the capital and operating costs required to develop this analysis.

This report is considered to be a final feasibility study, accurate to within plus or minus 15 percent. Additional investigations are recommended in certain areas to study possible cost reductions. However, these possible reductions or unforeseen cost additions are not expected to exceed the stated limits of accuracy.

The investigations and studies which generated the data and criteria for this volume of the Final Feasibility Study are described in the following reports:

TECHNICAL STUDIES

a. Preliminary Feasibility Study, Morrison-Knudsen, December 1977

b. Design Report - Proposed Tailings Impoundment, Anderson Uranium Project, Dames & Moore, May 1978

HYDROLOGICAL

a. Progress Report - Exploration for Water Supply, Anderson Mine, Arizona, Water Development Corporation, June 1977

b. Legal Evaluation of Alternative Sources of Water for the Anderson Mine Project, Yavapai Co., Arizona, D.P. Kearns & J.C. Lacy, March 1978

ENVIRONMENTAL

a. Socio-Economic Evaluation - Anderson Project, Minerals Exploration Company, April 1977

b. Wildlife and Vegetation Baseline Study - Anderson Uranium Project Area, Dames & Moore, January 1978

c. Wildlife and Vegetation Baseline Inventory - Proposed Water Pipeline Palmerita Ranch to Anderson Mine Project, Dames & Moore, January 1978

d. Preliminary Report of Field Paleontological Resources, Museum of Northern Arizona, June 1977

e. An Archaeological Survey of the Anderson Mine Area of West-Central Arizona, Museum of Northern Arizona, February 1978

f. Application for Certificate of Environmental Compatibility - Bagdad to Black Mountain 115 kv Line, Arizona Public Service, January 1978

g. Anderson Uranium Project Environmental Report, Woodward-Clyde Consultants

METALLURGICAL

a. Alkaline Leaching of Anderson Mine Samples, Hazen Research, August 1977

b. Acid Leaching of Anderson Mine Samples, Hazen Research, August 1977

c. Metallurgical Summary and Preliminary Design Data, A.H. Ross & Associates, September 1977

d. Uranium Recovery from Anderson Mine Ore, Hazen Research, March 1978

e. Metallurgical Summary and Mill Design Criteria for the Anderson Uranium Deposit, A.H. Ross & Associates, May 1978

SECTION 8

MILLING

8.1 MILL DESIGN CRITERIA - GENERAL

8.1.1 Site Location and Conditions

The mill site is located at Yavapai County, Arizona. The project area is situated along the northeast margin of the Date Creek Basin about 45 miles northwest of Wickenburg, Arizona. The mill site elevation is about 1950 feet above sea level, and the tailing pond will be situated some 200 feet below this level. The general location of the facility in respect to the State of Arizona is shown in Figure 8.1-1, Location Map.

The following data has been utilized for this study:

Elevation

Mill Site (average) - 1,950 ft.

Tailing Pond (approximate base) - 1,750 ft.

Temperatures

Mean Daily (maximum) - 86.6° F

(minimum) - 51.8° F

Maximum (extreme) - 120° F (July)

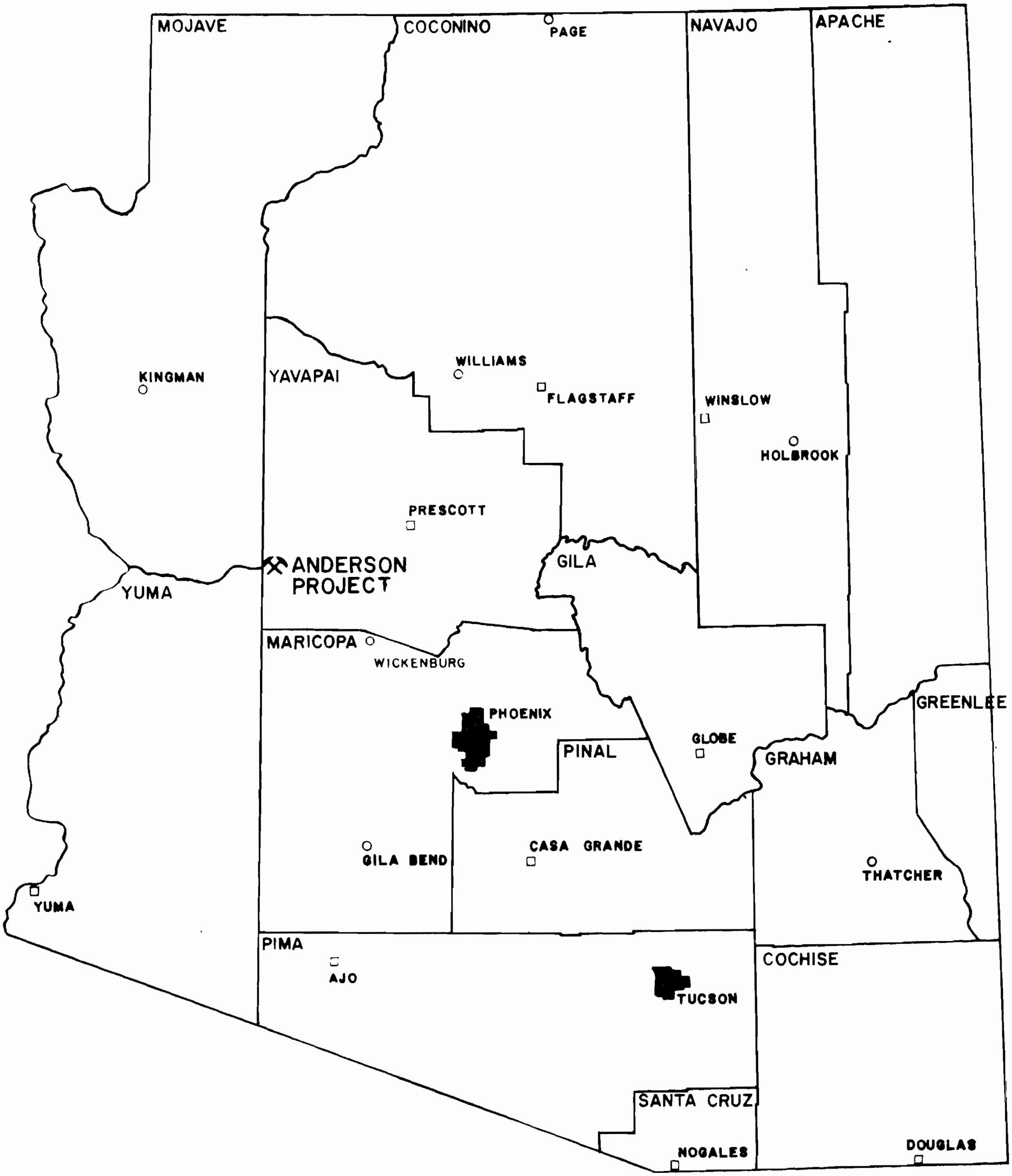
Minimum (extreme) - 10° F (January)

Wind

Predominant Direction - West Southwest

Velocity (maximum) - 80 MPH

Average - 7 MPH



SCALE IN MILES
0 10 20 50

UNION MINERALS EXPLORATION CO.

FIGURE 8.1-1

LOCATION MAP-ARIZ.

ANDERSON PROJECT

SCALE	DATE: FEB, 1978	APPROVED	REVISIONS
H: 1" = 40MI.	DRAWN BY: LRR		
V:	CHECKED:		
	DESIGN:		FILE:

Precipitation

Mean Yearly Rainfall - 7.47 inches per year

Average 24 Hour, 100 Year Storm - 4.5 inches

Maximum Probable 100 Year Storm - 12.5 inches

Evaporation Rate

76 to 80 Inches per Year (U.S. Department of Commerce, 1968)

Seismic

Zone II (Moderate damage; corresponding to intensity VII of the Modified Mercalli Intensity Scale of 1931. Ref.: "Uniform Building Code, 1970 Edition, Volume 1, Page 122.)

8.1.2 Ore Characteristics

The host rock consists mostly of carbonaceous shale, siltstone and limestone, with both relatively hard and soft layers. The deposit consists mainly of two ore horizons, referred to as the Middle Zone and the Lower Zone. These zones are highly variable with respect to both uranium and carbonate content. Chemical analyses of the ore were performed by Hazen Research, Inc., in April 1977, on drill core samples obtained from field drilling programs completed in 1975, 1976, and 1977. The CO_2 content varies from 0.03 to 32 percent CO_2, and U_3O_8 from 0.03 to 0.5 percent with no apparent correlation between them. The uranium mineral, as identified by the U.S. Bureau of Mines, Salt Lake City, on samples from the Anderson deposit is tyuyamunite ($Ca(UO_2)_2(VO_4)_2 \cdot 5\text{-}8\ H_2O$).

In December 1977, a composite corresponding to the "middle" and "late" mining periods was made, to approximate as close as possible, the predicted long term mill head grade of 0.069 percent U_3O_8.

Six different composites were prepared, each of which corresponds to a mining area. The composites, labelled A to F, are also intended to represent a time sequence of mining.

The composites analyzed as follows:

Composite	A	B	C	D	E	F
Weight - lb	75	81	136	68	80	46
Specific Gravity	2.36	2.41	2.28	2.38	2.41	2.47
Assays:						
U_3O_8 Fluorimetric	0.064	0.092	0.084	0.066	0.042	0.049
U_3O_8 Volumetric	0.061	0.100	0.091	0.067	0.045	0.049
V_2O_5	0.089	0.062	0.15	0.10	0.066	0.14
Mo	0.005	0.009	0.015	0.005	0.008	0.002
CO_2	8.0	9.1	3.4	2.7	6.2	1.6
PO_4	0.16	0.13	0.17	0.14	0.15	0.17
Cl	0.01	0.01	0.01	0.01	0.01	0.01
S	0.49	0.70	1.08	1.03	0.96	0.02

Other ore characteristics are as follows:

Specific Gravity	2.38
Bulk Density as Mined Ore	
Compacted	110 lb/cu ft
Loose	100 lb/cu ft
Moisture (Mine Run) - Assumed	15% maximum
Mill Design	10%

8.2 PROCESS DESIGN CRITERIA

8.2.1 General

Plant Feed Rate (dry basis):	2,000 TPD (average)
Design (90% Op. Eff.)	2,200 TPD (91.7 TPH)
Annual Rate	730,000 TPY (dry ore)
Ore Grade:	
Average	0.069% U_3O_8
Design	0.10% U_3O_8
Overall Recovery	88.5%
U_3O_8 Production (calculated)	(100% U_3O_8):
Pounds Per Day	2,443 (average), 3,960 (design)
Pounds Per Year	891,549

8.2.2 Ore Receiving and Grinding

Ore Pad	Gravel surfaced for ore storage, 550,000 ton capacity. 35-ton capacity end-dump trucks will be employed.
Feeding Method	3-1/2-yard front-end loader
Grinding Circuit	Semiautogenous grinding and rod mill grinding in closed circuit with a screen.
Product Size	Nominal minus 28 mesh and 80% passing 300 microns.
Pulp Density	SAG mill and rod mill discharge 55% solids (by weight)
Work Index	12.8

8.2.3 Leaching

Pulp Density	45% solids (by weight)
Flow	609.6 GPM
pH	1.5
emf (terminal)	minus 350 mv
Temperature	175° F
Acid Consumption (100% H_2SO_4):	
Average	415 lb/ton
Design	650 lb/ton
Chlorate Consumption:	
Average	6 lb/ton
Design	12 lb/ton
Retention Time	acid kill stage 1.5 hr remaining tanks 4.5 hr TOTAL 6.0 hr

8.2.4 CCD Circuit and Clarification

Number of Stages	5
Unit Area Required	7.0 sq ft/ton/24 hr
Size	140-ft diameter
Flocculant Usage:	
Type	Mg 200 (Dow Chemical)
Dosage:	
No. 1 Thickener	0.15 lb/ton
Total CCD	0.37 lb/ton
Underflow Pulp Density:	
Flowsheet	38%
Design	35%

Flow (at 38% solids)	765.5 GPM
Pregnant Liquor Flow (to S-X)	1,560 GPM
Glue Dosage:	0.10 lb/ton
Concentration	7.2 gpl

8.2.5 Solvent Extraction

Feed	1,560 GPM
Grade (average)	0.131 gpl
Grade (maximum)	0.211 gpl
Number of Stages	4
Solvent Concentration	2.5% Alamine 336 (by volume)
	2.5% Isodecanol (by volume)
	95.0% Kerosene (by volume)
Organic Loading	2.0 gpl U_3O_8
Advance Organic Flow	165 GPM
Settler Area	2,100 sq ft per stage
Stripping:	
Number of Stages	4
Strip Solution	150 GPM $(NH_4)_2SO_4$ with pH controlled at 4.0 - 4.3 with gaseous ammonia
Strip Liquor Flow	13.2 GPM
Strip Liquor Grade	25 gpl U_3O_8
Settler Area	160 sq ft per stage
NH_3 Requirement for Neutralization	0.4 lb/lb U_3O_8
Regeneration Stages	1

8.2.6 Yellowcake Precipitation and Washing

Precipitation Temperature	140° - 160° F
pH	7.3 - 8.2
NH_3 Required	0.2 lb/lb U_3O_8 (approx.)
Washing Thickener:	
Underflow	33% solids for flowsheet
Overflow	200 ppm solids
Centrifuge:	
Discharge Density	60% solids
Centrate Solids	2.0% of feed solids

8.2.7 Yellowcake Drying and Packaging

Dryer Feed (design)	40% solids
Capacity - Dry Solids/Day	4,680 lb yellowcake at 85% U_3O_8
Moisture Specification of Dried Product	Less than 2%
Packaging:	
Bulk Density of Yellowcake	80 lb/cu ft (loose)
Drum Capacity (55 gallon)	900 lb (approx.) per drum

8.2.8 Tailing Disposal

No. 5 Thickener Underflow Density:	
Flowsheet	38%
Design	35%
Solids	91.7 TPH
Flow (at 38% solids) (slurry)	765.5 GPM

Flow (at 38% solids) (solution)	605.7 GPM (Sp. Gr. 1.03)
Raffinate Bleed	0
Total Volume to Tailing Pond	765.5 GPM

8.3 PROCESS DESCRIPTION

8.3.1 General

The proposed uranium mill will process an average of 2000 short tons of ore per 24 hours, operating 365 days per year. During the first two years of operation, the estimated ore grade will be 0.080% U_3O_8 and the overall mill recovery, 90.13 percent. Under these conditions the mill will produce 1,052,718 pounds of U_3O_8 per year. For the remainder of the operation life, approximately 7.8 years, the mill will process 2000 short tons of ore per day with an average grade of 0.07% U_3O_8 and 88.6 percent overall recovery, with an annual production of 891,549 pounds of U_3O_8. A pictorial flowsheet of the process is shown in Drawing Nos. 21-53-0-101, 21-53-0-102 and 21-53-0-103 of Exhibit III-A. The Mill and Mine Facility Plot Plan, depicting the general plant layout, is shown in Drawing No. 21-53-0-104.

8.3.2 Ore Receiving (Drawing No. 21-53-0-105)

The mined ore will be hauled to the mill site in 35-ton capacity trucks. Ore hauling will commence nine months prior to mill start-up to accumulate a 550,000-ton stockpile. High grade ore will be blended with low grade ore to maintain a constant average mill feed grade. This ore will be transported from the stockpile to feed hopper with a front-end loader. The feed hopper capacity is 100 tons, and it will be equipped with a fixed grizzly with 18-inch square openings. The ore will be removed from the hopper by a 48-inch by 16-foot apron feeder. The feeder will discharge the ore through a fixed grizzly

(4-inch spacing) onto a 48-inch belt conveyor that conveys the ore to a semiautogenous mill located in the mill building. A dust collecting system has been provided in the hopper discharge area. All conveyors will be hooded at the discharge end and skirted at the feed end.

The wet scrubber has been rated to provide 99.5 percent efficiency.

A sump pump will be provided for cleaning purposes and to pump the scrubber discharge to the grinding area.

8.3.3 Grinding (Drawing No. 21-53-0-106)

The ore will be fed into the SAG mill feed chute. The feed rate is monitored by an automatic belt scale. Water is added on a controlled basis to produce a pulp of 55 percent solids. Grinding balls will be periodically added to the feed of the SAG mill.

The SAG mill discharge will pass through a trommel screen with 3/8-inch openings. The plus 3/8-inch material will be conveyed to feed a rod mill.

A tramp iron magnet will be installed on top of the oversize conveyor and ahead of the rod mill to prevent broken or worn out balls entering the rod mill. The minus 3/8-inch slurry will be pumped to the feed end of the rod mill. Water will be added to produce a discharge pulp of 55 percent solids. The rod mill discharge will be pumped to a screen to separate the minus 28-mesh product, which is finished product from the grinding circuit. The plus 28-mesh product will return to the rod mill for regrinding.

Due to the wide variation in ore hardness, variable speed drives will be installed on both the SAG and the rod mills.

8.3.4 Leaching (Drawing No. 21-53-0-108)

The ore pulp will be sampled and then pumped into two "acid kill" tanks. These two tanks will be in series and sized to handle the foam and high viscosity of the acid kill step. These tanks will provide about 1.5 hours of retention time for a pulp of 45 percent solids. Four additional leach tanks will provide about 4.5 hours of retention time. Mechanical agitators will be used in all six leach tanks.

Acid consumption during leaching has been estimated at 415 pounds per ton (100 percent H_2SO_4); however, acid handling facilities will be sized to handle up to 600 pounds H_2SO_4 per ton. Sodium chlorate solution will be added under controlled conditions to oxidize the ore. A leach temperature of 175° F will be maintained through the addition of steam. Adequate instrumentation will be provided to control reagent additions and temperature throughout the leaching process.

A wet scrubber will be provided to clean the fumes generated in the circuit. Scrubbed effluents will be returned to the circuit while clean gases will be released to the atmosphere.

8.3.5 CCD Circuit (Drawing No. 21-53-0-109)

The leaching pulp will discharge into a sump and will be pumped to the first of five 140-foot diameter washing thickeners.

In order to achieve adequate flocculation, the leached slurry will be mixed with thickener overflow solution in a sump and pumped to a mechanically agitated thickener feed mix tank. Part of the flocculant solution will be added to this tank while the balance is added by stages to the launder and finally to the thickener center well.

Thickener underflows will be handled with two diaphragm pumps, with both pumps required to handle the full tonnage rate at 35 percent solids.

Centrifugal pumps will be provided as spares for the diaphragm pumps. Two underflow lines will be provided for each thickener, with instrumentation provided to one line only (pulp density measurement and flow control).

A centrifugal pump will be utilized for feeding each thickener feed tank.

Piping will be arranged so that any thickener may be by-passed and recycled.

Raffinate solution and/or fresh water will be added to the fifth thickener and the thickener overflow will be advanced through the CCD circuit to the first thickener, thus generating the pregnant solution. The pregnant solution will contain about 150-250 ppm solids in suspension. The fifth thickener underflow, at approximately 38 percent solids, will be discarded after proper sampling to the tailing disposal area.

8.3.6 Clarification (Drawing No. 21-53-0-109)

In order to reduce the solids content of the pregnant solution from 150-200 ppm to 35-80 ppm, the solution will be pumped to a clarifier. A 70-foot diameter tank equipped with a rake mechanism will be provided for this purpose. A glue solution, at a rate of 0.1 pounds per ton, will be added to the clarifier to flocculate the suspended solids. The clarifier overflow will be pumped through a battery of three "polishing" sand filters. The filtrate, containing less than 10 ppm solids, will be routed to a holding tank to provide feed to the solvent extraction circuit.

8.3.7 Solvent Extraction (Drawing No. 21-53-0-110)

This circuit will have four stages of extraction and four stages of stripping. The clarified pregnant leach solution will be fed to the extraction circuit at a rate of 1,560 gpm with 0.131 gpl U_3O_8. The pregnant liquor solution will enter the first stage of extraction at the mixer tank where it is placed in intimate contact with an organic extractant to react with the uranium in solution. The organic extractant composition will be 2.5% Alamine 336, 2.5% isodecanol and 95% kerosene by volume.

Each stage of solvent extraction will include a "mixer" where the aqueous and organic solutions "intermix", followed by a "settler" where the two phases separate ("disengage"); the organic phase floating atop the aqueous phase in the settler. The barren aqueous solution, or raffinate, will be recycled to the circuit as wash solution to the last thickener of the CCD thickener.

The loaded organic will be pumped through a heat exchanger to the first stage of stripping. The temperature will be maintained at 86° F with steam. The strip solution used in this process contains 150 gpl of ammonium sulphate [$(NH_4)_2SO_4$]. The solution pH will be maintained at 4.0-4.3 with gaseous ammonia.

The loaded organic will be successively contacted with the strip liquor in four stripping stages to transfer the uranium to the aqueous phase. The pregnant uranium strip liquor will be subjected to a precipitation process with gaseous ammonia. A portion of the barren organic solution will be bled off to a regeneration mixer/settler for the purpose of removing impurities such as molybdenum and other organic contaminants which otherwise might build up in the circuit and prevent an efficient uranium extraction. The contaminant removal will be accomplished by treating the organic with a sodium bicarbonate solution and then returning the cleaned solvent to the barren organic storage tank.

An adequate fire protection system will be provided for this area. Heat sensors, properly located, will open water spray valves to deluge the surface of the tanks with water. The opening of the water valves will be alarmed in the control room.

8.3.8 Yellowcake Precipitation and Washing (Drawing No. 21-53-0-107)

The pregnant strip solution will be heated to 140°-160° F in a heat exchanger and fed to two agitated precipitation tanks in series. The pH will be adjusted to 7.3 to 8.2 with ammonia to precipitate uranium as ammonium diuranate.

The precipitate slurry will report to an 18-foot diameter washing thickener. The thickener overflow (barren strip solution) will return to the strip solution make-up tank after clarification in a continuous sand-type filter. The thickener underflow will be mixed with water for washing and dewatering in a centrifuge. The centrate reports back to the yellowcake washing thickener and the centrifuge solids will discharge to a dryer/calciner at about 60 percent solids. Gaseous and dust emissions in the precipitation area, yellowcake thickener and centrifuge, will be controlled with a wet scrubber installation. Any failure in the scrubber fan or water supply to the scrubber will be alarmed in the control room.

8.3.9 Yellowcake Drying and Packaging (Drawing No. 21-53-0-107)

The dryer/calciner unit will be an oil-fired, multiple hearth, Herreshoff-type furnace operated at about 750° F (higher temperatures can be achieved with this unit, if required).

The dryer will discharge into a roll mill to break any lumps larger than 0.25 inches. The yellowcake product, with less than two percent moisture and minus 0.25 inches, will be stored in a 275-cubic foot bin for packaging on the day shift.

The final product will be packed in 55-gallon steel drums (approximately 900 pounds per drum), hand-sampled and stored in shipping lots of approximately 40,000 pounds.

8.3.10 Tailing Disposal System (Drawing No. MEC-002)

Tailing slurry at about 38 percent solids will be gathered in a tailing sump. The tailings will consist of waste solids from the ore, water, minor quantities of unrecovered uranium values and small amounts of chemicals used in the milling process. The effluent stream will be sampled prior to the disposal.

The tailings will be transported by gravity to the tailing pond via high molecular weight plastic pipeline. A system of multiple drop boxes will be used to break the hydrostatic pressure generated between the mill site elevation and the tailing disposal area (approximately 200 feet difference).

The total length of pipe required will be approximately 1800 feet. The pipeline slope will be 1.5 percent. Ten drop boxes are included in the estimate for this study.

A system of multiple discharge points will be used at the tailings dam. The manifold system can be operated in such a manner that a damp sand beach can be maintained around the periphery of the pond.

8.4 PROCESS EQUIPMENT LIST

The major equipment items and related procurement information are presented in the following equipment list. This equipment requirement is based on the flowsheet developed for this final feasibility study. The equipment requirements may change slightly when the final flowsheet is developed for detailed engineering.

EQUIPMENT LIST

Client: MEC
Job: Anderson Project
Location: Wickenburg, Arizona

M-K Job No.: 1114
Date:

Equipment Number	Description	HP RPM	Weight lbs	Delivery Weeks	Price $	FOB Point Remarks
002	Air Compressor Rotary screw type, 450 cfm, 125 psig max	100	3,370	14-16	15,276	Holyoke, Mass. (Worthington)
003-004	Boilers 22,000 lb/hr, 125 psig max, with water treatment, feed system, deareator, fuel oil fired, complete package system	50	125,825	10	107,737	Kewanee, Il. (Kewanee)
005	Domestic Water Tank 40,000 gal capacity, mild steel, covered, with inspection manhole				29,800	Site
006	Forklift Truck 1 ton capacity		4,200	16	11,800	Arizona (Clark-Michigan)
007	Water Tank 500,000 gal capacity, mild steel, open top				94,880	Site
008	Fire Water Pump, Electric 1000 gpm, 125 psi with drive and motor	100	3,000	16	8,000	Indianapolis, In. (Peerless)
009	Fire Water Pump, Diesel 1000 gpm, 100 psi with drive and motor		5,000	32	18,000	Indianapolis, In. (Peerless)

EQUIPMENT LIST

Client: MEC
Job: Anderson Project
Location: Wickenburg, Arizona

M-K Job No.: 1114
Date:

Equipment Number	Description	HP RPM	Weight lbs	Delivery Weeks	Price $	FOB Point Remarks
010	Instrument Air Compressor 45 cfm, 60 psig, with drive and motor	7-1/2	850	8-10	1,922	Denver, Co. (Worthington)
011	Sulfuric Acid Unloading Compressor 100 cfm, 100 psig, with drive and motor	25	1,180	8	4,500	Denver, Co. (Worthington)
012	Emergency Power Generator 1000 kw, 480 v, 3 phase, 60 hz, diesel powered, skid mounted		22,575	16	102,546	Redwood City, Ca. (Allis-Chalmers)
013	Fresh-water Pump 150 gpm, 75' tdh, with drive and motor	5	344		861	Indianapolis, In. (Peerless)
014-015	Glandwater Pumps Horizontal centrifugal, cast iron, 150 gpm, 100' tdh, with drive and motor	10	610	18	1,762	Seneca Falls, NY (Gould)
016-017	Fresh Water Pumps, 800 gpm, 150' tdh	50	1,275		1,000	Indianapolis, In. (Peerless)
018-019	Potable Water Pumps, 36 gpm, 116' tdh	3	350		410	Indianapolis, In. (Peerless)
020	Potable Water Filtration Unit Duplex Mover		275		1,715	Michigan (Ronnigen-Petter)
021	Chlorination Unit for Potable Water 20 gpm		75		1,000	Philadelphia (PH Advance)

EQUIPMENT LIST

Client: MEC
Job: Anderson Project
Location: Wickenburg, Arizona

M-K Job No.: 1114
Date:

Equipment Number	Description	HP RPM	Weight lbs	Delivery Weeks	Price $	FOB Point Remarks
101-101a	Front-end Loader, 3-1/2 cu yd Rubber tired	--		26	78,051	Arizona (Caterpillar)
102	Surge Hopper, 100 ton capacity	--				
103	Apron Feeder, 48" x 16' Heavy duty, V.S. drive, 300 tph max	7-1/2	24,500	16	34,750	Duluth, Minn. (NICO)
104	Belt Conveyor, 48" x 304' SAG mill feed conveyor, components and motor only; structure not included	15	29,140	6-8	53,878	Clarksdale, Miss. (Stephans-Adamson)
105	Belt Scale, SAG mill feed 48", 0-300 tph, ± 0.5% accuracy with integrator and recording chart	--	350	6-8	5,410	Modesto, Ca. (Autoweigh, Inc.)
106	Semiautogenous Grinding Mill 16' diam x 5' with variable speed drive, motor and trommel screen	500	265,000	52	505,000	York, Pa. (Koppers)
107	SAG Mill Discharge Sump 900 gallon capacity					
108-109	Rod Mill Feed Pumps, Horizontal centrifugal, R.L., SS trim, 700 gpm, 52% solids, 25' tdh, with drives and motors	25	1,550 ea	14-16	3,255 ea	Colorado Springs, Co. (DECO)

EQUIPMENT LIST

Client: MEC
Job: Anderson Project
Location: Wickenburg, Arizona

M-K Job No.: 1114
Date:

Equipment Number	Description	HP RPM	Weight lbs	Delivery Weeks	Price $	FOB Point Remarks
110	Trommel Oversize Belt Conveyor No. 1 18" x 18'; components and motor only; structure not included	5	3,100	6-8	4,413	Clarksdale, Miss. (Stephans-Adamson)
111	Trommel Oversize Belt Conveyor No. 2 18" x 64'; components and motor only; structure not included	5	5,300	6-8	6,175	Clarksdale, Miss. (Stephans-Adamson)
112	Tramp Iron Magnet self-cleaning electromagnet, with control, drive and motor	3	2,700	12	5,500	Cudahy, Wisc. (Stearns-Magnetics)
113	Rod Mill, 9'6" diam x 16' with variable speed drive, motor	600	195,000	52	322,000	York, Pa. (Koppers)
114	Rod Mill Discharge Sump 1200 gallon capacity					
115-116	Classifier Screen Feed Pumps Horizontal centrifugal, R.L., SS trim, 700 gpm, 55% solids, 25' tdh, mechanical seals, with drives and motor	25	1,550 ea	14-16	3,255 ea	Colorado Springs, Co. (DECO)
117	Classifier Screen sieve bend type, 6' wide	--	1,500	6	5,500	Stamford, Ct. (Dorr-Oliver)

EQUIPMENT LIST

Client: MEC
Job: Anderson Project
Location: Wickenburg, Arizona

M-K Job No.: 1114
Date:

Equipment Number	Description	HP RPM	Weight lbs	Delivery Weeks	Price $	FOB Point Remarks
118	Sampling System, Leach Feed Complete 3-stage system with motors and drives. Interconnecting piping not included	1	850	14-16	7,900	Colorado Springs, Co. (DECO)
119	Leach Feed Sump, 1200 gallon capacity					
120-121	Leach Feed Pumps, horizontal centrifugal, R.L., SS trim, 700 gpm, 50% solids, 50' tdh, mechanical seals, with drives and motors	15	1,550 ea	14-16	3,050 ea	Colorado Springs, Co. (DECO)
122	Density/Flowmeter, Leach Feed	--	170	18	8,009	Rochester, NY (Taylor) Austin, TX (Texas Nuclear)
123	Wet Scrubber, Ore Receiving Area 2000 cfm, M.S. construction, with fan, drive, and motor	10	1,050	10	6,795	Cleveland, Ohio (Sly Mfg. Co.)
124	Sump Pump, Ore Receiving Area Vertical centrifugal, R.L., SS trim, 50 gpm, 35' tdh	7.5	500	16-18	1,558	Salt Lake, Ut. (Galigher)
125	Sump Pump, Grinding Area Vertical centrifugal, R.L., SS trim, 50 gpm, 35' tdh	7.5	500	16-18	1,558	Salt Lake, Ut. (Galigher)
126	Rod Mill Rod Charger Machine	5	6,000	16-18	9,000	Phoenix, Az. (Riffle Mfg. Co.)

EQUIPMENT LIST

Client: MEC
Job: Anderson Project
Location: Wickenburg, Arizona

M-K Job No.: 1114
Date:

Equipment Number	Description	HP RPM	Weight lbs	Delivery Weeks	Price $	FOB Point Remarks
127	Grinding Area Overhead Crane 80' span, 15 ton capacity with 5 ton auxiliary	28.5	33,730	15	63,720	Arizona (Shepard-Niles)
128	SAG Mill Liner Handler	15	8,500	52	50,000	York, Pa. (Koppers)
201-202	Acid Mix Tanks 20' Ø x 26', mild steel, rubber lined					
203-206	Leach Tanks 20' Ø 22', mild steel, rubber lined					
207-212	Agitators, Acid Mix and Leach Tanks wetted parts 316 SS, motor and drive included	150	23,000 ea	16-18	51,490 ea	Salt Lake, Ut. (Galigher)
213	Leach Discharge Sump 6' Ø x 10', mild steel, rubber lined					
214-215	Leach Discharge Pumps horizontal centrifugal, R.L., SS trim, 750 gpm, 50' tdh, 45% solids, mechanical seals, with drives and motors	25	1,550 ea	14-16	3,050 ea	Colorado Springs, Co. (DECO)
216	Wet Scrubber, Leaching Area 5000 cfm, SS construction, with fan, drive, and motor	15	1,500	10	8,960	Cleveland, Ohio (Sly Mfg. Co.)

EQUIPMENT LIST

Client: MEC
Job: Anderson Project
Location: Wickenburg, Arizona

M-K Job No.: 1114
Date:

Equipment Number	Description	HP RPM	Weight lbs	Delivery Weeks	Price $	FOB Point Remarks
217	Sump Pump, Leaching Area Vertical centrifugal, R.L., SS trim, 50 gpm, 30' tdh, with drive and motor	5	467	16-18	1,562	Salt Lake, Ut. (Galigher)
301-305	Thickener Feed Sumps 8' Ø x 8', rubber lined mild steel					
306-315	Thickener Feed Pumps Horizontal centrifugal, R.L., SS trim, 2700 gpm, 50' tdh, complete with drives and motors	100	5,050 ea	14-16	8,485 ea	Colorado Springs, Co. (DECO)
316-320	Mix Tanks 8' Ø x 8', rubber lined mild steel					
321-325	Agitators, Mix Tanks Wetted parts rubber covered mild steel, with drives and motors	7.5	1,800 ea	16-18	3,800 ea	Salt Lake, Ut. (Galigher)
326-330	Thickeners 140' Ø x 10', mild steel, rubber covered.					
331-335	Thickener Mechanisms Center pier type, 316 SS rake arms, blades and cone, with lifting device, drives and motors	5 1.5	86,400 ea	50	169,760 ea	Colorado Springs, Co. (DECO)
336-345	Thickener Underflow Pumps Diaphragm type, rubber lined, 910 gpm, 35' tdh, complete with drives and motors	7.5	5,500 ea	30	21,000 ea	Stamford, Ct. (Dorr-Oliver)

EQUIPMENT LIST

Client: MEC
Job: Anderson Project
Location: Wickenburg, Arizona

M-K Job No.: 1114
Date:

Equipment Number	Description	HP RPM	Weight lbs	Delivery Weeks	Price $	FOB Point Remarks
346-350	Thickener Underflow Stand-by Pumps Horizontal centrifugal, R.L., SS trim, 910 gpm, 35' tdh, with drives and motors	20	2,100	14-16	4,040 ea	Colorado Springs, Co. (DECO)
351-355	Density/Flowmeters, Thickener U'Flow Gamma gage type with magnetic flowmeter tantalum electrodes, neoprene lined	--	1,110 ea	24	4,500 ea	Arlington Heights, Il. (K-Ray) (Foxboro)
356	No. 1 Thickener Overflow Sump 8' Ø x 8', M.S., rubber covered					
357-358	No. 1 Thickener Overflow Sump Pumps Horizontal centrifugal, R.L., SS trim, 1800 gpm, 20' tdh, with motors and drives	20	1,825 ea	14-16	4,372 ea	Colorado Springs, Co. (DECO)
359	Sampling System, Tailing Two-stage, complete with timer drives and motors	1	625	16-18	5,400	Colorado Springs, Co. (DECO)
360	Tailing Sump 8' Ø x 8', M.S., rubber covered					
361	Sump Pump, CCD Area Vertical centrifugal, 50 gpm, 25' tdh, R.L., SS trim, with drive and motor	5	467	16-18	1,502	Salt Lake, Ut. (Galigher)

EQUIPMENT LIST

Client: MEC
Job: Anderson Project
Location: Wickenburg, Arizona

M-K Job No.: 1114
Date:

Equipment Number	Description	HP RPM	Weight lbs	Delivery Weeks	Price $	FOB Point Remarks
401	Clarifier-Thickener 70' Ø x 18', M.S., rubber lined					
402	Clarifier Mechanism Wetted parts 316 SS, with lifting device, drives and motors	5 1.5	35,000	40	68,000	Colorado Springs, Co. (DECO)
403	Clarifier Underflow Pump Horizontal centrifugal, R.L., SS trim, 20 gpm, 30' tdh, with drive and motor	3	300	14-16	1,840	Colorado Springs, Co. (DECO)
403a	Flowmeter, Clarifier Underflow Magnetic type, tantalum electrodes, teflon lined, with transmitter and recorder		85	16	4,614	Rochester, NY (Taylor)
405-406	Sand Filter Feed Pumps Horizontal centrifugal, R.L., SS trim, 1800 gpm, 80' tdh, with drives and motors	60	2,300 ea	14-16	5,550 ea	Colorado Springs, Co. (DECO)
407-409	Sand Filters 11' Ø x 6', M.S., rubber covered, skid mounted, complete with anthracite media		160,000	20-22	190,000	Los Angeles, Ca. (Western Water Equipment Co.)
410	Pregnant Solution Storage Tank 50' Ø x 28', M.S., rubber covered					
411-412	Sand Filter Backwash Pumps Horizontal centrifugal, R.L., SS trim, 1000 gpm, 135' tdh, with drives and motors	75	2,300 ea	14-16	5,550 ea	Colorado Springs, Co. (DECO)

EQUIPMENT LIST

Client: MEC
Job: Anderson Project
Location: Wickenburg, Arizona

M-K Job No.: 1114
Date:

Equipment Number	Description	HP RPM	Weight lbs	Delivery Weeks	Price $	FOB Point Remarks
413-414	Solvent Extraction Feed Pumps Horizontal centrifugal, R.L., SS trim, 1800 gpm, 30' tdh, with drives and motors	30	2,250 ea	14-16	4,300 ea	Colorado Springs, Co. (DECO)
501	Sampling System, S-X Feed Single stage, complete with timer		25	10	1,835	Yorkville, Il. (Bristol)
502	Flowmeter, Solvent Extraction Feed Magnetic type, tantalum electrodes, teflon lined, with transmitter and recorder		130	16	6,317	Rochester, NY (Taylor)
503-506	Mixer-Settler Tanks, Extraction Mixer tanks, 8' x 8' x 8' Settler tanks, 30' x 70' x 5-1/2' FRP lined concrete					
507-510	Agitators, Extraction Mixers Wetted parts 316 SS, with drives and motors	10	2,600 ea	16-18	7,878 ea	Salt Lake, Ut. (Galigher)
511-512	Raffinate Feed Pumps Horizontal centrifugal, 316 SS, 1800 gpm, 30' tdh, with drives and motors	25	2,350 ea	18	6,100 ea	Seneca Falls, NY (Gould)
513	Sampling System, Raffinate Single stage, complete with timer	1	25	10	1,835	Yorkville, Il. (Bristol)
514	Raffinate Tank 65' Ø x 12', M.S., FRP lined					

EQUIPMENT LIST

Client: MEC
Job: Anderson Project
Location: Wickenburg, Arizona

M-K Job No.: 1114
Date:

Equipment Number	Description	HP RPM	Weight lbs	Delivery Weeks	Price $	FOB Point Remarks
515-516	Raffinate Tank Discharge Pumps Horizontal centrifugal, 316 SS, 1800 gpm, 30' tdh, with motors and drives	25	2,350 ea	18	6,100 ea	Seneca Falls, NY (Gould)
517-518	Flowmeters, Raffinate Magnetic type, tantalum electrodes, teflon lined, with transmitter and recorder		130 ea	18	6,317 ea	Rochester, NY (Taylor)
519-520	Pregnant Organic Feed Pumps Vertical centrifugal, 316 SS, 220 gpm 20' tdh, with drives and motors	5	595 ea	18	5,617 ea	Seneca Falls, NY (Gould)
521	Pregnant Organic Tank 18' Ø x 14', FRP lined mild steel, covered and vented					
522-523	Pregnant Organic Tank Discharge Pumps Horizontal centrifugal, 316 SS, 220 gpm, 30' tdh, with drives and motors	5	520 ea	18	1,522 ea	Seneca Falls, NY (Gould)
524	Pregnant Organic Tank Bleed Off Pump Horizontal centrifugal, 316 SS, 20 gpm, 20' tdh, with drive and motor	1	240 ea	18	1,200 ea	Seneca Falls, NY (Gould)
525	Heat Exchanger, Pregnant Organic Impervious block graphite, steam heated			5	4,069	So. Plainfield, NJ (Kearney Industries)
526	Sampling System, Pregnant Organic Single stage, complete with timer		25	10	1,835	Yorkville, Il. (Bristol)

EQUIPMENT LIST

Client: MEC
Job: Anderson Project
Location: Wickenburg, Arizona

M-K Job No.: 1114
Date:

Equipment Number	Description	HP RPM	Weight lbs	Delivery Weeks	Price $	FOB Point Remarks
527	Flowmeter, Pregnant Organic		85	16	4,614	Rochester, NY (Taylor)
528-531	Mixer-Settler Tanks, Stripping Mixer tanks, 5' x 5' x 8' Settler tanks, 8' x 20' x 5-1/2' FRP lined concrete					
532-535	Agitators, Stripping Mixers 316 SS, with drives and motors	3	1,250 ea	16-18	4,079 ea	Salt Lake, Ut. (Galigher)
536-538	Barren Organic Feed Pumps Vertical centrifugal, 316 SS, 220 gpm, 20' tdh, with drives and motors	5	595 ea	18	5,617 ea	Seneca Falls, NY (Gould)
539	Sampling System, Barren Organic Single stage, complete with timer		25	10	1,835	Yorkville, Il. (Bristol)
540	Mixer-Settler Tank, Regeneration Mixer, 5' x 5' x 8' Settler, 3/8' x 20' x 5-1/2' FRP lined concrete					
541	Agitator, Regeneration Mixer Wetted parts 316 SS, with drive and motor	3	1,250 ea	16-18	4,079 ea	Salt Lake, Ut. (Galigher)

EQUIPMENT LIST

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M-K Job No.: 1114
Date:

Equipment Number	Description	HP RPM	Weight lbs	Delivery Weeks	Price $	FOB Point Remarks
542	Regeneration Aqueous Discharge Pump Horizontal centrifugal, 316 SS, 10 gpm, 30' tdh, with drive and motor	1	240	18	1,200	Seneca Falls, NY (Gould)
543	Barren Organic Tank 18' Ø x 14', FRP lined, mild steel, covered and vented					
544-545	Barren Organic Tank Discharge Pumps Horizontal centrifugal, 316 SS, 220 gpm, 35' tdh, with drives and motors	5	500 ea	18	2,180 ea	Seneca Falls, NY (Gould)
546	Barren Organic Tank Bleed-Off Pump Horizontal centrifugal, 316 SS, 20 gpm, 20' tdh, with drive and motor	1	240	18	1,200	Seneca Falls, NY (Gould)
547	Flowmeter, Barren Organic		85	16	4,614	Rochester, NY (Taylor)
548	Organic Sludge Tank 20' Ø x 20', FRP lined mild steel, covered and vented					
549	Agitator, Organic Sludge Tank Wetted parts 316 SS, with drive and motor	40	12,000	16-18	24,000	Salt Lake, Ut. (Galigher)

EQUIPMENT LIST

Client: MEC
Job: Anderson Project
Location: Wickenburg, Arizona

M-K Job No.: 1114
Date:

Equipment Number	Description	HP RPM	Weight lbs	Delivery Weeks	Price $	FOB Point Remarks
550	Organic Sludge Tank Supernatant Crud Pump; Horizontal centrifugal, 316 SS, 30 gpm, 35' tdh, with drive and motor	1	240	18	1,200	Seneca Falls, NY (Gould)
551	Sampling System, Supernatant Crud and Regeneration Aqueous Discharge Single stage, complete with timer		25	10	1,835	Yorkville, Il. (Bristol)
552	Organic Sludge Tank Discharge Pump Horizontal centrifugal, 316 SS, 30 gpm, 35' tdh, with drive and motor	1	240	18	1,200	Seneca Falls, NY (Gould)
553-554	Pregnant Strip Solution Feed Pumps Vertical centrifugal, 316 SS, 20 gpm, 15' tdh, with drives and motors	1	530 ea	18	4,465 ea	Seneca Falls, NY (Gould)
555	Sampling System, Pregnant Strip Solution Single stage, complete with timer		25	10	1,835	Yorkville, Il. (Bristol)
556	Sump Pump, Extraction Area Vertical centrifugal, 316 SS, 50 gpm, 30' tdh, with drive and motor	2	535	18	4,510	Seneca Falls, NY (Gould)
557	Sump Pump, Stripping Area Vertical centrifugal, 316 SS, 50 gpm, 30' tdh, with drive and motor	2	535	18	4,510	Seneca Falls, NY (Gould)
601	Heat Exchanger, Pregnant Strip Solution Impervious block graphite			5	3,024	So. Plainfield, NJ (Kearney Industries)

EQUIPMENT LIST

Client: MEC
Job: Anderson Project
Location: Wickenburg, Arizona

M-K Job No.: 1114
Date:

Equipment Number	Description	HP RPM	Weight lbs	Delivery Weeks	Price $	FOB Point Remarks
602-603	YC Precipitation Tanks 5' Ø x 6', FRP lined mild steel					
604-605	Agitators, YC Precipitation Tanks Wetted parts 316 SS, complete with drives and motors	5	1,100 ea	16-18	2,500 ea	Salt Lake, Ut. (Galigher)
606	YC Thickener 18' Ø x 5', mild steel, FRP lined					
607	YC Thickener Mechanism Wetted parts 316 SS, complete with drive and motor	1-1/2	4,500	40	17,000	Colorado Springs, Co. (DECO)
608	YC Thickener Underflow Pump Air operated diaphragm type, hypalon lined, 1 gpm, 20' tdh, complete with timer and check valves		300	20	1,711	Stamford, Ct. (Dorr-Oliver)
609	Flowmeter, YC Thickener Underflow Magnetic type, tantalum electrodes, teflon lined, with transmitter and recorder		60	14-16	4,066	Rochester, NY (Taylor)
610	YC Thickener Underflow Tank 8' Ø x 8', mild steel, FRP lined, covered					
611	Agitator, YC Thickener Underflow Tank Wetted parts 316 SS, complete with drive and motor	7.5	1,800	16-18	3,800	Salt Lake, Ut. (Galigher)

EQUIPMENT LIST

Client: MEC
Job: Anderson Project
Location: Wickenburg, Arizona

M-K Job No.: 1114
Date:

Equipment Number	Description	HP RPM	Weight lbs	Delivery Weeks	Price $	FOB Point Remarks
612	YC Centrifuge Feed Pump	1	285	16	1,837	San Leandro, Ca. (Moyno)
613	Unclarified Barren Strip Solution Tank 8' Ø x 8', mild steel, FRP lined					
614-615	Barren Strip Sand Filter Feed Pumps Horizontal centrifugal, 316 SS, 30 gpm, 80' tdh, with drives and motors	5	455 ea	18	1,181 ea	Seneca Falls, NY (Gould)
616	Barren Strip Sand Filter 2' Ø, rubber lined mild steel, skid mounted		2,450	16	22,688	Huntington Beach, Ca. (Baker Filtration)
617	Clarified Barren Strip Solution Tank 8' Ø x 8', mild steel, FRP lined					
618-619	Barren Strip Feed Pumps Horizontal centrifugal, 316 SS, 30 gpm, 20' tdh, with drives and motors	1	240 ea	18	1,200 ea	Seneca Falls, NY (Gould)
620	Flowmeter, Barren Strip Feed Solution Magnetic type, tantalum electrodes, teflon lined, with transmitter and recorder		60	14-16	4,066	Rochester, NY (Taylor)
621	Sampling System, Barren Strip Feed Solution; single stage , complete with timer		25	10	1,835	Yorkville, Il. (Bristol)

EQUIPMENT LIST

Client: MEC
Job: Anderson Project
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M-K Job No.: 1114
Date:

Equipment Number	Description	HP RPM	Weight lbs	Delivery Weeks	Price $	FOB Point Remarks
622	Flowmeter, Barren Strip Bleed-off Solution; Magnetic type, tantalum electrodes, teflon lined, with transmitter and recorder		60	14-16	4,066	Rochester, NY (Taylor)
623	Sampling System, Barren Strip Bleed-off Solution Single stage, complete with timer		25	10	1,835	Yorkville, Il. (Bristol)
624	Sand Filter Backwash Pump Horizontal centrifugal, 316 SS, 30 gpm, 135' tdh, with drive and motor	3	245	18	1,225	Seneca Falls, NY (Gould)
625	Backwash Surge Tank 4' Ø x 4', mild steel, FRP lined					
626	YC Centrifuge Solid bowl type, 316 SS, complete with drive and motor	20	1,200	33	30,000	Stamford, Ct. (Dorr-Oliver)
627	YC Screw Conveyor to Dryer 316 SS screw and housing, complete with drive and motor	1	300	8	2,000	New Jersey (Acrison)
628	YC Dryer Multiple hearth type, to dry 194 lb/hr from 60% to 2% moisture, diesel or LPG fired, complete with motor and drive	20	45,000	40-42	142,000	Deming, NM (Skinner)

EQUIPMENT LIST

Client: MEC
Job: Anderson Project
Location: Wickenburg, Arizona

M-K Job No.: 1114
Date:

Equipment Number	Description	HP RPM	Weight lbs	Delivery Weeks	Price $	FOB Point Remarks
629	YC Roll Crusher To crush lumps to pass 3/8" screen, complete with common base, drives and motors	10	2,000	12-14	9,208	Belleville, Il. (Gundlach)
630	YC Storage Bin 275 cu ft capacity, 7' Ø, conical bottom, M.S. construction					
631	Drum Vibrator Electric type, attach to YC drums to compact YC		106	3	970	Stan Hope, New Jersey (Durapak)
632	YC Platform Scale			14	8,927	Salt Lake, Ut. (Fairbanks)
633	Roller Conveyor 24" x 120', heavy duty, with drive and motor	1	1000	4-6	6,400	Salt Lake, Ut.
634	Wet Scrubber, YC Precip., Thickener and Centrifuge Area 1200 cfm, 316 SS construction, complete with fan, drive and motor	10	1,050	10	6,795	Cleveland, Ohio (Sly Mfg. Co.)
635	Wet Scrubber, YC Dryer 600 cfm, 316 SS construction, complete with fan, drive and motor	5	1,050	10	6,345	Cleveland, Ohio (Sly Mfg. Co.)
636	Wet Scrubber, YC Packaging 600 cfm, 316 SS construction, complete with fan, drive and motor	5	1,050	10	6,345	Cleveland, Ohio (Sly Mfg. Co.)

EQUIPMENT LIST

Client: MEC
Job: Anderson Project
Location: Wickenburg, Arizona

M-K Job No.: 1114
Date:

Equipment Number	Description	HP RPM	Weight lbs	Delivery Weeks	Price $	FOB Point Remarks
637	Sump Pump, Precipitation Area Vertical centrifugal, 316 SS, 30 gpm, 25' tdh, with drive and motor	1	530	18	4,465	Seneca Falls, NY (Gould)
638	Sump Pump, Drying and Packaging Area Vertical centrifugal, 316 SS, 30 gpm, 25' tdh, with drive and motor	1	530	18	4,465	Seneca Falls, NY (Gould)
701-702	Sulfuric Acid Storage Tanks 65' Ø x 30', M.S., covered, vented, with inspection manhole					
703-704	Acid Transfer Pumps Horizontal centrifugal, cast iron, mechanical seals, 70 gpm, 100' tdh, with drives and motors	5	455	18	1,181	Seneca Falls, NY (Gould)
705	Sodium Chlorate Solution Storage Tank 24' Ø x 16', M.S. construction, covered and vented, phenolic resin lined					
706-707	Sodium Chlorate Metering Pumps Cast iron, up to 10 gpm, 30' tdh, with drives and motors	2			3,200	Philadelphia, Pa. (Milton Roy)
708	Reagent Area Sump Pump Vertical centrifugal, 316 SS, 50 gpm, 30' tdh, with drive and motor	2	535	18	4,510	Seneca Falls, NY (Gould)
709-710	Flocculant Storage Tanks 20' Ø x 16', mild steel, covered, vented					

EQUIPMENT LIST

Client: MEC
Job: Anderson Project
Location: Wickenburg, Arizona

M-K Job No.: 1114
Date:

Equipment Number	Description	HP RPM	Weight lbs	Delivery Weeks	Price $	FOB Point Remarks
711	Flocculant Vibrating Feeder 250 lb/hr, complete with control		25	8	237	Erie, Pa. (Eriez)
712	Flocculant Transfer Pump Horizontal centrifugal, cast iron, 150 gpm, 25' tdh, complete with drive and motor	15	2,135		5,234	San Leandro, Ca. (Moyno)
713-714	Flocculant Metering Pumps M.S. rotor, rubber stator, 50 gpm, 40' tdh, with drives and motors	5	1,015		2,796	San Leandro, Ca. (Moyno)
715-716	Glue Preparation Tanks 8' Ø x 10', mild steel, open tops					
717	Glue Solution Transfer Pump Mild steel, 30 gpm, 15' tdh, with drive and motor	3	895		2,406	San Leandro, Ca. (Moyno)
718-719	Glue Solution Metering Pumps 5 gpm, 30' tdh, with drives and motors	1	380		1,082	San Leandro, Ca. (Moyno)
720	Kerosene Tank 6' Ø x 22', M.S. construction, covered, vented					
721	Kerosene Transfer Pump Cast iron, mechanical seal, 50 gpm, 35' tdh, with drive and motor	2	250		500	Indianapolis, In. (Peerless)

EQUIPMENT LIST

Client: MEC
Job: Anderson Project
Location: Wickenburg, Arizona

M-K Job No.: 1114
Date:

Equipment Number	Description	HP RPM	Weight lbs	Delivery Weeks	Price $	FOB Point Remarks
722	Liquid Anhydrous Ammonia Tank 20 ton capacity, mild steel					
723	Ammonia Vaporizer 100 lb/hr rate		500	12	2,000	So. Dartmouth, Ma. (Thermax)
724	Sodium Bicarbonate Solution Tank 5' Ø x 6', mild steel					
725-726	Sodium Bicarbonate Solution Pumps Cast iron, gland seal, 5 gpm, 15' tdh, with drives and motors	1	200	6	675	Dayton, Ohio (Duriron)
727	Alamine Solution Tank 3' Ø x 3', mild steel					
728	Isodecanol Tank 3' Ø x 3', mild steel					
729	Sodium Chlorate Solution Transfer Pump Cast iron, horizontal centrifugal, 300 gpm, 35' tdh, mechanical seals, with drive and motor	7.5	655	18	2,867	Seneca Falls, NY (Gould)
730	Sodium Chlorate Solution Tank 15' Ø x 16', mild steel, phenolic resin lined					

EQUIPMENT LIST

Client: MEC
Job: Anderson Project
Location: Wickenburg, Arizona

M-K Job No.: 1114
Date:

Equipment Number	Description	HP RPM	Weight lbs	Delivery Weeks	Price $	FOB Point Remarks
731	Agitator for 8' Ø x 10' glue preparation tank; mild steel, with drive, motor, propeller assembly and super structure	5	1,800	16-18	3,700	Salt Lake, Ut. (Galigher)
732	Agitator for 20' Ø x 16' flocculant tank; mild steel, with drive, motor, propeller assembly and super structure	30	7,000	16-18	14,500	Salt Lake, Ut. (Galigher)
733	Agitator for 5' Ø x 6' sodium bicarbonate tank/ rubber covered mild steel wetted parts with drive, motor, propeller assembly and super structure	5	1,500	16-18	3,200	Salt Lake, Ut. (Galigher)
734	Agitator for 15' Ø x 16' sodium chlorate tank; rubber covered mild steel wetted parts with drive, motor, propeller assembly and super structure	30	6,000	16-18	13,300	Salt Lake, Ut. (Galigher)

8.5 INSTRUMENTATION

The basic instrumentation philosophy used for the Anderson Project conceptual design was to provide modern, fast response instruments in those areas where they can be of effective use to plant operators. A brief description of the instrumentation philosophy, by area, is presented below:

8.5.1 Grinding

The controls for the grinding circuit components will be mounted on a control panel located in the mill control room. The semi-autogenous mill and rod mill speed will be remotely controlled from this control panel. The mills, pumps and conveyors that comprise the grinding circuit will be interlocked and sequenced to prevent material spillage and equipment damage. Recording ammeters, start-stop button and equipment status lights will be located in the control panel. Local start-stop and jog stations will be provided at the equipment locations.

An integrating belt scale will be mounted on the semiautogenous mill feed conveyor. It will provide a control signal for the variable speed apron feeder and the feed water control valve.

A mass flow and density control system will be used to monitor the leach circuit feed. This system will control the leach feed density by controlling the water addition at the classifier screen. It will also be used to totalize the flow for metallurgical accounting purposes.

8.5.2 Leaching

The following instrumentation will be provided:

a. A pH recorder/controller for acid mix tanks Nos. 1 and 2.

b. Acid flowmeters and totalizers to the acid mix tanks Nos. 1 and 2, and leach tanks Nos. 1 and 2.

c. A multipoint emf recorder in leach tanks Nos. 2 and 4.

d. A totalizing flow indicator for sodium chlorate addition to acid mix tanks Nos. 1 and 2, and leach tanks Nos. 1 and 2.

e. A temperature recorder for leach tanks Nos. 3 and 4.

8.5.3 CCD and Clarification

The following instrumentation will be provided:

a. Torque recorders and alarms for the thickener mechanisms.

b. Gamma gauge density and magnetic flowmeter recorders on each thickener underflow.

c. A flow recorder/controller for fresh water to CCD.

d. A flowmeter for flocculant addition to each thickener.

e. The instrumentation for the sand filters will be provided by the supplier of the filters.

f. A flow indicator/controller on the clarifying thickener underflow to leach or CCD.

8.5.4 Solvent Extraction

The following instrumentation will be provided:

a. Flow recorder/controllers on the following process streams:

   (1) Pregnant solution feed

   (2) Barren organic to solvent extraction

(3) Pregnant organic to stripping

(4) Barren strip solution to stripping

(5) Soda ash solution feed to regeneration

b. A temperature indicator/controller on pregnant organic to stripping.

c. A pH recorder/controller for automatic addition of ammonia to stripping stages Nos. 1, 2 and 3.

d. Level indicators on each of the following tanks:

(1) Pregnant organic tank

(2) Barren organic tank

(3) Pregnant solution storage tank

(4) Unclarified barren strip solution tank

(5) Clarified barren strip solution tank

(6) Raffinate tank

(7) Organic sludge tank

8.5.5 Precipitation

The following instrumentation will be provided:

a. A pH recorder/controller for ammonia addition to precipitation tank No. 1. (Manual control of ammonia feed to precipitation tank No. 2 will be provided.)

b. A temperature recorder/controller on precipitation tank No. 1.

8.5.6 Yellowcake Washing and Drying

The following instrumentation will be provided:

a. A flowmeter for wash water and scrubber solution to the centrifuge feed.

b. A flowmeter for water makeup and solution input to dryer scrubber.

c. The dryer instrumentation, draft control, temperature recorders, fuel oil gauges, etc., will be provided by the supplier of the dryer.

8.5.7 Dust Collecting System

All dust collecting systems will be equipped with protective devices, such as alarms in case of lack of power or insufficient flow of water. The instrumentation for the correct operation of the dust collection equipment will be supplied by the manufacturer.

8.6 MILL FACILITIES

8.6.1 Site Description

The mill complex will be located in a generally rectangular area approximately 1000 feet by 1600 feet, and will lay in the area between East 87600 to 88850 and North 1207600 to North 1208870 in Section 10, R10W, T11N, in Yavapai County, Arizona. The tailing pond area will lay to the southwest in the area between East 89000 to East 92000 and North 1204000 to North 1207000 as shown on the area Plot Plan.

Grade elevations for the mill building, leach tanks, solvent extraction, CCD thickeners, office, shop and other ancillary facilities will be at 1950 feet. Receiving hopper and feeder will be at 1924 feet.

The general drainage pattern will be to the south and drain trenches will be used to channel rainwater and spillage away from the mill area buildings to a collecting sump and returned to the mill circuit. Road entry to the mill complex will be from the south and east. The south access will carry material deliveries and commuter traffic while the east entry will carry the haulage vehicles and other mine traffic. Employee parking will be provided adjacent to the south entry road outside of the fenced area, and space will be provided for parking company and salaried employees' vehicles on the south side of the office and lab building. All employees will enter the plant through a security gatehouse where a full-time guard will also control vehicle access to the mill complex. All major roads will be paved with asphalt.

The ore pad covers approximately 620,000 square feet, and will have a total capacity of 550,000 tons. The pad will be constructed mostly on fill. Grade elevation top of receiving hopper will be at 1950 feet.

8.6.2 Steam Generation

Two 22,000-pounds-per-hour 125 psig oil-fired boilers complete with water treatment feed system (packaged units) will supply the process steam for the leaching, solvent extraction, precipitation and sodium chlorate facilities.

8.6.3 Standby Power

Standby power should be provided to operate the following equipment during a failure of the normal electrical power supply.

a. Leach agitator drive; all to be connected, but only one at a time to be driven

b. Leach discharge pump

c. All CCD thickener drives and rake lifting devices

d. Thickener underflow diaphragm pumps

e. Slurry advance pump on each thickener

f. Solvent extraction area sump pumps

g. Yellowcake thickener drive and underflow pump

h. Yellowcake dryer drive and cooling fan

i. Plant lighting

j. Instrument air

k. Gland water pump

l. Steam boiler

8.6.4 Water Distribution

The major requirements for operation of the mill complex include water for process make-up, fire protection, boiler feed, and potable uses. These systems will be supplied from the 500,000-gallon field-erected storage tank located northwest of the mill area. A pump house adjacent to the storage tank will house the pumps for the fire water and mill water systems.

Process Make-up Water

Approximately 776 GPM of make-up water are required to replace losses to tailings. This water will be pumped from the 500,000-gallon storage tank to the various points of usage.

Fire Water

Water for fire protection will be supplied from the bottom portion of the 500,000-gallon storage tank.

Three pumps and the necessary cross-connecting piping will be installed. The primary pump is driven electrically and backed up by a diesel driven pump of the same capacity to cover excessive pressure drop or electrical power failure. Constant pressure is maintained in the fire loop by a small jockey type pump which operates only if pressure in the loop falls below a predetermined setting. Outdoor hydrants and hose boxes are located along the fire loop so that adequate protection will be provided around the mill facilities. Wet standpipe and hose reels are provided inside the mill building, shop and warehouse.

Potable Water

Potable water will be pumped from the 500,000-gallon storage tank to a 40,000-gallon storage tank located adjacent to the west side of the grinding area to provide the mill facilities with a three-day supply of potable water at normal usage rates. A pressurizing pump delivers potable water from the storage tank to all points of usage at 50 PSI. Information from MEC indicates that chlorination may be the only treatment required. The pressurizing pump, chlorination and filtering equipment are located in the grinding area.

Boiler Feed Water

Water for boiler feed is provided from the potable water tank by the pressurization pump. Water is treated in a package sodium zeolite, ion exchange unit in the mill building near the boilers. The treatment packages are sized to soften approximately 48 GPM for make-up to the boiler feed water system based on 30 percent of the steam circulating load and be complete with brine tank, automatic backwash and regeneration controls.

8.6.5 Sanitary Sewage System

The sanitary sewage system is designed to serve 336 people for an estimated design flow of 16,800 gpd. Buildings served are the office and lab, shop warehouse and change house, and the mill building. The treatment plant is poured-in-place below grade concrete tanks with equipment to perform "Aerobic digestion". The plant includes screening, aeration, and clarification with chlorine treatment. Sewage plant effluent is diverted into a leach field.

Laboratory wastes are addressed in subsection 11.1.2.

8.7 MILL COSTS

8.7.1 Mill Capital Cost Estimate

This cost estimate includes the facilities specifically defined in the project description, Section 8, Milling, as supplemented by the scope, project criteria, process description, major equipment list, ancillary mill facilities, utilities and general sections. In addition, the estimate is specifically limited by the following conditions:

a. The estimate reflects current costs as of June 1, 1978.

b. The estimate is based upon union craft wage rates and operating costs.

c. Construction costs are based upon the assumption of reimbursible cost-plus-fee type contracts with the owner furnishing all operating capital.

d. The engineering and construction costs are for a standard one-shift 40-hour week.

e. Engineering costs were estimated at eight percent of the direct construction cost.

f. Detailed estimate was made for all indirect costs and a three percent fee on the direct plus indirect cost.

g. No allowance has been made for housing or camp costs for construction workers.

h. Spare parts have been estimated at five percent of initial purchase cost of the process equipment.

i. Initial mill reagent and supplies costs are shown for reference purposes in Table 8.7.2-6.

j. Electrical power will be supplied to the mill site substation by Arizona Public Service. The electrical was estimated from a power distribution single-line drawing. Material take-off prices were solicited by telephone and labor installation costs were derived from previous man-hour experience with present day union labor rates applied.

k. The process piping estimate was factored at ten percent of the process equipment costs; this was derived from previous experience on other similar projects.

l. A factor of 1.8 percent of the direct cost, less costs for spare parts was used for instrumentation installation. This was derived from the costs on similar projects.

m. No allowance has been included for owner incurred costs such as land acquisition, right of way purchase, royalties, financing, operating capital and general administration.

The capital cost estimate summary for the 2000 tpd mill is presented in Table 8.7.1-1.

TABLE 8.7.1-1

MILL CAPITAL COST SUMMARY

	Direct Cost Item	Labor	Material	Equipment	Subcontract	Total
1	Site Excavation	$ --	$ --	$ --	$1,030,210	$ 1,030,210
2	Mill Site Road & Fencing	3,310	4,000	--	159,730	167,040
3	Mill Water Storage Tank	29,040	60,590	5,250	--	94,880
4	Mill Water Distribution	9,470	16,730	--	--	26,200
5	Fire Protection System	22,510	45,040	26,450	36,300	130,300
6	Potable Water	13,720	20,910	2,500	--	37,130
7	Sanitary Sewer	16,930	13,920	--	26,780	57,630
8	Tailings Pipeline	6,770	22,170	--	6,720	35,660
9	Mill Building	392,890	498,620	64,590	204,180	1,160,280
10	Ore Receiving & Grinding	247,700	137,880	1,246,820	--	1,632,400
11	Leaching	120,380	157,570	329,380	117,150	724,480
12	CCD	767,570	1,316,550	1,252,390	1,332,260	4,668,770
13	Clarification	81,630	107,170	302,010	74,930	565,740
14	Solvent Extraction	203,580	215,810	207,970	332,260	959,620
15	YC Precipitation & Washing	41,270	21,180	307,550	15,540	385,540
16	Reagent Handling	132,020	332,360	71,380	38,750	574,510
17	Miscellaneous Equipment	36,120	--	371,200	--	407,320
18	Process Piping	691,440	628,630	--	--	1,320,070
19	Painting	42,890	18,000	--	--	60,890
20	Electrical	--	--	--	1,694,580	1,694,580
21	Instrumentation	--	--	--	343,140	343,140
22	Communications	--	--	--	25,000	25,000
23	Mill Equipment Spare Parts	12,390	--	247,120	--	259,510
24	Initial Mill Reagents and Supplies	--	--	--	396,000	396,000
	TOTAL DIRECT COST	$2,871,630	$3,617,130	$4,434,610	$5,833,530	$16,756,900
	INDIRECT COST ITEM					
	Supplies					$ 143,580
	Construction Equipment					1,396,990
	General Expenses and Overhead					2,231,930
	TOTAL INDIRECT COST					$ 3,772,500
	TOTAL DIRECT PLUS INDIRECT COSTS					$20,529,400
	CONSTRUCTION FEE @ 3%					$ 615,880
	ENGINEERING @ 8% OF DIRECT COST					$ 1,340,550
	TOTAL ESTIMATED INSTALLED COST					$22,485,830

8.7.2 Mill Operating Costs

This estimate of mill operating costs includes the cost of all labor, supplies, supervision, power and fuel for the production of uranium concentrate (yellowcake) from ore processed in accordance with the mill design described in Section 8 of this report. The estimate is specifically limited to the following conditions:

a. The estimate reflects costs as of June 1, 1978.

b. Freight and delivery costs for reagents are included.

c. Labor rates are based on data provided by Minerals Exploration. A burden of 40.2 percent is used in this estimate.

d. Supervision rates are based on data provided by Minerals Exploration Company. A burden of 23.0 percent is used in this estimate.

e. Taxes are not included.

f. General mine and mill administrative operating costs are not included in the mill operating cost estimate, but are shown for reference in Table 8.7.2-8.

g. The total mine and mill maintenance supervision costs are itemized in Table 8.7.2-7.

h. Amortization and depreciation costs are not included.

A mill operating cost summary is presented in Table 8.7.2-1 and breakdowns for supervision, labor, and supplies are shown in subsequent Tables 8.7.2-2 through 8.7.2-6.

TABLE 8.7.2-1

MILL OPERATING COST ESTIMATE - SUMMARY

ITEM	ANNUAL COST	COST PER TON	$/LB U_3O_8[1]	$/LB U_3O_8[2]
Mill Supervision	$ 374,781	$ 0.513	$ 0.417	$ 0.356
Mill Operations Labor	684,131	0.937	0.760	0.649
Laboratory Labor	115,043	0.157	0.128	0.109
Laboratory Supplies	120,000	0.164	0.133	0.114
Maintenance Supervision[3]	94,575	0.130	0.105	0.090
Mill Maintenance Labor	515,869	0.707	0.573	0.490
Mill Maintenance Supplies	773,804	1.060	0.860	0.735
Mill Reagents	6,748,405	9.244	7.499	6.410
Power (Mill Only)	1,149,722	1.575	1.278	1.092
Fuel Oil	485,450	0.665	0.540	0.461
Direct Mill Costs	$11,061,780	$15.152	$12.293	$10.506

NOTES: 730,000 TPY Ore
1 - 899,810 lb U_3O_8/yr @ Ore Grade of 0.0696% U_3O_8, 88.55% Recovery
2 - 1,052,718 lb U_3O_8/yr @ Ore Grade of 0.080% U_3O_8, 90.13% Recovery
3 - Maintenance Supervision 30% of Total $315,249 x 0.30 = $94,575 (From Table 8.7.2-7)

TABLE 8.7.2-2

MILL SUPERVISION ANNUAL COST

POSITION	NUMBER	ANNUAL RATE	ANNUAL COST	COST PER TON	\$/Lb U_3O_8 [1]	\$/Lb U_3O_8 [2]
Mill Superintendent	1	\$33,000	\$ 33,000	\$0.045	\$0.037	\$0.031
Mill General Foreman	1	28,600	28,600	0.039	0.032	0.027
Mill Foreman	4	24,200	96,800	0.133	0.108	0.092
Chief Metallurgist	1	28,600	28,600	0.039	0.032	0.027
Metallurgist	1	24,200	24,200	0.033	0.027	0.023
Mill Technician	2	16,500	33,000	0.045	0.037	0.031
Chemist	1	24,200	24,200	0.033	0.026	0.023
Analyst	1	19,800	19,800	0.027	0.022	0.019
Mill Clerk	1	16,500	16,500	0.023	0.018	0.016
Total Before Burden	13		\$304,700	\$0.417	\$0.339	\$0.289
23% Burden			70,081	0.096	0.078	0.067
Total	13		\$374,781	\$0.513	\$0.417	\$0.356

NOTES: 730,000 TPY Ore
1 - 899,810 Lb U_3O_8/Yr @ Ore Grade of 0.0696% U_3O_8, 88.55% Recovery
2 - 1,052,718 Lb U_3O_8/Yr @ Ore Grade of 0.080% U_3O_8, 90.13% Recovery

TABLE 8.7.2-3

MILL OPERATIONS LABOR COST

POSITION	NUMBER	ANNUAL RATE	ANNUAL COST	COST PER TON	$/Lb U_3O_8[1]	$/Lb U_3O_8[2]
Loader Operator (8.60/hr)	4	$17,888	$ 71,552	$0.098	$0.080	$0.068
Grinding & Leaching Operator (8.60/hr)	4	17,888	71,552	0.098	0.080	0.068
CCD Circuit Operator (8.60/hr)	4	17,888	71,552	0.098	0.080	0.068
S-X Precip. Operator (8.60/hr)	4	17,888	71,552	0.098	0.079	0.068
YC Drying-Handling (8.60/hr)	4	17,888	71,552	0.098	0.079	0.068
Tailing Pond Operator (8.60/hr)	4	17,888	71,552	0.098	0.079	0.068
Trainee (7.05/hr)	4	14,664	58,656	0.080	0.065	0.056
Total Before Burden	28		$487,968	$0.668	$0.542	$0.463
40.2% Burden			196.163	0.269	0.218	0.186
Total	28		$684,131	$0.937	$0.760	$0.649

NOTES: 730,000 TPY Ore
1 - 899,810 Lb U_3O_8/Yr @ Ore Grade of 0.0696% U_3O_8, 88.55% Recovery
2 - 1,052,718 Lb U_3O_8/Yr @ Ore Grade of 0.080% U_3O_8, 90.13% Recovery

TABLE 8.7.2-4

LABORATORY LABOR COST

POSITION	NUMBER	ANNUAL RATE	ANNUAL COST	COST PER TON	$/Lb U_3O_8 [1]	$/Lb U_3O_8 [2]
Mill Technicians (8.10/hr)	4	$16,848	$ 67,392	$0.092	$0.075	$0.064
Janitor (7.05/hr)	1	14,664	14,664	0.020	0.016	0.014
Total Before Burden	5		$ 82,056	$0.112	$0.091	$0.078
40.2% Burden	—		32,987	0.045	0.037	0.031
Total	5		$115,043	$0.157	$0.128	$0.109

NOTES: 730,000 TPY Ore
1 - 899,810 Lb U_3O_8/Yr @ Ore Grade of 0.0696% U_3O_8, 88.55% Recovery
2 - 1,052,718 Lb U_3O_8/Yr @ Ore Grade of 0.080% U_3O_8, 90.13% Recovery

TABLE 8.7.2-5

MILL MAINTENANCE LABOR COSTS AND SUPPLIES

POSITION	NUMBER	ANNUAL RATE	ANNUAL COST	COST PER TON	$/Lb U_3O_8[1]	$/Lb U_3O_8[2]
Electrician (9.15/hr)	4	$19,032	$ 76,128	$0.104	$0.085	$0.072
Mechanics (Craftsmen-9.15/hr)	6	19,032	114,192	0.156	0.127	0.108
Mechanic (Journeyman-8.60/hr)	1	17,888	17,888	0.025	0.020	0.017
Helper (8.10/hr)	6	16,848	101,088	0.139	0.112	0.096
Trainee (7.05/hr)	4	14,664	58,656	0.080	0.065	0.056
Total Before Burden	21		$367,952	$0.504	$0.409	$0.349
40.2% Burden	—		147,917	0.203	0.164	0.141
Total	21		$515,869	$0.707	$0.573	$0.490
Mill Maintenance Supplies			$773,804	$1.060	$0.860	$0.735

NOTES: 730,000 TPY Ore
1 - 899,810 Lb U_3O_8/Yr @ Ore Grade of 0.0696% U_3O_8, 88.55% Recovery
2 - 1,052,718 Lb U_3O_8/Yr @ Ore Grade of 0.080% U_3O_8, 90.13% Recovery

Mill Maintenance Supplies = Maintenance Labor X 1.50 = $515,869 X 1.50 = $773,804

TABLE 8.7.2-6

MILL REAGENT COSTS

ITEM	UNIT PRICE	CONSUMPTION PER TON ORE	ANNUAL COST	COST PER TON	\$/Lb U_3O_8 [1]	\$/Lb U_3O_8 [2]
Sulfuric Acid (93%)	\$ 30.00/Ton	446 Lb	\$4,883,700	\$6.690	\$5.427	\$4.639
Sodium Chlorate	0.20/Lb	6 Lb	876,000	1.200	0.974	0.832
Flocculant	1.50/Lb	0.37 Lb	405,150	0.555	0.450	0.385
Glue	1.25/Lb	0.10 Lb	91,250	0.125	0.102	0.087
Ammonia	180.00/Ton	0.75 Lb	49,275	0.068	0.055	0.047
Kerosene	0.45/Gal	0.22 Gal	72,270	0.099	0.080	0.069
Amine	1.00/Lb	0.10 Lb	73,000	0.100	0.081	0.069
Isodecanol	0.36/Lb	0.20 Lb	52,560	0.072	0.058	0.050
Sodium Bicarbonate	0.19/Lb	0.27 Lb	37,450	0.051	0.042	0.035
Sag Mill Balls (3-1/2" Ø)	331.00/Ton	0.45 Lb	54,370	0.074	0.060	0.052
Rod Mill Rods (2-1/2" Ø)	350.00/Ton	1.00 Lb	127,750	0.175	0.142	0.121
55-Gallon Drums	22.00 Ea.	1,165/Yr	25,630	0.035	0.028	0.024
Total			\$6,748,405	\$9.244	\$7.499	\$6.410
Fuel Oil Cost	\$ 0.38/Gal	1.75 Gal	\$ 485,450	\$0.665	\$0.540	\$0.461
Power	\$ 0.04/Kwh		\$1,149,722	\$1.575	\$1.278	\$1.092

NOTES: 730,000 TPY Ore
1 - 899,810 Lb U_3O_8 @ 0.0696% U_3O_8 and 88.55% Recovery
2 - 1,052,718 Lb U_3O_8 @ 0.080% U_3O_8 and 90.13% Recovery

TABLE 8.7.2-7

MAINTENANCE SUPERVISION ANNUAL COST

POSITION	NUMBER	ANNUAL RATE	ANNUAL COST	COST PER TON	$/Lb U_3O_8 [1]	$/Lb U_3O_8 [2]
Maintenance Superintendent	1	$33,000	$ 33,000	$0.045	$0.037	$0.031
General Maintenance Foreman	3	28,600	85,800	0.117	0.095	0.081
Shift Foreman	4	24,200	96,800	0.133	0.108	0.092
Mechanical Engineer	1	24,200	24,200	0.033	0.027	0.023
Maintenance Clerk	1	16,500	16,500	0.023	0.018	0.016
Total Before Burden	9		$256,300	$0.351	$0.285	$0.243
23% Burden			58,949	0.081	0.066	0.056
Total	10		$315,249	$0.432	$0.351	$0.299

NOTES: 730,000 TPY Ore
1 - 899,810 Lb U_3O_8/Yr @ Ore Grade of 0.0696% U_3O_8, 88.55% Recovery
2 - 1,052,718 Lb U_3O_8/Yr @ Ore Grade of 0.080% U_3O_8, 90.13% Recovery

TABLE 8.7.2-8

ADMINISTRATIVE COST - MINE AND MILL

POSITION	NUMBER	ANNUAL RATE	ANNUAL COST	COST PER TON	$/Lb U_3O_8[1]	$/Lb U_3O_8[2]
General Manager	1	$38,500	$ 38,500	$0.053	$0.043	$0.037
Administrative Manager	1	28,600	28,600	0.039	0.032	0.027
Chief Accountant	1	23,100	23,100	0.032	0.026	0.022
Accountant	1	19,800	19,800	0.027	0.022	0.019
Accounting Clerk	1	16,500	16,500	0.023	0.018	0.015
Personnel Manager	1	23,100	23,100	0.032	0.026	0.022
Personnel Representative	1	19,800	19,800	0.027	0.022	0.019
Personnel Clerk	1	16,500	16,500	0.023	0.018	0.015
Purchasing Agent	1	23,100	23,100	0.032	0.026	0.022
Secretary	1	13,200	13,200	0.018	0.015	0.013
Receptionist	1	11,000	11,000	0.015	0.012	0.010
Safety & Environmental Admin.	1	26,400	26,400	0.036	0.029	0.025
Environmental Assistant	1	19,800	19,800	0.027	0.022	0.019
Safety & Environmental Technician	5	16,500	82,500	0.113	0.092	0.078
Safety Engineer	1	19,800	19,800	0.027	0.022	0.019
Warehouse Supervisor	1	19,800	19,800	0.027	0.022	0.019
Warehouse Attendant	4	17,600	70,400	0.096	0.078	0.067
Warehouse Driver	1	17,600	17,600	0.024	0.020	0.017
Total Before Burden	25		$489,500	$0.671	$0.545	$0.465
23% Burden			112,585	0.154	0.125	0.107
Total	25		$602,085	$0.825	$0.670	$0.572
Environmental Operating Cost			$ 20,000	$0.027	$0.022	$0.019
Perpetual Care Fund (5¢/Ton Milled)			36,500	0.050	0.041	0.035
Total Environmental Operating Costs			$ 56,500	$0.077	$0.063	$0.054
Total Office Operating Supplies			91,700	0.126	0.102	0.087
TOTAL ANNUAL ADMINISTRATIVE COSTS			$750,285	$1.028	$0.835	$0.713

NOTES: 730,000 tpy Ore
1 - 899,810 lb U_3O_8/yr @ Ore Grade of 0.0696% U_3O_8, 88.55% Recovery
2 - 1,052,718 lb U_3O_8/yr @ Ore Grade of 0.080% U_3O_8, 90.13% Recovery

SECTION 9

TAILING DAM

This section summarizes a report submitted to Minerals Exploration Co., by Dames & Moore. Additional information can be obtained from this detailed study titled "Design Report, Proposed Tailings Impoundment, Anderson Uranium Project, Yavapai County, Arizona", dated April 12, 1978.

Although the vast majority of information presented in the report is still valid, revisions to the mine plan and to the metallurgical criteria after April 1978, will require modification of the existing plan. The modifications relate primarily to the volumes and flows presented in sections 9.3.7, Storage Volume and Surface Area, and 9.3.9, Water Balance. At present, the quantities mentioned in these sections represent a conservative approach to the conditions to be expected.

9.1 SITE SELECTION

The site of the tailing disposal area is located in a portion of the mined-out pit. This will require stripping the overburden, mining the ore and stockpiling the ore during mill construction to allow pit space to construct the first stage dam for the disposal area.

The faults in this area have been inactive for a long time period and as a result these fault zones do not present a problem when considering faulting with respect to a tailing disposal location.

The site is located such that there is very little contributing area for surface runoff and a minimum of surface diversion is required. After mining is completed, a fairly thick layer of the non-mineralized lacustrine lake bed remains. Laboratory testing shows these lake beds contain clay and would act as natural liner. This liner would effectively reduce the seepage to near zero. Groundwater in the area is flowing in a northerly direction and the south face of the pit would intercept groundwater flow to make the site dry during use.

The final reclamation of the dam site can be done so that no maintenance or monitoring would be required after a short period of time. In addition, this site has the advantage of incorporating this final reclamation into the partial backfilling of the pit.

9.2 GROUNDWATER

Based on measurements in geotechnical borings and measurements in exploration borings drilled by MEC in which free water was encountered, the groundwater level in the portion of the open pit to be occupied by the planned tailings impoundment is believed to be approximately 1715 feet and within the lacustrine sediment formation.

Mining near the southern limits of the open pit will extend to about elevation 1375 feet, and it is anticipated that some pumping from sumps might be required to maintain a dry working area. Consequently, the water table will be lowered to the bottom of the pit and a flow gradient created toward the southern limits of the pit.

In general, water quality in the area is good. A well and spring inventory and results of water quality analyses conducted on samples collected from several wells in the area are presented in the report by Water Development Corporation.

9.3 DESIGN CONSIDERATIONS

9.3.1 General

Zoned construction will be required for the retention dam in order to utilize overburden wastes from the open pit for construction material. The zones will consist of an upstream shell, a sloping impervious core, a transition zone, and a downstream shell. Recommended configurations of the various zones of the dam are shown in Figure 9.3-1, Typical Dam Section.

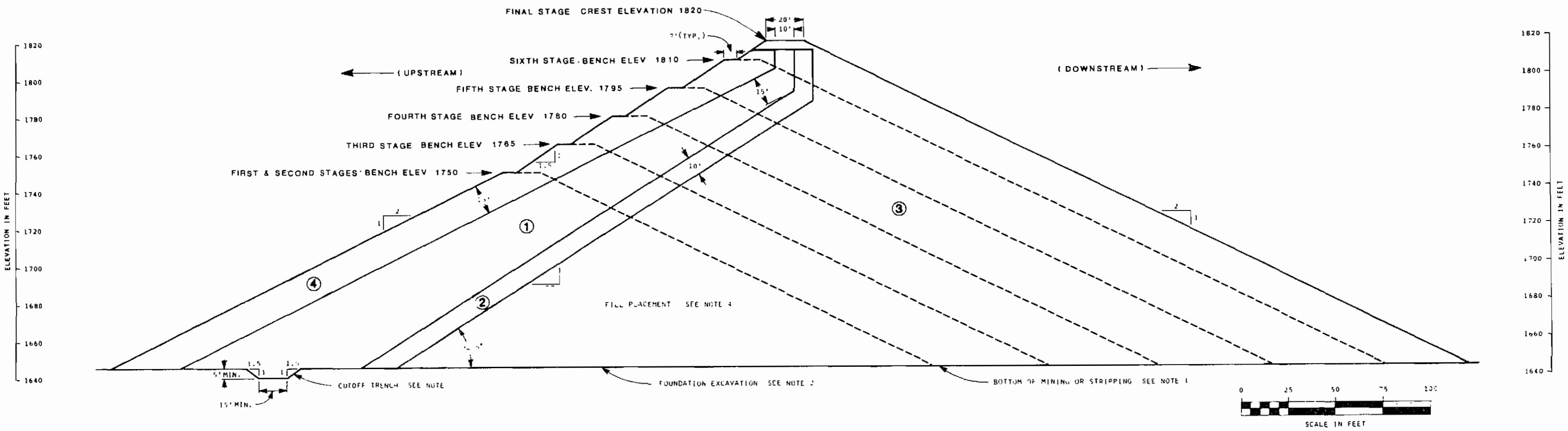
9.3.2 Impervious Core

The impervious core will function to minimize seepage losses through the dam. Non-mineralized claystone materials from the lacustrine sediments formation will be used for construction of the impervious core.

A trench will be excavated into the claystone foundation materials along the complete length of the dam. The purpose of the trench is to key the clay core into the impervious dam foundation.

9.3.3 Downstream Shell

The downstream shell will provide structural support for the sloping clay core and overall embankment stability. Sand and gravel material obtained during stripping of both the capping and lower conglomerate will be used in construction of the downstream shell. These granular materials will provide a high ratio of permeability between the downstream shell and the clay core in order to reduce seepage gradients and maintain a very low phreatic surface in the downstream portion of the dam.



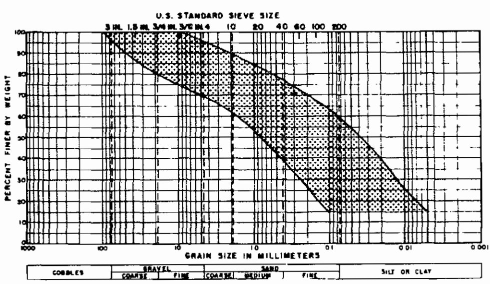
KEY:

(1) ZONE 1. (CORE) FILL. SHALL CONSIST OF CLAY AND/OR SILTY CLAY MIXTURE CONFORMING TO THE GRADATION SHOWN, AND COMPACTED TO A MINIMUM OF 90 PERCENT OF THE ASTM (D 1557-70) MAXIMUM DRY DENSITY.

(2) ZONE 2. (TRANSITION ZONE) FILL. SHALL CONSIST OF A WELL GRADED SILTY SAND CONFORMING TO THE GRADATION SHOWN, AND COMPACTED TO A MINIMUM OF 90 PERCENT OF THE ASTM (D 1557-70) MAXIMUM DRY DENSITY. OVER COMPACTION SHOULD BE AVOIDED.

(3) ZONE 3. (DOWNSTREAM SHELL) RANDOM FILL. SHALL CONSIST OF A SILTY SAND AND/OR SAND. ROCK FRAGMENTS UP TO SIX INCHES MAY BE INCLUDED PROVIDED THEY ARE DISTRIBUTED IN A SOIL MATRIX SUCH THAT NO OPEN WORK VOIDS EXIST. ZONE 3 SHALL BE COMPACTED TO A MINIMUM OF 90 PERCENT OF ASTM (D 1557-70) MAXIMUM DRY DENSITY.

(4) ZONE 4. (UPSTREAM SHELL) RANDOM FILL. SAME MATERIAL CRITERIA AS FOR ZONE 3. ZONE 4 SHALL BE COMPACTED TO A MINIMUM OF 90 PERCENT OF THE ASTM (D 1557-70) MAXIMUM DRY DENSITY.



GRADATION SPECIFICATIONS FOR ZONE 2 FILL

NOTES:

1. STRIPPING. WHERE THE DAM IS CONSTRUCTED OUTSIDE OF THE OPEN PIT ALL TOPSOIL AND VEGETATION WILL BE REMOVED.

2. FOUNDATION EXCAVATION. FOLLOWING STRIPPING, ALL MATERIALS IN THE DAM FOUNDATION MEETING REQUIREMENTS FOR ZONE 1 FILL SHALL BE EXCAVATED AND STOCKPILED FOR SUBSEQUENT USE AS CORE MATERIAL. ANY REMAINING FOUNDATION MATERIALS WHICH ARE EXCESSIVELY LOOSE, SOFT, OR DISTURBED SHOULD BE REMOVED PRIOR TO PLACEMENT OF FILL.

3. CUTOFF TRENCH. THE CUTOFF TRENCH SHALL BE EXCAVATED DOWN TO A MINIMUM OF FIVE FEET. SIDESLOPES OF 1.5:1 SHOULD BE MAINTAINED. MATERIALS SHOULD BE SEGREGATED DURING EXCAVATION ACCORDING TO THEIR SUITABILITY FOR USE IN THE VARIOUS FILL ZONES.

4. FILL PLACEMENT. IF SURFACE OF FILL BECOMES DRY OR HARD, SCARIFY PRIOR TO PLACING NEXT LIFT OF FILL.

TYPICAL DAM SECTION

DAMES & MOORE

FIGURE 9.3-1

9.3.4 Transition Zone

A 10-foot wide transition zone will be placed between the impervious core and the downstream shell. The principal purpose of the transition zone is to provide protection against movement of clay particles from the impervious core into the coarser downstream shell materials.

Materials used for construction of the transition zone will be limited to sand materials stripped from the weakly cemented sandstone stratum of the lower conglomerate.

9.3.5 Upstream Shell

The principal purpose of the upstream shell is to provide protection against erosion of the impervious core. Consequently, the characteristics of materials used for construction of the upstream shell are largely unrestricted and subject only to minimum strength requirements necessary to maintain adequate slope stability. Construction materials for the upstream shell will be obtained from stripping of both the capping and lower conglomerate overburden.

9.3.6 Stability

Stability analyses results indicate that factors of safety will be adequate and within the limits specified by NRS Guideline 3.11 for all cases analyzed (end-of-construction, partial pool with steady seepage, and maximum pool with steady seepage).

9.3.7 Storage Volume and Surface Area

The storage volume and surface area of the impoundment at any time will be dependent on the rate of dam construction which is in turn related to the mining plan. Assuming that construction follows the schedule set forth, the first stage dam will be completed prior to the start of milling operations. Assuming that tailings are produced at an average rate of 2000 dry tons per calendar day, and excess water will be removed from the tailings impoundment, the first stage dam will provide adequate tailing storage capacity for a period of about 33 months. Maximum surface area of the first stage impoundment will be approximately 28 acres.

The second stage impoundment will be available for tailing disposal by the end of the second year of milling. An additional nine months tailing storage will be provided by the second stage dam. Maximum surface area of the second stage impoundment will be about 14 acres.

9.3.8 Radiochemical Contaminant Migration

Analyses to evaluate potential migration of natural uranium, radium, and thorium through seepage from the proposed tailings impoundment were made.

The results of the radiochemical migration analyses indicate that radioactive contaminant movement through seepage will not occur outside the immediate boundaries of the tailings impoundment during the life of the project or in the long-term future.

9.3.9 Water Balance

a. General

Although the proposed tailings impoundment will have sufficient volume to store all of the tailings expected to be produced during the design life of the project, it does not have sufficient capacity to also store all of the waste water to be discharged from the mill. Therefore, provisions must be made for removal of the excess water.

b. Tailings and Water Inputs

Inputs to the impoundment will consist of tailings, waste water discharge from the mill and precipitation. The average tailings production is expected to be 2000 tons per day, and the discharge rate of wastewater is expected to be about 525 gpm. Part of the wastewater will become entrained in the tailings with the remainder forming the "free water" pond.

The rate of mill water accumulating in the "free water" pond is estimated to be about 29.3 million cubic feet per year. Precipitation input will be dependent on the drainage area which is in turn related to the stage construction schedule.

c. Evaporation and Seepage Outputs

Outputs from the tailings impoundment will consist of surface evaporation from the "free water" pond and seepage. Since evaporation and seepage are dependent on the area of the impoundment, they are, in turn, dependent on the stage construction schedule. The relationship between time and volume of evaporation and seepage outputs is based on the assumption that the stage construction schedule will be followed and that the tailings impoundment will be managed to achieve the maximum possible surface evaporation.

d. Excess Water

It is estimated that a minimum total of about 231 million cubic feet of excess water must be removed from the impoundment during the life of the project.

In order to maintain adequate floodwater surcharge capacity and freeboard, in the earlier stages of the project when the surface area of the pond is smallest and consequently surface evaporation from the pond is least, the excess water must be removed at a faster rate than in later stages when the surface area of the pond is larger.

9.4 CONSTRUCTION CONSIDERATIONS

9.4.1 Pre-construction Investigations

Following stripping of overburden and removal of ore from within the limits of the proposed tailings impoundment for each stage of construction, additional boreholes will be drilled within the foundation limits of the dam and in the reservoir bottom to investigate the continuity and thickness of the relatively impervious claystone layer that will serve as the dam's foundation and as the natural lining for the reservoir.

9.4.2 Preparation of Foundation, Key Trench, and Abutments

The foundation abutments and key trench will be carefully prepared prior to placement of fill materials.

All hard promontories and other abrupt changes in grade that could cause sharp differential settlement of overlying fill material will be removed. Additionally, any zones of softer, highly weathered, fractured or jointed rock will be completely removed by excavation.

Immediately prior to placement of the first layer of fill material, the foundation area to be covered will be moistened. Sheepsfoot equipment will be used to compact the first lift of fill in all zones, thus providing a good bond between the foundation and the fill.

9.4.3 Earthwork Quantities

Estimated earthwork quantities for each major item of dam construction are presented in Table 9.4.3-1.

9.4.4 Inspection During Construction

A qualified engineer familiar with earth dam construction will be present at all times during embankment construction to identify fill materials suitable for placement in each zone and to determine the adequacy of compaction.

Detailed written records will be maintained by the engineer of all activities and observations made during construction. The records will assist in analysis and correction of any unforeseen difficulties that might require design changes during construction or corrective measures after construction.

TABLE 9.4.3-1

EARTHWORK QUANTITIES
(In Cubic Yards)

In Place Earthwork Volumes in Cubic Yards

Item	First Stage	Second Stage	Third Stage	Fourth Stage	Fifth Stage	Sixth Stage	Total
Impervious Core	179,000	80,000	104,000	73,000	90,000	77,000	603,000
Transition Zone	55,000	17,000	20,000	30,000	44,000	58,000	224,000
Upstream Shell	365,000	97,000	69,000	65,000	76,000	78,000	750,000
Downstream Shell	576,000	591,000	505,000	746,000	1,124,000	1,649,000	5,191,000
Reservoir Lining	50,000	20,000	--	--	--	--	70,000
TOTAL	1,225,000	805,000	698,000	914,000	1,334,000	1,862,000	6,838,000

9.5 POND OPERATION

9.5.1 Tailings Discharge System

a. General

From a pickup point located near the northwest corner of the impoundment, tailings slurry will be transported by pipeline and discharged into the impoundment by spigoting from the crest of the dam. To control erosion, the tailings will be discharged from the spigot points through feeder lines laid on the inside slope of the embankment. Sufficient elevation differential exists between the pickup point and the crest of the impoundment to transport and discharge the tailings slurry by gravity flow.

b. Pipe Selection

Because of its excellent corrosion and abrasion resistance, and because it is relatively lightweight and easy to move, high density polyethylene pipe will be used for the discharge line.

9.5.2 Evaporation System

a. General

As discussed previously in this report, the volume of excess water expected to be generated over the life of the project will be over 231 million cubic feet. This water must be removed from the tailings impoundment in order that the excess water buildup does not infringe upon the required flood surcharge capacity and freeboard in the impoundment.

b. <u>Evaporation Ponds</u>

Evaporation ponds will be constructed atop one or more of the overburden waste dumps located northeast and west of the tailings impoundment. The area limits and depths of the evaporation ponds will be designed to accommodate the required rate of excess water removal from the tailings impoundment as well as to maintain adequate flood surcharge capacity and freeboard. Since permeability of the overburden wastes are expected to be relatively high, the evaporation ponds will be lined either with a compacted clay liner similar to the material to be used in construction of the impervious core of the dam, or with an appropriate artificial membrane material.

A barge-mounted decanting system will be required in the tailings impoundment for pumping the excess water through a pipeline to the evaporation ponds. Two pumps, each with the capability of pumping approximately 1000 gpm will be required on the decant barge. One of the pumps will act as a backup pump in case of breakdown of the other.

c. <u>Spray Evaporation</u>

Spray evaporation methods are currently being used for disposal of excess water at other uranium projects in the United States. In view of the relatively high evaporation rate at the site, spray evaporation methods are being investigated for this project. A cost savings of $1,483,000 may be realized by using the spray system in place of evaporation ponds.

The capacity of the spray evaporation system for removal of excess water from the impoundment will be designed to account for periods of cool and wet weather as well as the favorable dry, hot summer conditions.

9.6 INSPECTION AND INSTRUMENTATION

9.6.1 Inspection and Maintenance

Once the tailings impoundment becomes operational, a detailed systematic and regular visual inspection and maintenance program will be established to detect and repair possible damage that might detrimentally affect the integrity of the retention dam. Detailed records will be maintained for each inspection; and if signs of distress to the dam are noted, a qualified engineer will be contacted immediately to evaluate the seriousness of the distress.

9.6.2 Instrumentation

Instrumentation will be installed in the retention dam during its construction to monitor changes that might be critical to dam stability or seepage conditions. The instrumentation will be monitored at regular intervals, and the available records and readings compared with previous monitoring results to detect abnormal performance of the instruments or evidence of unusual performance and distress in the dam.

9.6.3 Groundwater Monitoring

Water quality monitoring wells, located in the downstream slope of the dam, will be used to monitor the phreatic surface in the downstream shell of the dam and the quality of seepage escaping from the dam. When sampling, a sufficient amount of water will be removed from the well prior to sample collection to assure that a representative sample is obtained.

The six monitor wells will be checked quarterly for water level and quality. Complete chemical and radiochemical analysis will be made for the first four sample collections. During pond operation quarterly analyses of the tailings pond liquid will also be performed.

After the first four quarterly analyses, the water quality data will be reviewed and a revised program drawn up for subsequent analyses in the six monitor wells. Levels of contaminants in the tailings pond liquid will be used as a guide in any modifications to the monitor well assay program.

All sampling and analytical work will be done in accordance with the standards of the U.S. Environmental Protection Agency, the U.S. Nuclear Regulatory Commission, or other recognized standards acceptable to the reviewing agencies.

9.7 ABANDONMENT CONSIDERATIONS

9.7.1 General

After project termination, discharge of tailings and water into the impoundment will cease, and standing water will be allowed to evaporate. When a competent surface exists sufficient to allow access by construction equipment, the entire tailings impoundment will be covered with pit overburden and topsoil, and revegetation will follow.

9.7.2 Abandonment Cover

The type and thickness of cover material required over the surface of the tailings are governed principally by radiological and erosional criteria.

The recommended treatment is to cover the surface of the tailings with a 14-foot thick layer of compacted sand similar to that used in construction of the downstream shell of the dam.

In addition to covering the surface of the tailing, additional fill material will be placed against the downstream slope of the retention dam. The fill will serve to control rill erosion. Fill material consists of gravelly silty sand similar to the upper sand layer to be placed over the surface of the impoundment. To further control erosion, a small retention dike will be constructed at the crest of the impoundment to minimize runoff over the slopes. The perimeter dike will create a closed retention system on the upper surface of the abandoned tailings impoundment.

Runoff from the surrounding drainage area and precipitation falling directly on the surface of the impoundment will be retained and eventually lost to evaporation and plant transpiration. The surface area of the abandoned tailings impoundment is sufficiently large that the small perimeter dike creates enough storage capacity to contain runoff from the probable maximum flood series.

9.7.3 Revegetation

In order to promote growth of vegetation after abandonment, top soil removed and stockpiled from the surface of the open pit and mill areas during mining and construction operations will be spread on the surface and slopes of the tailings impoundment. Fertilizer will also be applied.

The surface of the impoundment and its slopes will be scarified and left in a rough condition and seeded to several different vegetative species native to the area.

9.8 CAPITAL AND OPERATING COSTS

Capital and operating cost estimates were developed from information provided by Dames & Moore. These costs are presented in Table 9.8-1. The construction estimates per stage include equipment, labor and supply costs. The equipment cost estimates include new equipment required specifically for the tailings dam construction. The first stage of construction cost and the equipment costs will be capitalized.

The balance of the construction stages, including abandonment, are considered as operating expenses under tailings dam operations. Dames & Moore investigated two methods for evaporating water; evaporation ponds and a spray evaporation system. The pond system was used for the estimate presented in this feasibility study. The spray system will be investigated further during detailed engineering because of a potential savings of $1,475,000.

Table 9.8-2 shows the operating costs for the tailings dam construction by year.

Table 9.8-3 lists the estimated manpower required for the tailings dam construction operations. It is assumed that these personnel will be reassigned to other Mine department functions when not working on the construction of the tailings dam.

TABLE 9.8-1

TAILINGS DAM CONSTRUCTION COSTS

Construction Cost Estimate Per Stage

Construction Stage	Year Required	Tailings Impoundment	Tailings Discharge System	Evaporation Ponds[1]	Total With Evap. Ponds
*First	0	$ 430,000	$47,268	$1,640,745	$2,118,013
Second	2	218,160	10,908	--	229,068
Third	3	200,890	6,360	--	207,250
Fourth	4	221,800	10,000	--	231,800
Fifth	6	309,060	5,454	--	314,514
Sixth	8	399,050	5,454	--	404,504
Abandonment	12	2,582,000	--	--	2,582,000
TOTAL		$4,360,960	$85,444	$1,640,745	$6,087,149

**Equipment Cost Estimate

1 - Dozer, Rubber-tired, Cat. 824 S	$ 161,018
1 - Compactor, Cat Model 825	144,895
1 - Water Truck, 10,000 Gallon	238,939
	$ 544,852

*First stage construction costs to be capitalized. Balance will be charged to operating expenses for the year when the expenses occurred.
**Balance of equipment required will be provided by the Mine department.

[1]Evaporation ponds are being used for this estimate. An alternate spray system may be considered. A possible cost reduction of $1,483,000 may be realized with the spray system.

TABLE 9.8-2

TAILINGS DAM CONSTRUCTION

OPERATING COST ESTIMATE

Item	Year	Annual Cost	Cost Per Ton	$/Lb U_3O_8[1]	$/Lb U_3O_8[2]
Second Construction Stage	1981	$ 229,068	$0.314		$0.218
Third Construction Stage	1983	207,250	0.284	0.230	
Fourth Construction Stage	1984	231,800	0.318	0.258	
Fifth Construction Stage	1986	314,514	0.431	0.350	
Sixth Construction Stage	1988	404,504	0.554	0.450	
Abandonment	1992	2,582,000			

NOTES: 730,000 tpy ore
1 - 899,810 lb U_3O_8/yr. Ore grade 0.0696% U_3O_8, 88.55% recovery
2 - 1,052,718 lb U_3O_8/yr. Ore grade 0.080% U_3O_8, 90.13% recovery (first two years of operation)

TABLE 9.8-3

TAILINGS DAM CONSTRUCTION

MANPOWER REQUIREMENTS

Construction Stage	Year	Salaried	Hourly	Total
Second	1981	2	4	6
Third	1983	2	4	6
Fourth	1984	2	4	6
Fifth	1986	2	4	6
Sixth	1988	2	4	6
Abandonment	1992	--	--	--

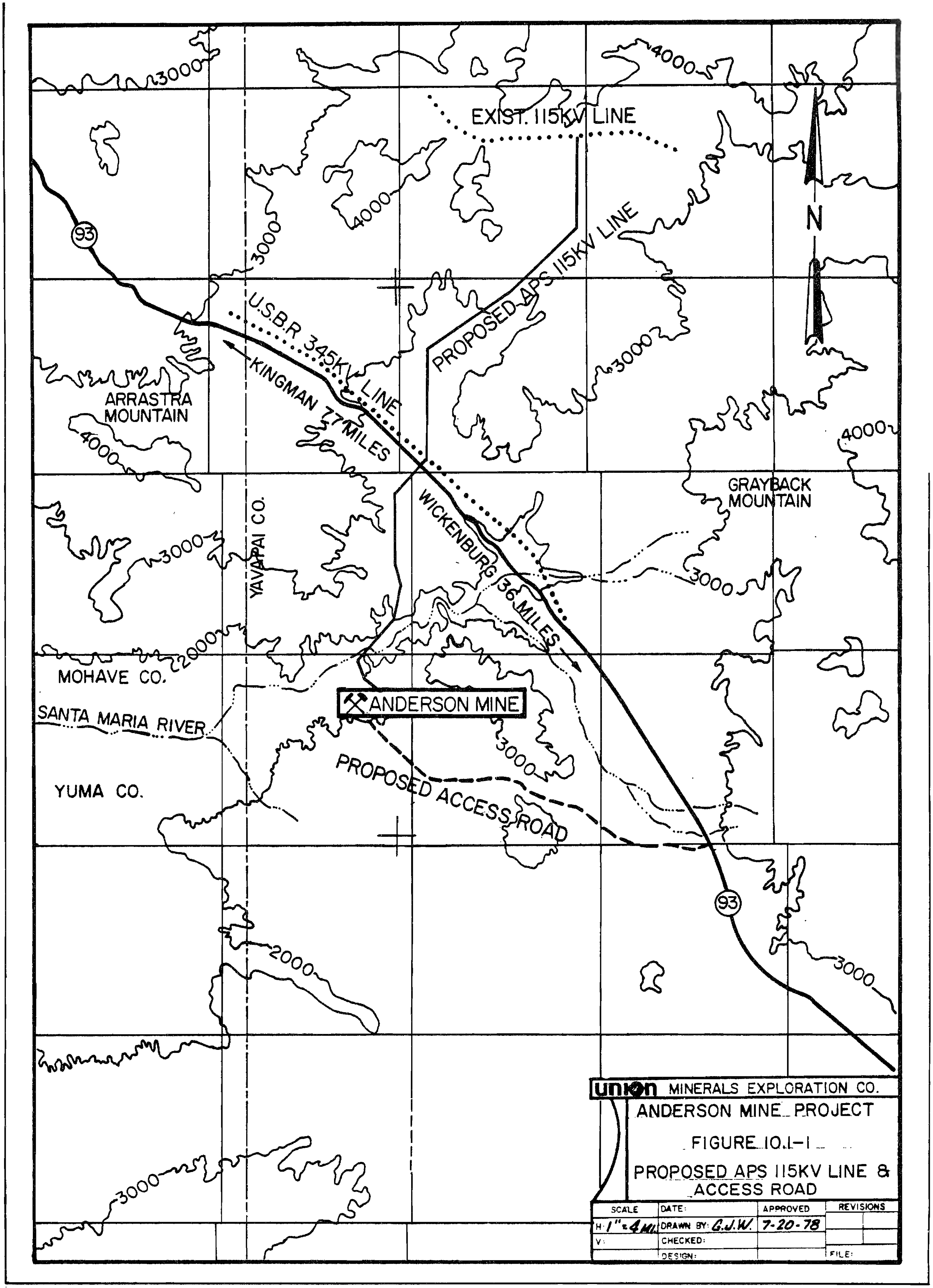
SECTION 10

ANCILLARY CONSIDERATIONS

10.1 ACCESS ROAD

An access road will be constructed by a contractor from U.S. Highway 93 to the project site (see Figure 10.1-1). The road will be 12.2 miles in length and terminate with a public turn-around near the south end of the east waste dump. The road has been designed using a 26-foot wide paved roadway with four-foot wide safety shoulders on each side for emergency pulloffs. After completion of the road, the route will be turned over to Yavapai County as a County Secondary Highway with the County assuming maintenance responsibility.

The remaining portion of the road to the plant site will be built and maintained by Minerals Exploration Company. Road entry to the mill complex will be from the southeast. The access will carry material deliveries and commuter traffic. Employee parking will be provided west of the administration building outside of the fenced area. Space will be provided for parking company supervisory staff vehicles on the south side of the office and lab building inside the fenced area. All employees will enter the plant through a security gate where a full-time guard will also control vehicle access to the mill complex. All major roadways will be paved with asphalt.



3000
4000
EXIST. 115KV LINE
N
4000
3000
PROPOSED APS 115KV LINE
93
U.S.B.R. 345KV LINE
KINGMAN 77 MILES
3000
ARRASTRA MOUNTAIN
4000
4000
GRAYBACK MOUNTAIN
WICKENBURG 36 MILES
YAVAPAI CO.
3000
3000
2000
MOHAVE CO.
ANDERSON MINE
SANTA MARIA RIVER
3000
PROPOSED ACCESS ROAD
YUMA CO.
93
2000
3000
3000
UNION MINERALS EXPLORATION CO.
ANDERSON MINE PROJECT
FIGURE 10.1-1
PROPOSED APS 115KV LINE & ACCESS ROAD
SCALE
H: 1" = 4 MI.
V:
DATE:
DRAWN BY: G.J.W.
7-20-78
CHECKED:
DESIGN:
APPROVED
REVISIONS
FILE:

The following cost estimate was developed for Minerals by Western Technologies, who are responsible for the road engineering.

a. Cost from U.S. 93 to Public Turnaround (as of May 1, 1978).

Description	Quantity	Unit	Unit Cost	Total Cost
Clearing & Grubbing	73	acres	$150.00	$ 10,950
Roadway Excavation	223,850	cu yd	0.95	212,658
Overhaul	44,800	cu yd	0.16	7,168
Structural Excavation	3,360	cu yd	3.10	10,416
Special Backfill	3,360	cu yd	5.26	17,674
Aggregate Base Course	67,750	Ton	4.95	335,363
Mineral Aggregate for AC Paving	21,526	Ton	8.50	182,971
Asphaltic Material AR-4000	1,374	Ton	112.00	153,888
Subgrade Preparation	213,805	sq yd	0.35	74,832
Ditch Grading	47,500	sq yd	0.35	16,625
36-in. CMP Drainage Structure	1,044	lin ft	23.00	24,012
72-in. CMP Drainage Structure	204	lin ft	50.00	10,200
60-in. CMP Drainage Structure	72	lin ft	40.00	2,880
48-in. CMP Drainage Structure	64	lin ft	35.00	2,240
60-in. Multi Plate Drainage Structure	136	lin ft	120.00	16,320
84-in. Multi Plate Drainage Structure	68	lin ft	130.00	8,840
90-in. Multi Plate Drainage Structure	72	lin ft	135.00	9,720

Description	Quantity	Unit	Unit Cost	Total Cost
96-in. Multi Plate Drainage Structure	452	lin ft	$140.00	$ 63,280
138-in. Multi Plate Drainage Structure	92	lin ft	175.00	16,100
144-in. Multi Plate	176	lin ft	175.00	30,800
13-ft x 20-ft Multi Plate Pipe Arch	100	lin ft	500.00	50,000
10-ft x 14-ft 5-in. Multi Plate Pipe Arch	76	lin ft	200.00	15,200
7-ft x 11-ft Multi Plate Pipe Arch	64	lin ft	130.00	8,320
6-ft 7-in. x 9-ft 9-in. Multi Plate Pipe Arch	64	lin ft	130.00	8,320
Rock Excavation	25,000	cu yd	5.00	125,000
Additive Items				
Prime Coat	310	Ton	110.00	34,100
Miscellaneous Concrete	150	cu yd	250.00	37,500
Subtotal				$ 1,485,377
Overhead				225,600
Subtotal				$ 1,710,977
Taxes				40,000
Contractor Profit Margin				160,000
Subtotal				$ 1,910,977
Engineering & Quality Control				146,640
Subtotal				$ 2,057,617
Inflation @ 1.0% (to 6-1-78)				20,576
TOTAL (12.2 miles)				$ 2,078,193

b. Cost Frame Public Turnaround to Front Gate (by Minerals)

	Total Cost
Multiplate	$ 87,000
Excavation	108,100
Subgrade	8,400
Gravel	55,225
Asphalt	16,450
TOTAL (approx. one mile)	$ 275,175
TOTAL ACCESS ROAD CONSTRUCTION COSTS	$2,353,368

10.2 WATER SUPPLY

The major requirements for operation of the Project include water for process, fire protection, boiler feed, potable uses, and dust control. The quantities required are detailed on Dwg. No. 21-53-0-111.

The Project water supply will come from four wells located in Section 16, T11N, R10W. Each well will produce approximately 350 gpm. Three wells will be operated at a given time with the fourth well on standby to supply the required flow to the operation.

The original test well will be utilized as one of the four producers. The hole was rotary drilled 20-inch diameter to bedrock at 1490 feet. A 14-inch pre-perforated casing was installed and then the well was gravel packed. The remaining wells will be 17-1/2-inch diameter drilled to 1800 feet or bedrock if shallower. 12-3/4-inch pre-perforated casing will be installed and gravel packed from the total depth to the surface.

The wells will be tied together by a pipeline and the water will be pumped to a primary booster station consisting of a concrete sump and two vertical turbine pumps (one operating and one standby). Control instrumentation is included with the wells to maintain the level of the water in the supply tank.

The water line will be steel and ten inches in diameter. The line will run north from Section 16 and skirt the mine area to the west and north and tie into the mill storage tank. The line will run along the surface for ease of inspection and maintenance and will be approximately four miles in length.

Cost estimates for the water supply of the Anderson Project have been set apart as follows:

a. Water Supplies Capital Costs

b. Water Supplies Operating Costs

A detailed estimate of both costs is shown below.

a. Water Supplies Capital Costs

Water pipeline (steel, 10 in Ø, 21,120 ft)	$ 408,110
Wells (Drilling and casing 3 wells, setting four pumps)	823,040
Construction Supplies and General Expenses	240,080
TOTAL	$1,471,230

b. Water Supply Operating Costs
(800 GPM, 4¢/kwh, mill site operations)*

Annual Power Cost

Year**	kwh/yr x 10^6	Annual Power Cost	Year	kwh/yr x 10^6	Annual Power Cost
1	2.72	$ 108,800	7	3.20	$ 128,000
2	2.80	112,000	8	3.28	131,200
3	2.88	115,200	9	3.36	134,400
4	2.96	118,400	10	3.44	137,600
5	3.04	121,600	11	3.52	140,800
6	3.12	124,800	12	3.60	144,000

Annual cost of water paid to State of Arizona ($5/acre foot) = $6,451

*See Drawing No. 21-53-0-111 for details.

**At start of mill production. Variations in power consumption are due to changes in the water table.

10.3 POWER

Power will be provided to the property by Arizona Public Service (APS) via a new 115 KV 22.5 mile transmission line. (See Figure 10.1-1). This line is supplied by the Willow Lake Substation which is approximately 60 miles away. At Willow Lake a 50/60/83 MVA transformer steps voltage down from 230 KV to 115 KV. One other use is also supplied from this line; Bagdad Copper Co., which has a maximum demand of approximately 50 MW.

APS will provide the main substation for this facility in the southcentral portion of Section 2. They presently plan to provide a 115 KV circuit switcher on the incoming line, and a 10 MVA step-down transformer lowering the voltage to 12.47 KV for plant distribution. Two 12.47 KV feeders will emanate from the substation controlled by an automatic circuit recloser. The lines will run together on common poles to the process plant (underbuilt). One line is dedicated to feed the mine and water supply system; the other to feed the mill. Single line pole construction will be used from the mill area to the mine and to the water supply wells. The three-phase, symmetrical short circuit level at the secondary of the APS transformer will be approximately 83 MVA. Voltage regulation should not, therefore, be a problem. Steps have been taken to ensure reliable shovel operation by providing capacitors and reduced voltage starters on the shovels.

The mill substation will be located outside the mill building fed by underground 15 KV cable from the pole line located outside the plant perimeter.

The 480 V system has been provided with a synchro-bus tie to enable loads to be transferred to another transformer in the event of loss of one transformer.

All integral horsepower drives below 250 horsepower will be run on the three-phase 480 V system. In the mill areas this will be a high resistance grounded system with ground fault alarm and pulsing ground fault detection. This allows the process to be uninterrupted for a single ground fault, which, when it occurs, can be quickly found and isolated. Additionally, destructive and dangerous arcing ground faults are eliminated.

Emergency power is available from a 1000 KW diesel engine generator, which would start automatically on loss of normal power. Emergency lighting and critical process drives would be served by this via automatic transfer switches to the motor control centers. The reference one line diagram is shown on drawing No. 21-54-0-112, and a summary of power requirements is shown on the following Table 10.3-1.

TABLE 10.3-1

MINERALS EXPLORATION COMPANY

ANDERSON PROJECT

ELECTRICAL LOAD SUMMARY

Equipment Number	No. of Units	Description	Connected HP	Operating HP
002	1	Air Compressor, Plant	100	100
003-004	2	Boilers, 22,000#/HR	100	50
008	1	Fire Water Pump, 1000 gpm	100	- -
010	1	Instrument Air Compressor	7.5	7.5
011	1	Shop Air Compressor	10	10
012	1	H_2SO_4 Unload Compressor	25	25
014	1	Fresh Water Pump, 150 gpm	5	5
015-016	2	Gland Water Pump, 150 gpm	20	10
103	1	Apron Feeder	7.5	7.5
104	1	Belt Conveyor	15	15
106	1	Semiautogenous Grinding Mill	500	500
108-109	2	Rod Mill Feed Pumps	50	25
110	1	Trommel Oversize Belt Conveyor-1	5	5
111	1	Trommel Oversize Belt Conveyor-2	5	5
112	1	Tramp Iron Magnet	3	3
113	1	Rod Mill	600	600
115-116	2	Classifier Screen Feed Pumps	50	25
118	1	Sampling System, Leach Feed	1	1
120-121	2	Leach Feed Pumps	30	15
123	1	Wet Scrubber	10	10
124	1	Sump Pump, Ore Receiving Area	7.5	7.5
125	1	Sump Pump, Grinding Area	7.5	7.5
126	1	Rod Mill Charger	5	5
127	1	Grinding Area Overhead Crane	28.5	28.5
128	1	Sag Mill Liner Handler	15	15
207-212	6	Agitators, Acid-Mix and Leach	900	900
214-215	2	Leach Discharge Pumps	50	25
216	1	Wet Scrubber, Leaching Area	15	15
217	1	Sump Pump, Leaching Area	5	5
306-315	10	Thickener Feed Pumps	1000	500
321-325	5	Agitators, Mix Tanks	37.5	37.5
331-335	5	Thickener Mechanisms	32.5	32.5
336-345	10	Thickener Underflow Pumps	75	75
346-350	5	Thickener Underflow Standby Pumps	100	- -
357-358	2	Thickener Overflow Sump Pump	40	20
359	1	Sampling System, Tailings	1	1
361	1	Sump Pump, CCD Area	5	5
402	1	Clarifier Mechanism	6.5	6.5

Equipment Number	No. of Units	Description	Connected HP	Operating HP
403	1	Clarifier Underflow Pump	3	3
405-406	2	Sand Filter Feed Pumps	120	60
411-412	2	Sand Filter Backwash Pumps	150	75
413-414	2	Solvent Extraction Feed Pumps	60	30
507-510	4	Agitators, Extraction Mixers	40	40
511-512	2	Raffinate Feed Pumps	50	25
515-516	2	Raffinate Tank Discharge Pumps	50	25
519-520	2	Pregnant Organic Feed Pumps	10	5
522-523	2	Pregnant Organic Discharge Pumps	10	5
524	1	Pregnant Organic Bleed-off Pump	1	1
532-535	4	Agitators, Stripping Mixers	12	12
536-538	3	Barren Organic Feed Pumps	15	10
541	1	Agitator, Regeneration Mixer	3	3
542	1	Regeneration Aqueous Discharge Pump	1	1
544-545	2	Barren Organic Discharge Pumps	10	5
546	1	Barren Organic Bleed-off Pump	1	1
549	1	Agitator, Organic Sludge Tank	40	40
550	1	Supernatant Crud Pump	1	1
552	1	Organic Sludge Discharge Pump	1	1
553-554	2	Pregnant Strip Feed Pumps	2	1
556	1	Sump Pump, Extraction Area	2	2
557	1	Sump Pump, Stripping Area	2	2
604-605	2	Agitators, YC Precipitation	10	10
607	1	YC Thickener Mechanism	1.5	1.5
611	1	Agitator, YC Thickener Underflow	7.5	7.5
612	1	YC Centrifuge Feed Pump	1	1
614-615	2	Sand Filter Feed Pumps	10	5
618-619	2	Barren Strip Feed Pumps	2	1
624	1	Sand Filter Backwash Pump	3	3
626	1	YC Centrifuge	20	20
627	1	YC Screw Conveyor	1	1
628	1	YC Dryer	20	20
629	1	YC Roll Crusher	10	10
633	1	Roller Conveyor	1	1
634	1	Wet Scrubber YC Precipitation	10	10
635	1	Wet Scrubber YC Drying	5	5
636	1	Wet Scrubber YC Packaging	5	5
637	1	Sump Pump, Precipitation Area	1	1
638	1	Sump Pump, Drying and Packaging Area	1	1
703-704	2	Acid Transfer Pumps	10	5
706-707	2	Sodium Chlorate Metering Pumps	4	2
708	1	Reagent Area Sump Pump	2	2
712	1	Flocculant Area Transfer Pump	15	15
713-714	2	Flocculant Metering Pumps	10	10
717	1	Glue Solution Transfer Pump	3	3

Equipment Number	No. of Units	Description	Connected HP	Operating HP
718-719	2	Glue Solution Metering Pumps	2	1
721	1	Kerosene Transfer Pump	2	2
725-726	2	Sodium Bicarbonate Pumps	2	1
729	1	Sodium Chlorate Transfer Pump	15	7.5
731	1	Glue Preparation Agitator	5	5
732	1	Flocculant Tank Agitator	30	30
733	1	Sodium Bicarbonate Agitator	5	5
734	1	Sodium Chlorate Agitator	30	30
		Subtotal	4803	3574.5
		Shops and Warehouse	150	150
		Administration and Laboratory	50	50
		MILL TOTAL	5003	3874.5
		Others:		
		P&H 2100 Shovel (2)	1200	1200
		Tailings Decant Pumps (2)	400	200
		Booster Pumps Water Supply (2)	400	200
		Well Pumps (4)	600	450
		Lighting and Miscellaneous	235	155
		TOTAL	2835	2205
		GRAND TOTAL	7838	6079.5

ELECTRICAL CAPITAL AND OPERATING COSTS

1. APS Transmission Line

115 kv Tap Station	$ 314,000
115 kv Transmission Line	907,100
115/12.5 kv XFMR, and Metering	295,000
Land Right-of-way	26,000
TOTAL	$1,542,100

2. Mine and Plant Distribution

Poles, Wire & Hardware	$ 93,436
4-Well Substations	27,600
Labor	123,750
Automatic Well Controls	37,638
TOTAL	$ 282,424

3. Power Connections

a. Plant Substation 12.5/4.16 kv	$ 78,635
b. Portable 12.5/4.16 kv Shovel	121,500
TOTAL	$ 200,135
GRAND TOTAL	$2,024,659

4. Power Rates

4¢ per kwh (June 1, 1978)

10.4 COMMUNICATIONS

A telephone system will be used as the primary communication system. It will be complemented by a paging system installed in the large areas such as the shop, warehouse and mill building. Radios will be used to provide communications between the mobile equipment and a base station located in the maintenance building.

Service will be provided by Mountain Bell. For the purpose of the study it is to be assumed that an underground line connecting the plant to the Yarnell-Congress Exchange will be utilized. A microwave evaluation will be done at a later date when Mountain Bell engineers can examine the Project.

The cost of the underground line would be $204,000 which is used for the Feasibility Study although it has been stated by a Mountain Bell representative that the microwave would be considerably less expensive.

SECTION 11

ENVIRONMENTAL

11.1 WASTE MANAGEMENT

Operations in uranium extraction processes include grinding, leaching, separating the leach liquor from the tailings, and recovering the uranium from the leach liquor. These operations generate gaseous, liquid and solid emissions and effluents.

Waste containment systems have been incorporated in this study to prevent pollution of water, soil and air. Particulate concentrations will be maintained below permissible levels, to safeguard the surrounding environment from radioactive contamination, by using wet scrubbers. Solid and liquid wastes will be impounded in ponds designed to applicable standards.

Mill effluents and waste will be minimized to the extent reasonably achievable. Pollution control equipment will be "state of the art". It will be routinely checked for proper operation. Equipment failure will be monitored by an annunciator system to detect failure.

The location of emissions points and collection points are shown on the following drawings in Exhibit III-A:

21-53-0-113	Ore Receiving and Conveying Emission Control
21-53-0-114	Mill Building Emission Control
21-53-0-115	Mill Building Emission Control

21-53-0-116	Leach and Filter Area Emission Control
21-53-0-117	CCD Thickener Emission Control
21-53-0-118	Mill Site Plan Emission Control
MEC-002	Tailing Disposal System

11.1.1 Gaseous Emissions

The dust collecting, venting and fume control systems in the plant have been designed to control all possible particulate, gaseous, and mist emissions at acceptable levels when the plant is operating at an average of 2000 tons per day. Wet scrubbing and venting are the primary methods of gaseous emission control.

Gaseous emissions originate in several locations and are controlled by several control systems.

a. Locations

(1) Ore Receiving

There will be small amounts of dust and radon generated by the ore stockpiles and the subsequent transportation to the ore surge hopper. The ore stockpiles will be sprinkled with water to suppress dust. Natural air currents will provide sufficient dispersion and dilution to prevent buildup to hazardous concentrations.

In the ore receiving facility, dust containing radionuclides and radon gas will be generated only at the apron feeder to belt conveyor transfer point. There will be a wet scrubber to control emissions at this critical pick-up point.

(2) Leaching and Solvent Extraction

Radon, chlorine and sulfuric acid mists will be emitted from the top of the mix and leach tanks. All of these tanks will be vented through a wet scrubber in the leach area. Kerosene and ammonia fumes will be present in the solvent extraction area; however, these fumes will be minimal as they are contained by the tank covers. The actual losses will not impose an adverse impact to the environment.

(3) Uranium Concentrate Precipitation, Dewatering, Drying and Packaging

Ammonia fumes, steam and uranium dust will be emitted from the uranium concentrate precipitation tanks, thickener, centrifuge, dryer and packaging areas. These fumes and dust will be collected in three separate wet scrubbers. Each scrubber will be responsible for different pickup points. All three scrubbers will vent through a single stack.

(4) Laboratory

The fume hoods from the laboratories will collect perchloric acid fumes and other miscellaneous chemical fumes. These will be air diluted before venting to the atmosphere.

(5) Boilers

Steam requirements will be filled by the plant's two small commercial boilers fired with No. 2 diesel fuel. The exhaust from these boilers will contain particulates, hydrocarbons, sulfur dioxide, nitrous oxides, and carbon monoxide. The boilers will be equipped with the proper firing controls to prevent undue emissions from the exhaust stack. Natural air currents will further disperse and dilute pollutant concentrations to meet acceptable levels.

(6) Emergency Power Generator

To ensure that the mill receives continuous power in the event of power outage, a diesel powered emergency generating unit rated at approximately 1,000 kilowatts will be installed in the mill complex. Emissions from the diesel engine will be vented to the atmosphere through a stack. Natural air currents will disperse stack emissions sufficiently to meet acceptable levels.

b. Control Systems Description

As mentioned in the above sections, several wet scrubbers are anticipated in the Anderson Project mill. They are described in more detail as follows:

(1) Ore Receiving	CFM Air Cleaned
Pickup Points: Apron Feeder	2000
TOTAL	2000

Control:

Wet scrubber, 99+ percent efficient, sized for 2000 CFM, discharged through Stack No. 1. The scrubber effluent is returned to the circuit (to the ore receiving area sump)

(2) Leaching Area — CFM Air Cleaned

Pickup Points:

Includes a total of 6 pickup points, one at the top of each leach tank, and the acid mix tanks.	5000
TOTAL	5000

Control:

Wet scrubber, 99+ percent efficient, sized for 5000 CFM, discharged through Stack No. 2. The scrubber effluent is returned to the circuit (to leach discharge).

(3) Uranium Concentrate Precipitation and Dewatering Area — CFM Air Cleaned

Pickup Points:

Precipitation Tanks	600
Thickener and Centrifuge Areas	600
TOTAL	1200

Control:

Wet scrubber, 99+ percent efficient, sized for 1200 CFM, discharged through Stack No. 3. The scrubber effluent is returned to the circuit (to the uranium concentrate thickener).

(4) Drying — CFM Air Cleaned

Pickup Points:

Hearth Dryer In (800° F)	760 ACFM
Out (160° F)	580 ACFM
TOTAL	760 ACFM

Control:

Wet scrubber, 99+ percent efficient, sized for 800 ACFM, discharged through Stack No. 3. The scrubber effluent is returned to the circuit (to the uranium concentrate thickener).

(5) Packaging Area	CFM Air Cleaned
Pickup Points:	
Packaging Area	500
TOTAL	500

Control:

Wet scrubber, 99+ percent efficient, sized for 550 CFM, discharged through Stack No. 3. The scrubber effluent is returned to the circuit (to uranium concentrate thickener).

c. Mill Discharge Stacks

Mill discharge stack information is contained in Tables 11.1-1 and 11.1-2. These tables contain information on stack heights, types and concentration of effluents discharged and any air quality controls used.

11.1.2 Liquids and Solids

a. Tailings Disposal

Tailings slurry at about 38 percent solids, together with other milling wastes, will be gathered into a tailings dilution box. The combined tailings effluent will be sampled. The tailings will consist of waste solids from the ore, water, minor quantities of unrecovered uranium values and small amounts of chemicals used in the milling process. The solid portion of the tailings will be

TABLE 11.1-1

MILL STACK EMISSIONS AND DESIGN SPECIFICATIONS

	STACK LOCATION	EMISSION CONTROL EQ.	COLLECTION EFFICIENCY (%)	EXIT FLOW RATE CFM	EXIT T° °F	EXIT DIAM. (IN.)	RELEASE HEIGHT	POLLUTANT	STACK CONCENTRATION OR EMISSION DATE
1.	Ore Receiving Facility	Wet Scrubber	99+	2,000	Ambient	12	70	Ore Dust	$9x10^2$ mg/cu ft (3.18 mg/M^3 assuming a dust load of 516/hr)
2.	Leach Tank Area	Wet Scrubber	99+	5,000	70° F	18	70	H_2SO_4 Mist	$40x10^2$ mg/M^3 (EPA 40 CFR 50.5 and 50.11)
3.	Uranium Concentrate Area	Wet Scrubber	99+	2,550	120° F	12	70	Ammonia	$<$ 50 ppm
								Yellowcake	$0.9x10^3$ mg/M^3 (assuming a loading of $2.7x10^5$ lb/sec)
4.	Laboratory Hood Manifold	None	--	2,000	70° F	12	40	Acid Vapors	$<$ 30 mg/M^3
5.	Emergency Power	None	--	--	--	8	35	Misc.	Intermittent
6.	Boiler	None	--	7,500	450° F	22	70	See Table 11.1-2	

TABLE 11.1-2

ESTIMATED BOILER STACK EMISSIONS

Pollutant	Emission Rate[a] [lb/hr (g/sec)] Maximum[b]	Annual Average[c]
Particulates	0.4 (0.06)	0.3 (0.04)
Sulfur dioxide[d]	16.5 (2.0)	12.0 (1.5)
Carbon monoxide	1.2 (0.14)	0.9 (0.10)
Hydrocarbons	0.3 (0.03)	0.2 (0.02)
Nitrogen oxides (as NO_2)	4.9 (0.62)	3.8 (0.46)

[a] Emission estimates based on EPA (1973) emission factors.

[b] Maximum emissions based on a distillate fuel oil consumption rate of 224.2 gal/hr.

[c] Annual average emissions based on a distillate fuel oil consumption rate of 168.1 gal/hr.

[d] Sulfur content of fuel assumed to be 0.5 percent.

composed of sand and silt sized particles with approximately 89 percent of the tailings expected to pass the 35 mesh screen and 41 percent to pass the 200 mesh screen.

The tailings will be transported to the tailing pond via a ten-inch diameter, high density polyethylene pipeline. A system of ten multiple drop boxes will be used to break the hydrostatic pressure generated between the mill site elevation and the tailings disposal area (approximately 200-foot difference). The total length of pipe required is estimated at 1800 feet.

The pipeline slope will be 1.5 percent. A berm will be placed along the pipeline such that if a pipeline break occurs, the tailings slurry will flow into the tailing impoundment. A system of multiple discharge points will be used at the tailings impoundment. This manifold system can be operated in such a manner that a damp sand beach can be maintained around the periphery of the pond.

The storage capacity of the impoundment is sufficient to retain all of the tailings expected to be generated during the design life of the project. However, sufficient capacity is not available to also store all of the waste water to be discharged from the mill. Excess water will be pumped from the tailing impoundment area to an evaporation pond which will have no effluent.

Monitor wells will be installed on the perimeter of the tailing pond to detect possible seepage of mill tailings solutions. The estimated rates of slurry discharge to the tailings impoundment are shown in Table 11.1-3.

A tailings impoundment area covering approximately 81 acres in previously mined out portions of the pit has been used for this study. The dam construction will be in segments and stages to coincide with pit mining schedule. The natural clay in the non-mineralized zones of the lacustrine sediments will be used in the dam core and impoundment bottom to reduce seepage to a negligible value. The dam design uses the downstream method using non-tailings materials for construction to maintain structural integrity. Also, the dam has been designed to meet all safety factor requirements in accordance with accepted methods of analysis.

The tailings distribution system will keep fugitive dust and contaminants below allowable limits. Due to the method of tailings distribution, the perimeter of the impoundment will be wet at all times. A daily inspection program will include inspection of the dam, pond and other surface areas used for the evaporation system. Records will be kept and any deficiencies will be corrected immediately.

b. Other Wastes

Various industrial wastes will be discharged either to the tailings pond, to a leach field, or returned to the

TABLE 11.1-3

TAILINGS POND OPERATING CONDITIONS

Production and General Criteria	
Operating schedule, 2000 tpd, 365 days per year	
Total tailings deposited per year, tons solids (dry weight)	730,000
Total tailings deposited (9.8 years), tons (dry weight)	7,181,950
Total volume of tailings in the impoundment (wet, cu ft)	128.25×10^6
Mill drainage area, acres	35
Surface area of tailing ponds (final)	81
Precipitation (inches per year)	7.47
Evaporation (inches per year)	78

Solution Inflow to Tailings Ponds	GPM
No. 5 thickener underflow solution	605.7
Precipitation (7.47 inches of water per year)	44.8
Total Solution to Tailings Ponds	650.5

Solution Outflow from Tailings Ponds	GPM
Seepage losses (estimated from D&M report, page 33)	7.0
Lake evaporation	326.5
Water entrained in tailings particles	121.1
Subtotal	454.6
Net Amount to be Evaporated (Average)	*195.9

*This figure will change in accordance with the rate of tailings input, available storage volume and rate of evaporation.

mill circuit. The mill area drainage system will return any precipitation or spillage of industrial wastes back to the mill circuit. A description of the industrial wastes follows:

(1) Laboratory Waste

This waste will include liquids from laboratory testing such as water diluted acids, bases and solvents. An average of 3 GPM is estimated for this inflow. The laboratory waste will be collected and pumped to the mill circuit.

(2) Boiler Blowdown and Bleed Line Waste

This waste will include water from regular maintenance of the boiler and bleed lines. Approximately 5 GPM will be returned to the mill circuit.

(3) Treated Sewage

This waste will generate from the office building, mill building, shop, and laboratory. The sewage will be treated and the effluent will discharge into a leach field. Approximately 10 GPM of solution will be generated.

(4) Dust Suppression

The active areas of the mine, including haul roads, will be wetted down via water trucks or sprays to reduce fugitive dust. Ore will be trucked from the mine pits and temporarily stored in stockpiles. The fresh ore will be wet, with a moisture content of approximately 10 percent. Consequently, fugitive dust from the stockpiles is not expected to be significant. Additional wetting may be necessary and will be provided as needed.

The exterior plant areas will be subject to rigorous housekeeping with all accumulations of dirt, spillage, dust piles and debris promptly removed. Water washdown will be used where applicable.

11.2 NUCLEAR INSTRUMENTS SOURCES

There will be a total of six commercially available nuclear density gauges, five on the thickener underflow lines and one on the leach slurry feed line.

All source heads will be doubly encapsulated in stainless steel and be sealed and mounted in rugged, shielded housings. The source heads will be provided with key securable, manually operated three-position source shutters for measurement, calibration, and complete closure. The housings will be clearly marked with radiation warning notices as required by the NRC, and all gauges will be installed away from frequently used operator walkways. All gauges will be leak tested initially and once every three years thereafter, providing the beta and gamma surveys do not show an unusual radiation increase.

11.3 ENVIRONMENTAL CONSIDERATIONS

Consideration has been given to environmental constraints for both existing laws and perceivable future law changes. Baseline studies with field data have been completed by various consultants: Wildlife and vegetation by Dames & Moore; archaeology and cultural resources by the Museum of Northern Arizona; surface and groundwater hydrology by Water Development Corporation; socioeconomic and geology by Minerals Exploration Company, seismology, meteorology, air quality and radiological considerations by Woodward-Clyde Consultants. In addition, Minerals Exploration supported these studies with a water quality collection and analysis program and operation of a meteorological station and high volume air sample programs. Woodward-Clyde Consultants then took each individual study and prepared a comprehensive baseline environmental report for this project. It should be further noted that additional pump testing is to be completed in the pit areas to gain better understanding of local groundwater hydrology.

Design completed to date on the mill, mine and tailing impoundment reflect consideration given to environmental requirements. The tailing impoundment site was selected in a portion of the mined-out pit to meet current federal regulatory position requirements while taking advantage of a natural clay base to effectively control seepage.

Dames & Moore has completed a document entitled "Final Design Report of the Tailings Impoundment". This report addresses in-depth items such as design, construction, seepage, operations management, including monitoring for seepage and dam stability, decommissioning and stabilization. Wet scrubbers have been employed on the mill to reduce air emissions to as low as practically achievable. Dust suppression techniques primarily using water have been included in the active mine areas and haul roads to reduce particulate emissions. Radiation safety and environmental monitoring programs are planned to comply with federal and state regulations. Also, water quality monitoring wells with a sampling and analysis program, a site boundary air quality monitoring program and other monitoring programs will be instituted to provide data for environmental consideration with the project that is ongoing.

The State of Arizona is an Agreement State with the U.S. Nuclear Regulatory Commission. The Arizona Atomic Energy Commission has the power to issue a Radioactive Materials license to operate the mill and tailing disposal facility under this agreement by complying with certain NRC guidelines. To support this application, the Dames & Moore "Final Design Report of the Tailings Impoundment" was submitted in its entirety.

Arizona does not currently require a formal EIS (Environmental Impact Statement) in its permitting procedure, but Woodward-Clyde Consultants is currently preparing an environmental impact report.

Since current trends are toward requiring an EIS, it is felt that this document may be required in the future. Recently, Arizona has passed legislation addressing uranium milling and tailing disposal facilities. One point in this bill is the requirement for the AAEC to review applications with respect to tailing disposal facility siting alternatives, tailing operations management, and groundwater hydrological impacts using other state agencies. This was anticipated, but required extracting these sections from the Woodward-Clyde report. Also, a radiological impact section has been included, as requested by the AAEC.

The Air Quality Installation Permit application to the Arizona State Bureau of Air Quality Control has been completed and submitted. The air impact section from the Environmental Impact Statement is now required for the Environmental Protection Agency PSD (Prevention of Significant Deterioration) Air Quality Permit, as a result of the 1977 Amendments to the 1970 Clean Air Act. The EPA PSD permit will be applied for as soon as the EPA publishes final rules and regulations on the 1977 Amendments.

At the present time there are no laws in Arizona which require mine reclamation. Legislation does exist for coal mines, and the Federal Land Policy and Management Act of 1976 provides for reclamation of lands disturbed by any exploration or mining activity. However, regulations were issued in draft form in December 1976, but have never been promulgated.

In anticipation that reclamation will be required before the project is completed, the mine planning has made allowance to partially backfill exhausted pit areas with the exception of the final pit area. This final pit area will fill with water and create a water source for wildlife and livestock in the area. This backfilling will greatly facilitate any future reclamation requirements. Also, Union Oil Research is working with Minerals Exploration Company to develop a suitable reclamation plan complete with recommended plant species for revegetation.

Since most of the necessary environmental background information has been compiled, the operating and capital costs directly related to the radiation safety and environmental monitoring programs can be tabulated for this feasibility study as follows:

(1) OPERATING COSTS

a. Manpower

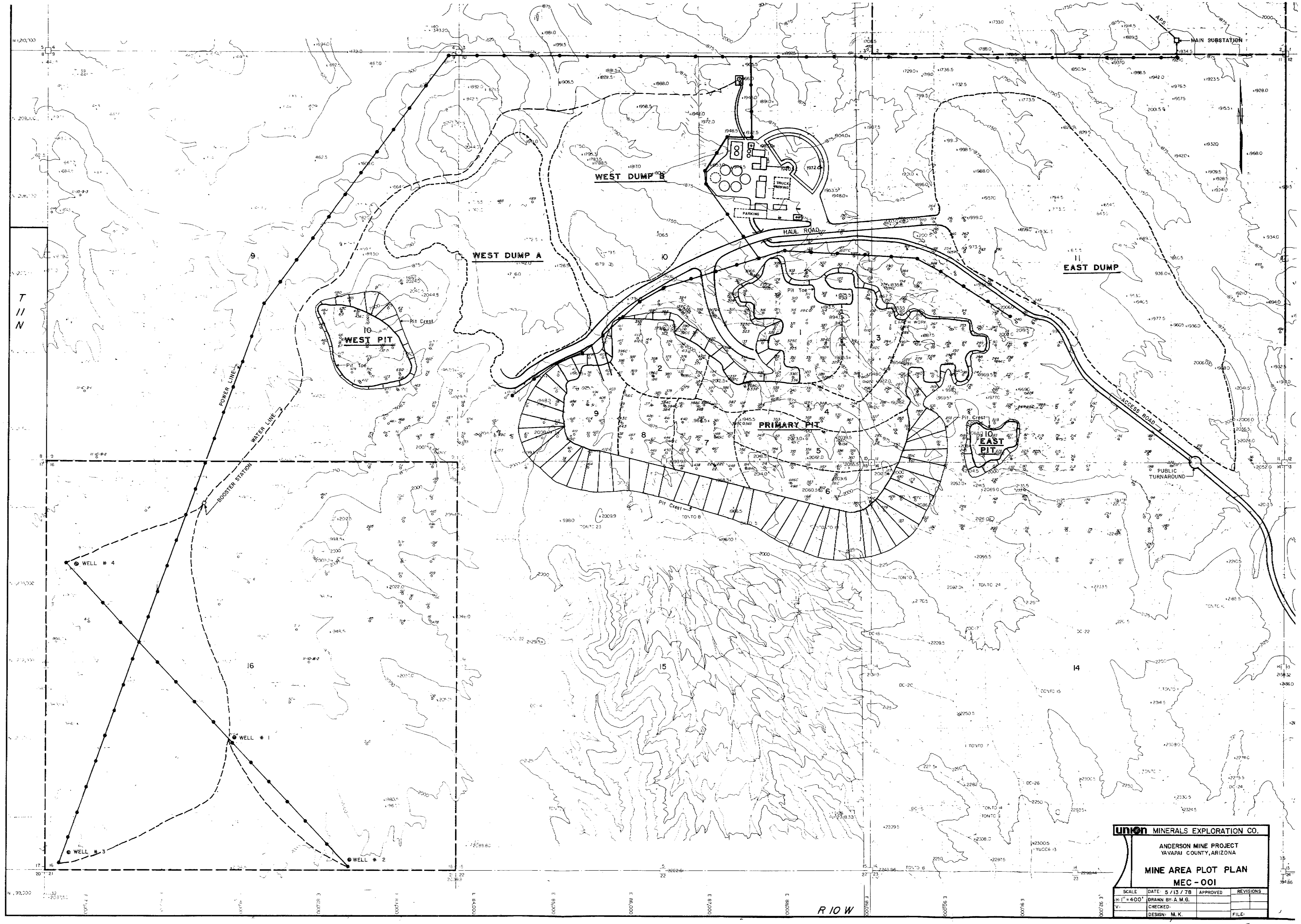
Environmental & Safety Administrator	$ 26,400
Safety Engineer	19,800
Environmental Assistant	19,800
Environmental & Safety Technician (5 required @ $16,500)	82,500
Subtotal	$148,500/yr

b. Supplies and Outside Lab Work (to maintain quality control)	$ 20,000
c. Perpetual Care Fund - Tailing Pond (5¢ per ton milled)	$ 36,500
	$ 56,500
TOTAL OPERATING COST	$205,000/yr

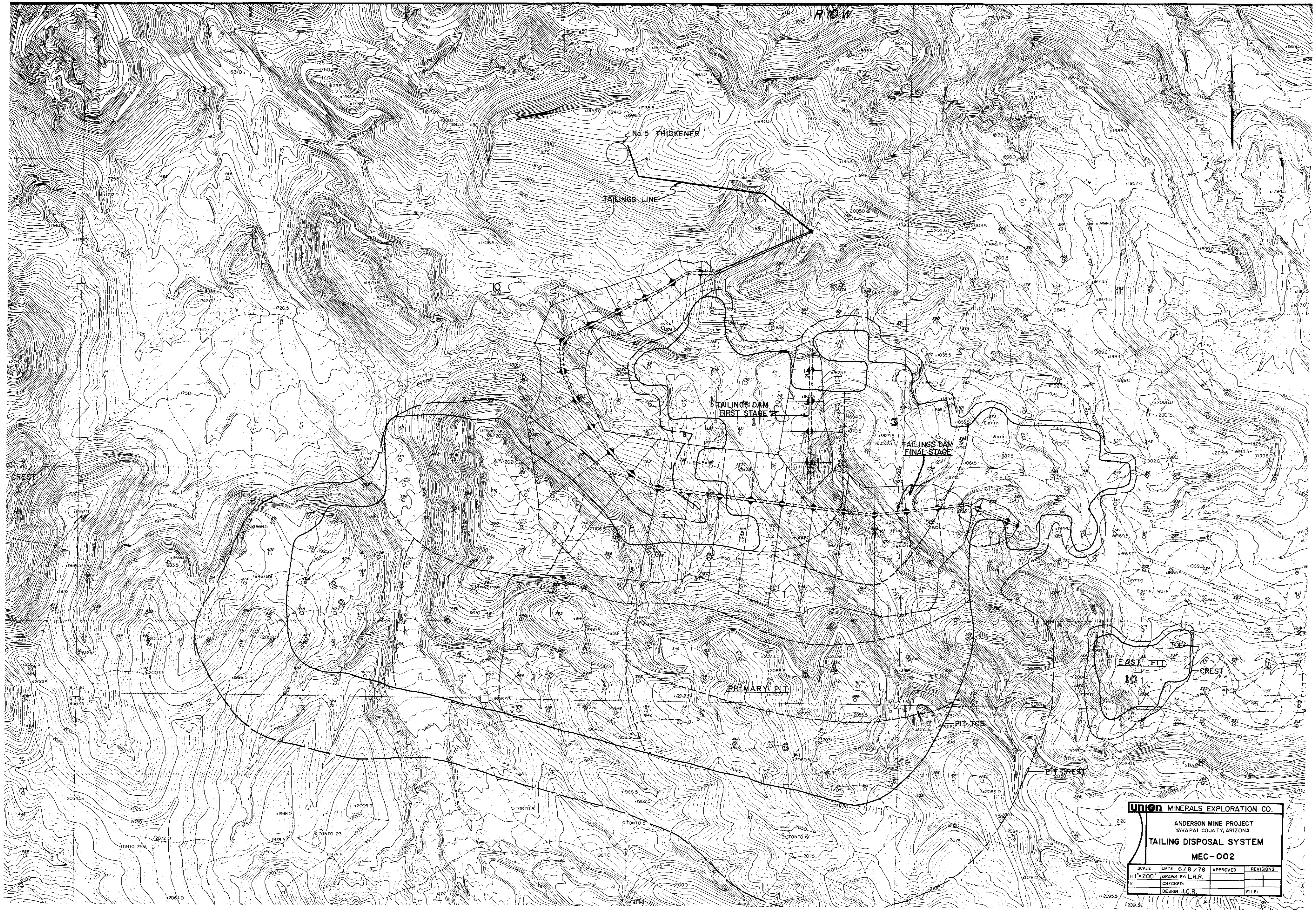
(2) CAPITAL COSTS

a.	Environmental Laboratory Instrumentation with lab space and some major equipment carried by the mill	$ 50,000
b.	Monitoring Equipment Includes Alpha-Beta Instrument, Hi-Vol samples, personnel monitors, etc.	$100,000
	TOTAL ENVIRONMENTAL CAPITAL COST	$150,000

EXHIBIT III-A
DRAWINGS



MAIN SUBSTATION
APS
WEST DUMP B
WEST DUMP A
EAST DUMP
WEST PIT
Pit Crest
Pit Toe
PRIMARY PIT
EAST PIT
HAUL ROAD
ACCESS ROAD
PARKING
PUBLIC TURNAROUND
POWER LINE
WATER LINE
BOOSTER STATION
WELL # 1
WELL # 2
WELL # 3
WELL # 4
T 11 N
R 10 W
UNION MINERALS EXPLORATION CO.
ANDERSON MINE PROJECT
YAVAPAI COUNTY, ARIZONA
MINE AREA PLOT PLAN
MEC - 001
SCALE
H: 1" = 400'
V:
DATE: 5 / 13 / 78
DRAWN BY: A.M.G.
CHECKED:
DESIGN: M. K.
APPROVED
REVISIONS
FILE:


R10W
No. 5 THICKENER
TAILINGS LINE
TAILINGS DAM
FIRST STAGE
TAILINGS DAM
FINAL STAGE
CREST
PRIMARY PIT
PIT TOE
PIT CREST
EAST PIT
TOE
CREST
UNION MINERALS EXPLORATION CO.
ANDERSON MINE PROJECT
YAVAPAI COUNTY, ARIZONA
TAILING DISPOSAL SYSTEM
MEC-002
SCALE
H 1" = 200'
V:
DATE 6/8/78
APPROVED
REVISIONS
DRAWN BY L.R.R.
CHECKED:
DESIGN J.C.R.
FILE:


MAIN SUBSTATION
WEST DUMP B
PARKING
HAUL ROAD
WEST DUMP A
EAST DUMP
WEST PIT
Pit Crest
Pit Toe
PRIMARY PIT
EAST PIT
PUBLIC TURNAROUND
ACCESS ROAD
POWER LINE
WATER LINE
BOOSTER STATION
WELL # 4
WELL # 1
WELL # 3
WELL # 2
T 11 N
R 10 W
NOTE: PREVAILING WIND DIRECTION VARIES WITH THE SEASON
SEASON | PREVAILING WIND DIRECTION IS FROM
SUMMER | S-NIGHT / WSW DAY
FALL | TRANSITION - NIGHT / WSW - DAY
WINTER | N - NIGHT / WSW - DAY
SPRING | TRANSITION - NIGHT / WSW - DAY
LEGEND
- AIR SAMPLING STATION (SAMPLED ON 6 DAY CYCLE WHERE POWER IS NO PROBLEM 6 DAY CYCLE FOR 1 MONTH EACH QUARTER WHERE POWER IS A PROBLEM)
- METEOROLOGICAL STATION
TAILINGS MONITORING SITES (SAMPLED MONTHLY)
GROUNDWATER MONITORING SITES (SAMPLED MONTHLY (FIRST YR) - QUARTERLY (2ND YR) - SEMI-ANNUALLY THERE AFTER)
SURFACE WATER MONITORING SITES (SAMPLED QUARTERLY - SEMI ANNUALLY)
SOIL & VEGETATION MONITORING SITES (SAMPLED ANNUALLY - EVERY SPRING)
UNION MINERALS EXPLORATION CO.
ANDERSON MINE PROJECT
YAVAPAI COUNTY, ARIZONA
ENVIRONMENTAL MONITORING
MINE AREA PLOT PLAN
MEC - 005
SCALE
H: 1" = 400'
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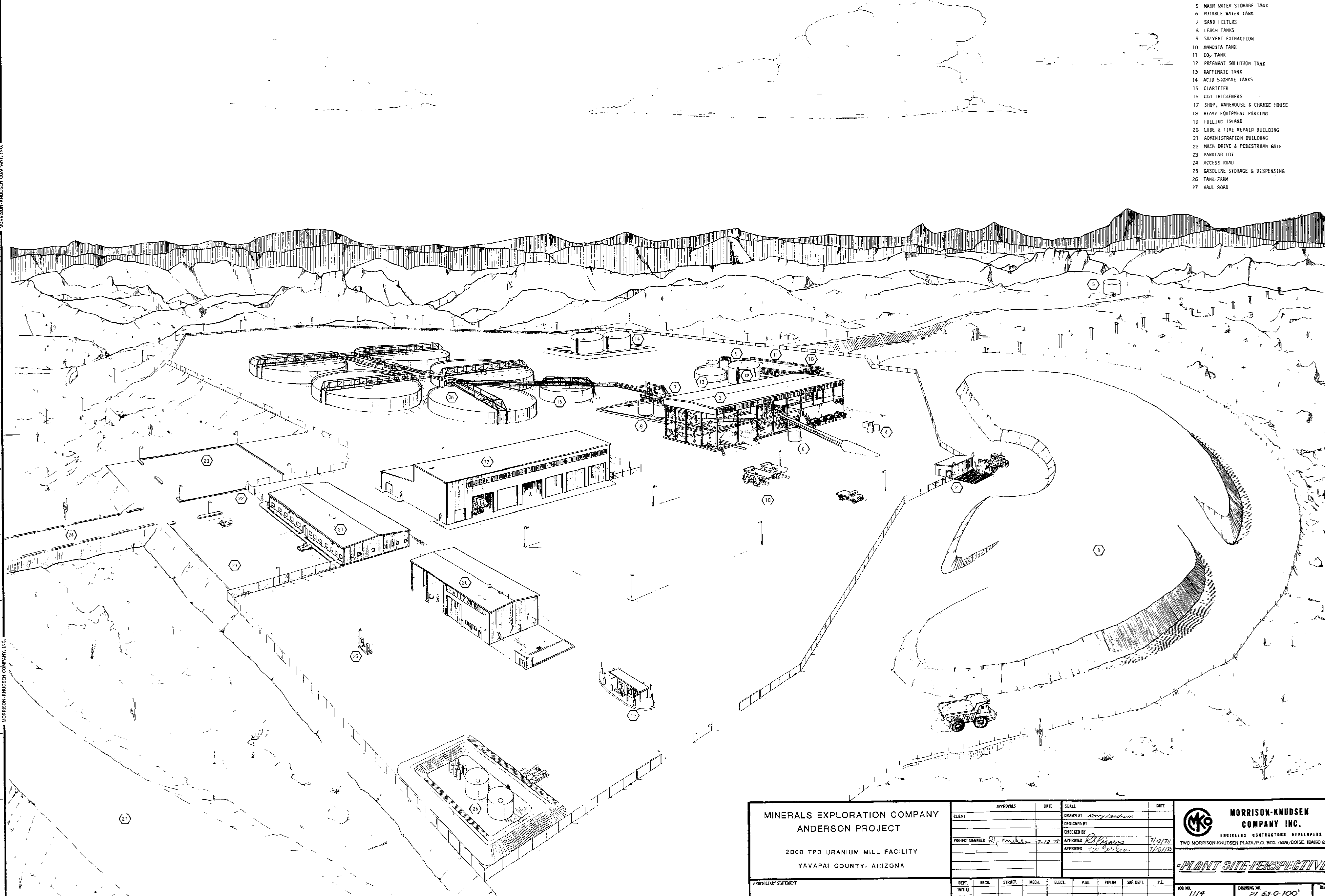
CHECKED:
DESIGN: M.K.
APPROVED
REVISIONS
FILE:

00106512

MORRISON-KNUDSEN COMPANY, INC.



LEGEND

1 ORE STORAGE PAD
2 ORE RECEIVING & CONVEYING
3 MILL BUILDING
4 SODIUM CHLORATE TANKS
5 MAIN WATER STORAGE TANK
6 POTABLE WATER TANK
7 SAND FILTERS
8 LEACH TANKS
9 SOLVENT EXTRACTION
10 AMMONIA TANK
11 CO_2 TANK
12 PREGNANT SOLUTION TANK
13 RAFFINATE TANK
14 ACID STORAGE TANKS
15 CLARIFIER
16 CCD THICKENERS
17 SHOP, WAREHOUSE & CHANGE HOUSE
18 HEAVY EQUIPMENT PARKING
19 FUELING ISLAND
20 LUBE & TIRE REPAIR BUILDING
21 ADMINISTRATION BUILDING
22 MAIN DRIVE & PEDESTRIAN GATE
23 PARKING LOT
24 ACCESS ROAD
25 GASOLINE STORAGE & DISPENSING
26 TANK-FARM
27 HAUL ROAD

MINERALS EXPLORATION COMPANY
ANDERSON PROJECT

2000 TPD URANIUM MILL FACILITY

YAVAPAI COUNTY, ARIZONA

PROPRIETARY STATEMENT

APPROVALS		DATE
CLIENT		
PROJECT MANAGER		7-18-78

SCALE		DATE
DRAWN BY	Kerry Landrum	
DESIGNED BY		
CHECKED BY		
APPROVED		7/18/78
APPROVED		7/18/78

DEPT.	ARCH.	STRUCT.	MECH.	ELECT.	P.&I.	PIPING	SAF. DEPT.	P.E.
INITIAL								
DATE								

MORRISON-KNUDSEN COMPANY INC.
ENGINEERS CONTRACTORS DEVELOPERS
TWO MORRISON-KNUDSEN PLAZA/P.O. BOX 7808/BOISE, IDAHO 83729

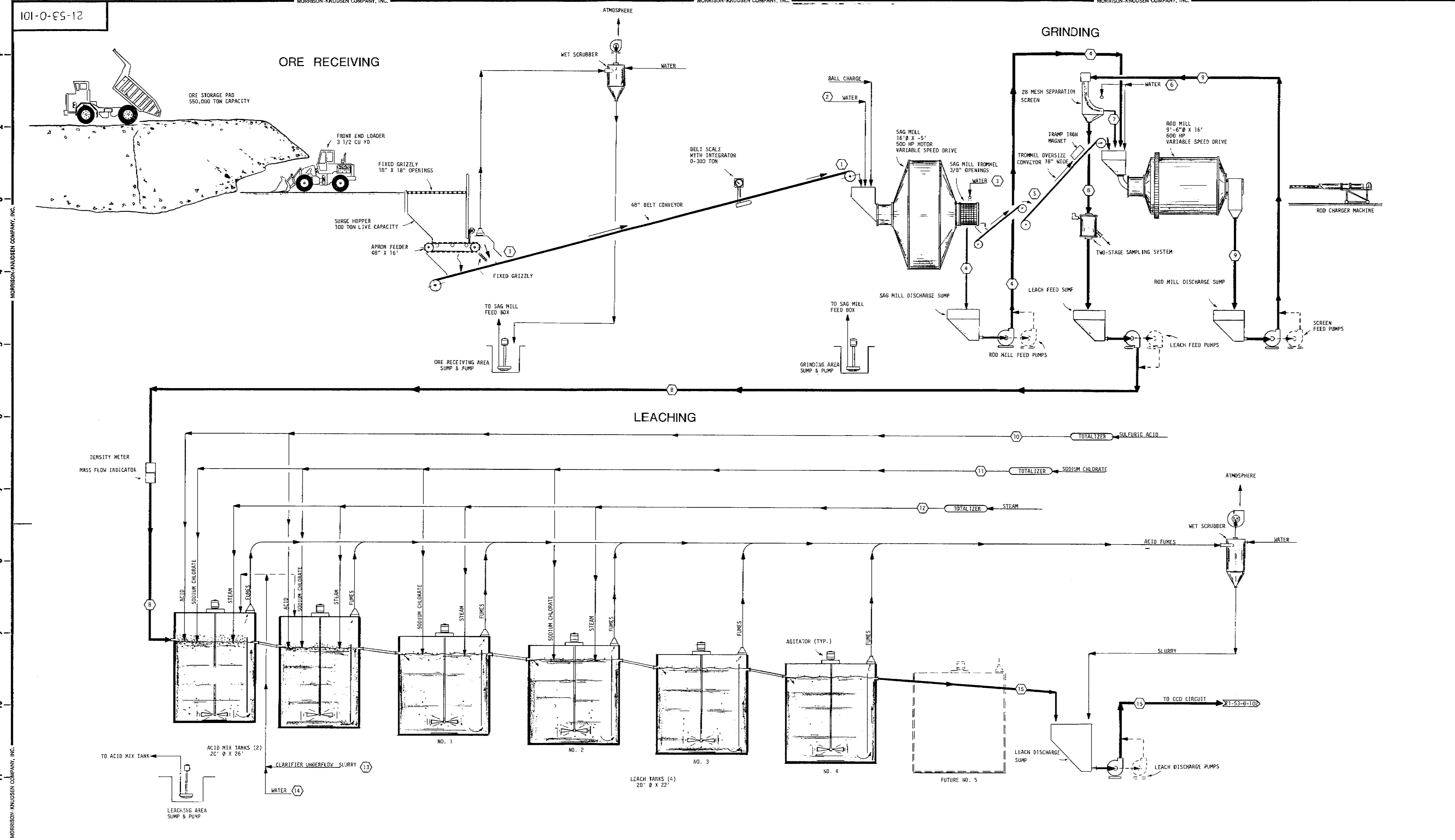
PLANT SITE PERSPECTIVE

JOB NO. 1114

DRAWING NO. 21-53-0-100

REVISION

21-53-0-101



LEGEND

- INDICATES MAIN PRODUCT FLOW
- INDICATES STAND-BY OR INTERMITTENT FLOW
- INDICATES DRAWING NO. OF LINE CONTINUATION
- INDICATES STREAM NUMBER

STREAM NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
SOLIDS TPH	91.7	---	---	82.5	9.2	---	18.3	91.7	110.0	---	---	---	---	---	95.1
LIQUID TPH	10.1	64.9	3.0	77.0	1.0	8.8	3.2	91.7	90.0	20.4	0.7	9.8	2.0	6.4	116.2
TOTAL FLOW GPM		259.6	12.0	446.9		35.2		521.2	545.3	*44.7	2.0	39.2	8.0	25.6	609.6

*27.7 GPM ARE USED UF BY $CaCO_3$

#1

REFERENCE DRAWING	NUMBER
ORE RECEIVING & CONVEYING PLAN & EL.	21-53-0-105
CCD CLARIFYING & TAILING FLOW SHEET	21-53-0-102
MILL BUILDING PLAN & EL.	21-53-0-107
LEACH & FILTER AREA PLAN & EL.	21-53-0-108

NO. | DATE | REVISION | BY | APPR. | APPR.

NOTES

1. LEACH TANKS LOCATED OUTDOORS
2. LEACHING CIRCUIT BYPASS LINES OMITTED FOR CLARITY

DESCRIPTION | COST ACCOUNT

WORK COVERED BY THIS DRAWING CHARGED TO COST ACCOUNT ABOVE

MINERALS EXPLORATION COMPANY
ANDERSON PROJECT

2000 TPD URANIUM MILL FACILITY
YAVAPAI COUNTY, ARIZONA

PROPRIETARY STATEMENT

APPROVALS	DATE
CLIENT	
PROJECT MANAGER R. Knuckles	7-18-78

SCALE NONE	DATE
DRAWN BY Ben	30 MAY 78
DESIGNED BY	
CHECKED BY J. KUZILIK	7/11/78
APPROVED R.S. Lozano	7/18/78
APPROVED T.W. Wilson	7/18/78

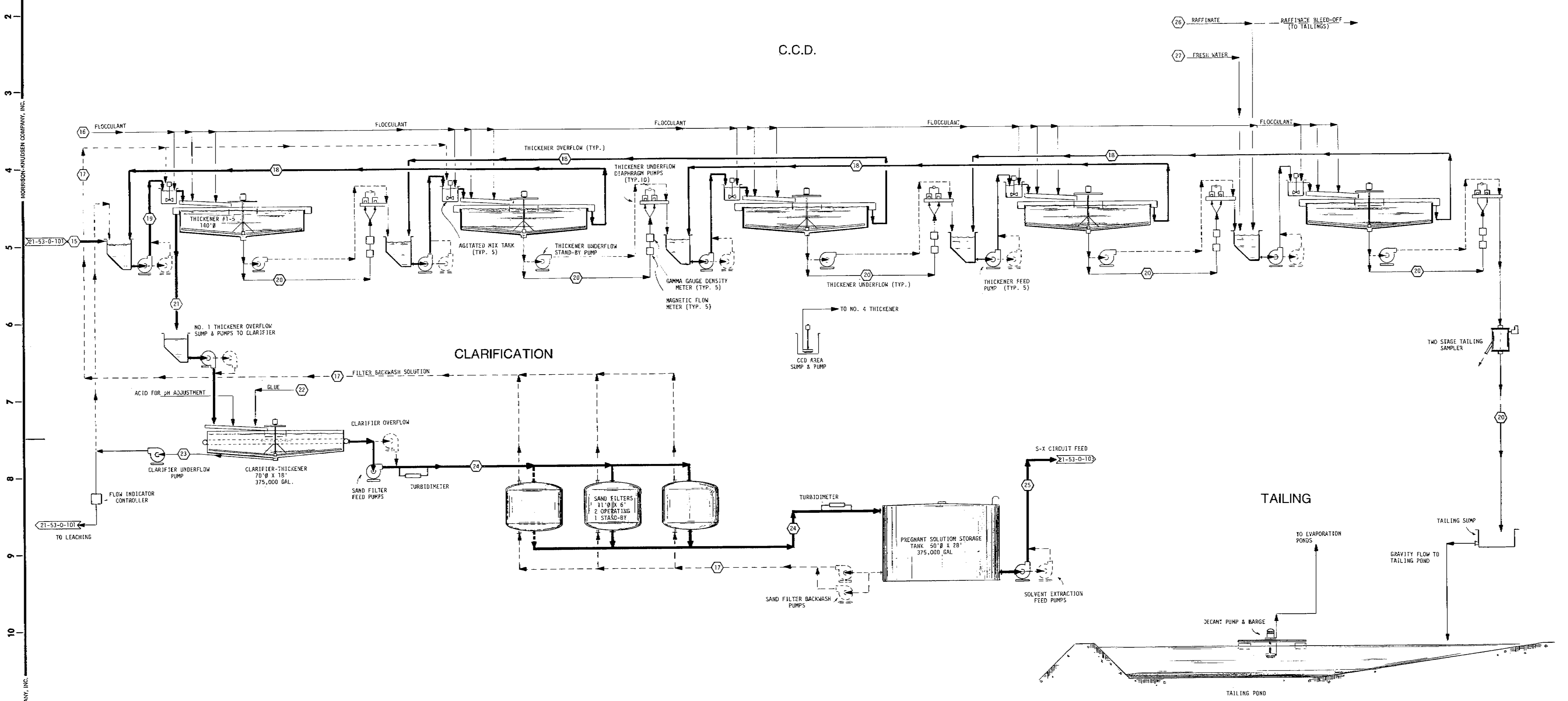
DEPT.	ARCH.	STRUCT.	MECH.	ELECT.	P.&I.	PIPING	SAF. DEPT.	P.E.
INITIAL								
DATE								

MORRISON-KNUDSEN COMPANY INC.
ENGINEERS CONTRACTORS DEVELOPERS
TWO MORRISON-KNUDSEN PLAZA/P.O. BOX 7808/BOISE, IDAHO 83729

ORE RECEIVING, GRINDING & LEACHING FLOW SHEET

JOB NO. 1114 | DRAWING NO. 21-53-0-101 | REVISION 0

21-53-0-102



STREAM NO.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
SOLIDS TPH	---	---	---	95.1	95.1	---	---	---	---	---	---	---			
LIQUID TPH	5.6	12.5	424.7	559.0	155.1	403.9	0.6	2.0	402.5	390	390	34.7			
TOTAL FLOW GPM	22.6	50.0	1698.8	2381.0	765.5	1615.5	2.5	8.0	1610.0	1560	1560	138.8			

LEGEND

- INDICATES MAIN PRODUCT FLOW
- INDICATES STAND-BY OR INTERMITTENT FLOW
- INDICATES DRAWING NO. OF LINE CONTINUATION
- INDICATES STREAM NUMBER

#2

REFERENCE DRAWING	NUMBER
RECEIVING, GRINDING, & LEACHING FLOWSHEET	21-53-0-101
CCD AREA PLAN & ELEVATION	21-53-0-109
LEACH & FILTER AREA PLAN & ELEVATION	21-53-0-108
MILL SITE PLAN	21-53-0-104
S-X, STRIPPING PRECIPITATION DRYING & PACKAGING FLOWSHEET	21-53-0-103

NO. | DATE | REVISION | BY | APPR. | APPR.

NOTES

1. THICKENER BYPASS AND RECIRCULATION LINES OMITTED FOR CLARITY

DESCRIPTION | COST ACCOUNT

WORK COVERED BY THIS DRAWING CHARGED TO COST ACCOUNT ABOVE

MINERALS EXPLORATION COMPANY
ANDERSON PROJECT

2000 TPD URANIUM MILL FACILITY
YAVAPAI COUNTY, ARIZONA

PROPRIETARY STATEMENT

APPROVALS	DATE
CLIENT	
PROJECT MANAGER [signature]	7-18-78

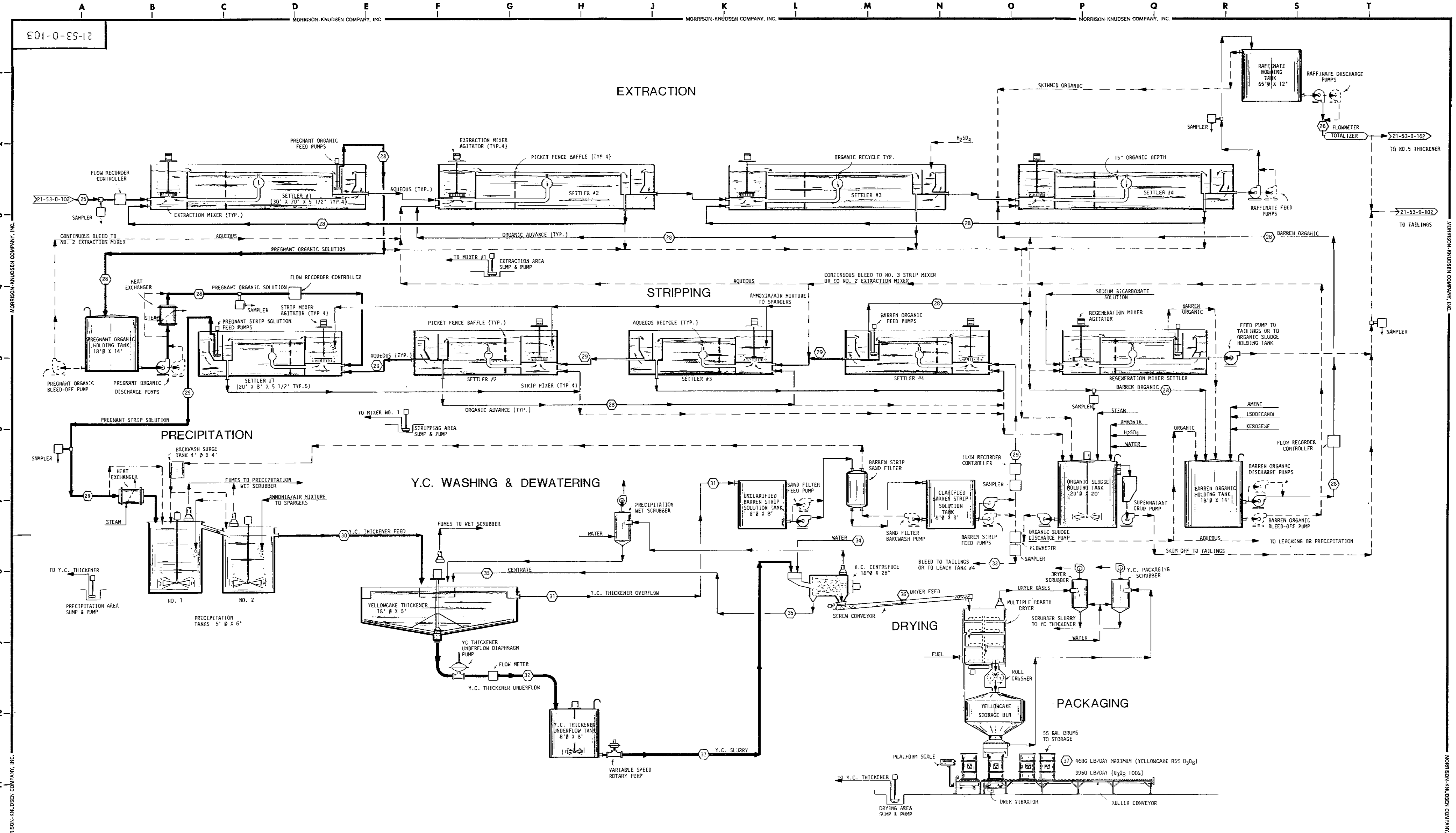
		DATE
SCALE	NONE	
DRAWN BY	[signature]	31 MAY 78
DESIGNED BY		
CHECKED BY	J. ZUZILIK	7/11/78
APPROVED	R. Pizarro	7/18/78
APPROVED	[signature]	7/18/78

DEPT. | ARCH. | STRUCT. | MECH. | ELECT. | P.&I. | PIPING | SAF. DEPT. | P.E.
INITIAL
DATE

MORRISON-KNUDSEN COMPANY INC.
ENGINEERS CONTRACTORS DEVELOPERS
TWO MORRISON-KNUDSEN PLAZA/P.O. BOX 7808/BOISE, IDAHO 83729

C.C.D. CLARIFICATION & TAILING FLOW SHEET

JOB NO. 1114 | DRAWING NO. 21-53-0-102 | REVISION 0



STREAM NO.	25	26		28	29	30	31	32	33	34	35	36	37				
SOLIDS TPH	---	---		---	---	.063	---	.083	---	---	---	.083	.083				
LIQUID TPH	390.0	390		33.0	3.7	4.79	4.62	.17	.92	1.04	1.05	.124	.002				
TOTAL FLOW GPM	1560	1560		165	13.2	17.9	17.25	.65	3.4	4.16	4.15	.5	*				

* 3960 LB/DAY U_3O_8 (100%)
EQUIVALENT TO 4659 LB/DAY U_3O_8 (85%)

LEGEND

- INDICATES MAIN PRODUCT FLOW
- INDICATES STAND-BY OR INTERMITTENT FLOW
- INDICATES DRAWING NO. OF LINE CONTINUATION
- INDICATES STREAM NUMBER

#3

REFERENCE DRAWING	NUMBER
SOLVENT EXTRACTION & STRIPPING PLAN & ELEVATION	21-53-0-110
MILL BUILDING PLAN & ELEVATIONS	21-53-0-107
MILL BUILDING PLAN & ELEVATIONS	21-53-0-106
MILL SITE PLAN	21-53-0-104
CCD, CLARIFYING & TAILINGS FLOWSHEET	21-53-0-102

NO. | DATE | REVISION | BY | APPR. | APPR. | NOTES

DESCRIPTION | COST ACCOUNT
WORK COVERED BY THIS DRAWING CHARGED TO COST ACCOUNT ABOVE

MINERALS EXPLORATION COMPANY
ANDERSON PROJECT
2000 TPD URANIUM MILL FACILITY
YAVAPAI COUNTY, ARIZONA

PROPRIETARY STATEMENT

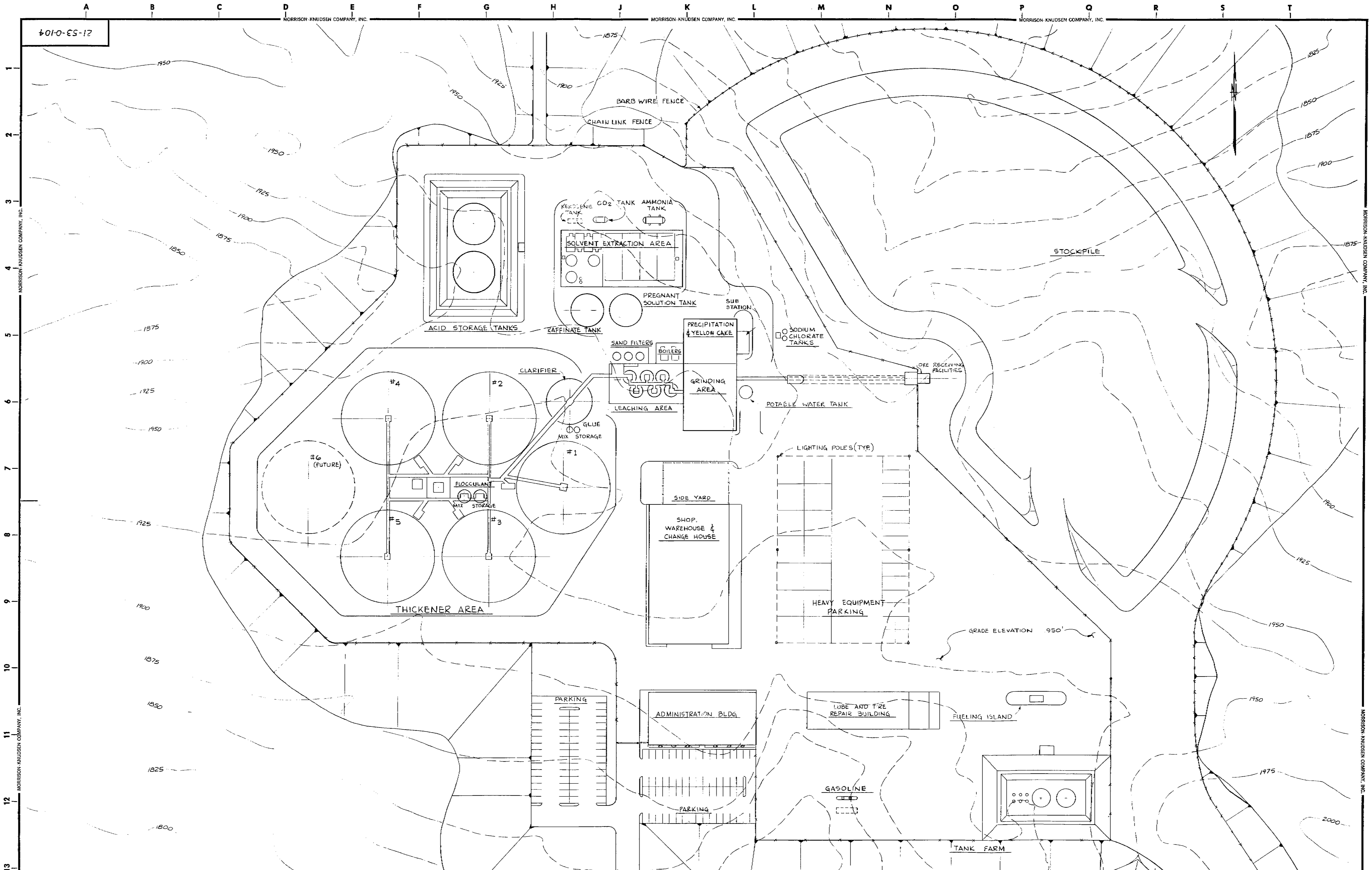
APPROVALS | DATE
CLIENT
PROJECT MANAGER | 7-18-78
SCALE NONE | DATE 6 JUNE 78
DRAWN BY
DESIGNED BY
CHECKED BY J. KUZILIK | 7/11/78
APPROVED | 7/18/78
APPROVED | 7/16/78

DEPT. | ARCH. | STRUCT. | MECH. | ELECT. | P.&I. | PIPING | SAF. DEPT. | P.E.
INITIAL
DATE

MORRISON-KNUDSEN COMPANY INC.
ENGINEERS CONTRACTORS DEVELOPERS
TWO MORRISON-KNUDSEN PLAZA/P.O. BOX 7808/BOISE, IDAHO 83729

SOLVENT EXTRACTION, STRIPPING Y.C. PRECIPITATION & PACKAGING FLOW SHEET

JOB NO. 1114 | DRAWING NO. 21-53-0-103 | REVISION 0



NO.	DATE	REVISION	BY	APPR.	APPR.

REFERENCE DRAWING	NUMBER

NOTES

DESCRIPTION	COST ACCOUNT
WORK COVERED BY THIS DRAWING CHARGED TO COST ACCOUNT ABOVE	

MINERALS EXPLORATION COMPANY
ANDERSON PROJECT

2000 TPD URANIUM MILL FACILITY
YAVAPAI COUNTY, ARIZONA

PROPRIETARY STATEMENT

APPROVALS	DATE
CLIENT	
PROJECT MANAGER	7-18-78

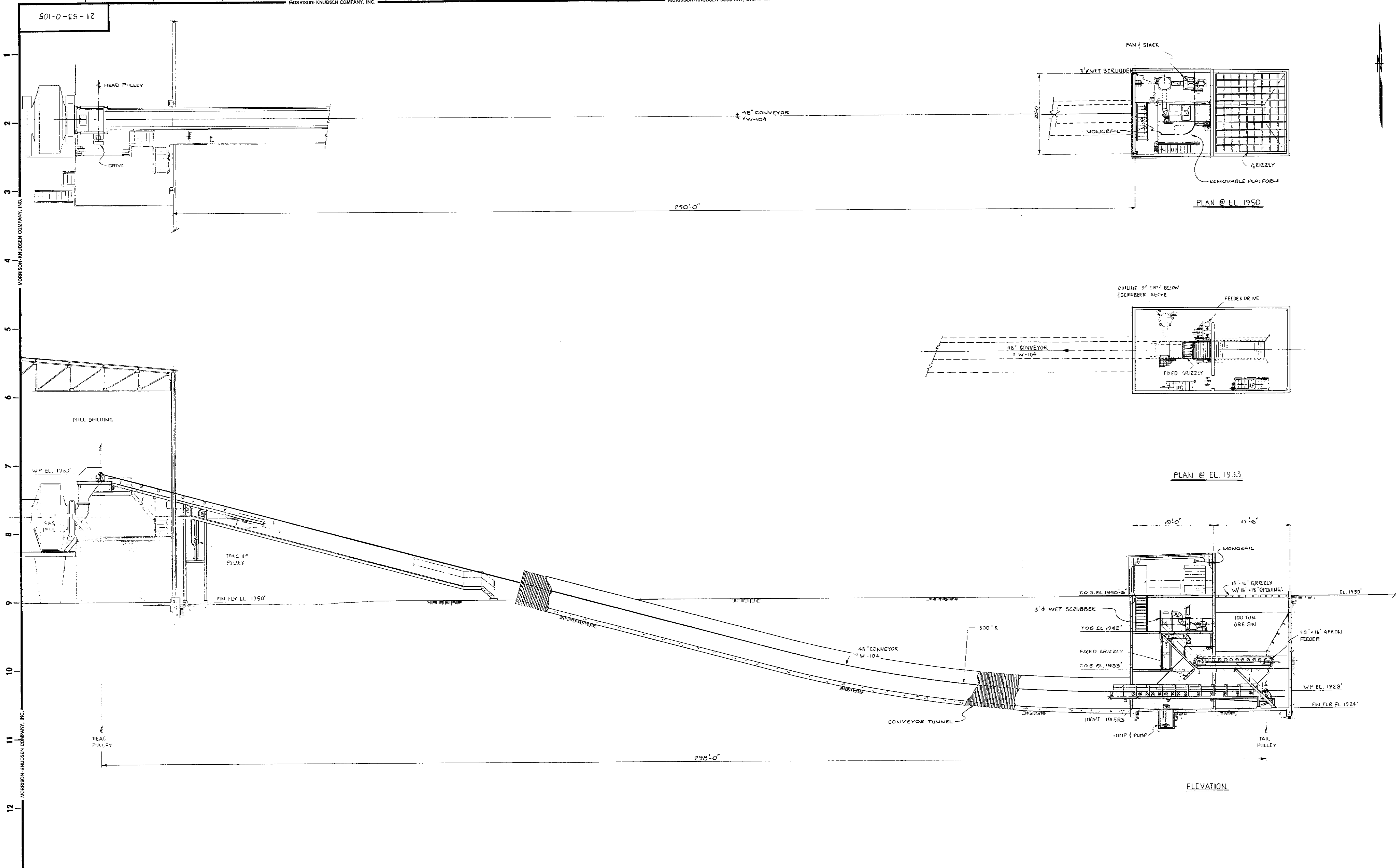
SCALE 1"=50'	DATE
DRAWN BY S. BUTTERBRODT	6/22/78
DESIGNED BY	
CHECKED BY J. KUZIUK	7/11/78
APPROVED	7/18/78
APPROVED	7/18/78

DEPT.	ARCH.	STRUCT.	MECH.	ELECT.	P.&I.	PIPING	SAF. DEPT.	P.E.
INITIAL								
DATE								

MORRISON-KNUDSEN COMPANY INC.
ENGINEERS CONTRACTORS DEVELOPERS
TWO MORRISON-KNUDSEN PLAZA/P.O. BOX 7808/BOISE, IDAHO 83729

MILL & MINE FACILITY PLOT PLAN

JOB NO.	DRAWING NO.	REVISION
1114	21-53-0-104	0



NO.	DATE	REVISION	BY	APPR.	APPR.

REFERENCE DRAWING	NUMBER
MILL BUILDING PLAN & ELEVATION	21-53-0-106
MILL SITE PLAN	21-53-0-104
RECEIVING, GRINDING & LEACHING FLOW SHEET	21-53-0-101

NOTES

DESCRIPTION | COST ACCOUNT

WORK COVERED BY THIS DRAWING CHARGED TO COST ACCOUNT ABOVE

MINERALS EXPLORATION COMPANY
ANDERSON PROJECT

2000 TPD URANIUM MILL FACILITY
YAVAPAI COUNTY, ARIZONA

PROPRIETARY STATEMENT

APPROVALS		DATE
CLIENT		
PROJECT MANAGER	[signature]	7-18-78

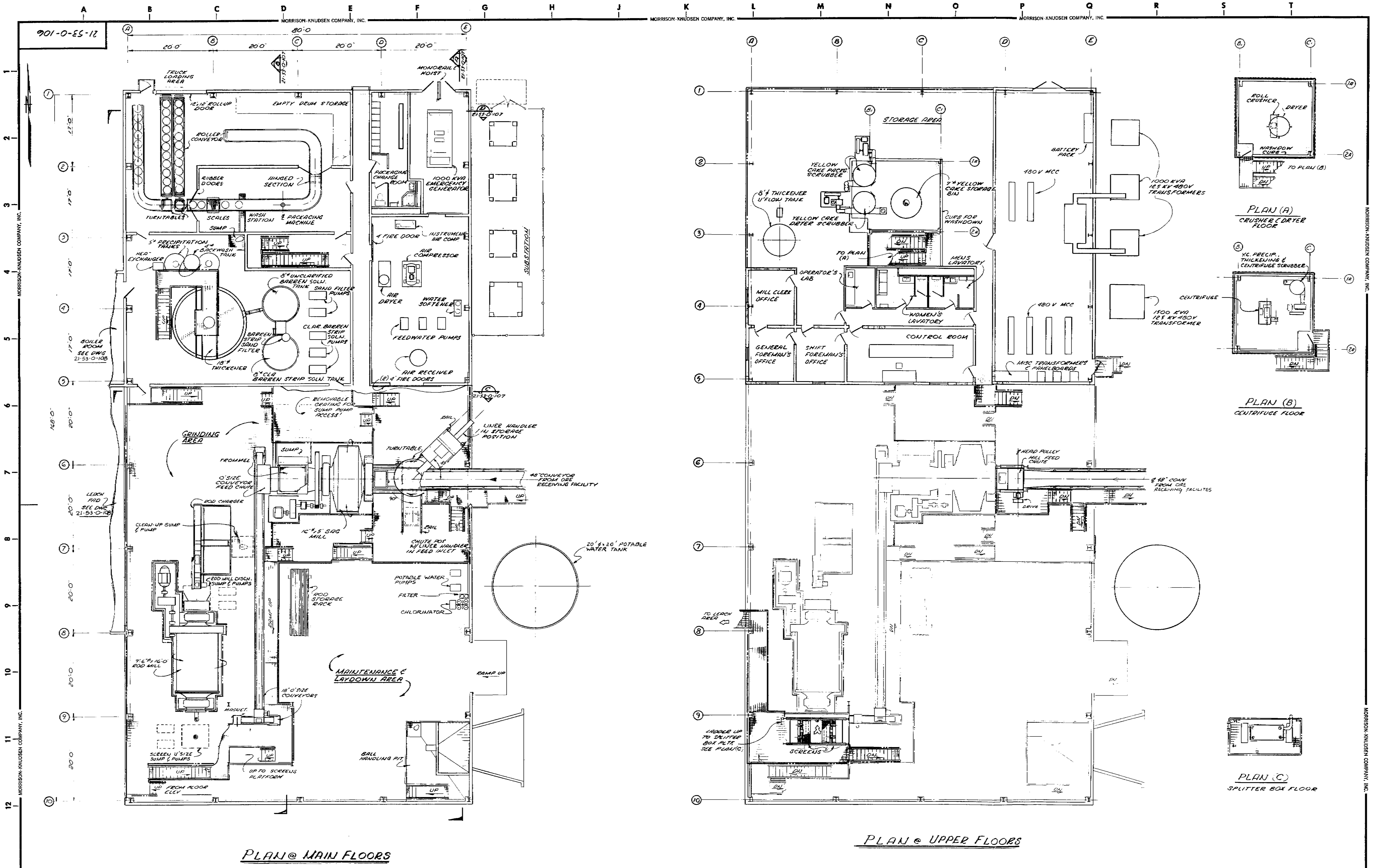
SCALE	1/8" = 1'-0"	DATE
DRAWN BY	[initials]	
DESIGNED BY		
CHECKED BY	J. KUZILIK	7/17/78
APPROVED	[signature]	7/18/78
APPROVED	[signature]	7/18/78

DEPT.	ARCH.	STRUCT.	MECH.	ELECT.	P.&I.	PIPING	SAF. DEPT.	P.E.
INITIAL								
DATE								

MORRISON-KNUDSEN COMPANY INC.
ENGINEERS CONTRACTORS DEVELOPERS
TWO MORRISON-KNUDSEN PLAZA/P.O. BOX 7808/BOISE, IDAHO 83729

ORE RECEIVING & CONVEYING
GENERAL ARRANGEMENT
PLANS & ELEVATION

JOB NO.	DRAWING NO.	REVISION
1114	21-53-0-105	0



NO.	DATE	REVISION	BY	APPR.	APPR.	REFERENCE DRAWING	NUMBER	NOTES
						MILL BUILDING - GEN. ARRANGEMENT - ELEVATIONS	21-53-0-107	

DESCRIPTION — COST ACCOUNT
WORK COVERED BY THIS DRAWING CHARGED TO COST ACCOUNT ABOVE

MINERALS EXPLORATION COMPANY
ANDERSON PROJECT

2000 TPD URANIUM MILL FACILITY
YAVAPAI COUNTY, ARIZONA

PROPRIETARY STATEMENT

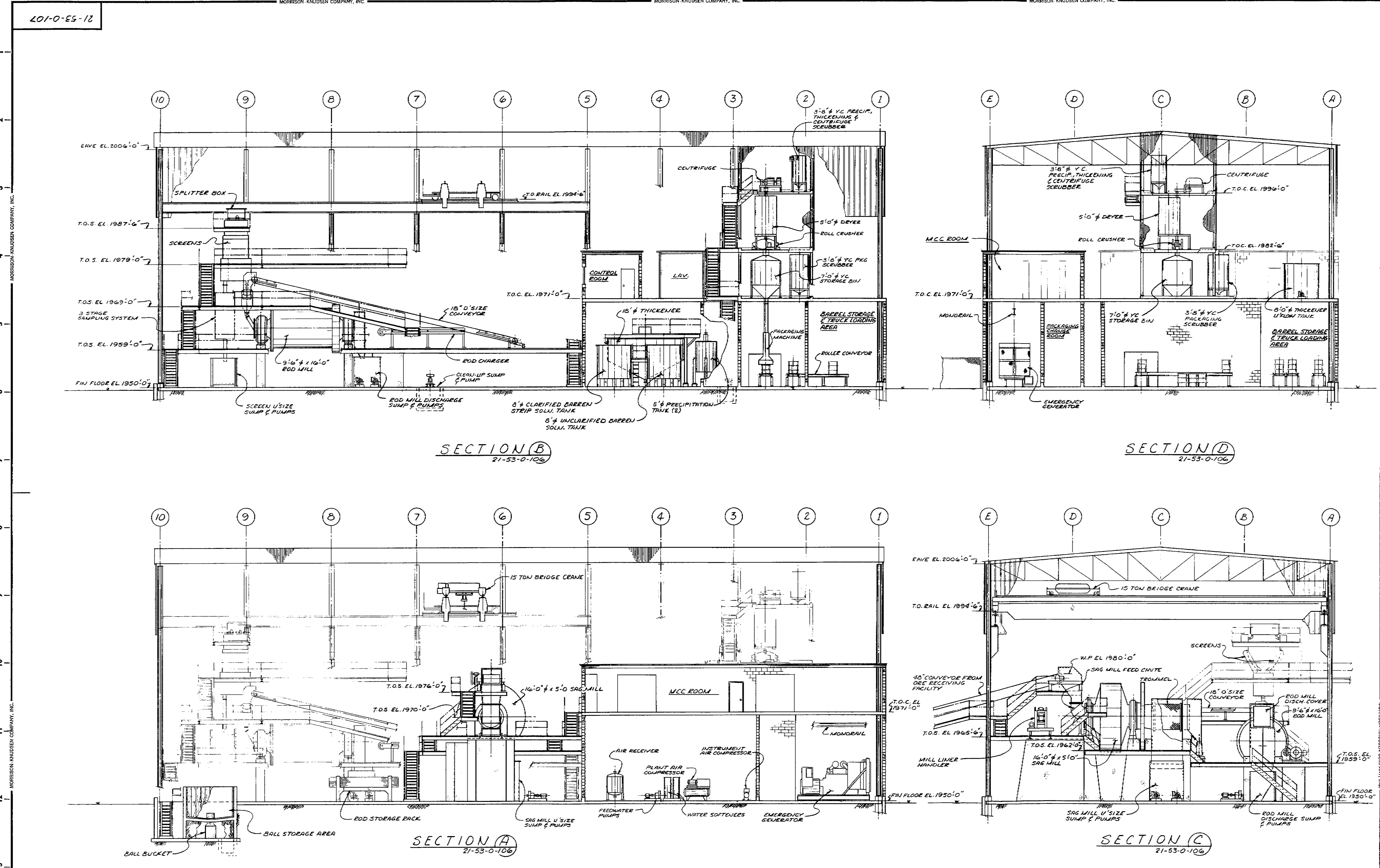
SCALE 1/8" = 1'-0"
DRAWN BY Kerry Landrum 6/29/78
DESIGNED BY
CHECKED BY J. Kuzulk 7/1/78
APPROVED 7/18/78
APPROVED 7/18/78
PROJECT MANAGER 7-7-78

DEPT. ARCH. STRUCT. MECH. ELECT. P.&I. PIPING SAF. DEPT. P.E.
INITIAL
DATE

MORRISON-KNUDSEN COMPANY INC.
ENGINEERS CONTRACTORS DEVELOPERS
TWO MORRISON-KNUDSEN PLAZA/P.O. BOX 7808/BOISE, IDAHO 83729

MILL BUILDING
GENERAL ARRANGEMENT
PLANS

JOB NO. 1114 — DRAWING NO. 21-53-0-106 — REVISION 0



NO.	DATE	REVISION	BY	APPR.	APPR.	REFERENCE DRAWING	NUMBER	NOTES
						MILL BUILDING-GEN ARRANGEMENT-PLAN	21-53-0-106	

DESCRIPTION — COST ACCOUNT

WORK COVERED BY THIS DRAWING CHARGED TO COST ACCOUNT ABOVE

MINERALS EXPLORATION COMPANY
ANDERSON PROJECT

2000 TPD URANIUM MILL FACILITY
YAVAPAI COUNTY, ARIZONA

PROPRIETARY STATEMENT

APPROVALS		DATE
CLIENT		
PROJECT MANAGER	R. [signature]	7-18-78

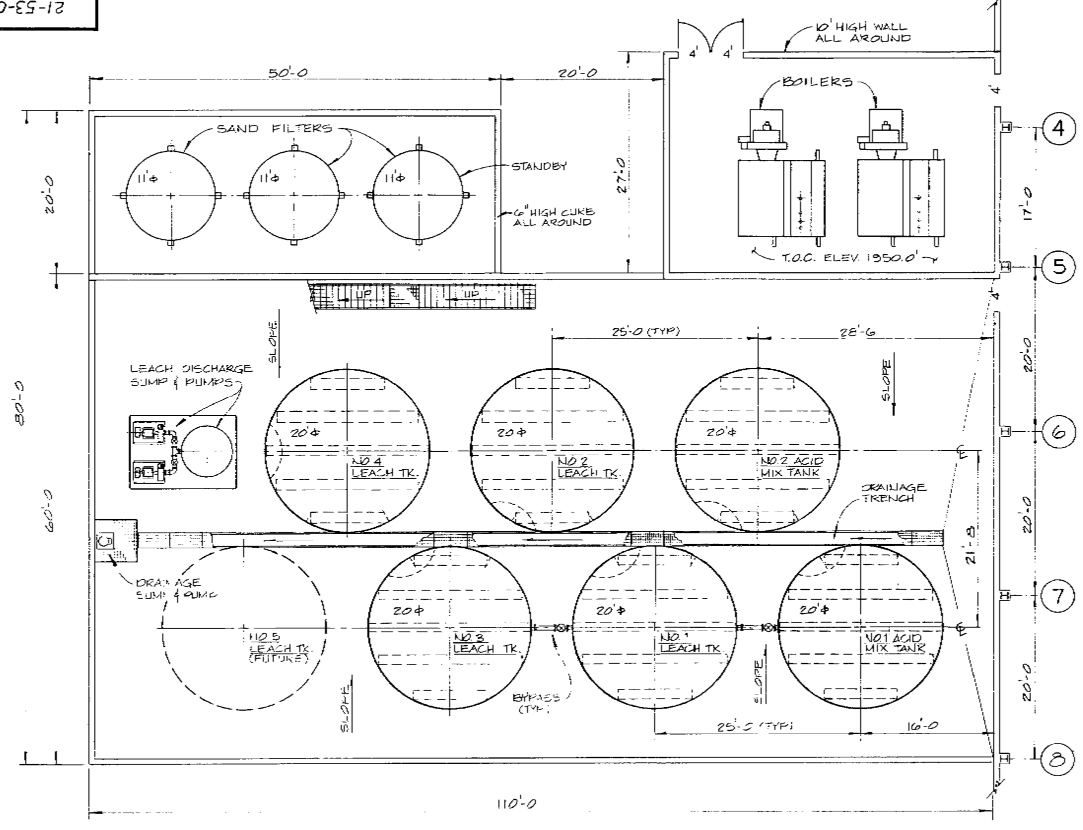
		DATE
SCALE	1/8" = 1'-0	
DRAWN BY	GARY WELLS	6/22/78
DESIGNED BY		
CHECKED BY	J. KUZILIK	7/11/78
APPROVED	[signature]	7/13/78
APPROVED	[signature]	7/15/78

DEPT.	ARCH.	STRUCT.	MECH.	ELECT.	P.&I.	PIPING	SAF. DEPT.	P.E.
INITIAL								
DATE								

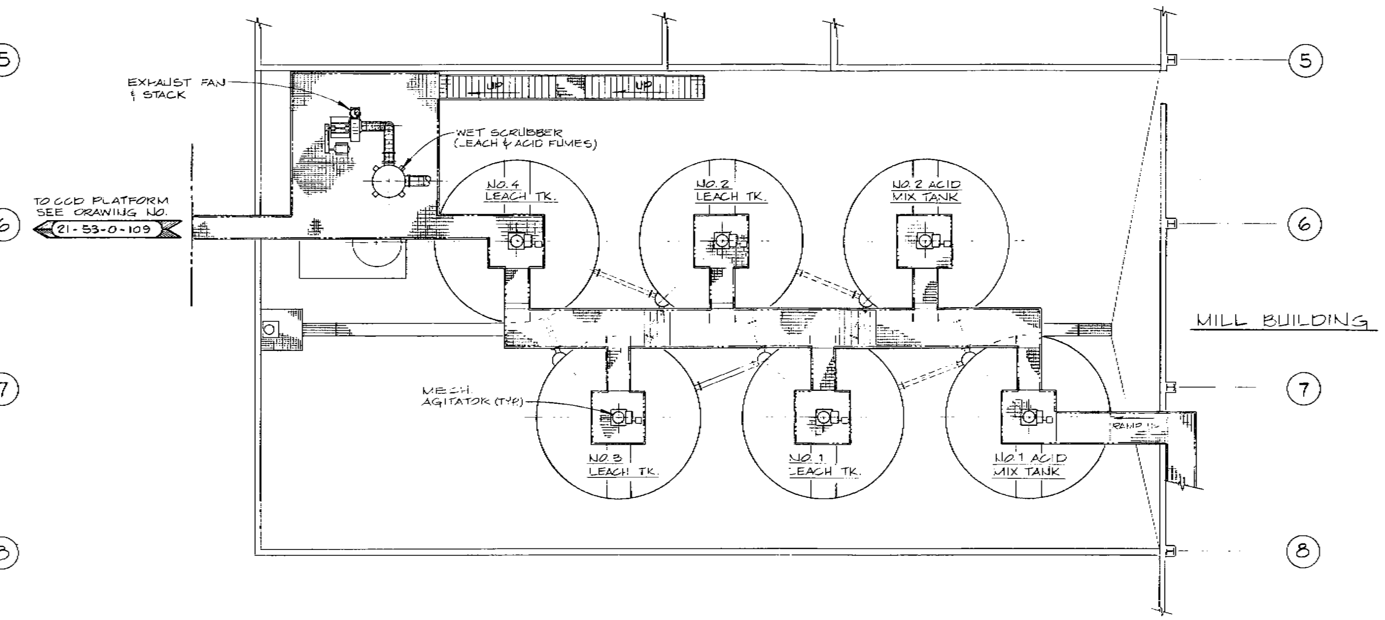
MORRISON-KNUDSEN COMPANY INC.
ENGINEERS CONTRACTORS DEVELOPERS
TWO MORRISON-KNUDSEN PLAZA/P.O. BOX 7808/BOISE, IDAHO 83729

MILL BUILDING
GENERAL ARRANGEMENT
ELEVATIONS

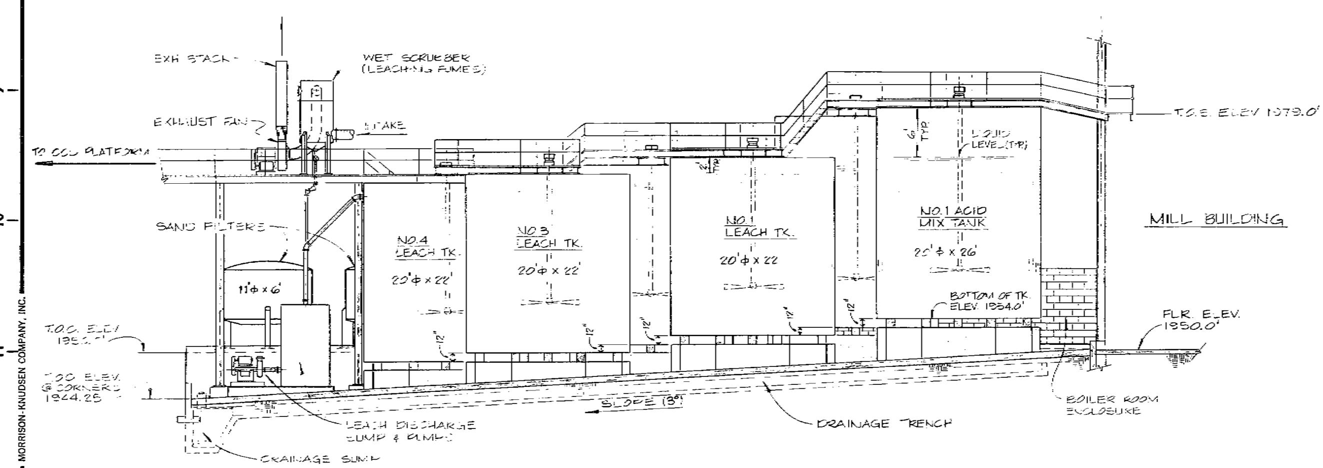
JOB NO.	DRAWING NO.	REVISION
1114	21-53-0-107	0



LEACHING AREA – PLAN VIEW
SCALE: 1/8" = 1'-0



PLAN VIEW @ CATWALK
SCALE: 1/8" = 1'-0



LEACHING – SIDE ELEVATION
SCALE: 1/8" = 1'-0

NO.	DATE	REVISION	BY	APPR.	APPR.

REFERENCE DRAWING	NUMBER

NOTES

DESCRIPTION	COST ACCOUNT
WORK COVERED BY THIS DRAWING CHARGED TO COST ACCOUNT ABOVE	

MINERALS EXPLORATION COMPANY
ANDERSON PROJECT

2000 TPD URANIUM MILL FACILITY
YAVAPAI COUNTY, ARIZONA

PROPRIETARY STATEMENT

APPROVALS	DATE
CLIENT	
PROJECT MANAGER [signature]	7-18-78

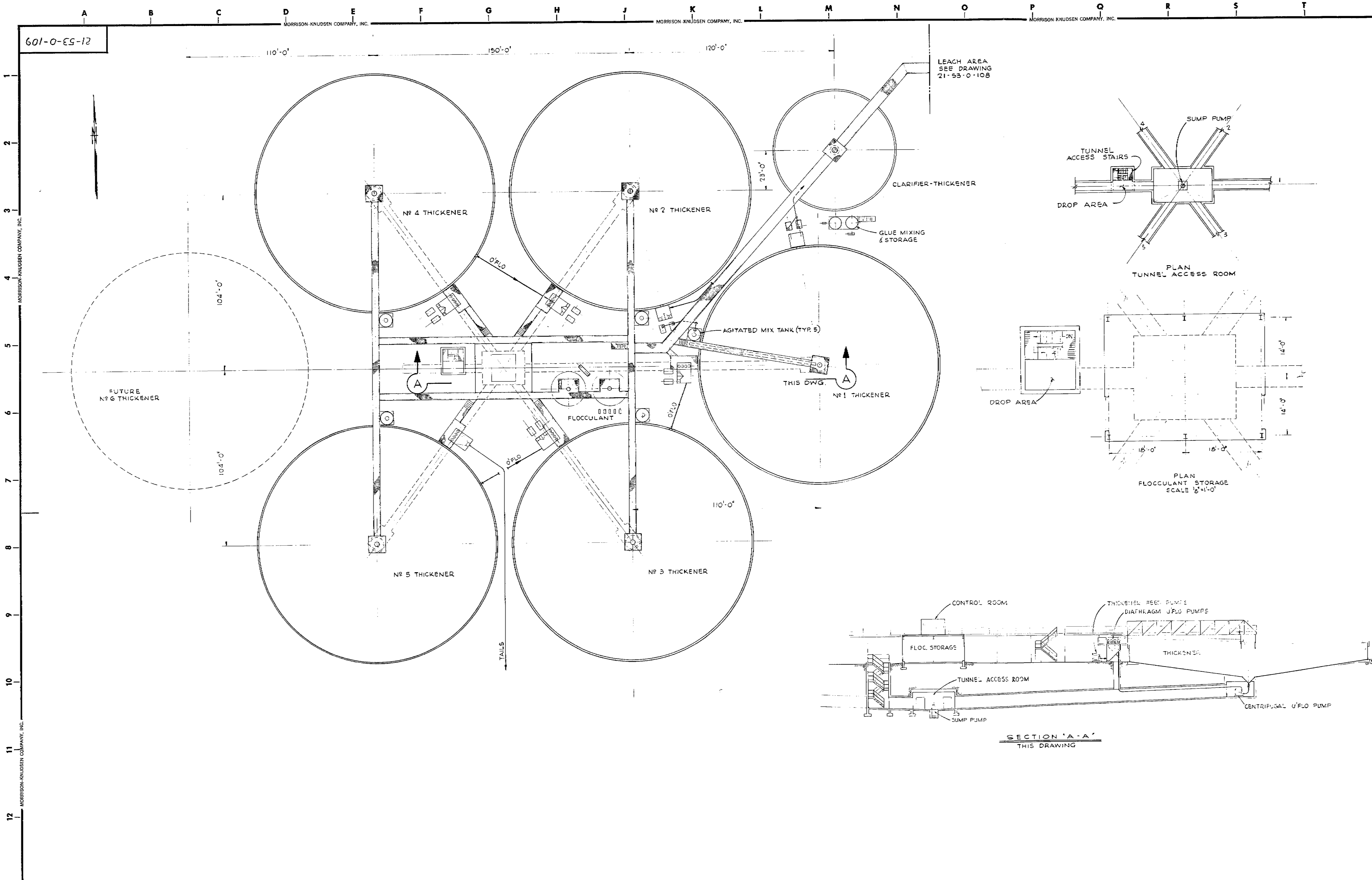
SCALE AS NOTED	DATE
DRAWN BY J. BERGIN	6/21/78
DESIGNED BY	
CHECKED BY J. KUZILIK	7/11/78
APPROVED [signature]	7/18/78
APPROVED T.W. Wilson	7/18/78

DEPT.	ARCH.	STRUCT.	MECH.	ELECT.	P.&I.	PIPING	SAF. DEPT.	P.E.
INITIAL								
DATE								

MORRISON-KNUDSEN COMPANY INC.
ENGINEERS CONTRACTORS DEVELOPERS
TWO MORRISON-KNUDSEN PLAZA/P.O. BOX 7808/BOISE, IDAHO 83729

LEACH & FILTER AREA
GENERAL ARRANGEMENT
PLANS & ELEVATION

JOB NO.	DRAWING NO.	REVISION
1114	21-53-0-108	0



NO.	DATE	REVISION	BY	APPR.	APPR.	REFERENCE DRAWING	NUMBER	NOTES

DESCRIPTION	COST ACCOUNT
WORK COVERED BY THIS DRAWING CHARGED TO COST ACCOUNT ABOVE	

MINERALS EXPLORATION COMPANY
ANDERSON PROJECT

2000 TPD URANIUM MILL FACILITY
YAVAPAI COUNTY, ARIZONA

PROPRIETARY STATEMENT

APPROVALS		DATE
CLIENT		
PROJECT MANAGER	[illegible]	7-18-78

SCALE 1"=20' & AS NOTED	DATE
DRAWN BY KUZILIK	6-23-78
DESIGNED BY KUZILIK	
CHECKED BY A. FOSTER	7-10-78
APPROVED [illegible]	7/18/78
APPROVED [illegible]	7/16/78

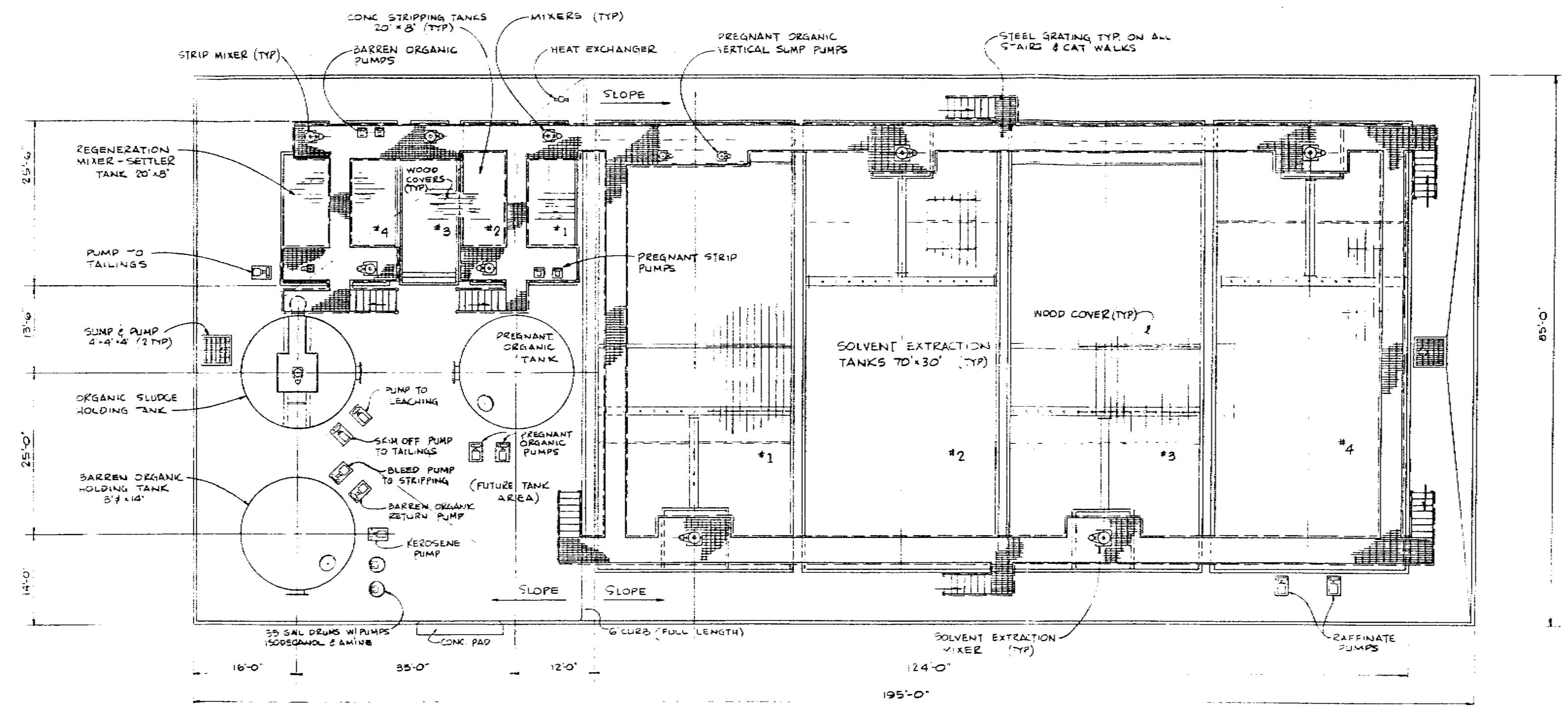
DEPT.	ARCH.	STRUCT.	MECH.	ELECT.	P.&I.	PIPING	SAF. DEPT.	P.E.
INITIAL								
DATE								

MORRISON-KNUDSEN COMPANY INC.
ENGINEERS CONTRACTORS DEVELOPERS
TWO MORRISON-KNUDSEN PLAZA/P.O. BOX 7808/BOISE, IDAHO 83729

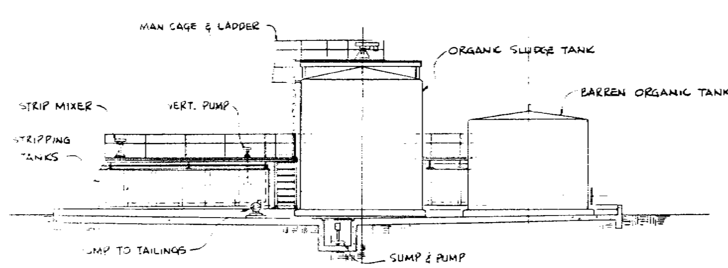
CCD THICKENERS
GENERAL ARRANGEMENT
PLANS & ELEVATION

JOB NO.	DRAWING NO.	REVISION
1114	21-53-0-109	0

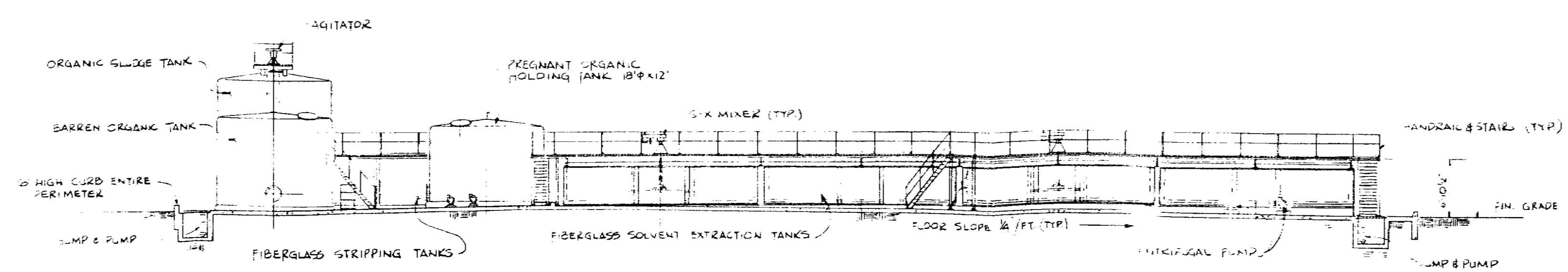
23-53-0-110



PLAN



END VIEW



ELEVATION

NO.	DATE	REVISION	BY	APPR.	APPR.	REFERENCE DRAWING	NUMBER	NOTES

DESCRIPTION | COST ACCOUNT

WORK COVERED BY THIS DRAWING CHARGED TO COST ACCOUNT ABOVE

MINERALS EXPLORATION COMPANY
ANDERSON PROJECT

2000 TPD URANIUM MILL FACILITY
YAVAPAI COUNTY, ARIZONA

PROPRIETARY STATEMENT

APPROVALS | DATE
CLIENT
PROJECT MANAGER

SCALE 1" = 10' | DATE
DRAWN BY | 6-26-78
DESIGNED BY
CHECKED BY | 7/1/78
APPROVED | 7/18/78
APPROVED | 7/18/78

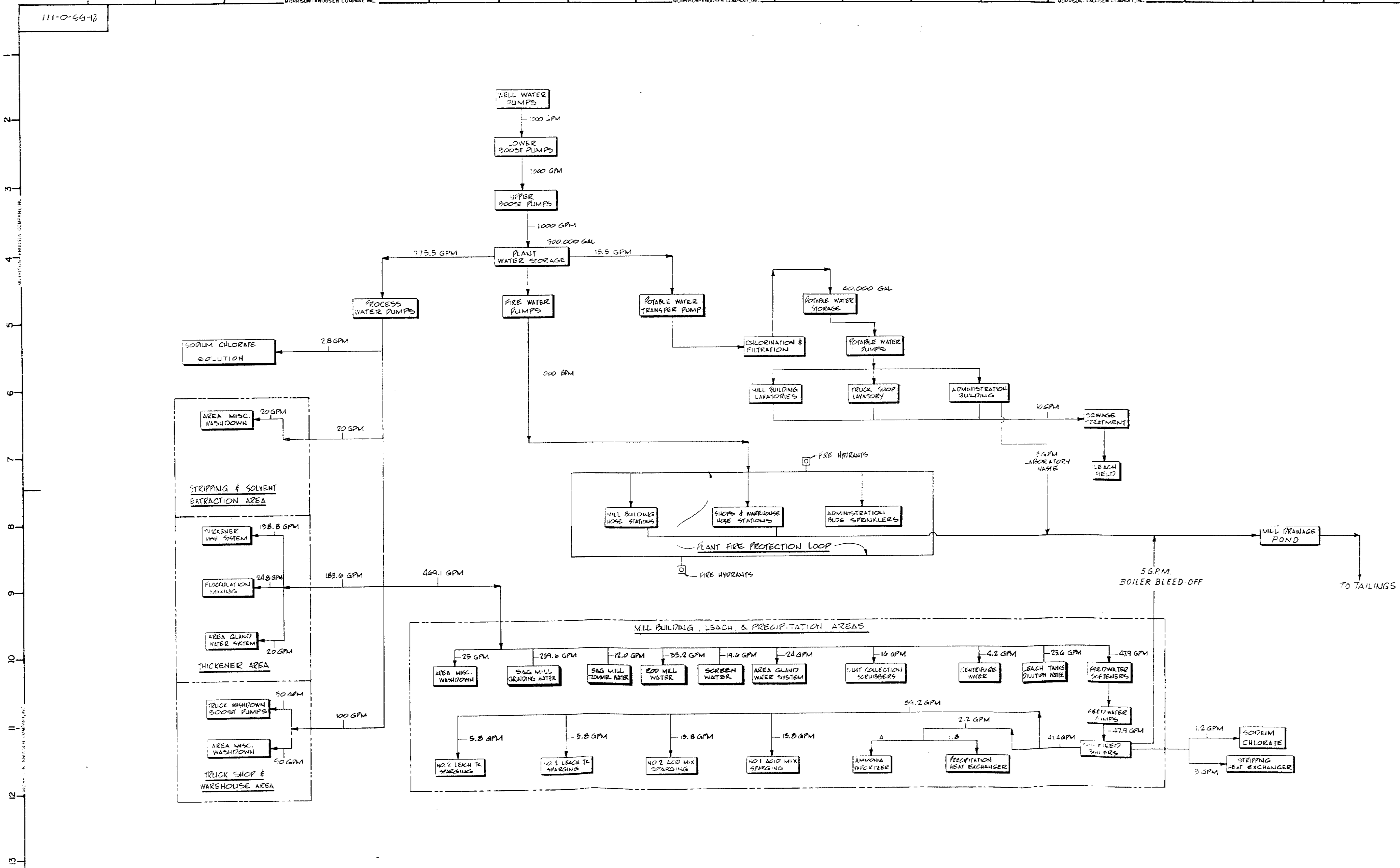
DEPT | ARCH. | STRUCT. | MECH. | ELECT. | P.M. | PIPING | SAF. DEPT. | P.E.
INITIAL
DATE

MORRISON-KNUDSEN COMPANY INC.
ENGINEERS CONTRACTORS DEVELOPERS
TWO MORRISON-KNUDSEN PLAZA/P.O. BOX 7808/BOISE, IDAHO 83729

SOLVENT EXTRACTION & STRIPPING
GENERAL ARRANGEMENT
PLAN & ELEVATIONS

JOB NO. 1114 | DRAWING NO. 21-53-0-110 | REVISION 0

111-0-6548



MINERALS EXPLORATION COMPANY
ANDERSON PROJECT

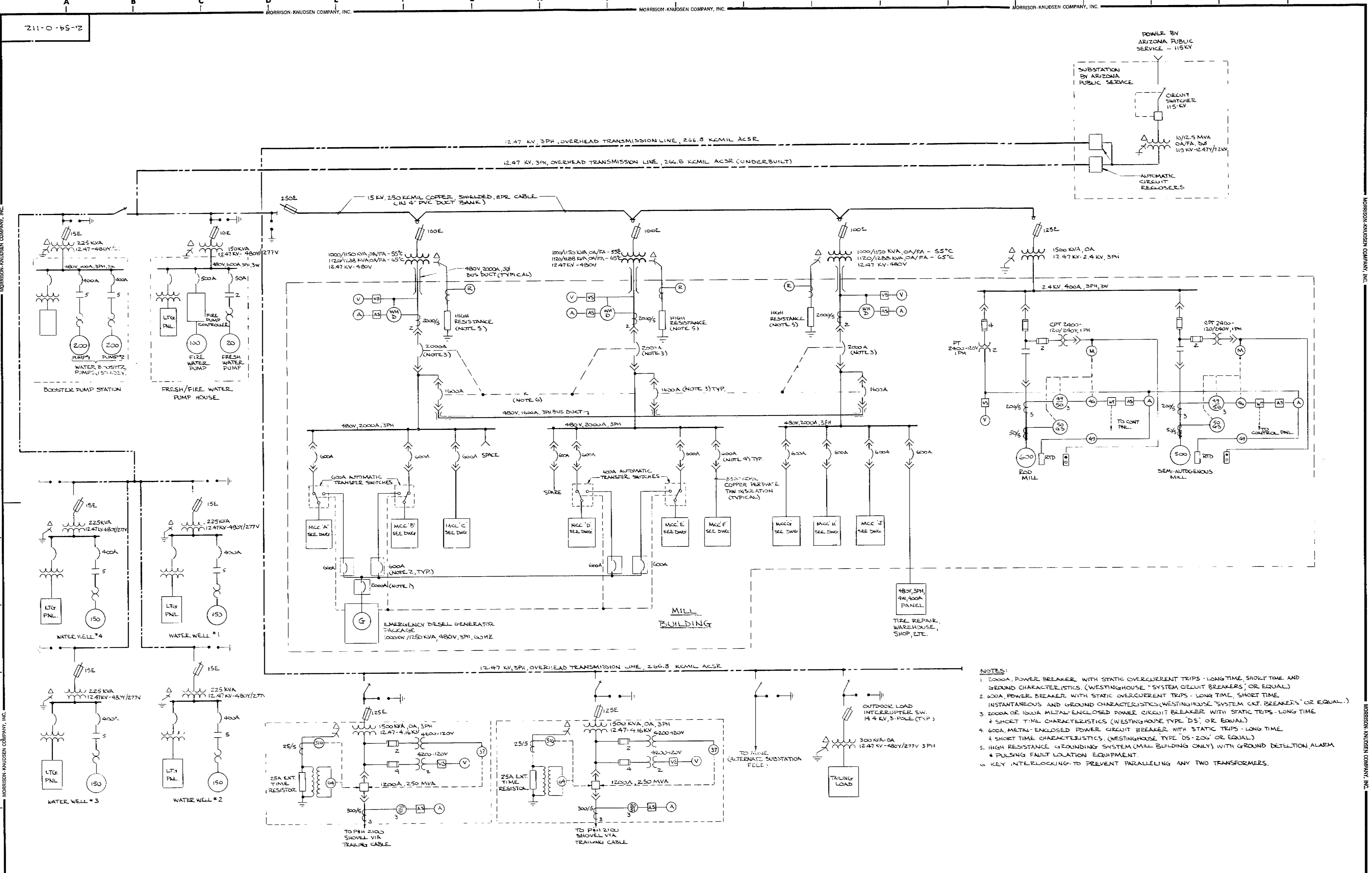
2000 TPD URANIUM MILL FACILITY
YAVAPAI COUNTY, ARIZONA

SCALE	NONE
DRAWN BY	KUZIUK, 6-28-77
CHECKED BY	A. FOSTER, 7-11-78
APPROVED	11/8/78
APPROVED	11/8/78

MORRISON-KNUDSEN COMPANY INC.
ENGINEERS CONTRACTORS DEVELOPERS

ONE LINE UTILITY DIAGRAM

JOB NO	DRAWING NO	REVISION
1114	21-53-0-111	0



NOTES:

1. 2000A, POWER BREAKER WITH STATIC OVERCURRENT TRIPS - LONG TIME, SHORT TIME AND GROUND CHARACTERISTICS. (WESTINGHOUSE "SYSTEM CIRCUIT BREAKERS" OR EQUAL)
2. 600A, POWER BREAKER WITH STATIC OVERCURRENT TRIPS - LONG TIME, SHORT TIME INSTANTANEOUS AND GROUND CHARACTERISTICS (WESTINGHOUSE "SYSTEM CKT. BREAKERS" OR EQUAL.)
3. 2000A OR 1600A METAL-ENCLOSED POWER CIRCUIT BREAKER WITH STATIC TRIPS - LONG TIME & SHORT TIME CHARACTERISTICS (WESTINGHOUSE TYPE "DS" OR EQUAL)
4. 600A, METAL-ENCLOSED POWER CIRCUIT BREAKER WITH STATIC TRIPS - LONG TIME & SHORT TIME CHARACTERISTICS. (WESTINGHOUSE TYPE "DS-206" OR EQUAL)
5. HIGH RESISTANCE GROUNDING SYSTEM (MILL BUILDING ONLY) WITH GROUND DETECTION, ALARM & PULSING FAULT LOCATION EQUIPMENT.
6. KEY INTERLOCKING TO PREVENT PARALLELING ANY TWO TRANSFORMERS.

NO.	DATE	REVISION	BY	APPR.	APPR.
1	7-11-78	ADDED 12.47 KV LINE, MINE SS, & WATER SYS.			

REFERENCE DRAWING	NUMBER

NOTES

DESCRIPTION — COST ACCOUNT

WORK COVERED BY THIS DRAWING CHARGED TO COST ACCOUNT ABOVE

MINERALS EXPLORATION COMPANY
ANDERSON PROJECT

2000 TPD URANIUM MILL FACILITY
YAVAPAI COUNTY, ARIZONA

PROPRIETARY STATEMENT

APPROVALS	DATE
CLIENT	
PROJECT MANAGER	7-18-78

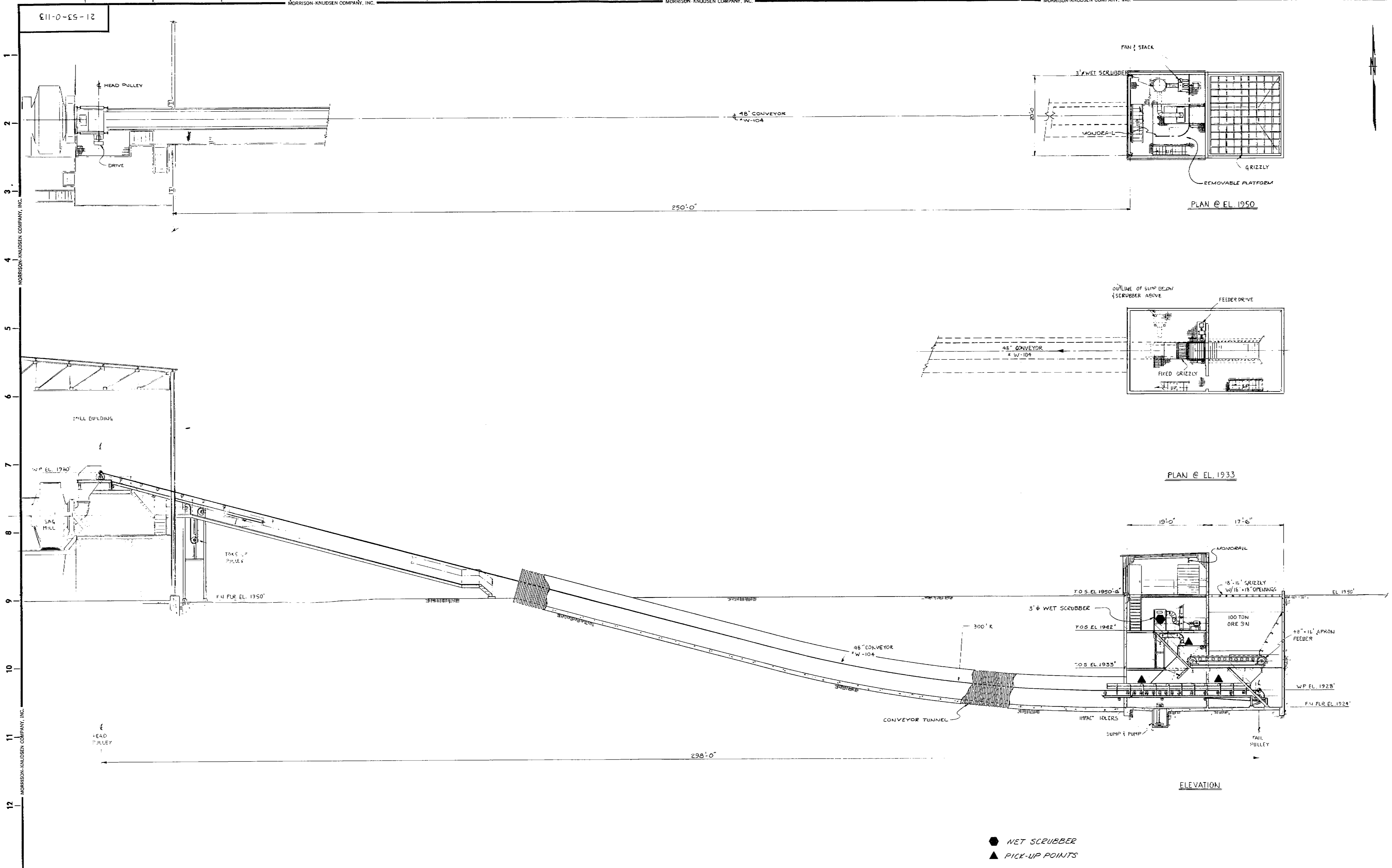
SCALE NONE	DATE
DRAWN BY M'Aury	62278
DESIGNED BY	6-24-78
CHECKED BY M. VAN DUSER	6-26-78
APPROVED	6-26-78
APPROVED	7/18/78

DEPT.	ARCH.	STRUCT.	MECH.	ELECT.	P.&I.	PIPING	SAF. DEPT.	P.E.
INITIAL								
DATE								

MORRISON-KNUDSEN COMPANY INC.
ENGINEERS CONTRACTORS DEVELOPERS
TWO MORRISON-KNUDSEN PLAZA/P.O. BOX 7808/BOISE, IDAHO 83729

PLANT ELECTRICAL ONE-LINE DIAGRAM

JOB NO.	DRAWING NO.	REVISION
1114	21-54-0-112	1



NO.	DATE	REVISION	BY	APPR.	APPR.

REFERENCE DRAWING	NUMBER
MILL BUILDING PLAN & ELEVATION	21-53-0-106
MILL SITE PLAN	21-53-0-104
RECEIVING, GRINDING & LEACHING FLOW SHEET	21-53-0-101

NOTES

DESCRIPTION	COST ACCOUNT

WORK COVERED BY THIS DRAWING CHARGED TO COST ACCOUNT ABOVE

MINERALS EXPLORATION COMPANY
ANDERSON PROJECT

2000 TPD URANIUM MILL FACILITY
YAVAPAI COUNTY, ARIZONA

PROPRIETARY STATEMENT

APPROVALS	DATE
CLIENT	
PROJECT MANAGER [signature]	7-13-78

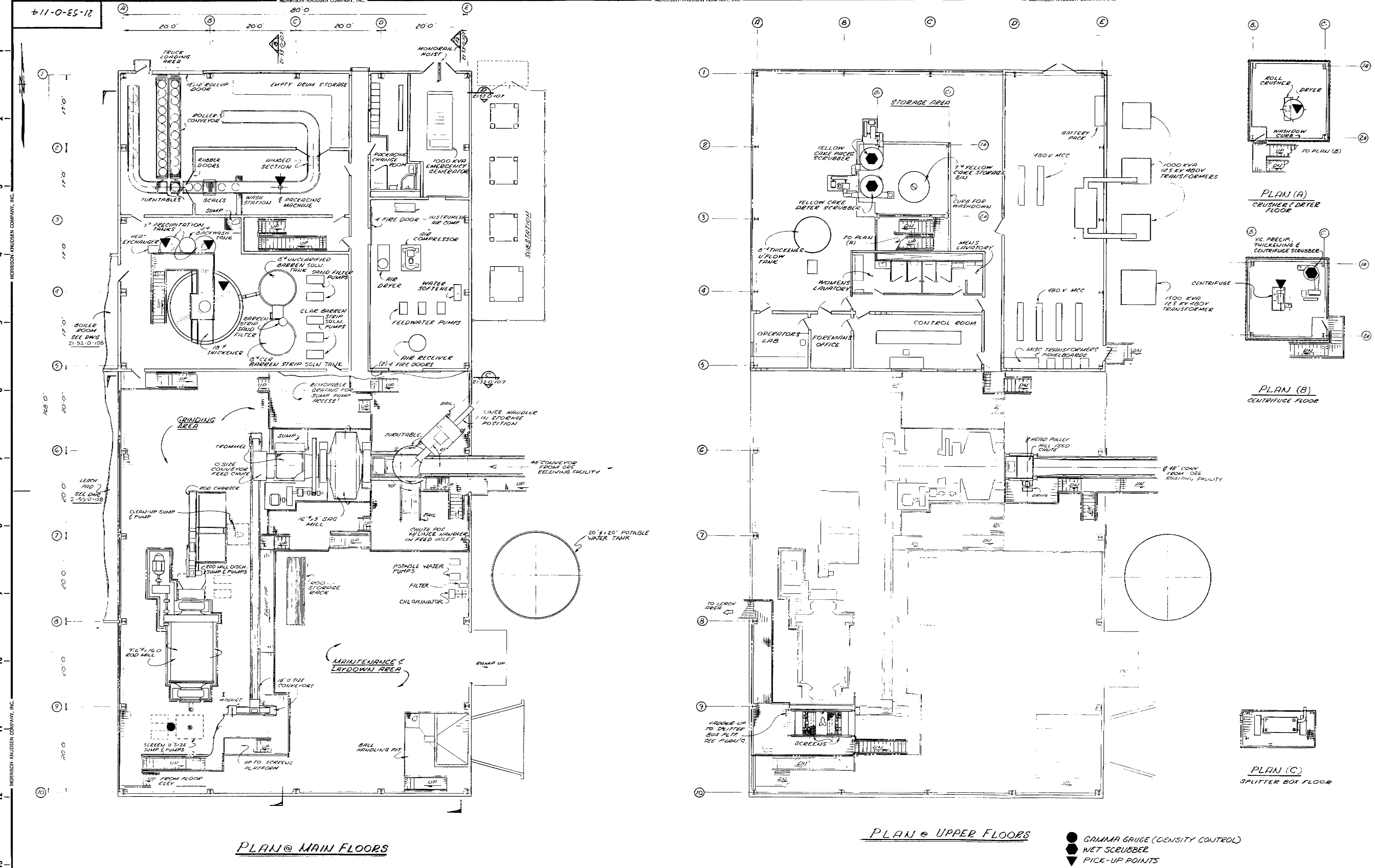
		DATE
SCALE	1/8" = 1'-0"	
DRAWN BY	D.B.	6/28/78
DESIGNED BY		
CHECKED BY	J. KUZIK	7/11/78
APPROVED	[signature]	7/18/78
APPROVED	[signature]	7/19/78

DEPT.	ARCH.	STRUCT.	MECH.	ELECT.	P.&I.	PIPING	SAF. DEPT.	P.E.
INITIAL								
DATE								

MORRISON-KNUDSEN COMPANY INC.
ENGINEERS CONTRACTORS DEVELOPERS
TWO MORRISON-KNUDSEN PLAZA/P.O. BOX 7808/BOISE, IDAHO 83729

ORE RECEIVING & CONVEYING
EMISSION CONTROL

JOB NO.	DRAWING NO.	REVISION
1114	21-53-0-113	0



NO.	DATE	REVISION	BY	APPR.	APPR.	REFERENCE DRAWING	NUMBER	NOTES
						MILL BUILDING-GEN. ARRANGEMENT-ELEVATIONS	21-53-0-107	

DESCRIPTION | COST ACCOUNT

WORK COVERED BY THIS DRAWING CHARGED TO COST ACCOUNT ABOVE

PROPRIETARY STATEMENT

MINERALS EXPLORATION COMPANY
ANDERSON PROJECT

2000 TPD URANIUM MILL FACILITY
YAVAPAI COUNTY, ARIZONA

APPROVALS		DATE
CLIENT		
PROJECT MANAGER	[signature]	7-18-78

		DATE
SCALE	1/8" = 1'-0"	
DRAWN BY	Kerry Landrum	6/29/78
DESIGNED BY		
CHECKED BY	J. KUZILIK	7/11/78
APPROVED	[signature]	7/18/78
APPROVED	[signature]	7/18/78

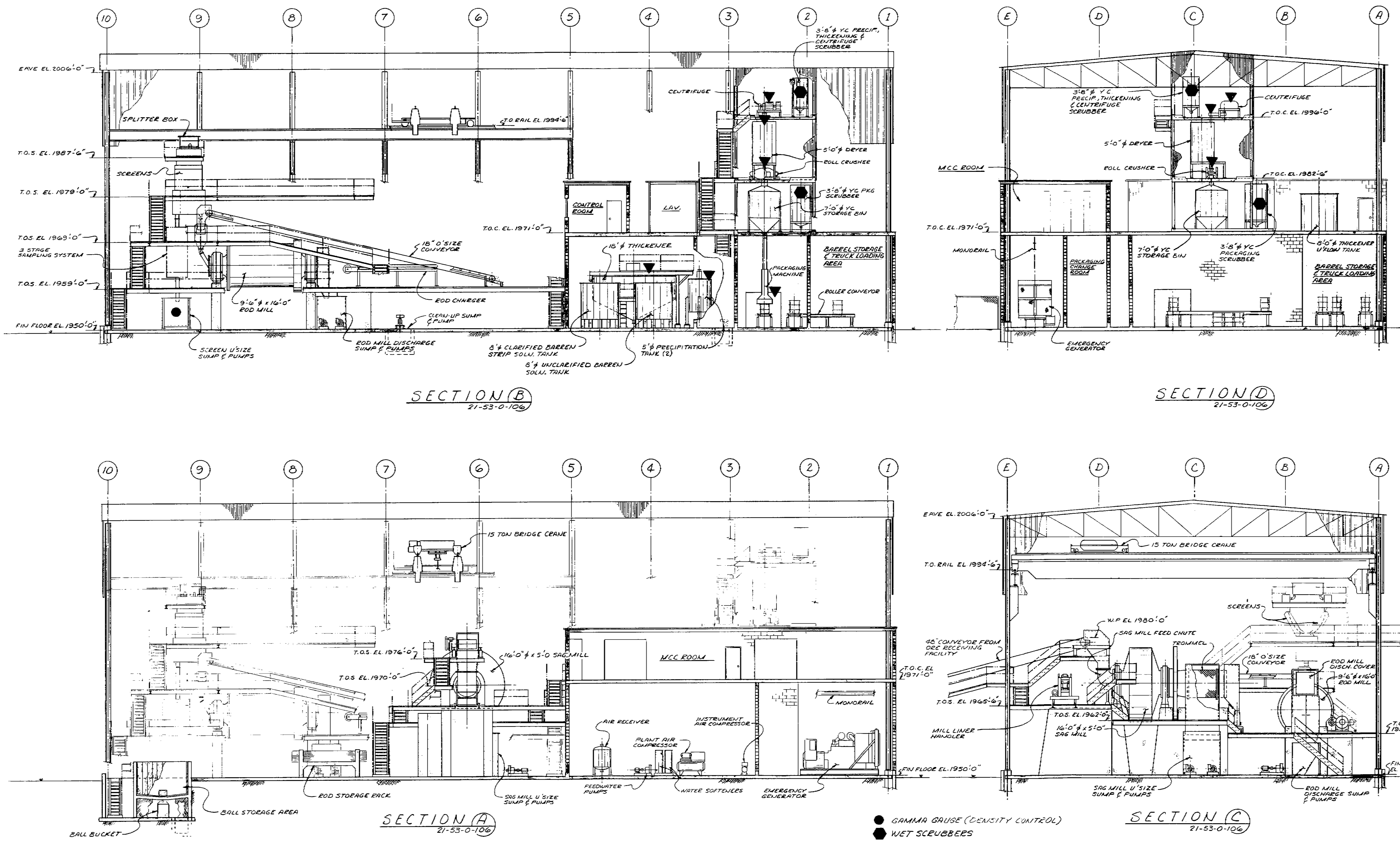
DEPT.	ARCH.	STRUCT.	MECH.	ELECT.	P.&I.	PIPING	SAF. DEPT.	P.E.
INITIAL								
DATE								

MORRISON-KNUDSEN COMPANY INC.
ENGINEERS CONTRACTORS DEVELOPERS
TWO MORRISON-KNUDSEN PLAZA/P.O. BOX 7808/BOISE, IDAHO 83729

MILL BUILDING
EMISSION CONTROL

JOB NO.	DRAWING NO.	REVISION
1119	21-53-0-114	

21-53-0-115



● GAMMA GAUGE (DENSITY CONTROL)
⬢ WET SCRUBBERS
▼ PICK-UP POINTS

NO.	DATE	REVISION	BY	APPR.	APPR.	REFERENCE DRAWING	NUMBER	NOTES
						MILL BUILDING-GEN ARRANGEMENT-PLAN	21-53-0-106	

DESCRIPTION — COST ACCOUNT

WORK COVERED BY THIS DRAWING CHARGED TO COST ACCOUNT ABOVE

MINERALS EXPLORATION COMPANY
ANDERSON PROJECT

2000 TPD URANIUM MILL FACILITY
YAVAPAI COUNTY, ARIZONA

PROPRIETARY STATEMENT

APPROVALS		DATE
CLIENT		
PROJECT MANAGER	[signature]	7-18-78

SCALE		DATE
DRAWN BY	GARY WELLS	6/22/78
DESIGNED BY		
CHECKED BY	J. ZUZILIK	7/1/78
APPROVED	[signature]	7/18/78
APPROVED	[signature]	7/19/78

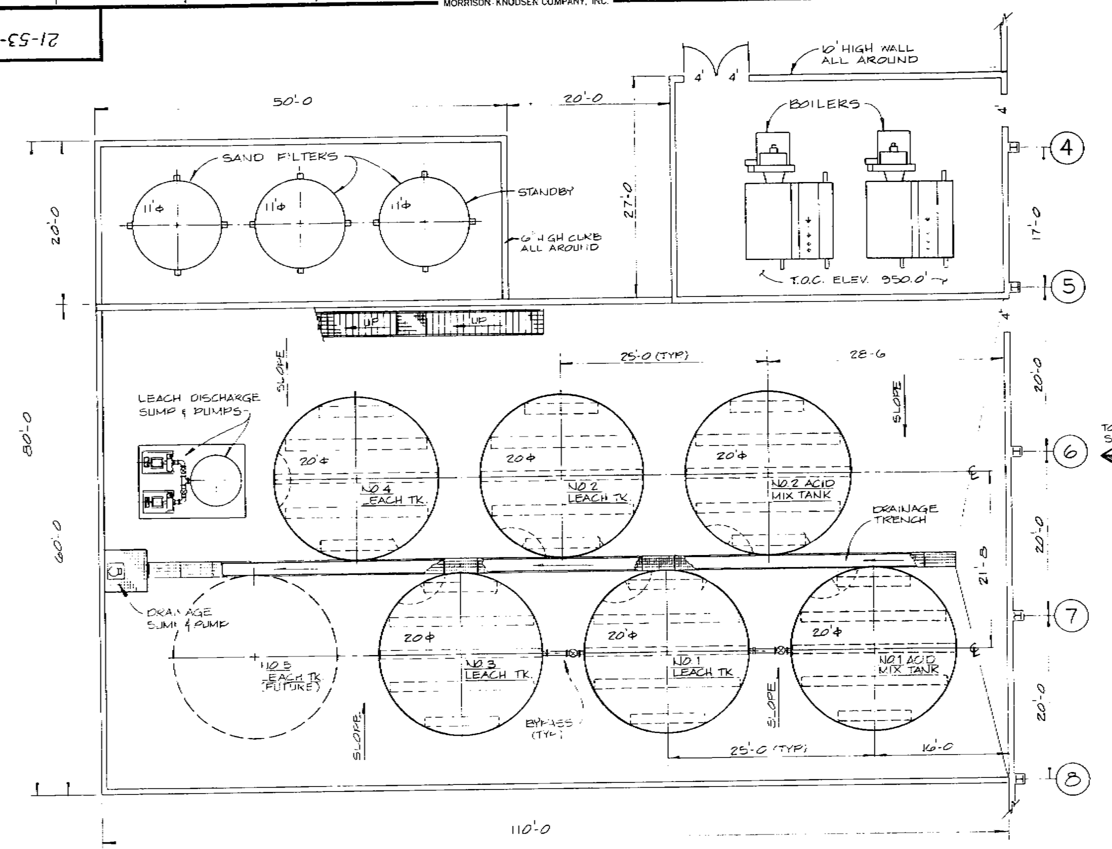
DEPT.	ARCH.	STRUCT.	MECH.	ELECT.	P.&I.	PIPING	SAF. DEPT.	P.E.
INITIAL								
DATE								

MORRISON-KNUDSEN COMPANY INC.
ENGINEERS CONTRACTORS DEVELOPERS
TWO MORRISON-KNUDSEN PLAZA/P.O. BOX 7808/BOISE, IDAHO 83729

MILL BUILDING
EMISSION CONTROL

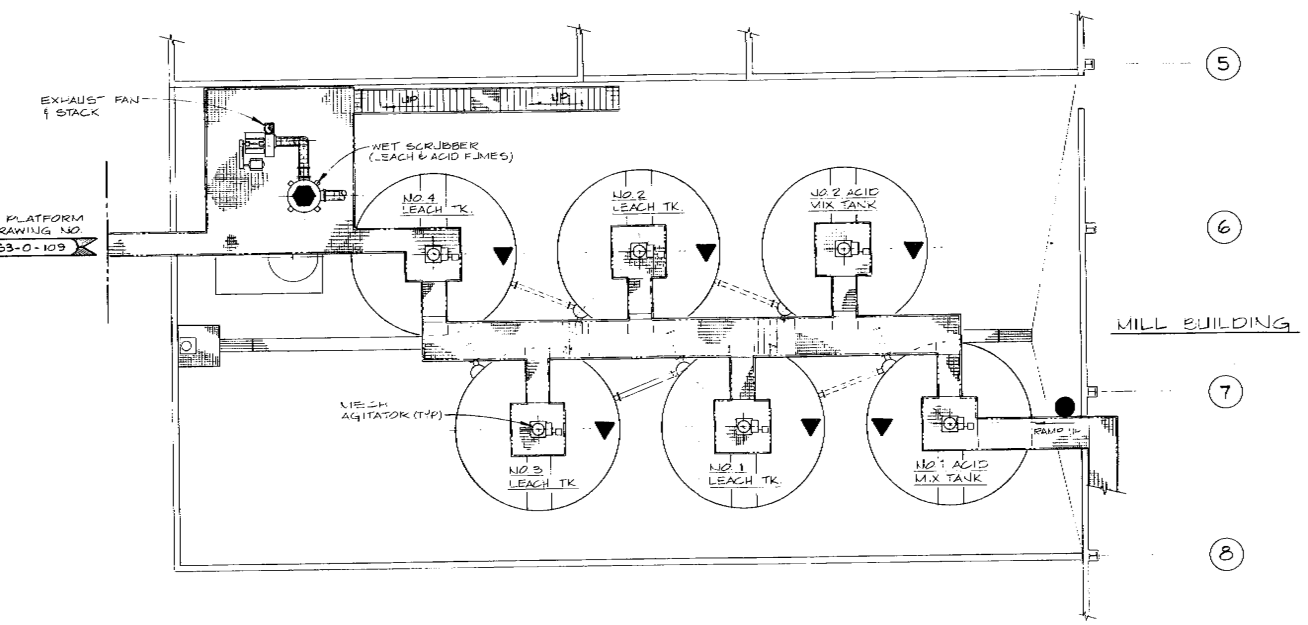
JOB NO.	DRAWING NO.	REVISION
1114	21-53-0-115	

21-53-0-116



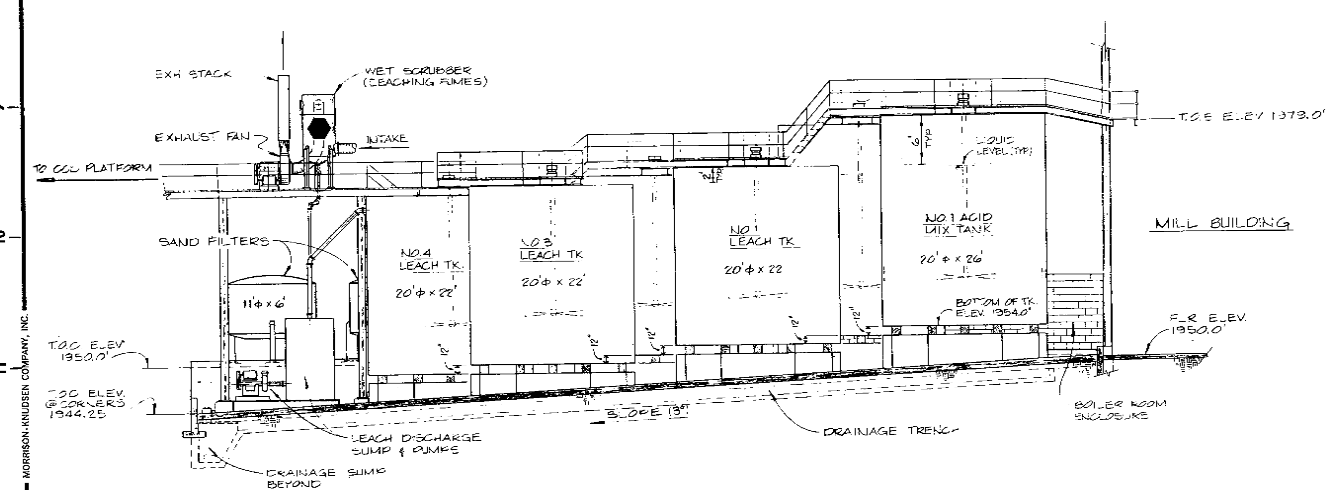
LEACHING AREA – PLAN VIEW

SCALE: 1/8" = 1'-0



PLAN VIEW @ CATWALK

SCALE: 1/8" = 1'-0



LEACHING – SIDE ELEVATION

SCALE: 1/8" = 1'-0

● GAMMA GAUGE (DENSITY CONTROL)

⬢ WET SCRUBBERS

▼ PICK-UP POINTS

NO.	DATE	REVISION	BY	APPR.	APPR.	REFERENCE DRAWING	NUMBER	NOTES

DESCRIPTION	COST ACCOUNT
WORK COVERED BY THIS DRAWING CHARGED TO COST ACCOUNT ABOVE	

MINERALS EXPLORATION COMPANY
ANDERSON PROJECT

2000 TPD URANIUM MILL FACILITY
YAVAPAI COUNTY, ARIZONA

PROPRIETARY STATEMENT

APPROVALS		DATE
CLIENT		
PROJECT MANAGER	[signature]	7-18-78

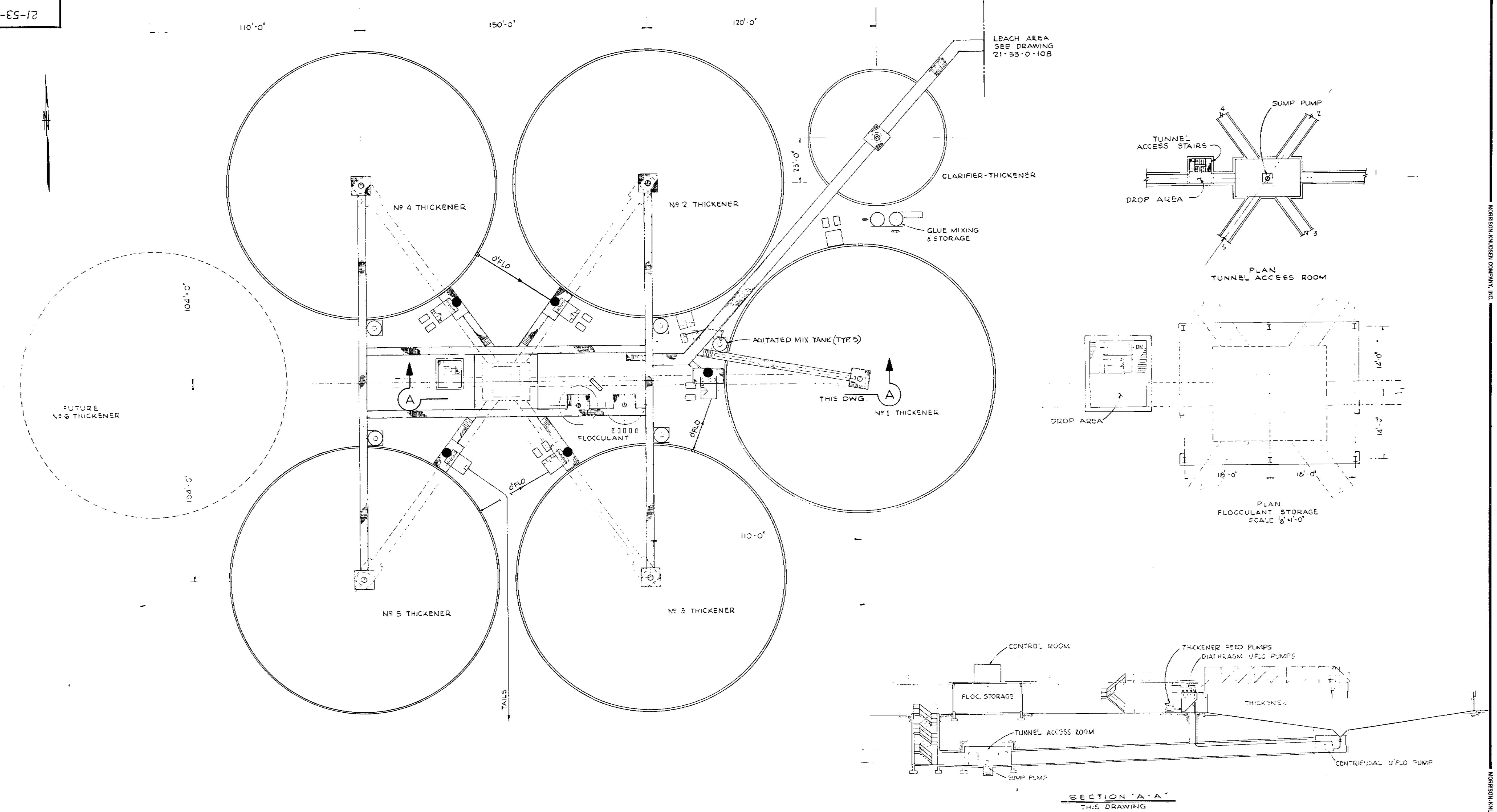
SCALE AS NOTED	DATE
DRAWN BY J. BERGIN	6/21/78
DESIGNED BY	
CHECKED BY J. KUTLIK	7/1/78
APPROVED [signature]	7/18/78
APPROVED [signature]	7/18/78

DEPT.	ARCH.	STRUCT.	MECH.	ELECT.	P.&I.	PIPING	SAF. DEPT.	P.E.
INITIAL								
DATE								

MORRISON-KNUDSEN COMPANY INC.
ENGINEERS CONTRACTORS DEVELOPERS
TWO MORRISON KNUDSEN PLAZA/P.O. BOX 7808/BOISE, IDAHO 83729

LEACH & FILTER AREA EMISSION CONTROL

JOB NO.	DRAWING NO.	REVISION
1114	21-53-0-116	0



● GAMMA GAUGE (DENSITY CONTROL)

NO.	DATE	REVISION	BY	APPR.	APPR.	REFERENCE DRAWING	NUMBER	NOTES

DESCRIPTION | COST ACCOUNT

WORK COVERED BY THIS DRAWING CHARGED TO COST ACCOUNT ABOVE

MINERALS EXPLORATION COMPANY
ANDERSON PROJECT

2000 TPD URANIUM MILL FACILITY
YAVAPAI COUNTY, ARIZONA

PROPRIETARY STATEMENT

APPROVALS	DATE
CLIENT	
PROJECT MANAGER R. J. Miller	7-18-78

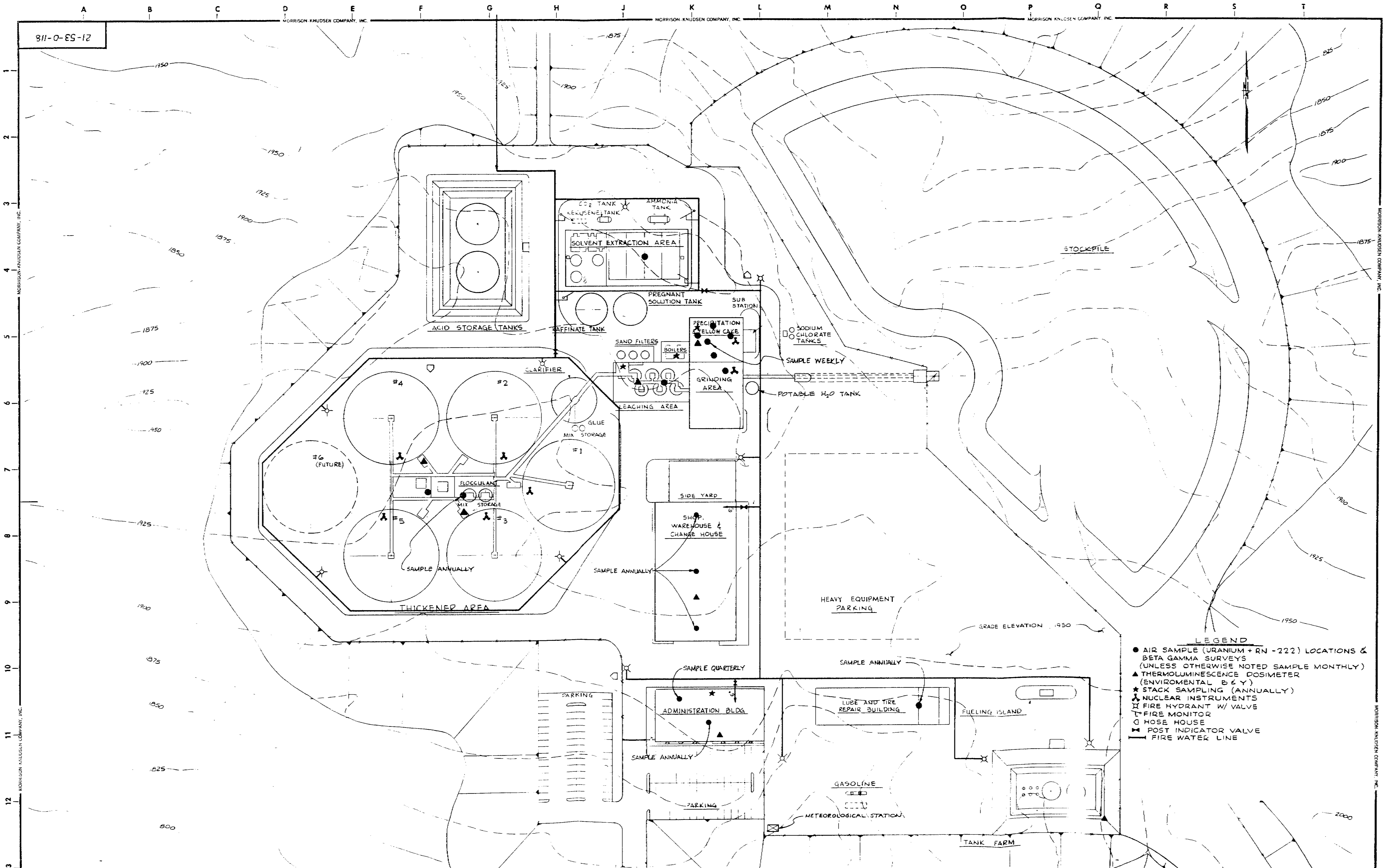
		DATE
SCALE	1"=20' & AS NOTED	
DRAWN BY	KUZLIK	6-23-78
DESIGNED BY	KUZLIK	
CHECKED BY	A. FOSTER	7-10-78
APPROVED	R. Pizarro	7/18/78
APPROVED	[illegible]	7/18/78

DEPT.	ARCH.	STRUCT.	MECH.	ELECT.	P.&I.	PIPING	SAF. DEPT.	P.E.
INITIAL								
DATE								

MORRISON-KNUDSEN COMPANY INC.
ENGINEERS CONTRACTORS DEVELOPERS
TWO MORRISON-KNUDSEN PLAZA/P.O. BOX 7808/BOISE, IDAHO 83729

CCO THICKENERS
EMISSION CONTROL

JOB NO.	DRAWING NO.	REVISION
1114	21-53-0-117	0



NO.	DATE	REVISION	BY	APPR.	APPR.	REFERENCE DRAWING	NUMBER

NOTES

BUILDING FIRE PROTECTION —
- ADMINISTRATION BLDG., SHOP, WAREHOUSE, CHANGEHOUSE BLDG. — AUTOMATIC SPRINKLER & HAND EXTINGUISHERS
- MILL BUILDING — HOSE REELS & HAND EXTINGUISHERS
- LUBE & TIRE BLDG., FUELING ISLAND, LEACHING AREA, THICKENER CONTROL RM & FLOC. AREA — HAND EXTINGUISHERS
- SOLVENT EXTRACTION AREA — AUTOMATIC CO_2 & HAND EXTINGUISHERS

DESCRIPTION | COST ACCOUNT

WORK COVERED BY THIS DRAWING CHARGED TO COST ACCOUNT ABOVE

MINERALS EXPLORATION COMPANY
ANDERSON PROJECT

2000 TPD URANIUM MILL FACILITY
YAVAPAI COUNTY, ARIZONA

PROPRIETARY STATEMENT

APPROVALS		DATE
CLIENT		
PROJECT MANAGER	R. J. ...	7.18.78

		DATE
SCALE	1:50'	
DRAWN BY	S. BUTTERBRODT	6/22/78
DESIGNED BY		
CHECKED BY	J. KUZILIK	7/11/78
APPROVED	R. S. ...	7/18/78
APPROVED	...	7/18/78

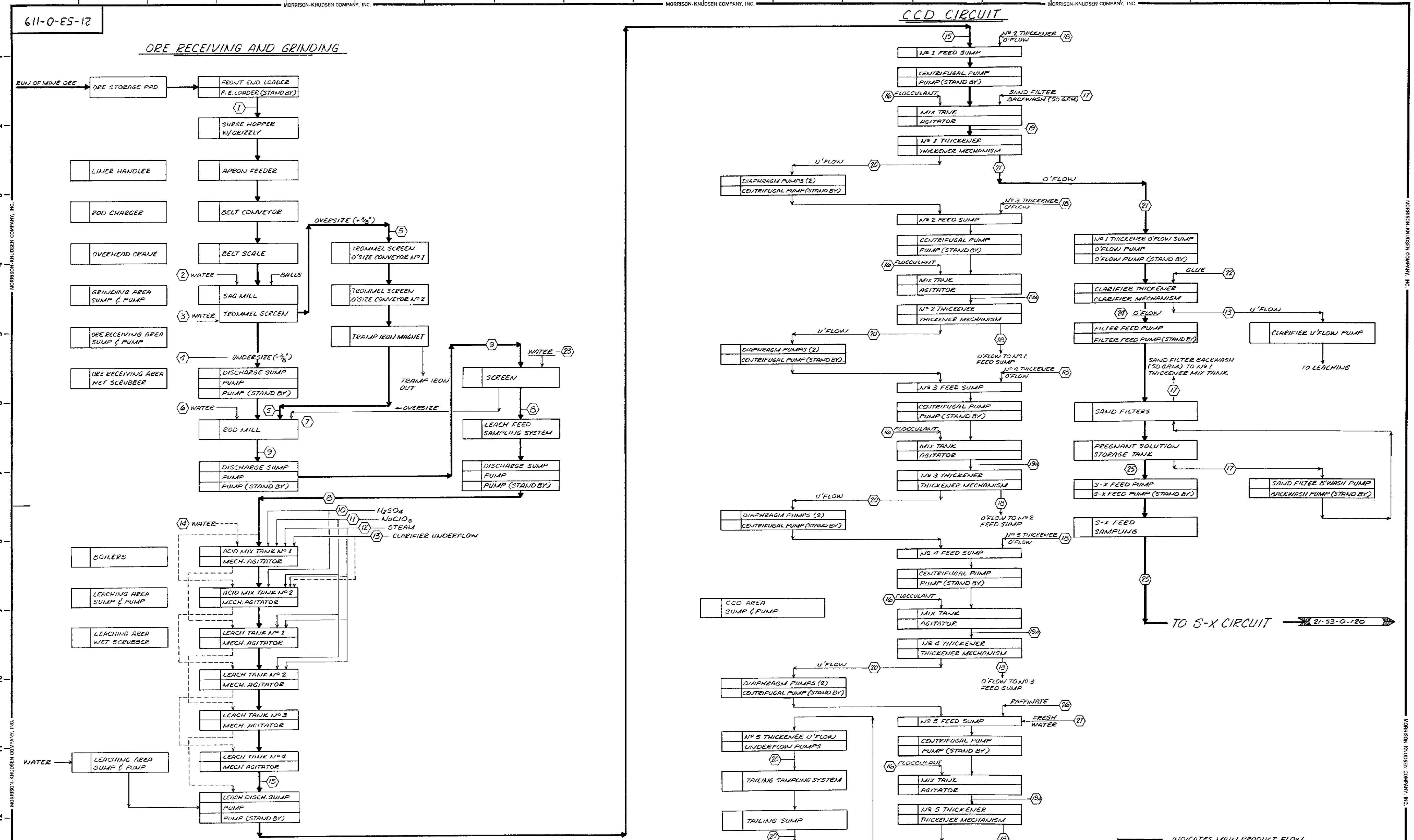
DEPT.	ARCH.	STRUCT.	MECH.	ELECT.	P&I	PIPING	SAF. DEPT.	P.E.
INITIAL								
DATE								

MORRISON-KNUDSEN COMPANY INC.
ENGINEERS CONTRACTORS DEVELOPERS
TWO MORRISON KNUDSEN PLAZA/P.O. BOX 7808/BOISE, IDAHO 83729

MILL & MINE FACILITY
EMISSION CONTROL
& FIRE PROTECTION

JOB NO.	DRAWING NO.	REVISION
1114	21-53-0-118	0

611-0-ES-12



PROCESS FLOW QUANTITIES

STREAM No	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SOLIDS T.P.H.	91.7	—	—	82.5	9.2	—	18.3	91.7	110.0	—	—	—	—	—
LIQUID T.P.H.	10.1	64.9	3.0	77.0	1.0	8.8	3.2	91.7	90.0	20.4	0.7	9.8	2.0	6.4
TOTAL FLOW G.P.M.	194.8	259.6	12.0	446.9	19.5	35.2	43.7	521.2	545.3	*44.7	2.0	39.2	8.0	25.6

STREAM No	15	16	17	18	19	19A	20	21	22	23	24	25	26	27
SOLIDS T.P.H.	95.1	—	—	—	95.1	95.1	95.1	—	—	—	—	—	—	—
LIQUID T.P.H.	116.2	5.6	12.5	424.7	559.0	579.8	155.1	403.9	0.6	4.9	402.5	390.0	390.0	34.7
TOTAL FLOW G.P.M.	609.6	22.6	50.0	1698.8	2381.0	2464.3	765.5	1615.5	2.5	19.6	1610.0	1560.0	1560.0	138.8

* 27.7 GPM ARE USED UP BY $CaCO_3$

NO.	DATE	REVISION	BY	APPR.	APPR.

REFERENCE DRAWING	NUMBER
PROCESS FLOWSHEET-BLOCK DIAGRAM #2	21-53-0-120
FLOWSHEET-SX, STRIPPING, PRECIP & PACKAGING	21-53-0-103
FLOWSHEET-CCD, CLARIFICATION & TAILINGS	21-53-0-102
FLOWSHEET-RECEIVING, GRINDING, LEACHING	21-53-0-101

NOTES

1. PIPING WILL BE PROVIDED SUCH THAT ANY THICKENER MAY BE BY-PASSED AND RECYCLED. STAGED FLOCCULANT ADDITION WILL BE PROVIDED AT THE FEED SUMP, THICKENER FEED LAUNDER & THICKENER WELL.

DESCRIPTION | COST ACCOUNT

WORK COVERED BY THIS DRAWING CHARGED TO COST ACCOUNT ABOVE

MINERALS EXPLORATION COMPANY
ANDERSON PROJECT

2000 TPD URANIUM MILL FACILITY
YAVAPAI COUNTY, ARIZONA

PROPRIETARY STATEMENT

CLIENT

PROJECT MANAGER

APPROVALS | DATE

SCALE NONE

DRAWN BY GARY WELLS 6/28/78

DESIGNED BY

CHECKED BY J. KUTIN 7/11/78

APPROVED 7/18/78

APPROVED 7/21/78

DEPT. | ARCH. | STRUCT. | MECH. | ELECT. | P&I. | PIPING | SAF. DEPT. | P.E.

INITIAL

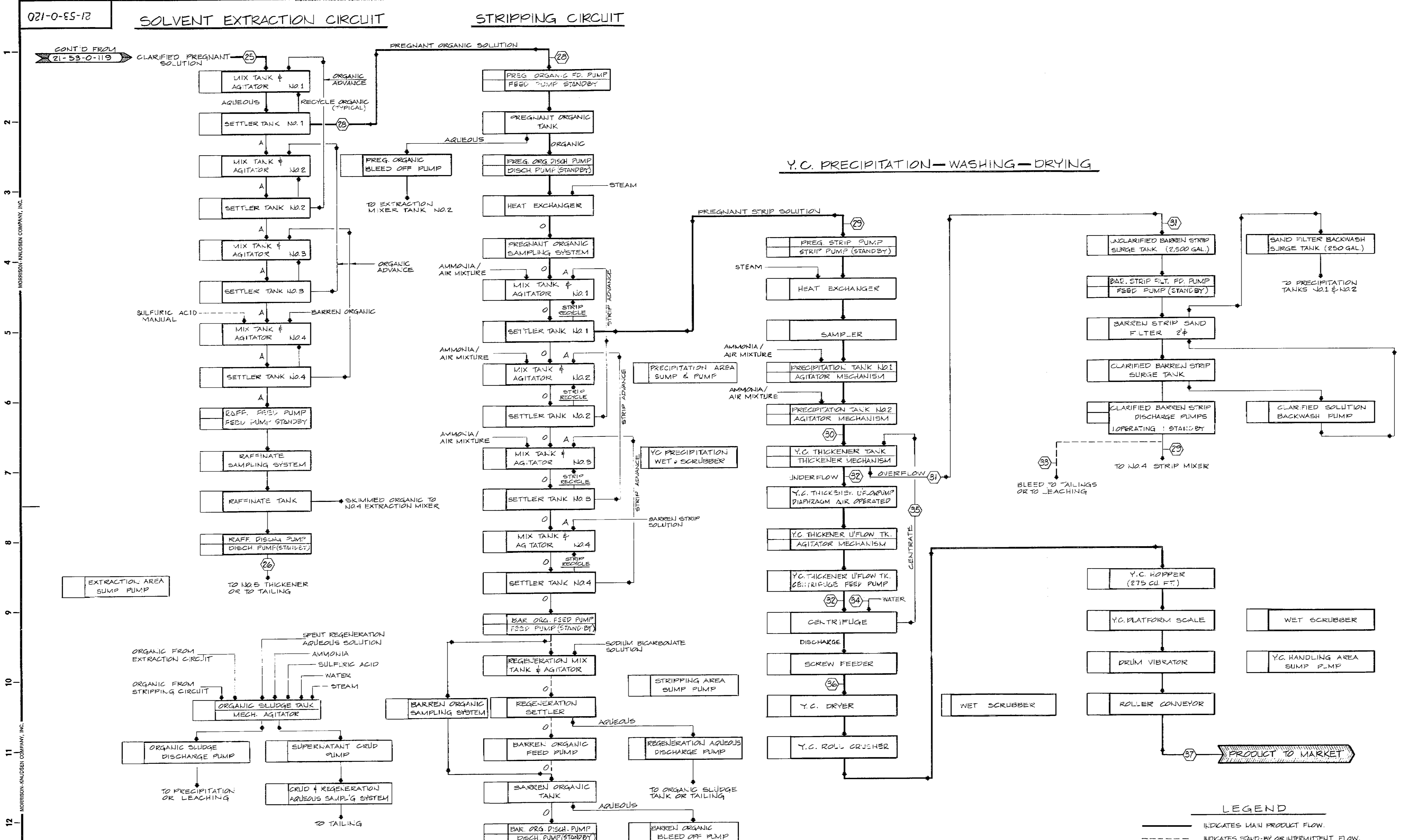
DATE

MORRISON-KNUDSEN COMPANY INC.
ENGINEERS CONTRACTORS DEVELOPERS
TWO MORRISON KNUDSEN PLAZA/P.O. BOX 7808/BOISE, IDAHO 83729

PROCESS FLOWSHEET
BLOCK DIAGRAM #1

JOB NO. 1114 | DRAWING NO. 21-53-0-119 | REVISION 0

21-53-0-120



PROCESS FLOW QUANTITIES

STREAM NO.	25	26	27	28	29	30	31	32	33	34	35	36	37*
SOLIDS T.P.H.	–	–	–	.083	.083	.083	–	.083	–	–	–	.083	.083
LIQUIDS T.P.H.	390.0	390.0	34.7	33.0	3.7	4.79	4.62	.17	.92	1.04	1.09	.124	.002
TOTAL FLOW G.P.M.	1560.0	1560.0	138.8	165.0	13.2	17.9	17.25	.65	3.4	4.16	4.15	.5	

* 3,960 LB/DAY U_3O_8 (100%) EQUIV. TO 4,659 LB/DAY U_3O_8 (85%)

REFERENCE DRAWING	NUMBER
PROCESS FLOWSHEET—BLOCK DIAGRAM #1	21-53-0-119
FLOWSHEET—S-X, STRIPPING, PRECIP., PACKAGING	21-53-0-103
FLOWSHEET—CCD, CLARIFICATION, & TAILINGS	21-53-0-102
FLOWSHEET—RECEIVING, GRINDING, LEACHING	21-53-0-101

NO. | DATE | REVISION | BY | APPR. | APPR. | NOTES

DESCRIPTION | COST ACCOUNT
WORK COVERED BY THIS DRAWING CHARGED TO COST ACCOUNT ABOVE

MINERALS EXPLORATION COMPANY
ANDERSON PROJECT
2000 TPD URANIUM MILL FACILITY
YAVAPAI COUNTY, ARIZONA

PROPRIETARY STATEMENT

SCALE NONE
DRAWN BY J. BERGIN 6/9/78
CHECKED BY J. ... 7/1/78
APPROVED 7/18/78
APPROVED 7/18/78
PROJECT MANAGER 7-18-78

MORRISON-KNUDSEN COMPANY INC.
ENGINEERS CONTRACTORS DEVELOPERS
TWO MORRISON-KNUDSEN PLAZA/P.O. BOX 7808/BOISE, IDAHO 83729

PROCESS FLOWSHEET BLOCK DIAGRAM #2

JOB NO. 1114 | DRAWING NO. 21-53-0-120 | REVISION 0

EXHIBIT III-B
PULP AND WATER BALANCE

MINERALS EXPLORATION COMPANY - ANDERSON PROJECT

PULP AND WATER BALANCE

Item	Tons Per Hour		Total Solids	%	Tons Per Day			G.P.M.		Specific Gravity		
	Solids	Solution	T.P.D.	Solids	Pulp	Water	Solids	Water	Pulp	Solids	Pulp	Observations
Sag Mill Feed												
New Ore	91.7	10.1	2,200.8	90	2,443.2	242.4	154.4	40.4	194.8	2.38		
Grinding Water	--	64.9	--	--	1,557.6	1,557.6	--	259.6	259.6		1.0	
Sag Mill Discharge	91.7	75.0		55	4,000.8	1,799.0	154.4	300.0	454.4	2.38	1.47	
Trommel Water	--	3.0	--	--	--	72	--	12.0	--	--	1.00	
Trommel Undersize	82.5	77.0	1,980.0	51.7	3,828	1,848	138.9	308	446.9	2.38	1.43	
Trommel Oversize	9.2	1.0	220.8	90.0	244.8	24	15.5	4.0	19.5	2.38		
Rod Mill Feed												
Trommel Discharge	91.7	78.0	2,200.8	54.0	4,072.8	1,872.0	154.4	312.0	466.4	2.38	1.46	
Classifier Screen O'Size	18.3	3.2	439.2	85.0	516.0	76.8	30.9	12.8	43.7	2.38	1.97	
Grinding Water	--	8.8	--	--	211.2	211.2		35.2	35.2	--	1.00	
TOTAL	110.0	90.0	2,640.0	55.0	4,800.0	2,160.0	185.3	360.0	545.3	2.38	1.47	
Classifier Screen												
Rod Mill Discharge	110.0	90.0	2,640.0	55.0	4,800.0	2,160.0	185.3	360.0	545.3	2.38	1.47	
Classifier Screen Water	--	4.9	--	--	117.6	117.6	--	19.6	19.6	--	1.00	
Classifier Screen O'Size	18.3	3.2	439.2	85.0	516.0	76.8	30.9	12.8	43.7	2.38	1.97	
Classifier Screen U'Size	91.7	91.7	2,200.8	50.0	4,401.6	2,200.8	154.4	366.8	521.2	2.38	1.41	

MINERALS EXPLORATION COMPANY - ANDERSON PROJECT

PULP AND WATER BALANCE

Item	Tons Per Hour Solids	Tons Per Hour Solution	Total Solids T.P.D.	% Solids	Tons Per Day Pulp	Tons Per Day Water	Solids	G.P.M. Water	Pulp	Specific Gravity Solids	Specific Gravity Pulp	Observations
Leaching Circuit												
Feed	91.7	91.7	2,200.8	50.0	4,401.6	2,200.8	154.4	366.8	521.2	2.38	1.41	*% Concentration in Solution
Sulfuric Acid*	--	20.4 (7.8)	--	93.0*	187.2	187.2	--	17.0	17.0	--	1.83	*% Concentration in Solution
Sodium Chlorate Sol.*	--	0.7	--	40.0*	16.8	16.8	--	2.0	2.0		1.38	**11.9 Tons of $CaCO_3$ are converted into 20.5 Tons of $CaSO_4 \cdot 2H_2O$ - Total Tons of Solids increase by 3.4 TPH 8.8 GPM of water are attached to the gypsum and subtracted from the water.
Steam Condensate	--	9.8	--	--	235.2	235.2	--	39.2	39.2		1.00	
Clarifier U'Flow	--	2.0	--	5.0	48.0	48.0	--	8.0	8.0		1.04	
Calcium Sulfate**	3.4	-2.2	81.6	--	+28.8(Net)	-52.8	5.4	-8.8	-3.4	2.30	1.34	
Dilution Water	--	6.4	--	--	153.6	153.6		25.6	25.6			
	95.1	116.2***	2,282.4	45.0	5,071.2	2,788.8	159.8	449.8	609.6	2.38	1.35	
CCD Circuit												
No. 1 Thickener												
Leach Discharge	95.1	116.2	2,282.4	45.0	5,071.2	2,788.8	159.8	449.8	609.6	2.38	1.35	
Flocculant	Neglig.	5.6	--	0.3	134.4	134.4	--	22.6	22.6	--	1.00	***Specific gravity of solution 1.03
Sand Filter B'Wash	Neglig.	12.5	--	--	300.0	300.0	--	50.0	50.0	--	1.00	
No. 2 Thick. O'Flow	--	424.7	--	--	10,192.8	10,192.8	--	1,698.8	1,698.8	--	1.00	
No. 1 Thickener Feed	95.1	559.0	2,282.4	15.0	15,698.4	13,416.0	159.8	2,221.2	2,381.0	2.38	1.09	
Products												
No. 1 Thickener Underflow	95.1	155.1	2,282.4	38.0	6,004.8	3,722.4	159.8	605.7	765.5	2.38	1.28	
No. 1 Thickener Overflow	--	403.9	--	--	9,693.6	9,693.6		1,615.5	1,615.5		1.00	
TOTAL	95.1	559.0	2,282.4	15.0	15,698.4	13,416.0	159.8	2,221.2	2,381.0	2.38	1.09	

MINERALS EXPLORATION COMPANY - ANDERSON PROJECT

PULP AND WATER BALANCE

	Tons Per Hour		Total Solids		Tons Per Day		G.P.M.			Specific Gravity		
Item	Solids	Solution	T.P.D.	% Solids	Pulp	Water	Solids	Water	Pulp	Solids	Pulp	Observations
Clarification												
Feed to Clarifier												
No. 1 Thickener Overflow		403.9						1,615.5				*Glue = 0.11 TPD
Glue*	Neglig	0.6						2.5				
		404.5						1,618.0				
Products												
Clarifier Underflow	--	2.0						8.0				
Clarifier Overflow	--	402.5						1,610.0				
		404.5						1,618.0				
Sand Filters Feed												
Clarifier Overflow	--	402.5						1,610.0				
Backwash Solution	--	12.5						50.0				
TOTAL		415.0						1,660.0				
Products												
Backwash Solution	--	12.5										
Clarified Preg. Sol.	--	402.5										
		415.0										
Pregnant Sol. Tank Feed	--	402.5						1,610.0				
B'Wash To Sand Filters	--	12.5						50.0				
Feed to S-X	--	390.0						1,560.0				

MINERALS EXPLORATION COMPANY - ANDERSON PROJECT

PULP AND WATER BALANCE

Item	Tons Per Hour Solids	Tons Per Hour Solution	Total Solids T.P.D.	% Solids	Tons Per Day Pulp	Tons Per Day Water	G.P.M. Solids	G.P.M. Water	G.P.M. Pulp	Specific Gravity Solids	Specific Gravity Pulp	Observations
No. 2 Thickener												
Feed												
No. 1 Thickener U'Flow	95.1	155.1	2,282.4	38.0	6,004.8	3,722.4	159.8	605.7	765.5	2.38	1.28	
No. 3 Thickener O'Flow	--	424.7	--	--	10,192.8	10,192.8		1,698.8	1,698.8	--	1.00	
TOTAL	95.1	579.8	2,282.4	14.1	16,197.6	13,915.2	159.8	2,304.5	2,464.3		1.09	*Volume Change Due to Chemical Reactions
Products												
Underflow	95.1	155.1	2,282.4	38.0	6,004.8	3,722.4	159.8	605.7	765.5	2.38	1.28	
Overflow	--	424.7	--	--	10,192.8	10,192.8		1,698.8	1,698.8	--	1.00	
TOTAL	95.1	579.8	2,282.4	14.1	16,197.6	13,915.2	159.8	2,304.5	2,464.3	2.38	1.09	
No. 3 Thickener												
Feed												
No. 2 Thickener U'Flow	95.1	155.1	2,282.4	38	6,004.8	3,722.4	159.8	605.7	765.5	2.38	1.28	
No. 4 Thickener O'Flow	--	424.7	--	--	10,192.8	10,192.8	--	1,698.8	1,698.8	--	1.00	
TOTAL	95.1	579.8	2,282.4	14.1	16,197.6	13,915.2	159.8	2,304.5	2,464.3	2.38	1.09	
Products												
No. 3 Thickener U'Flow	95.1	155.1	2,282.4	38.0	6,004.8	3,722.4	159.8	605.7	765.5	2.38	1.28	
No. 3 Thickener O'Flow	--	424.7	--	--	10,192.8	10,192.8	--	1,698.8	1,698.8	--	1.00	

MINERALS EXPLORATION COMPANY - ANDERSON PROJECT

PULP AND WATER BALANCE

Item	Tons Per Hour		Total Solids	%	Tons Per Day		G.P.M.			Specific Gravity		Observations
	Solids	Solution	T.P.D.	Solids	Pulp	Water	Solids	Water	Pulp	Solids	Pulp	
No. 4 Thickener												
Feed												
No. 3 Thickener U'Flow	95.1	155.1	2,282.4	38.0	6,004.8	3,722.4	159.8	605.7	765.5	2.38	1.28	
No. 5 Thickener O'Flow	--	424.7	--	--	10,192.8	10,192.8	--	1,698.8	1,698.8	--	1.00	
TOTAL	95.1	579.8	2,282.4	14.1	16,197.6	13,915.2	159.8	2,304.5	2,464.3	2.38	1.09	
Products												
No. 4 Thickener U'Flow	95.1	155.1	2,282.4	38.0	6,004.8	3,722.4	159.8	605.7	765.5	2.38	1.28	
No. 4 Thickener O'Flow	--	424.7	--	--	10,192.8	10,192.8	--	1,698.8	1,698.8	--	1.00	
No. 5 Thickener												
Feed												
No. 4 Thickener U'Flow	95.1	155.1	2,282.4	38.0	6,004.8	3,722.4	159.8	605.7	765.5	2.38	1.28	
Make Up Water												
Raffinate*	--	390.0	--	--	9,360.0	9,360.0		1,560.0	1,560.0	1.00	1.00	*No Bleed-off of Raffinate Solution
Fresh Water	--	34.7	--	--	832.8	832.8		138.8	138.8			
TOTAL	95.1	579.8	2,282.4		10,192.8	10,192.8	159.8	2,304.5	2,464.3	2.38		

MINERALS EXPLORATION COMPANY - ANDERSON PROJECT

PULP AND WATER BALANCE

Item	Tons Per Hour Solids	Tons Per Hour Solution	Total Solids T.P.D.	% Solids	Tons Per Day Pulp	Tons Per Day Water	G.P.M. Solids	G.P.M. Water	G.P.M. Pulp	Specific Gravity Solids	Specific Gravity Pulp	Observations
Products												
No. 5 Thickener U'Flow (Tailings)	95.1	155.1	2,282.4	38.0	6,004.8	3,722.4	159.8	605.7	765.5	2.38	1.28	
No. 5 Thickener O'Flow	--	424.7	--	--	10,192.8	10,192.8		1,698.8	1,698.8	--	1.00	
	95.1	579.8	2,282.4		16,197.6	13,915.2	159.8	2,304.5	2,464.3	2.38	1.09	

S-X, PRECIPITATION - DEWATERING - DRYING (3,960 Lb/Day) (Design Basis)

S-X Circuit Extraction	Tons Per Hour Solids	Tons Per Hour Solution	Total Solids T.P.D.	% Solids	Tons Per Day Pulp	Tons Per Day Water	G.P.M. Solids	G.P.M. Water	G.P.M. Pulp	Specific Gravity Solids	Specific Gravity Pulp	U_3O_8 Solution (gpl)	U_3O_8 Solids (Lb/Day)
Feed		390	--	--	9,360.0	9,360.0		1,560	1,560		1.03	0.21	3960
Preg. Organic (Advance)		33.0	--		792.0	792.0		165	165		0.80	1.99	3960
Preg. Organic (Recycle)		416.0						2,080	2,080				
Preg. Strip Solution		3.7	--	2.2				13.2	13.2		1.14	25.0	3960
Aqueous (Recycle)		15.4						55.0	55.0				
Barren Organic	--	33.0	--					165	165		0.80		
Barren Strip Sol.	--	3.7	--					13.2	13.2		1.12		
YC Thickener Feed	.083	4.79	1.98	1.7				17.9	17.9	5.70	1.10		3960

MINERALS EXPLORATION COMPANY - ANDERSON PROJECT

PULP AND WATER BALANCE

S-X, PRECIPITATION - DEWATERING - DRYING (3,960 Lb/Day)

Item	Tons Per Hour Solids	Tons Per Hour Solution	Total Solids T.P.D.	% Solids	Tons Per Day Pulp	Tons Per Day Water	Solids	G.P.M. Water	Pulp	Specific Gravity Solids	Specific Gravity Pulp	Observations
YC Thickener O'Flow	--	4.62	--					17.25	17.25		1.07	
YC Thickener U'Flow	.083	0.17	1.98	33.0				0.65	0.65	5.70	1.37	
Centrifuge Feed												
YC Thickener U'Flow	.083	0.17	1.98	33.0				0.65	0.65	5.70	1.37	
Wash Water	--	1.04	--	--				4.16	4.16	--	1.00	
Products												
Centrate	--	1.09	--	--	26.16	26.16		4.15	4.15		1.05	
Bleed-Off	--	.92	--	--	3.7	3.7		3.4	3.4		1.07	
Dryer Feed	.083	.124	1.98	40%*				0.5	0.5	5.70	1.65	*Design
Dryer Discharge	.083	.002	1.98	98.0								3,960 lb/day U_3O_8 (100%) Equivalent to 4,659 lb/day U_3O_8 (85%)

EXHIBIT III-C
MILL EQUIPMENT
PERFORMANCE SPECIFICATIONS

AIR COMPRESSOR

EQUIPMENT NO. 002

LOCATION

Inside Mill Building

CAPACITY

450 scfm @ 125 psig (max)

DUTY

This rotary screw air compressor will supply the compressed air needs of the process, specifically in the stripping phase of solvent extraction and the yellowcake precipitation.

The compressor will be complete with drive, guard, TEFC motor and air drying equipment suitable for the capacity.

BOILERS

EQUIPMENT NO. 003-004

LOCATION

Adjacent to Mill Building

CAPACITY

22,000 lb/hr ea @ 125 psig

FUEL TYPE

Fuel Oil (Diesel)

SPECIAL FEATURES

Water Treatment and Feed System

Deareator

DUTY

These boilers will supply steam to the leach tanks and the heat exchangers primarily. The two boilers will be served by a single water treatment, feed, and deareator sized to service only one boiler at a time.

The boilers will be complete with combustion system, controls, pumps, integral piping and wiring, TEFC motors for pumps and fans. Water treatment equipment and deaerator will also be included.

TANK

EQUIPMENT NO. 005

LOCATION

500 ft North of Mill Building

MATERIAL DESCRIPTION

Potable Water

Solution: Temp. 40-60° F pH approx 7.0 Sp. Gr. 1.00

VOLUME

40,000 gal

RETENTION

2.0-2.5 days

DUTY

This tank will serve as the reservoir of fresh water for domestic needs within the mill area.

This mild steel tank will be covered but will have an inspector manhole.

FORKLIFT TRUCK

EQUIPMENT NO. 006

LOCATION

Packaging Area

MATERIAL HANDLED

55 gal drums of yellowcake (primarily)

CAPACITY

2000 lb

FUEL TYPE

Gasoline

DUTY

This forklift will be utilized primarily for storing and loading 55 gal drums of yellowcake in the packaging area. It will, however, be available for duty in other plant areas much of the time.

TANK

EQUIPMENT NO. 007

LOCATION

500 ft North of Mill Building

MATERIAL DESCRIPTION

Process Water

Solution: Temp. 40-60^{0} F pH approx 7.0 Sp. Gr. 1.0

VOLUME

500,000 gal (250,000 gal for fire protection)

RETENTION

Approx 8 hr (excluding fire protection water)

DUTY

This tank will serve as the reservoir for process water needed throughout the phases of the milling operation. It serves additionally as the source of fire protection water.

This tank will be constructed of mild steel and have no cover.

HORIZONTAL CENTRIFUGAL PUMPS

EQUIPMENT NO. 008-009

LOCATION

500 ft North of Mill Building in Pump House

MATERIAL HANDLED

Water

Solution: Temp. 40-60° F pH approx. 7.0 Sp. Gr. 1.00

CAPACITY

1000 gpm @ 100 psig (Diesel) or 125 psi (Electric)

DUTY

These two water pumps will boost water pressure for fire protection within the mill site. The primary pump will be electric. In case of power failure, a diesel unit of equal capacity will be available as a backup.

The pumps will be cast iron and will be complete with drives, guards and motors. The electrically driven pump will have a TEFC motor.

AIR COMPRESSOR

EQUIPMENT NO. 010

LOCATION

Inside Mill Building

CAPACITY

45 scfm @ 60 psig

DUTY

This small compressor will supply the air necessary to maintain operating pressure within the mill's instrumentation circuits which are air actuated.

This compressor's function is backed up by an inter-tie with the mill's main air compressor (Equipment No. 002).

The compressor will be complete with drive, guard, TEFC motor, air drying equipment, and an 80 gal air receiver.

AIR COMPRESSOR

EQUIPMENT NO. 011

LOCATION

Beside Sulfuric Acid Tanks, 100 ft West of S-X Pad

CAPACITY

100 scfm @ 100 psig

DUTY

This compressor will be in intermittent service supplying pressure necessary to unload the approximately 14 sulfuric acid trucks per day, 5 days per week.

The compressor will be complete with drive, guard and TEFC motor.

EMERGENCY POWER GENERATOR

EQUIPMENT NO. 012

LOCATION

Inside Mill Building

CAPACITY

1000 kw, 480 v, 3 phase, 60 hz

FUEL TYPE

Fuel Oil (Diesel)

DUTY

This emergency generator will supply power to certain critical equipment in case of interruption of the primary source of electricity.

The generator will be a complete skid-mounted unit.

HORIZONTAL CENTRIFUGAL PUMP

EQUIPMENT NO. 013

LOCATION

At pump house adjacent to water storage tanks

CAPACITY

150 gpm at 75 ft tdh

DUTY

For domestic water distribution within plant area.

The pump will be complete with drive, guard, and TEFC motor.

HORIZONTAL CENTRIFUGAL

EQUIPMENT NO. 014

LOCATION

CCD thickener area

CAPACITY

150 gpm at 100 ft tdh

DUTY

To provide gland seal water for plant area pumps. The pump will be complete with drive, guard and TEFC motor.

FRONT END LOADER

EQUIPMENT NO. 101

LOCATION

Ore Receiving Area

MATERIAL HANDLED

Shale and Siltstone Ore

Bulk Density: 100 lb/cu ft (Dry Basis) Moisture: 10%

Size Analysis: Run-of-mine ore

CAPACITY OR SIZE

3.5 cu yd

FUEL TYPE

Gasoline

DUTY

The front end loader will have broken ore from run-of-mine stockpiles to a 100-ton capacity hopper. The loader and bucket must be of heavy duty construction for continuous service.

During plant operation, the loader must be capable of handling an average of 100 tph ore. Average one-way distance traveled from ore storage to hopper will be 200 ft. Loader emissions must comply with state and federal environmental regulations.

ORE FEED HOPPER

EQUIPMENT NO. 102

LOCATION

Ore Receiving Area

MATERIAL DESCRIPTION

Shale and Siltstone Ore

Bulk Density: 100 lb/cu ft (Dry Basis)

Sp. Gr.: 2.38

% Moisture: 10%

Size: 18 in. max

RETENTION

Approx. 1 hr

DUTY

This hopper will receive run-of-mine ore from a front end loader and will discharge to an apron feeder. The bin will be constructed of concrete and lined with A-R plate. It will have a stationary grizzly on top with 18" x 18" openings.

APRON FEEDER

EQUIPMENT NO. 103

LOCATION

Ore Receiving Area

MATERIAL DESCRIPTION

Shale and Siltstone Ore

Bulk Density: 100 lb/cu ft (Dry Basis)

Sp. Gr.: 2.38

% Moisture: 10%

Size: 18 in. max

FEED RATE

91.7 tph average

SPEED

Variable, up to 300 tph max.

DUTY

The apron feeder will deliver ore from the 100 ton surge hopper to the SAG mill belt conveyor. It will be designed for heavy duty ore handling. The feeder will be 16' long by 48" wide and will be complete with drive, guards, and TEFC motor.

BELT CONVEYOR

EQUIPMENT NO. 104

LOCATION

Ore Receiving Area

MATERIAL DESCRIPTION

Shale and Siltstone Ore

Bulk Density: 100 lb/cu ft (Dry Basis)

Sp. Gr.: 2.38

% Moisture: 10%

Size: 18 in. max.

FEED RATE

91.7 tph average; 300 tph max.

SPEED

Constant

DUTY

This belt conveyor will transfer ore from the apron feeder to the SAG mill. The conveyor will be 48" wide and 266' long with a 50' lift. Conveyor drive, components and structure must be designed to handle a maximum of 300 tph.

The conveyor will be provided with hoods over the belt and will have a single walkway with continuous handrail. It will have a vertical gravity take-up and will be designed with 35° troughing idlers. The belt conveyor will be furnished complete with idlers, pulleys, drive, guards, TEFC motor, backstop, and belt wiper.

BELT SCALE

EQUIPMENT NO. 105

LOCATION

Ore Receiving Area

RANGE

0-300 tph; average rate 91.7 tph

MATERIAL DESCRIPTION

Shale and Siltstone Ore

Bulk Density: 100 lb/cu ft (Dry Basis)

Sp. Gr.: 2.38

% Moisture: 10%

Temperature: 28 - 112° F

Size: 18 in. max. lumps

DUTY

The belt scale will weigh ore on the 48" wide SAG mill feed belt conveyor. The belt conveyor will have 35° troughing idlers and will operate at a speed of 100 fpm.

The belt scale will be electronic with ±0.5% accuracy. It will be furnished with integrator and recorder.

SEMIAUTOGENOUS GRINDING MILL

EQUIPMENT NO. 106

LOCATION

Grinding Area

MATERIAL DESCRIPTION

Shale and Siltstone Ore

Bulk Density: 100 lb/cu ft (Dry Basis)   Sp. Gr.: 2.38

% Moisture: 10%   Temperature: 28-112^{0} F

Word Index: 12.8   Feed Size: 18 in. max

OPERATING CONDITIONS

Feed Rate: 91.7 tph (average)   Pulp Density: 55% Solids

PRODUCT REQUIREMENTS

Size: 80% will pass 3/8 inch Screen; Max. 3/4 inch

TYPE OF DISCHARGE

Grate (3/4 inch)

DUTY

The SAG mill will reduce 80% of the run-of-mine ore to less than 3/8 inch. Material of 3/4 x 3/8 inch will be separated by a trommel screen at the SAG mill discharge and report to the rod mill. The -3/8 inch material which passes the trommel will flow to a discharge sump.

The SAG mill will be 16' Ø x 5'. The mill will be furnished with one set of liners, a 500 HP motor and variable speed drive. The mill will carry a ball load of up to 8% of mill volume. An automatic lubricating system and all necessary guards will be provided.

SUMP

EQUIPMENT NO. 107

LOCATION

Grinding Area

MATERIAL DESCRIPTION

Shale and Siltstone Ore Slurry

Slurry: Sp. Gr. 1.43 % Solids by Weight 52%

Solution: Temp. 40-70^{o} F pH 6.5-7.0 Sp. Gr. 1.00

Solids: Sp. Gr. 2.38

Size Analysis: -3/8 inch to -325 mesh

VOLUME

900 gal

RETENTION

Approx. 2 min

DUTY

This sump will receive underflow from the SAG mill trommel screen and from a grinding area scrubber.

The sump will be rubber-lined mild steel. It will be provided with a clean-out and will be designed for discharge by horizontal pumps.

HORIZONTAL CENTRIFUGAL PUMPS

EQUIPMENT NO. 108-109

LOCATION

Grinding Area

MATERIAL DESCRIPTION

Shale and Siltstone Ore Slurry

Slurry: Sp. Gr. 1.43 % Solids by Weight 52%

Solution: Temp. 40-70^{o} F pH 6.5-7.0 Sp. Gr. 1.00

Solids: Sp. Gr. 2.38

Size Analysis -3/8 inch to -325 mesh

CAPACITY

500 gpm at 25 ft tdh

DUTY

Two pumps will deliver trommel screen undersize from the SAG mill discharge sump to the rod mill feed box. Standard operation will be one operating and one stand-by. The pumps will be rubber lined furnished with 316 SS trim, mechanical seals, drives, guards and TEFC motors.

BELT CONVEYOR

EQUIPMENT NO. 110

LOCATION

Grinding Area, Mill Building

MATERIAL DESCRIPTION

Shale and Siltstone Ore

Bulk Density: 100 lb/cu ft (Dry Basis)

Sp. Gr.: 2.38 % Moisture Approx. 10%

Temperature: 40-70° F

Size Analysis: -3/4 x 3/8 inch

FEED RATE

Approx. 20 tph

SPEED

Constant

DUTY

This belt conveyor is the first of a two-belt system to deliver SAG mill trommel screen oversize to the rod mill feed box. This conveyor will be horizontal, 18" wide and 18' long and will have 20° idlers.

BELT CONVEYOR

EQUIPMENT NO. 111

LOCATION

Grinding Area, Mill Building

MATERIAL DESCRIPTION

Shale and Siltstone Ore

Bulk Density: 100 lb/cu ft (Dry Basis)

Sp. Gr.: 2.38 % Moisture Approx. 10%

Temperature: 40-70^{o} F

Size Analysis: -3/4 x 3/8 inch

FEED RATE

Approx. 20 tph

SPEED

Constant

DUTY

This belt conveyor is the second of a two-belt system to deliver SAG mill trommel screen oversize to the rod mill feed box. This conveyor will be 18" wide and 64' long with a 17' lift. It will have 20^{o} idlers and will be provided with a single walkway.

TRAMP IRON MAGNET

EQUIPMENT NO. 112

LOCATION

Grinding Area, Mill Building

OPERATING CONDITIONS

The conveyor serviced by the self-cleaning electromagnet will be 18" wide, with 20^{0} idlers. Approximately 20 tph of -3/4 x 3/8 inch ore will be conveyed at 100 fpm. The ore will have a bulk density of 100 lb/cu ft and will contain approximately 10% moisture.

DUTY

This electromagnet will remove tramp iron from the 18" x 64' trommel oversize belt conveyor. It will be self-cleaning and will be furnished complete with drive, guard, TEFC, motor, belt scraper, and control. The magnet will be in an across-the-belt configuration.

ROD MILL

EQUIPMENT NO. 113

LOCATION

Grinding Area

MATERIAL DESCRIPTION

Shale and Siltstone Ore

Bulk Density: 100 lb/cu ft (Dry Basis)

Sp. Gr.: 2.35 % Solids 42%

Temperature: 50-80^{o} F Bond Work Index 12

Size Analysis: 10% -3/4 x 3/8 inch
90% -3/8 inch

OPERATING CONDITIONS

Feed Rate: 110 tph (Design)

Pulp Density: 55% Solids

PRODUCT REQUIREMENTS

85% will pass 28 mesh screen

TYPE OF DISCHARGE

Overflow

TYPE OF CIRCUIT

Closed with DSM Screen

DUTY

The rod mill will reduce the SAG mill discharge and DSM screen oversize to -28 mesh with less than 20% recycle. Rod mill discharge will flow to the DSM-type classifier screen with screen undersize (-28 mesh) reporting to the leach feed sump.

The rod mill will be 9'6" Ø x 16'. It will be furnished with one set of liners, a 600 HP motor and variable-speed drive. An automatic lubricating system and all necessary guards will be provided.

SUMP

EQUIPMENT NO. 114

LOCATION

Grinding Area

MATERIAL DESCRIPTION

Shale and Siltstone Ore Slurry

Slurry: Sp. Gr. 1.47 % Solids by Weight 55%

Solution: Temp. 40-70^{o} F pH 6.5-7.0 Sp. Gr. 1.00

Solids: Sp. Gr. 2.38

Size Analysis: -3/4 inch to -325 mesh

VOLUME

1200 gal

RETENTION

Approx. 2 min

DUTY

This sump will receive rod mill discharge. The sump will be rubber lined mild steel. It will be provided with a clean-out and will be designed for discharge by horizontal pumps.

HORIZONTAL CENTRIFUGAL PUMPS

EQUIPMENT NO. 115-116

LOCATION

Grinding Area

MATERIAL DESCRIPTION

Shale and Siltstone Ore Slurry

Slurry: Sp. Gr. 1.47 % Solids by Weight 55%

Solution: Temp. 40-70^{o} F pH 6.5-7.0 Sp. Gr. 1.00

Solids: Sp. Gr. 2.38

Size Analysis: -3/4 inch to -325 mesh

CAPACITY

600 gpm at 35 ft tdh

DUTY

Two pumps will deliver rod mill discharge to the feed box of a DSM-type screen. Standard operation will be one pump operating and one stand-by.

The pumps will be rubber lined, will have 316 SS trim and will be complete with drives, guards, and TEFC motors.

SCREEN

EQUIPMENT NO. 117

LOCATION

Grinding Area

MATERIAL DESCRIPTION

Shale and Siltstone Ore Slurry

Slurry: Sp. Gr. 1.47 % Solids by Weight 55%

Solution: Temp. 40-70^{o} F pH 6.5-7.0 Sp. Gr. 1.00

Solids: Sp. Gr. 2.38

Size Analysis: -3/4 inch to -325 mesh

FEED RATE

600 gpm slurry

OPENING SIZE

28 mesh

TYPE OF SCREEN

Sieve bend or DSM type

DUTY

This screen will receive slurry from the rod mill discharge sump and separate it into a +28 mesh fraction which will be returned to the rod mill and a -28 mesh fraction which will report to the leach feed sump.

Design of this sieve bend or DSM-type screen will allow ease of reversing the screen surface to maximize screen life.

SAMPLING SYSTEM

EQUIPMENT NO. 118

LOCATION

Grinding Area

MATERIAL DESCRIPTION

Shale and Siltstone Ore Slurry

Slurry: Sp. Gr. 1.41 % Solids by Weight 50%

Solution: Temp. 40-70° F pH 6.5-7.0 Sp. Gr. 1.00

Solids: Sp. Gr. 2.38

Size Analysis:

	98%	-28 mesh
Approx.	50%	-200 mesh
Approx.	35%	-325 mesh

OPERATING CONDITIONS

Feed Rate: 600 gpm

Feed Sample Required: 3.4% of Total

Final Sample Size: 2.5 gal/shift

DUTY

This sampling system will sample leach feed slurry. The system will be three-stage with a sample storage tank between the second and third stages. The first two stages will be continuous and the third stage will operate only at the end of each operating shift. The samplers will be designed for variable adjustment of cutter speed and sample size. The system will be furnished complete with all drives, guards, TEFC motors, sample containers and controls.

SUMP

EQUIPMENT NO. 119

LOCATION

Grinding Area

MATERIAL DESCRIPTION

Shale and Siltstone Ore Slurry

Slurry: Sp. Gr. 1.41   % Solids by Weight 50%

Solution: Temp. 40-70° F   pH 6.5-7.0   Sp. Gr. 1.00

Solids: Sp. Gr. 2.38

Size Analysis:	98%	-28 mesh
	Approx. 50%	-200 mesh
	Approx. 35%	-325 mesh

VOLUME

1200 gal

RETENTION

Approx. 2 min

DUTY

This sump will receive underflow from the DSM-type screen. It will be rubber lined mild steel, furnished with clean-out, and designed for discharge by horizontal pumps.

HORIZONTAL CENTRIFUGAL PUMPS

EQUIPMENT NO. 120-121

LOCATION

Grinding Area

MATERIAL DESCRIPTION

Shale and Siltstone Ore Slurry

Slurry: Sp. Gr. 1.41 % Solids by Weight 50%

Solution: Temp. 40-70^{o} F pH 6.5-7.0 Sp. Gr. 1.00

Solids: Sp. Gr. 2.38

Size Analysis:	98%	-28 mesh
	Approx. 50%	-200 mesh
	Approx. 36%	-325 mesh

CAPACITY

600 gpm at 35 ft tdh

DUTY

Two pumps will deliver leach feed slurry from the leach feed sump to the first acid mix tank. Standard operation will be one pump operating and one stand-by.

The pumps will be rubber lined, will have 316 SS trim, and will be furnished with mechanical seals, drives, guards, and TEFC motors.

MASS FLOWMETER

EQUIPMENT NO. 122

LOCATION

Grinding Area

MATERIAL DESCRIPTION

Shale and Siltstone Ore Slurry

Slurry: Sp. Gr. 1.41 % Solids by Weight 50%

Solution: Temp. 40-70° F pH 6.5-7.0 Sp. Gr. 1.00

Solids: Sp. Gr. 2.38

Size Analysis:		
	98%	-28 mesh
	Approx. 50%	-200 mesh
	Approx. 35%	-325 mesh

FEED RATE

600 gpm

DUTY

The mass flowmeter will monitor and record flow rate and percent solids of feed to the leaching circuit. It will be located between the leach feed pumps and the first acid mix tank.

The mass flowmeter will include a nuclear density guage, magnetic flowmeter, transmitters and integrator-recorder. The density gauge will have ±2.0% accuracy and the flowmeter will have ± 1.0% accuracy. The flowmeter will have stainless steel electrodes and will be neoprene lined.

SCRUBBER

EQUIPMENT NO. 123

LOCATION

Ore Receiving Area

MATERIAL DESCRIPTION

Shale and Siltstone Ore Dust

Radon Gas

Size Analysis: 100% -325 mesh

Properties: Not Soluble in Water

Not Corrosive

Abrasive

Not Difficult to Wet

FLOW RATE

3000 scfm

EFFICIENCY

99.5%

DUTY

The wet scrubber in the ore receiving area will control emissions from the apron feeder-belt conveyor transfer point. The system will be designed to keep the work area in compliance with current hygiene regulations and yield stack emission compatible with current environmental specifications. The scrubber liquid effluent will report to the ore receiving area sump.

The scrubber will be mild steel construction. It will be furnished complete with fan, drive, guard, TEFC motor, and scrubber controls as required.

VERTICAL CENTRIFUGAL PUMP

EQUIPMENT NO. 124

LOCATION

Ore Receiving Area

MATERIAL DESCRIPTION

Shale and Siltstone Ore Slurry

Slurry: Sp. Gr. 1.0-1.4 % Solids by Weight 0-50%

Solution: Temp. 40-70° F pH 6.5-7.0 Sp. Gr. 1.0

Solids: Sp. Gr. 2.38

Size Analysis: -3/4 inch to -325 mesh (est)

CAPACITY

50 gpm at 30 ft tdh

DUTY

This pump will deliver slurry from the ore receiving area sump to the SAG mill feed box. The particle size and percent solids to be pumped will vary over a wide range. The pump will be selected to handle the extreme condition.

The pump will be rubber lined with 316 SS trim. It will be furnished complete with level control, drive, guard, and TEFC motor.

VERTICAL CENTRIFUGAL PUMP

EQUIPMENT NO. 125

LOCATION

Grinding Area

MATERIAL DESCRIPTION

Shale and Siltstone Ore Slurry

Slurry: Sp. Gr. 1.0-1.42 % Solids by Weight 0-50%

Solution; Temp. 40-70^{o} F pH 6.5-7.0 Sp. Gr. 1.0

Solids: Sp. Gr. 2.38

Size Analysis -3/4 inch to -325 mesh (est)

CAPACITY

50 gpm at 20 ft tdh

DUTY

This pump will deliver slurry from the grinding area sump to the SAG mill feed box. The particle size and percent solids to be pumped will vary over a wide range. The pump will be selected to handle the extreme conditions.

The pump will be rubber lined with 316 SS trim. It will be furnished complete with level control, drive, guard, and TEFC motor.

ROD CHARGING MACHINE

EQUIPMENT NO. 126

LOCATION

Grinding Area

DUTY

This electric or air-operated machine will facilitate handling and charging of rods into the rod mill.

The machine will be complete with all drives, TEFC motors, guards, and controls.

OVERHEAD BRIDGE CRANE

EQUIPMENT NO. 127

LOCATION

Grinding Area

CAPACITY

15 ton main hoist with 5 ton auxiliary hoist

DUTY

This crane will provide service to the entire grinding area. The crane will be designed for Class C service. It will be furnished with bridge, trolley, hoists and all electrical control and hardware integral to the crane, but not including crane rail, crane beams and runway electrification.

LINER HANDLER

EQUIPMENT NO. 128

LOCATION

Grinding Area

DUTY

The liner handler will be used to facilitate removal and replacement of liners for a 16' Ø x 5' semiautogenous grinding mill. It will be furnished complete with drives, TEFC motors, guards and control.

TANKS

EQUIPMENT NO. 201-202

LOCATION

Leaching Area

MATERIAL DESCRIPTION

Shale, Siltstone, and Gypsum Slurry

Slurry: Sp. Gr. 1.39 % Solids by Weight 45%

Solution: Temp. 75° C pH $\leq$1.5 Sp. Gr. 1.04

Solids: Sp. Gr. 2.38

Size Analysis: (est) 98% -28 mesh
50% -200 mesh
36% -325 mesh

VOLUME

47,000 gal ea (Usable)

RETENTION

75 min ea

DUTY

This two-tank series will be the initial reactor tanks of the leaching circuit. They will receive the ore slurry from the leach feed sump as well as the bulk of the 93% sulfuric acid and a portion of the sodium chlorate and steam for leaching the uranium. The tanks will be 20' Ø x 26' deep with 20' utilized for reacting, and the top 6 feet available to contain froth from the chemical reaction. The mild steel tanks will be rubber lined and will be designed to support agitator mechanisms.

TANKS

EQUIPMENT NO. 203-206

LOCATION

Leaching Area

MATERIAL DESCRIPTION

Shale, Siltstone, and Gypsum Slurry

Slurry: Sp. Gr. 1.39 % Solids by Weight 45%

Solution: Temp. 75° C pH $\leq$1.5 Sp. Gr. 1.04

Solids: Sp. Gr. 2.38

Size Analysis: (est)
98% -28 mesh
50% -200 mesh
35% -325 mesh

VOLUME

47,000 gal ea (Usable)

RETENTION

75 min ea

DUTY

This four-tank series of tanks will complete the uranium extraction started in the acid mix tanks. The first tank of the series will receive a continuous flow of slurry from the second acid mix tank. The first two leach tanks will be fitted for acid, sodium chlorate, and steam additions. The final leach tank will discharge continuously into the leach discharge sump. The leach tanks will be 20' Ø x 22' deep. two feet of freeboard are allowed to accommodate foaming. The tanks will be rubber-lined mild steel and will be designed to support agitator mechanisms.

AGITATORS

EQUIPMENT NO. 207-212

LOCATION

Leaching Area

MATERIAL DESCRIPTION

Shale, Siltstone and Gypsum Slurry

Slurry: Sp. Gr. 1.45 % Solids by Weight 50% (Design)

Solution: Temp. 75^{o} C pH <1.5 Sp. Gr. 1.04

Solids: Sp. Gr. 2.38

Size Analysis: (est) 98% -28 mesh
50% -200 mesh
35% -325 mesh

TANK DESCRIPTION

Diameter: 20 ft Depth: 20-26 ft Volume: 47,000 gal

DUTY

These agitators will suspend the solids contained in the ore slurry and mix the reactants sufficiently to maintain the uniform acid concentration required for optimum leaching.

The agitator shafts and impellers will be rubber covered mild steel. The agitators will be furnished complete with drives, guards, TEFC motors, and support structure with walkway and handrail.

SUMP

EQUIPMENT NO. 213

LOCATION

Leaching Area

MATERIAL DESCRIPTION

Shale, Siltstone, and Gypsum Slurry

Slurry: Sp. Gr. 1.39 % Solids by Weight 45%

Solution: Temp. 75^{o} C pH $\leq$1.5 Sp. Gr. 1.04

Solids: Sp. Gr. 2.38

Size Analysis: (est)

98%	-28 mesh
50%	-200 mesh
35%	-325 mesh

VOLUME

1500 gal

RETENTION

Approx. 2 min

DUTY

This sump will receive the discharge from the final leach tank. The 6' Ø x 10' deep mild steel sump will be rubber lined.

HORIZONTAL CENTRIFUGAL PUMPS

EQUIPMENT NO. 214-215

LOCATION

Leaching Area

MATERIAL DESCRIPTION

Shale, Siltstone, and Gypsum Slurry

Slurry: Sp. Gr. 1.39 % Solids by Weight 45%

Solution: Temp. 76° C pH $\leq$1.5 Sp. Gr. 1.04

Solids: Sp. Gr. 2.38

Size Analysis: (est)
98% -28 mesh
50% -200 mesh
35% -325 mesh

CAPACITY

700 gpm at 30 ft tdh

DUTY

Two pumps will deliver leach discharge slurry from the leach discharge sump to the No. 1 CCD thickener. Standard operation will be one pump operating and one stand-by. The pumps will be rubber lined with mechanical seals and 316 SS trim. The pumps will be furnished complete with drives, guards, and TEFC motors.

SCRUBBER

EQUIPMENT NO. 216

LOCATION

Leaching Area

MATERIAL DESCRIPTION

Carbon Dioxide

Sulfuric Acid Fumes

Steam

Radon Gas

PROPERTIES

Corrosive

moist

FLOW RATE

5000 cfm

EFFICIENCY

99.5%

DUTY

The wet scrubber in the leach area will control emissions from the acid mix tanks, the leach tanks, and the leach discharge sump. The system will be designed to keep the work area in compliance with current hygiene regulations and yield stack emissions compatible with current environmental specifications. The scrubber liquid effluent will report to the leach discharge sump.

The scrubber will be mild steel construction. It will be furnished complete with fan, drive, guard, TEFC motor, and scrubber controls as required.

VERTICAL CENTRIFUGAL PUMP

EQUPMENT NO. 217

LOCATION

Leaching Area

MATERIAL DESCRIPTION

Shale, Siltstone, and Gypsum Slurry

Slurry: Sp. Gr. 1.00-1.45 % Solids by Weight 0-50%

Solution: Temp. 40-150° F pH $<$ 1.5 Sp. Gr. 1.04

Solids: Sp. Gr. 2.38

Size Analysis: (est)

98%	-28 mesh
50%	-200 mesh
35%	-325 mesh

CAPACITY

50 gpm of 25 ft tdh

DUTY

This sump pump will deliver all slurry from the leaching area sump to the first acid mix tank. The percent solids will vary over a wide range. The solution can contain up to 20-30 gpl of free acid. The pump will be selected to handle the extreme conditions.

The pump will be rubber lined, will have 316 SS trim, and will be furnished complete with level control, drive, guard, and TEFC motor. The tanks will be designed to support agitators.

SUMPS

EQUIPMENT NO. 301-305

LOCATION

CCD Area

MATERIAL DESCRIPTION

Shale, Siltstone, and Gypsum Slurry

Slurry: Sp. Gr. 1.14 % Solids by Weight 15%

Solution: Temp. 40-70^{0} C pH<1.5 Sp. Gr. 1.04

Solids: Sp. Gr. 2.38

Size Analysis: (est) 98% -28 mesh
50% -200 mesh
35% -325 mesh

VOLUME

Approx. 2500 gal

RETENTION

60 sec

DUTY

These five sumps will receive and thoroughly mix elements of each CCD thickener feed.

These 8' x 8' mild steel tanks will be rubber lined and will be designed to support agitators.

HORIZONTAL CENTRIFUGAL PUMPS

EQUIPMENT NO. 306-315

LOCATION

CCD Area

MATERIAL DESCRIPTION

Shale Siltstone, and Gypsum Slurry

Slurry: Sp. Gr. 1.14 % Solids by Weight 15%

Solution: Temp. 40-70^{0} C pH$<$1.5 Sp. Gr. 1.04

Solids: Sp. Gr. 2.38

Size Analysis: (est) 98% -28 mesh
50% -200 mesh
35% -325 mesh

CAPACITY

2700 gpm at 25 ft tdh

DUTY

These ten pumps will deliver mixed slurry from the thickener feed tanks to the feed well of the CCD thickeners. Each feed tank will be fitted with two pumps, one operating and one stand-by. The pumps will be rubber lined, will have 316 SS trim and will be furnished complete with drives, guards and TEFC motors.

TANKS

EQUIPMENT NO. 316-320

LOCATION

CCD Area

MATERIAL DESCRIPTION

Shale, Siltstone, and Gypsum Slurry

Slurry:	Sp. Gr. 1.14		% Solids by Weight 15%
Solution:	Temp. 40-70^{o}C	pH$<$1.5	Sp. Gr. 1.04
Solids:	Sp. Gr. 2.38		
	Size Analysis (est)	90% -28 mesh 50% -200 mesh 35% -325 mesh	

VOLUME

Approx. 2500 gal

RETENTION

60 sec

DUTY

These five agitated tanks receive the discharge of the five thickener feed pumps and also receive the flocculants. The tanks overflow continually into launders running to the thickner feed wells.

The 8' Ø X 8" mild steel tanks will be rubber lined due to the low pH and abrasiveness of the thickener feed elements.

AGITATORS

EQUIPMENT NO. 321-325

LOCATION

CCD Area

MATERIAL DESCRIPTION

Shale, Siltstone, and Gypsum Slurry

Slurry: Sp. Gr. 1.14 % Solids by Weight 15%

Solution: Temp. 40-70^{o} C pH$<$1.5 Sp. Gr. 1.04

Solids: Sp. Gr. 2.38

Size Analysis: (est) 98% -28 mesh
50% -200 mesh
35% -325 mesh

TANK DESCRIPTION

Diameter: 8 ft Depth: 8 ft Volume: 3000 gal

DUTY

These agitators will suspend and mix all solids and wash liquors flowing into the five thickener feed tanks.

These agitator shafts and impellers will be rubber covered mild steel. The agitators will be furnished complete with drives, guards, TEFC motors and support structure.

THICKENERS

EQUIPMENT NO. 326-330

LOCATION

CCD Area

MATERIAL DESCRIPTION

Shale, Siltstone, and Gypsum Slurry

Slurry: Sp. Gr. 1.14 (Avg)   % Solids by Weight 15% (Avg)

Solution: Temp. 40-70^{o} C   pH<1.5   Sp. Gr. 1.04

Solids: Sp. Gr. 2.38

Size Analysis: (est) 98% -28 mesh
50% -200 mesh
35% -325 mesh

OPERATING CONDITIONS

Feed Rate: 2381 gpm

Underflow: 765 gpm at 38% solids

Overflow: 1616-1668 gpm at 150-250 ppm Solids

Diameter: 140 ft   Sidewall 10 ft

Settling Area: 7.0 sq ft/ton/24 hr

Retention: 7.9 hr

WASH RATIO*: 2.67 (Thickener Nos. 2-5)

*Wash Water Divided by Slurry Liquor

DUTY

These five thickener tanks will receive the leached pulp and counter-current flowing wash water and provide the time necessary for settling and thickening of pulp.

These thickeners will be constructed of mild steel with rubber lining on walls and bottom.

THICKENER MECHANISMS

EQUIPMENT NO. 331-335

LOCATION

CCD Area

MATERIAL DESCRIPTION

Shale, Siltstone, and Gypsum Slurry

Slurry: Sp. Gr. 1.33 % Solids by Weight 38%

Solution: Temp. 40-70oC pH<1.5 Sp. Gr. 1.04

Solids: Sp. Gr. 2.38 Size Analysis: (est) 98% -28 mesh
50% -200 mesh
35% -325 mesh

OPERATING CONDITIONS

Feed Rate: 2381 gpm Underflow: 765 gpm at 38% solids

Overflow: 1616 gpm at 150-250 ppm Solids

THICKENER DESCRIPTION

Diameter: 140 ft Sidewall 10 ft

Settling Area: 7.0 sq ft/ton/24 hr

Retention: 7.9 hr Wash Ratio*: 2.67 (Thickener Nos. 2-5)

*Wash Water Divided by Slurry Liquor

DUTY

These thickener mechanisms, one for each of the five CCD thickeners, will rake the settled pulp in the thickeners to the discharge cone. These mechanisms will have no stub arms but will be equipped with motorized rake lifting mechanisms and remote torque indicators. They will be the center pier type.

The mechanisms will be constructed to perform satisfactorily in a low pH environment with the arms, blades and cones fabricated of 316 SS.

The thickener mechanisms will be furnished complete with drives, guards and motors, motorized rake lifting device, feed wells, bridge structure with walkway and handrail and feed launder or pipe.

DIAPHRAGM PUMPS

EQUIPMENT NO. 336-345

LOCATION

CCD Area

MATERIAL DESCRIPTION

Shale, Siltstone, and Gypsum Slurry

Slurry: Sp. Gr. 1.30 % Solids by Weight 35%

Solution: Temp. 40-70^{o}C pH$<$1.5 Sp. Gr. 1.04

Solids: Sp. Gr. 2.38

Size Analysis: (est) 98% -28 mesh
50% -200 mesh
35% -325 mesh

CAPACITY

Approx. 900 gpm at 25 ft tdh

DUTY

These ten pumps will be used in pairs to convey the underflow pulp of each of the five CCD thickeners to its next thickener feed tank except that the final thickener underflow will report to a sump tank from which the pulp will flow to the tailing area.

These duplex diaphragm pumps will be rubber lined, will have 316 SS trim, and will be furnished complete with drives, guards and TEFC motors.

HORIZONTAL CENTRIFUGAL

EQUIPMENT NO. 346-350

LOCATION

CCD Area

MATERIAL DESCRIPTION

Shale, Siltstone, and Gypsum Slurry

Slurry: Sp. Gr. 1.30 % Solids by Weight 35%

Solution: Temp. 40-70^{o}C pH<1.5 Sp. Gr. 1.04

Solids: Sp. Gr. 2.38

Size Analysis: (est) 98% -28 mesh
50% -200 mesh
35% -325 mesh

CAPACITY

Approx. 910 gpm at 35 ft tdh

DUTY

These five centrifugal pumps will be back-up pumps to the primary thickener underflow pumps. They will advance underflow pulp to the next thickener feed tank with the final flow going to a sump tank. These pumps will be piped to recycle underflow to the same thickener or advance it to the thickener feed tank beyond its normal discharge.

These pumps will be rubber lined, will have 316 SS trim and will be furnished complete with drives, guards and TEFC motors.

DENSITY/FLOWMETERS

EQUIPMENT NO. 351-355

LOCATION

CCD Area

MATERIAL DESCRIPTION

Shale, Siltstone, and Gypsum Slurry

Slurry: Sp. Gr. 1.33 % Solids by Weight 38%

Solution: Temp. 40-70°C pH<1.5 Sp. Gr. 1.04

Solids: Sp. Gr. 2.38

Size Analysis: (est) 98% -28 mesh
50% -200 mesh
35% -325 mesh

FEED RATE

900 gpm

CHARACTERISTICS

± 1.0% Accuracy (Flow)
± 2.0% Accuracy (Density)
Indicator-recorders

DUTY

These gamma gauge density meters and magnetic flowmeters on the five thickener underflow streams will continually measure and record the density and flow of the underflow slurry. These meters will not be monitoring the stand-by pumps' outputs.

This equipment will be complete with nuclear density gauge, transmitters, recorder/controller and teflon lined magnetic flowmeter with tantalum electrodes.

SUMP

EQUIPMENT NO. 356

LOCATION

CCD Area

MATERIAL DESCRIPTION

Uranium Bearing Aqueous Solution

Slurry: Sp. Gr. 1.04 % Solids 150-250 ppm

Solution: Temp. 40-60^{o} C pH<1.5 Sp. Gr. 1.04

Solids: Sp. Gr. 2.38

Size Analysis: 100% -325 mesh

VOLUME

2500 gal

RETENTION

1.5 min

DUTY

This sump receives the overflow from the No. 1 thickener.

This 8' Ø X 8' deep tank will be constructed of mild steel with rubber lining.

HORIZONTAL CENTRIFUGAL PUMPS

EQUIPMENT NO. 357-358

LOCATION

CCD Area

MATERIAL DESCRIPTION

Uranium Bearing Aqueous Solution

Slurry: Sp. Gr. 1.05 % Solids 150-250 ppm

Solution: Temp. 40-60°C pH<1.5 Sp. Gr. 1.05

Solids: Sp. Gr. 2.38

Size Analysis: 100% -325 mesh

CAPACITY

1800 gpm at 20 ft tdh

DUTY

These pumps will deliver the No. 1 thickener overflow solution from the thickener overflow sump to the clarifier. Normal operation will be one pump operating and one stand-by.

These pumps will be constructed with rubber linings and will have 316 SS trim. They will be complete with drives, guards, and TEFC motors.

SAMPLING SYSTEM

EQUIPMENT NO. 359

LOCATION

CCD Area

MATERIAL DESCRIPTION

Shale, Siltstone, and Gypsum Slurry

Slurry: Sp. Gr. 1.33 % Solids by Weight 38%

Solution: Temp. 40-60°C pH<1.5 Sp. Gr. 1.04

Solids: Sp. Gr. 2.38

Size Analysis: (est) 98% -28 mesh
50% -200 mesh
35% -325 mesh

OPERATING CONDITIONS

Feed Rate: 900 gpm

Final Sample Size: 2.5 gal/shift

DUTY

This two stage sampling system will sample the CCD circuit tailing slurry at a point downstream from the No. 5 thickener underflow pump.

The system will be furnished complete with drives, guards, TEFC motors, sample containers, controls, and variable adjustment for speed and sample quantity. Wetted parts must be constructed of 316 SS.

SUMP

EQUIPMENT NO. 360

LOCATION

CCD Area

MATERIAL DESCRIPTION

Shale, Siltstone and Gypsum Slurry

Slurry: Sp. Gr. 1.33 % Solids by Weight 38%

Solution: Temp. 40-60°C pH<1.5 Sp. Gr. 1.04

Solids: Sp. Gr. 2.38

Size Analysis: (est) 98% -28 mesh
50% -200 mesh
35% -325 mesh

VOLUME

2500 gal

RETENTION

3.0 min

DUTY

This sump will receive the discharge from the No. 5 thickener underflow pump. This slurry, the main mill tailing, flows from the sump by gravity to the tailing impoundment area.

This 8' Ø X 8' deep tank will be constructed of mild steel with rubber lining.

VERTICAL CENTRIFUGAL PUMP

EQUIPMENT NO. 361

LOCATION

CCD Area

MATERIAL DESCRIPTION

Shale, Siltstone and Gypsum Slurry

Slurry: Sp. Gr. 1.00-1.33 % Solids by Weight 0-38%

Solution: Temp. 40-100°F pH<1.5 Sp. Gr. 1.00-1.04

Solids: Sp. Gr. 2.38

Size Analysis: (est) 98% -28 mesh
50% -200 mesh
35% -325 mesh

CAPACITY

100 gpm at 25 ft tdh

DUTY

This sump pump will deliver slurry collected in the CCD area sump to the No. 3 thickener feed tank. The percent solids to be pumped by this pump will vary over a wide range. This pump will be selected to handle the extreme conditions.

The pump will be rubber lined, will have 316 SS trim and will be furnished complete with drive, guard, TEFC motor and level control.

CLARIFIER

EQUIPMENT NO. 401

LOCATION

Clarification Area

MATERIAL DESCRIPTION

Uranium Bearing Aqueous Solution

Slurry: Sp. Gr. 1.05 % Solids 150-250 ppm

Solution: Temp. 40-70^{o}C pH<1.5 Sp. Gr. 1.05

Solids: Sp. Gr. 2.38

Size Analysis: 100% -325 mesh

OPERATING CONDITIONS

Feed Rate: 1618 gpm

Underflow: 8 gpm at 5% solids (Max)

Overflow: 1610 gpm at 35-80 ppm solids

Diameter: 70 ft Sidewall 18 ft

Settling Area: 2.77 sq ft/lb/24 hr

Retention: 5.3 hr

DUTY

This clarifier will receive the No. 1 CCD thickener overflow and provide the flocculant and retention to substantially reduce the very fine suspended solids. Underflow slurry from this vessel is pumped to the No. 1 acid mix tank. The overflow feeds the sand filter feed pumps.

The clarifier will be constructed of rubber lined mild steel.

CLARIFIER MECHANISM

EQUIPMENT NO. 402

LOCATION

Clarification Area

MATERIAL DESCRIPTION

Uranium Bearing Aqueous Solution

Slurry: Sp. Gr. 1.05 % Solids 150-250 ppm

Solution: Temp. 40-70^{o}C pH$<$1.5 Sp. Gr. 1.05

Solids: Sp. Gr. 2.38

Size Analysis: 100% -325 mesh

OPERATING CONDITIONS

Feed Rate: 1618 gpm

Underflow: 8 gpm at 5% solids (Max)

Overflow: 1610 gpm at 35-80 ppm solids

THICKENER DESCRIPTION

Diameter: 70 ft Sidewall 18 ft

Settling Area: 2.77 sq ft/lb/24 hr

Retention: 5.3 hr

DUTY

This clarifier mechanism will rake the flocculated and settled fines in the clarifier to the discharge cone.

This mechanism will be constructed of 316 SS in exposed areas such as rake arms and blades because of the low pH of the solution. It will be furnished complete with feedwell, support structure with walkway and handrail, drive, guard and TEFC motor.

HORIZONTAL CENTRIFUGAL PUMP

EQUIPMENT NO. 403

LOCATION

Clarification Area

MATERIAL DESCRIPTION

Shale, Siltstone and Gypsum Slurry

Slurry: Sp. Gr. 1.08 % Solids by Weight 5% (Max)

Solution: Temp. 40-60^{o}C pH<1.5 Sp. Gr. 1.05

Solids: Sp. Gr. 2.38

Size Analysis: 100% -325 mesh

CAPACITY

20 gpm at 30 ft tdh

DUTY

This underflow pump will deliver the clarifier underflow to the No. 1 acid mix tank.

This pump will be rubber lined with 316 SS trim. It will be furnished complete with drive, guard and TEFC motor.

FLOWMETER

EQUIPMENT NO. 404

LOCATION

Clarification Area

MATERIAL DESCRIPTION

Shale, Siltstone and Gypsum Slurry

Slurry: Sp. Gr. 1.08 % Solids by Weight 5% (Max)

Solution: Temp. 40-60^{o}C pH<1.5 Sp. Gr. 1.05

Solids: Sp. Gr. 2.38

Size Analysis: 100% -325 mesh

FEED RATE

20 gpm

CHARACTERISTICS

$\pm$ 1.0% Accuracy

Indicator-controller

DUTY

This magnetic flowmeter will continuously measure and record the flow of clarifier underflow slurry between the clarifier thickener and the leaching or CCD circuit. The flowmeter will be an indicator-controller type and will be complete with transmitter, tantalum electrodes and the flowmeter will be hypalon lined.

HORIZONTAL CENTRIFUGAL PUMPS

EQUIPMENT NO. 405-406

LOCATION

Clarification Area

MATERIAL DESCRIPTION

Uranium Bearing Aqueous Solution

Solution: Temp. 40-60°C pH$<$1.5 Sp. Gr. 1.05

CAPACITY

1800 gpm at 80 ft tdh

DUTY

These two horizontal centrifugal pumps will pump the clarifier overflow through the sand filters and into the pregnant solution storage tank. One pump will operate while the other will be on stand-by.

These pumps will be rubber lined with 316 SS trim. The pumps will be furnished complete with drives, guards and TEFC motors.

SAND FILTERS

EQUIPMENT NO. 407-409

LOCATION

Clarification Area

MATERIAL DESCRIPTION

Uranium Bearing Aqueous Solution

Solution: Temp. 40-60^{o}C pH<1.5 Sp. Gr. 1.05

Solids: Sp. Gr. 2.38 % Solids 35-80 ppm

Size Analysis: 100% -325 mesh

OPERATING CONDITIONS

Feed Rate: 1800 gpm

Filtrate: 1800 gpm at 10 ppm solids

DUTY

These three sand filters will be operated in parallel and will further reduce the suspended solids in the clarifier overflow solution. The filter discharge will go to the pregnant solution storage tank. Filter cleaning and rejuvenation will be accomplished by periodic backwashing with pregnant solution.

These filters will be approximately 11' Ø x 6' high. They will be rubber lined mild steel, skid mounted, with anthracite filter media.

TANK

EQUIPMENT NO. 410

LOCATION

Clarification Area

MATERIAL DESCRIPTION

Uranium Bearing Aqueous Solution

Solution: Temp. 30-45°C pH<1.5 Sp. Gr. 1.05

VOLUME

375,000 gal

RETENTION

5.3 hr

DUTY

This 50' Ø x 28' deep tank will receive the discharge of the sand filters and serve as a surge tank between the clarifier and the S-X circuit.

This tank will be rubber lined mild steel.

HORIZONTAL CENTRIFUGAL PUMPS

EQUIPMENT NO. 411-412

LOCATION

Clarification Area

MATERIAL DESCRIPTION

Uranium Bearing Aqueous Solution

Solution: Temp. 40-70^{o}F pH<1.5 Sp. Gr. 1.05

CAPACITY

1000 gpm at 135 ft tdh

DUTY

This pump will provide the solution flow to purge the sand filters of built up fines. The pump will receive its feed from the pregnant solution storage tank. The backwash will flow to No. 1 CCD thickener feed tank. Operation will be intermittent.

A spare pump will be on stand-by.

The pumps will be rubber lined with 316 SS trim. They will be furnished complete with drives, guards and TEFC motors.

HORIZONTAL CENTRIFUGAL PUMPS

EQUIPMENT NO. 413-414

LOCATION

Clarification Area

MATERIAL DESCRIPTION

Uranium Bearing Aqueous Solution

Solution: Temp. 30-45^{o}C pH$<$1.5 Sp. Gr. 1.05

CAPACITY

1800 gpm at 30 ft tdh

DUTY

These two pumps will draw solution from the pregnant solution storage tank and pump it into the No. 1 extraction mixer tank. Normal operation will be for one pump to be operating and the other to be on stand-by.

These pumps will be rubber lined with 316 SS trim. They will be furnished complete with drives, guards and TEFC motors.

SAMPLER

EQUIPMENT NO. 501

LOCATION

Solvent Extraction Area

MATERIAL DESCRIPTION

Uranium Bearing Aqueous Solution

Solution: Temp. 40-70°F pH$<$1.5 Sp. Gr. 1.05

OPERATING CONDITIONS

Feed Rate: 1800 gpm

Final Sample Size: 0.5 gal/shift

DUTY

This single stage sampler will sample the solvent extraction feed solution at a point just ahead of the first solvent extraction tank.

Wetted parts of the sampler will be 316 SS. It will be furnished complete with controls.

FLOWMETER

EQUIPMENT NO. 502

LOCATION

Solvent Extraction Area

MATERIAL DESCRIPTION

Uranium Bearing Aqueous Solution

Solution: Temp. 40-70°F pH$<$1.5 Sp. Gr. 1.05

FEED RATE

1800 gpm

CHARACTERISTICS

$\pm$ 1.0% Accuracy

Recording Chart

DUTY

This magnetic flowmeter will continuously measure and record the flow of pregnant solution between the solvent extraction feed pump and the No. 1 extraction mixer tank. It will be furnished complete with transmitter and recorder. The meter will have tantalum electrodes and will be teflon lined.

MIXER-SETTLER TANKS

EQUIPMENT NO. 503-506

LOCATION

Solvent Extraction Area

MATERIAL DESCRIPTION

Aqeous and Organic Solution Mixture

Aqueous Solution: Temp. 40-70^{o}F pH<1.5 Sp. Gr. 1.05

Organic Solution: Temp. 40-70^{o}F pH<1.5 Sp. Gr. 0.8

VOLUME

Mixer Tank 3100 gal, (1.5 gal/daily ton)

Settler Tank 86,400 gal

DIMENSIONS

Mixer Tank 8 ft x 8 ft x 8 ft deep

Settler Tank 30 ft x 70 ft x 5½ ft deep

RETENTION

Mixer Tanks 1.8 min ea

Settler Tanks 50 min ea

DUTY

The four mixer-settler tanks will provide for the necessary counter-current contact between the pregnant solution and the kerosene-based organic solution which will extract the uranium. The pregnant solution will be fed to mixer No. 1 by the solvent extraction feed pump. The organic will be delivered to mixer No. 4 by the barren organic tank pump. The mixer-settlers will be constructed to accommodate internal recycling from the settlers to the mixers.

The tanks will be constructed of FRP line concrete.

AGITATORS

EQUIPMENT NO. 507-510

LOCATION

Solvent Extraction Area

MATERIAL DESCRIPTION

Aqueous and organic solution mixture

Aqueous Solution: Temp. 40-70°F pH<1.5 Sp. Gr. 1.05

Organic Solution: Temp. 40-70°F pH<1.5 Sp. Gr. 0.80

Composition 95 Vol % Kerosene
2.5 Vol % Alamine 336 or Equivalent
2.5 Vol % Isodecanol or Tridecanol

TANK DESCRIPTION

Dimensions 8 ft x 8 ft x 8 ft deep

Volume 3100 gal

DUTY

These four pumping agitators will blend the aqueous and organic solutions in the four stages of extraction. They will produce sufficient solution to solution contact, with the aid of a 2080 gpm recycle flow from the settler tanks, to allow for the transfer of the uranium from the aqueous to the organic solution.

These agitators will be constructed of 316 SS. They will be furnished complete with drives, guards and TEFC motors.

HORIZONTAL CENTRIFUGAL PUMPS

EQUIPMENT NO. 511-512

LOCATION

Solvent Extraction Area

MATERIAL DESCRIPTION

Aqueous Solution

Solution: Temp. 40-70°F pH<1.5 Sp. Gr. 1.05

CAPACITY

1800 gpm at 30 ft tdh

DUTY

These two horizontal centrifugal pumps will remove aqueous solution from the No. 4 extraction settler and deliver it to the raffinate tank.

Normal operation will be one pump operating and one stand-by.

These pumps will be constructed of 316 SS.

They will be furnished complete with drives, guards and TEFC motors.

SAMPLER

EQUIPMENT NO. 513

LOCATION

Solvent Extraction Area

MATERIAL DESCRIPTION

Aqueous Solution

Solution: Temp. 40-70^{o}F pH<1.5 Sp. Gr. 1.05

OPERATING CONDITIONS

Feed Rate: 1800 gpm

Final Sample Size: 0.5 gal/shift

DUTY

This single state sampler will sample the extraction circuit aqueous discharge, raffinate, from the solution line just before it enters the raffinate tank.

Wetted parts of the sampler will be 316 SS. The sampler will be furnished complete with controls.

TANK

EQUIPMENT NO. 514

LOCATION

Solvent Extraction Area

MATERIAL DESCRIPTION

Aqueous Solution

Solution: Temp. 40-70°F pH<1.5 Sp. Gr. 1.05

VOLUME

300,000 gal

RETENTION

3.2 hr

DUTY

This 65' Ø x 12' deep tank will store the raffinate pumped out of the No. 4 extraction settler and feed the raffinate tank discharge pumps delivering solution to the CCD circuit. The tank's retention serves to absorb surge between the S-X and CCD circuits.

The tank will be constructed of FRP lined mild steel.

HORIZONTAL CENTRIFUGAL PUMPS

EQUIPMENT NO. 515-516

LOCATION

Solvent Extraction Area

MATERIAL DESCRIPTION

Aqueous Solution

Solution: Temp. 40-70^{O}F pH$<$1.5 Sp. Gr. 1.05

CAPACITY

1800 gpm at 30 ft tdh

DUTY

These two horizontal centrifugal pumps will pump solution of very low uranium content from the raffinate tank back to the No. 5 CCD thickener. Under normal operating conditions, one pump will be operating and one will be on stand-by.

These pumps will be constructed of 316 SS. They will be furnished complete with drives, guards and TEFC motors.

FLOWMETERS

EQUIPMENT NO. 517-518

LOCATION

Solvent Extraction Area

MATERIAL DESCRIPTION

Aqueous Solution

Solution: Temp. 40-70^{0}F pH<1.5 Sp. Gr. 1.05

FEED RATE

1800 gpm

CHARACTERISTICS

$\pm$ 1.0% Accuracy

Recording Chart

DUTY

One flowmeter will measure, record and control the flow of raffinate between the raffinate tank and the No. 5 CCD thickener. The other flowmeter will measure and totalize the flow of raffinate to tailing when such a bleed-off is required. These magnetic flowmeters will be furnished complete with transmitters and recorders. One of the meters will also be provided with a controller. The meters will have tantalum electrodes and will be teflon lined.

VERTICAL CENTRIFUGAL PUMPS

EQUIPMENT NO. 519-520

LOCATION

Solvent Extraction Area

MATERIAL DESCRIPTION

Organic Solution (95 Vol % Kerosene)

Solution: Temp. 40-70^{o}F pH<1.5 Sp. Gr. 0.80

Composition: 95 Vol % Kerosene
2.5 Vol % Alamine or Equivalent
2.5 Vol % Isodecanol or Tridecanol

CAPACITY

220 gpm at 20 ft tdh

DUTY

These two vertical centrifugal pumps will pump organic solution from the No. 1 extraction settler to the pregnant organic tank. Under normal operating conditions, one of these pumps will be operating and one will be on stand-by.

These pumps will be constructed of 316 SS. They will be furnished complete with drives, guards and TEFC motors.

TANK

EQUIPMENT NO. 521

LOCATION

Solvent Extraction Area

MATERIAL DESCRIPTION

Organic Solution (95 Vol % Kerosene)

Solution: Temp. 40-70^{0}F   pH<1.5   Sp. Gr. 0.80

Composition: 95 Vol % Kerosene
2.5 Vol % Alamine or Equivalent
2.5 Vol % Isodecanol or Tridecanol

VOLUME

23,500 gal

RETENTION

2.4 hr

DUTY

This 18' Ø x 14' deep tank will store the uranium bearing organic solution pumped from the No. 1 extraction settler. The tank will serve as a surge vessel between the extraction and stripping phases of the S-X circuit.

The tank will be FRP lined steel, covered and vented to atmosphere.

HORIZONTAL CENTRIFUGAL PUMPS

EQUIPMENT NO. 522-523

LOCATION

Solvent Extraction Area

MATERIAL DESCRIPTION

Organic Solution (95 Vol % Kerosene)

Solution: Temp. 40-70^{o}F pH<1.5 Sp. Gr. 0.80

Composition: 95 Vol % Kerosene
2.5 Vol % Alamine or Equivalent
2.5 Vol % Isodecanol or Tridecanol

CAPACITY

220 gpm at 30 ft tdh

DUTY

These two horizontal centrifugal pumps will deliver pregnant organic solution from the pregnant organic tank through a heat exchanger to the No. 1 stripping mixer tank. Normal operation will be one pump operating and one stand-by.

The pumps will be 316 SS. Mechanical seals will be used to avoid water contamination of the organic. The pumps will be furnished complete with drives, guards and TEFC motors.

HORIZONTAL CENTRIFUGAL PUMP

EQUIPMENT NO. 524

LOCATION

Solvent Extraction Area

MATERIAL DESCRIPTION

Aqueous Solution

Solution: Temp. 40-70^{o}F pH$<$1.5 Sp. Gr. 1.05

CAPACITY

20 gpm at 20 ft tdhk

DUTY

This horizontal centrifugal pump will return to the No. 2 extraction mixer small amounts of aqueous solution which separates from the organic in the pregnant organic tank. The pump will run continuously or intermittently depending on the amount of aqueous entrained in the organic.

The pump will be constructed of 316 SS. It will be furnished with drive, guard and TEFC motor.

HEAT EXCHANGER

EQUIPMENT NO. 525

LOCATION

Solvent Extraction Area

MATERIAL DESCRIPTION

Organic Solution 995 Vol % Kerosene)

Solution: Temp. 65-104°F pH<1.5 Sp. Gr. 0.80

OPERATING CONDITIONS

Feed Rate: 220 gpm

Temperature: Inlet 65°F Outlet 104°F

DUTY

This heat exchanger will heat the pregnant organic solution flowing between the pregnant organic tank discharge pump and the No. 1 stripping mixer tank.

The heat source for this impervious block graphite exchanger will be steam.

SAMPLER

EQUIPMENT NO. 526

LOCATION

Solvent Extraction Area

MATERIAL DESCRIPTION

Organic Solution (95 Vol % Kerosene)

Solution: Temp. 104^{o}F pH<1.5 Sp. Gr. 0.80

OPERATING CONDITIONS

Feed Rate: 220 gpm

Final Sample Size: 0.5 gal/shift

DUTY

This single stage sampler will sample the pregnant organic solution at a point just before the pregnant organic tank.

Wetted parts of the sampler will be 316 SS. The sampler will be furnished complete with controls.

FLOWMETER

EQUIPMENT NO. 527

LOCATION

Solvent Extraction Area

MATERIAL DESCRIPTION

Organic Solution (95 Vol % Kerosene)

Solution: Temp. 104°F pH 1.5 Sp. Gr. 0.80

FEED RATE

220 gpm

CHARACTERISTICS

± 1.0% Accuracy

Recording Chart

DUTY

This flowmeter will continuously measure and record the flow of pregnant organic between the pregnant organic tank discharge pumps and the No. 1 stripping mixer tank.

It will be furnished complete with transmitter and recorder.

MIXER-SETTLER TANKS

EQUIPMENT NO. 528-531

LOCATION

Solvent Extraction Area

MATERIAL DESCRIPTION

Aqueous and Organic Solution Mixture

Aqueous Solution:	Temp. 104°F	pH 4.0-4.3	Sp. Gr. 1.10
Organic Solution:	Temp. 104°F	pH 4.0-4.3	Sp. Gr. 0.80

VOLUME

Mixer Tank 930 gal (0.5 gal/daily ton)

Settler Tank 6580 gal

DIMENSIONS

Mixer Tank 5 ft x 5 ft x 8 ft deep

Settler Tank 8 ft x 20 ft x 5½ ft deep

RETENTION

Mixer Tank 5.2 min

Settler Tank 27.7 min

DUTY

Thes four mixer-settler tanks will provide the necessary contact and mixing between the pregnant organic solution, containing the uranium, and the aqueous stripping solution. The pregnant organic will flow into No. 1 mixer tank and barren organic will be pumped from No. 4 settler tank. Barren strip solution will flow to No. 4 mixer tank a and pregnant strip solution will be pumped from No. 1 settler tank. The mixer-settlers will be constructed to accommondate internal recycling from the settlers to the mixers.

The tanks will be constructed of FRP lined concrete.

AGITATORS

EQUIPMENT NO. 532-535

LOCATION

Solvent Extraction Area

MATERIAL DESCRIPTION

Aqueous and Organic Solution Mixture

Aqueous Solution: Temp. 104°F pH 4.0-7.0 Sp. Gr. 1.08

Organic Solution: Temp. 104°F pH 4.0-7.0 Sp. Gr. 0.80

Composition: 95 Vol % Kerosene
2.5 Vol % Alamine or Equivalent
2.5 Vol % Isodecanol or Tridecanol

TANK DESCRIPTION

Dimensions 5 ft x 5 ft x 8 ft deep

Volume 930 gal

DUTY

These four agitators will blend the aqueous and organic solutions in the four stages of stripping. They will produce sufficient solution to solution contact, with the aid of 55 gpm recycle flow from the settler tanks, to allow for the transfer of the uranium from the organic to the aqueous solution.

Wetted parts of these agitators will be constructed of 316 SS. They will be furnished complete with drives, guards and TEFC motors.

VERTICAL CENTRIFUGAL PUMPS

EQUIPMENT NO. 536-538

LOCATION

Solvent Extraction Area

MATERIAL DESCRIPTION

Organic Solution (95 Vol % Kerosene)

Solution: Temp. 104^{o}F pH 4.0-4.3 Sp. Gr. 0.80

CAPACITY

220 gpm at 20 ft tdh

DUTY

These three pumps will pump barren organic solution from the No. 4 stripping settler tank and the regeneration settler tank. The barren organic from No. 4 settler will go to the barren organic holding tank. The organic from the regeneration settler will also go to the barren organic holding tank. One pump will be used on the regeneration tank. The other two will be used one at a time on the No. 4 settler.

All three pumps will be constructed of 316 SS. They will be furnished complete with drives, guards and TEFC motors.

SAMPLER

EQUIPMENT NO. 539

LOCATION

Solvent Extraction Area

MATERIAL DESCRIPTION

Organic Solution (95 Vol % Kerosene)

Solution: Temp. $104^{o}F$ pH 4.0-4.3 Sp. Gr. 0.80

OPERATING CONDITIONS

Feed Rate: 220 gpm

Final Sample Size: 0.5 gal/shift

DUTY

This single stage sampler will sample the barren organic solution at a point just before the barren organic tank.

Wetted parts of the sampler will be 316 SS. The sampler will be furnished complete with controls.

MIXER-SETTLER TANK

EQUIPMENT NO. 540

LOCATION

Solvent Extraction Area

MATERIAL DESCRIPTION

Aqueous and Organic Solution Mixture

Aqueous Solution:	Temp. $80\text{-}100^{\circ}F$	pH 4.0-7.0	Sp. Gr. 1.08
Organic Solution:	Temp. $80\text{-}100^{\circ}F$	pH 4.0-7.0	Sp. Gr. 0.80

VOLUME

Mixer Tank: 930 gal

Settler Tank: 4900 gal

DIMENSIONS

Mixer Tank: 5 ft x 5 ft x 8 ft deep

Settler Tank: 8 ft x 20 ft x 5½ ft deep

DUTY

This mixer-settler tank will be employed as required with an input of 5% $NaHCO_3$ solution to rejuvenate organic solution which has become contaminated. Organic discharge of this tank will bo to the barren organic tank. Aqueous discharge will report to the tailing stream or the organic sludge tank.

The tank will be constructed of FRP lined concrete.

AGITATOR

EQUIPMENT NO. 541

LOCATION

Solvent Extraction Area

MATERIAL DESCRIPTION

Aqueous and Organic Solution Mixture

Aqueous Solution:	Temp. 80-100^{o}F	pH 4.0-7.0	Sp. Gr. 1.08
Organic Solution:	Temp. 80-100^{o}F	pH 4.0-7.0	Sp. Gr. 1.08

Composition:
95 Vol % Kerosene
2.5 Vol % Alamine or Equivalent
2.5 Vol % Isodecanol or Tridecanol

TANK DESCRIPTION

Dimensions 5 ft x 5 ft x 8 ft deep

Volume 930 gal

DUTY

This agitator will blend the barren organic solution with a sodium bicarbonate solution for the purpose of regenerating contaminated organic solution. Recycling of solutions from the settler back to the mixer will be provided to aid in this regeneration process.

Wetted parts of the agitator will be constructed of 316 SS. The agitator will be furnished complete with drive, guards, TEFC motor and support structure.

HORIZONTAL CENTRIFUGAL PUMP

EQUIPMENT NO. 542

LOCATION

Solvent Extraction Area

MATERIAL DESCRIPTION

Aqueous Solution (5% $NaHCO_3$)

Solution: Temp. 80-100°F pH 4.0-7.0 Sp. Gr. 1.04

CAPACITY

10 gpm at 30 ft tdh

DUTY

This pump will deliver spent sodium bicarbonate solution from the regeneration settler to either the CCD circuit tailing sump or the organic sludge tank.

This pump will be constructed of 316 SS. It will be furnished complete with drive, guard and TEFC motor.

TANK

EQUIPMENT NO. 543

LOCATION

Solvent Extraction Area

MATERIAL DESCRIPTION

Organic Solution (95 Vol % Kerosene)

Solution: Temp. $100^{o}F$ pH 4.0-4.3 Sp. Gr. 0.80

VOLUME

23,500 gal

RETENTION

2.4 hr

DUTY

This 18' Ø X 14' deep tank will store the barren organic solution pumped from the No. 4 stripping settler or regeneration settler and serve as the source of feed for the barren organic tank discharge pumps delivering organic solution back to the extraction circuit.

The tank will be constructed of FRP lined mild steel and covered. Fumes will be vented to atmosphere.

HORIZONTAL CENTRIFUGAL PUMPS

EQUIPMENT NO. 544-545

LOCATION

Solvent Extraction Area

MATERIAL DESCRIPTION

Organic Solution (95 Vol % Kerosene)

Solution: Temp. 90-100°F pH 4.0-4.3 Sp. Gr. 0.80

CAPACITY

220 gpm at 30 ft tdh

DUTY

These horizontal centrifugal pumps will deliver barren organic solution from the barren organic tank to the No. 4 extraction mixer tank. Normal operating procedures will call for one pump to be operating and one to be on stand-by.

Due to the nature of the material being handled, the pumps will be 316 SS. Mechanical seals will be used to avoid water contamination of the organic solution. The pumps will be furnished with drives, guards, and TEFC motors.

HORIZONTAL CENTRIFUGAL PUMP

EQUIPMENT NO. 546

LOCATION

Solvent Extraction Area

MATERIAL DESCRIPTION

Aqueous Solution

Solution: Temp. 70-100°F pH 4.0-4.3 Sp. Gr. 1.08

CAPACITY

20 gpm at 20 ft tdh

DUTY

This pump will return to the No. 2 stripping mixer small amounts of aqueous solution which separate from the organic in the barren organic tank. The pump will run continuously or intermittently depending on the amount of aqueous entrained in the organic.

The pump will be constructed of 316 SS. It will be furnished with drive, guard and TEFC motor.

FLOWMETER

EQUIPMENT NO. 547

LOCATION

Solvent Extraction Area

MATERIAL DESCRIPTION

Organic Solution (95 Vol % Kerosene)

Solution: Temp. $104^{o}F$ pH 4.0-4.3 Sp. Gr. 0.80

FEED RATE

220 gpm

CHARACTERISTICS

± 1.0% Accuracy

Recording Chart

DUTY

This flowmeter will continuously measure and record the flow of barren organic between the barren organic tank discharge pumps and the No. 4 extraction mixer tank. The meter will be complete with transmitter and recorder.

TANK

EQUIPMENT NO. 548

LOCATION

Solvent Extraction Area

MATERIAL DESCRIPTION

Organic, Aqueous, Crud Mixture

Aqueous Solution: Temp. 60-80°F pH 1.5-7.0 Sp. Gr. 1.00

Organic Solution: Temp. 60-80°F pH 1.5-7.0 Sp. Gr. 0.80

Crud: Emulsion of organic, water and impurities

VOLUME

40,000 gal

RETENTION

Variable

DUTY

This 20' Ø x 20' deep tank will store crud material bled from all settler tanks. Periodically this crud will be treated with ammonia and sulfuric acid to regenerate as much organic as possible and recover values from the aqueous released.

This tank will be constructed of FRP lined mild steel and covered. It will be vented to atmosphere.

AGITATOR

EQUIPMENT NO. 549

LOCATION

Solvent Extraction Area

MATERIAL DESCRIPTION

Organic, Aqueous, Crud Mixture

Aqueous Solution: Temp. 60-80°F pH 1.5-7.0 Sp. Gr. 1.00

Organic Solution: Temp. 60-80°F pH 1.5-7.0 Sp. Gr. 0.80

Crud: Emulsion of Organic, Water and Impurities

TANK DESCRIPTION

Diameter 20ft Depth 20 ft Volume 40,000 gal

DUTY

This agitator will mix and suspend the ingredient in the organic sludge tank.

The agitator wetted parts will be constructed of 316 SS. It will be furnished with drive, guard, TEFC motor and support structure with walkway and handrail.

HORIZONTAL CENTRIFUGAL PUMP

EQUIPMENT NO. 550

LOCATION

Solvent Extraction Area

MATERIAL DESCRIPTION

Aqueous-Organic Emulsion (Crud)

Temp. 50-80°F pH $<$1.5-7.0 Sp. Gr. Variable

CAPACITY

30 gpm at 35 ft tdh

DUTY

This horizontal centrifugal pump will remove from a small sump all supernatant crud overflowing the organic sludge tank and will deliver this emulsion to the CCD circuit tailing sump. The operation of this pump will be intermittent.

This pump will be constructed of 316 SS. It will be complete with drive, guard and TEFC motor.

SAMPLER

EQUIPMENT NO. 551

LOCATION

Solvent Extraction Area

MATERIAL DESCRIPTION

Aqueous-Organic Emulsion (Crud)

Temp. 60-80^{o}F pH 1.5-7.0 Sp. Gr. Variable

OPERATING CONDITIONS

Feed Rate: 30 gpm

Final Sample Size: 0.5 gal/shift

DUTY

This single stage sampler will sample the supernatant crud and/or regeneration aqueous discharge solution at a point after they are flowing in a common line and before the CCD tailing sump.

Wetted parts of the sampler will be 316 SS.

HORIZONTAL CENTRIFUGAL PUMP

EQUIPMENT NO. 552

LOCATION

Solvent Extraction Area

MATERIAL DESCRIPTION

Organic or Aqueous Solution

Aqueous Solution: Temp. 60-80°F pH $<$1.5 Sp. Gr. 1.05

Organic Solution: Temp. 60-80°F pH $<$1.5 Sp. Gr. 0.80

Composition: 95 Vol % Kerosene
2.5 Vol % Alamine or Equivalent
2.5 Vol % Isodecanol or Tridecanol

CAPACITY

30 gpm at 35 ft tdh

DUTY

This horizontal centrifugal pump will pump either aqueous or organic solution from the organic sludge tank. The aqueous will be delivered to the leaching or precipitation circuit. The organic solution will flow to the barren organic tank. This pump will operate intermittently.

This pump will be constructed of 316 SS. It will be complete with drive, guard and TEFC motor.

VERTICAL CENTRIFUGAL PUMPS

EQUIPMENT NO. 553-554

LOCATION

Solvent Extraction Area

MATERIAL DESCRIPTION

Uranium Bearing Ammonium Sulfate Solution

Solution: Temp. $104^{o}F$ pH 4.0-4.3 Sp. Gr. 1.10

CAPACITY

20 gpm at 15 ft tdh

DUTY

These two vertical pumps will remove pregnant strip solution of 150 gpl ammonium sulfate and about 20 gpl U_3O_8 from the No. 1 stripping settler tank and pump it through a heat exchanger to the No. 1 yellow-cake precipitation tank. Under normal circumstances, one pump will be operating and one will be on stand-by.

The pumps will be constructed of 316 SS. They will be complete with drives, guards and TEFC motors.

SAMPLER

EQUIPMENT NO. 555

LOCATION

Solvent Extraction Area

MATERIAL DESCRIPTION

Uranium Bearing Ammonium Sulfate Solution

Solution: Temp. $104^{o}F$ pH 4.0-4.3 Sp. Gr. 1.10

OPERATING CONDITIONS

Feed Rate: 20 gpm

Final Sample Size: 0.5 gal/shift

DUTY

This single stage sampler will sample pregnant strip solution at a point just after the pregnant strip solution feed pumps and before the No. 1 yellowcake precipitation tanks.

Wetted parts of the sampler will be 316 SS. The sampler will be furnished complete with controls.

VERTICAL CENTRIFUGAL PUMP

EQUIPMENT NO. 556

LOCATION

Solvent Extraction Area

MATERIAL DESCRIPTION

Aqueous and/or Organic Solution

Aqueous Solution: Temp. 40-70^{o}F pH 1.5-7.0 Sp. Gr. 1.00-1.05

Organic Solution: Temp. 40-70^{o}F pH 1.5 Sp. Gr. 0.80

Composition: 95 Vol % Kerosene
2.5 Vol % Alamine or Equivalent
2.5 Vol % Isodecanol or Tridecanol

CAPACITY

50 gpm at 30 ft tdh

DUTY

This sump pump will deliver all solutions collected in the extraction area sump to the No. 1 extraction mixer. The solution will vary from water to aqueous solution to organic solution. The pump will be selected to handle all conditions.

Pump construction will be 316 SS. It will be complete with drive, guard and TEFC motor.

VERTICAL CENTRIFUGAL PUMP

EQUIPMENT NO. 557

LOCATION

Solvent Extraction Area

MATERIAL DESCRIPTION

Aqueous and/or Organic Solution

Aqueous Solution:	Temp. 70-100^{o}F	pH 4.0-7.0	Sp. Gr. 1.00-1.05
Organic Solution:	Temp. 70-100^{o}F	pH 4.0-4.3	Sp. Gr. 0.80

Composition:
95 Vol % Kerosene
2.5 Vol % Alamine or Equivalent
2.5 Vol % Isodecanol or Tridecanol

CAPACITY

50 gpm at 30 ft tdh

DUTY

This sump pump will deliver all solutions collected in the stripping area sump to the No. 1 stripping mixer. The solution will vary from water to ammonium sulfate solution to organic solution. The pump will be selected to handle all conditions.

Pump construction will be 316 SS. It will be complete with drive, guard and TEFC motor.

HEAT EXCHANGER

EQUIPMENT NO. 601

LOCATION

Precipitation Area

MATERIAL DESCRIPTION

Ammonium Sulfate Solution

Solution: Temp. 80-160°F pH 4.0-4.3 Sp. Gr. 1.08

OPERATING CONDITIONS

Feed Rate: 20 gpm

Temperature: Inlet 80° F Outlet 160°F

DUTY

This heat exchanger will heat the pregnant strip solution flowing between the pregnant strip solution feed pumps in the No. 1 stripping settler and the No. 1 yellowcake precipitation tank.

The heat source of this impervious block graphite exchanger will be steam.

TANKS

EQUIPMENT NO. 602-603

LOCATION

Precipitation Area

MATERIAL DESCRIPTION

Ammonium Sulfate Slurry

Slurry: Sp. Gr. 1.10 % Solids by Weight 2.5%

Solution: Temp. 140-160^{o}F pH 4.5-7.5 Sp. Gr. 1.08

Solids: Sp. Gr. 5.7

Size Analysis: 100% -325 mesh

VOLUME

600 gal ea

RETENTION

45 min ea

DUTY

These 5' Ø x 6' deep tanks in series are the reaction vessels for precipitating the uranium from the ammonium sulfate solution. This is accomplished with the aid of agitation and an ammonia gas/air mixture and steam being sparged in.

These tanks will be constructed of FRP lined mild steel and covered.

AGITATORS

EQUIPMENT NO. 604-605

LOCATION

Precipitation Area

MATERIAL DESCRIPTION

Ammonium Sulfate Slurry

Slurry: Sp. Gr. 1.10 % Solids by Weight 2.5%

Solution: Temp. 140-160° F pH 4.5-7.5 Sp. Gr. 1.08

Solids: Sp. Gr. 5.7

Size Analysis 100% -325 mesh

TANK DESCRIPTION

Diameter: 5 ft Depth: 6 ft Volume: 750 gal

DUTY

These two agitators in the two series yellowcake precipitation tanks will suspend and mix precipitated yellowcake with a uranium bearing sulfate solution at a high pH to facilitate precipitation of the uranium.

Wetted parts of these agitators will be constructed of 316 SS. They will be complete with drives, guards, TEFC motors and support structure.

THICKENER

EQUIPMENT NO. 606

LOCATION

Washing and Dewatering Area

MATERIAL DESCRIPTION

Yellowcake/Ammonium Sulfate Slurry

Slurry: Sp. Gr. 1.08-1.45 % Solids by Weight 0-33%

Solution: Temp. 140^{o} F pH 7.0-7.5 Sp. Gr. 1.08

Solids: Sp. Gr. 5.7

Size Analysis 100% -325 mesh

OPERATING CONDITIONS

Feed Rate: 18 gpm

Underflow: 1 gpm at 33% solids

Overflow: 17 gpm at 200 ppm

Diameter: 18 ft Sidewall 5 ft

Settling Area: 109 sq ft/ton/24 day

Retention: 8.8 hr

DUTY

This thickener tank will receive the yellowcake slurry from the second precipitation tank and provide the time necessary for the yellowcake precipitate to settle to the thickener bottom where the rake mechanism will move the material to the center discharge cone. The thickener overflow will flow to the unclarified barren strip solution tank.

This tank will be constructed of FRP lined mild steel.

THICKENER MECHANISM

EQUIPMENT NO. 607

LOCATION

Washing and Dewatering Area

MATERIAL DESCRIPTION

Ammonium Sulfate Slurry

Slurry: Sp. Gr. 1.08-1.45 % Solids by Weight 0-33%

Solution: Temp. 140^{0} F pH 7.0-7.5 Sp. Gr. 1.08

Solids: Sp. Gr. 5.7

Size Analysis 100% -325 mesh

OPERATING CONDITIONS

Feed Rate: 18 gpm

Underflow: 1.0 gpm at 33% solids

Overflow: 17 gpm at 200 ppm solids

THICKENER DESCRIPTION

Diameter: 18 ft Sidewall 5 ft

Settling Area: 109 sq ft/ton YC/24 hr

Retention: 8.8 hr

DUTY

This thickener mechanism will rake the settled yellowcake to the thickener discharge cone.

All wetted parts of the mechanism will be constructed of 316 SS. It will be complete with drive, guards, TEFC motor, motorized rake lifting device and support structure with walkway and handrail.

DIAPHRAGM PUMP

EQUIPMENT NO. 608

LOCATION

Washing and Dewatering Area

MATERIAL DESCRIPTION

Yellowcake/Ammonium Sulfate Slurry

Slurry: Sp. Gr. 1.27 % Solids by Weight 20%

Solution: Temp. 100° F pH 7.0-7.5 Sp. Gr. 1.08

Solids: Sp. Gr. 5.7

Size Analysis 100% -325 mesh

CAPACITY

1.0 gpm at 20 ft tdh

DUTY

This air operated diaphragm pump will move the yellowcake thickener underflow slurry from the thickener discharge to the thickener underflow tank.

This pump will be hypalon lined. The pump will be complete with necessary check valves, power package, muffler and timer.

FLOWMETER

EQUIPMENT NO. 609

LOCATION

Washing and Dewatering Area

MATERIAL DESCRIPTION

Yellowcake/Ammonium Sulfate Slurry

Slurry: Sp. Gr. 1.45 % Solids by Weight 33%

Solution: Temp. 140° F pH 7.0-7.5 Sp. Gr. 1.08

Solids: Sp. Gr. 5.7

Size Analysis 100% -325 mesh

FEED RATE

1.0 gpm

CHARACTERISTICS

± 1.0% Accuracy

Recording Chart

DUTY

This magnetic flowmeter will continually measure and record the flow of yellowcake slurry being pumped from the discharge cone of the yellowcake thickener. The meter will be complete with transmitter and recorder. It will have 316 SS electrodes and will be teflon lined.

TANK

EQUIPMENT NO. 610

LOCATION

Washing and Dewatering

MATERIAL DESCRIPTION

Yellowcake/Ammonium Sulfate Slurry

Slurry: Sp. Gr. 1.45 % Solids by Weight 33%

Solution: Temp. 100^{o} F pH 7.0-7.5 Sp. Gr. 1.08

Solids: Sp. Gr. 5.7

Size Analysis 100% -325 mesh

VOLUME

2500 gal

RETENTION

42 hr

DUTY

This tank will be used primarily as a surge vessel between the yellowcake thickener and the yellowcake centrifuge. It will receive the yellowcake thickener underflow slurry and deliver it on a steady basis to the centrifuge through the underflow tank discharge pump.

This tank will be constructed of FRP lined mild steel and will have a cover.

AGITATOR

EQUIPMENT NO. 611

LOCATION

Washing and Dewatering Area

MATERIAL DESCRIPTION

Ammonium Sulfate Slurry

Slurry: Sp. Gr. 1.45 % Solids by Weight 33%

Solution: Temp. 100^{o} F pH 7.0-7.5 Sp. Gr. 1.08

Solids: Sp. Gr. 5.7

Size Analysis 100% -325 mesh

TANK DESCRIPTION

Diameter: 8 ft Depth: 8 ft Volume: 2500 gal

DUTY

This agitator will keep precipitated yellowcake in suspension in the surge tank located between the yellowcake thickener and the centrifuge.

Wetted parts of the agitator will be constructed of 316 SS. It will be complete with drive, guard, TEFC motor and support structure.

POSITIVE DISPLACEMENT

EQUIPMENT NO. 612

LOCATION

Washing and Dewatering Area

MATERIAL DESCRIPTION

Yellowcake/Ammonium Sulfate Slurry

Slurry: Sp. Gr. 1.27 % Solids by Weight 20%

Solution: Temp. 100° F pH 7.0-7.5 Sp. Gr. 1.08

Solids: Sp. Gr. 5.7

Size Analysis: 100% -325 mesh

CAPACITY

1.0 gpm Against 30 ft tdh

DUTY

This pump will transfer yellowcake slurry from the thickener underflow tank to the centrifuge inlet. The pump should be a Moyno or approved equal complete with drive, guard and TEFC motor.

TANK

EQUIPMENT NO. 613

LOCATION

Washing and Dewatering Area

MATERIAL DESCRIPTION

Ammonium Sulfate Solution

Slurry: Sp. Gr. 1.08 % Solids 200 ppm

Solution: Temp. 90^{o} F pH 7.0-7.5 Sp. Gr. 1.08

Solids: Sp. Gr. 5.7

Size Analysis 100% -325 mesh

VOLUME

2500 gal

RETENTION

2.5 hr

DUTY

This 8' Ø x 8' deep tank will receive the yellowcake thickener overflow and serve as a surge tank as well as the source of feed for the pump delivering unclarified barren strip solution to the sand filter.

This tank will be constructed of FRP lined mild steel.

HORIZONTAL CENTRIFUGAL

EQUIPMENT NO. 614-615

LOCATION

Washing and Dewatering Area

MATERIAL DESCRIPTION

Ammonium Sulfate Solution

Slurry: Sp. Gr. 1.08 % Solids 200 ppm

Solution: Temp. 90^{o} F pH 7.0-7.5 Sp. Gr. 1.08

Solids: Sp. Gr. 5.7

Size Analysis 100% -325 mesh

CAPACITY

30 gpm at 80 ft tdh

DUTY

These horizontal centrifugal pumps will provide the feed for the barren strip sand filters. They will pump from the unclarified barren strip solution tank. Normal operation will be for one pump to be operating and the other to be on stand-by.

These pumps will be constructed of 316 SS. They will be complete with drives, guards, and TEFC motors.

SAND FILTER

EQUIPMENT NO. 616

LOCATION

Washing and Dewatering Area

MATERIAL DESCRIPTION

Ammonium Sulfate Solution

Slurry: Sp. Gr. 1.08 % Solids 200 ppm

Solution: Temp. 90^{o} F pH 7.0-7.5 Sp. Gr. 1.08

Solids: Sp. Gr. 5.7

Size Analysis 100% -325 mesh

OPERATING CONDITIONS

Feed Rate: 30 gpm

Filtrate: 30 gpm at 10 ppm solids

DUTY

This sand filter will be operated to reduce the solids in the unclarified barren strip solution. The filter discharge, clarified barren strip solution, flows to a tank to be reused in the stripping phase of the S-X circuit. Filter cleaning and rejuvenation will be accomplished by backwashing the filter intermittently with clarified barren strip solution.

This filter, which will be approximately 3' Ø, will be rubber lined mild steel, skid mounted.

TANK

EQUIPMENT NO. 617

LOCATION

Washing and Dewatering Area

MATERIAL DESCRIPTION

Ammonium Sulfate Solution

Solution: Temp. 80° F pH 7.0-7.5 Sp. Gr. 1.08

VOLUME

2500 gal

RETENTION

2.5 hr

DUTY

This 8' Ø x 8' deep tank will receive the barren strip sand filter discharge solution and serve as the source of feed for the pump feeding clarified barren strip solution back to the No. 4 stripping mixer in the S-X circuit.

This tank will be constructed of FRP lined mild steel.

HORIZONTAL CENTRIFUGAL PUMPS

EQUIPMENT NO. 618-619

LOCATION

Washing and Dewatering Area

MATERIAL DESCRIPTION

Ammonium Sulfate Solution

Solution: Temp. 70° F   pH 7.0-7.5   Sp. Gr. 1.08

CAPACITY

30 gpm at 20 ft tdh

DUTY

These pumps will pump clarified barren strip solution from the tank to the No. 4 stripping mixer in the S-X circuit. Normal operation will be for one of these pumps to be operating and one to be on stand-by.

These pumps will be constructed of 316 SS. They will be complete with drive, guard and TEFC motor.

FLOWMETER

EQUIPMENT NO. 620

LOCATION

Washing and Dewatering Area

MATERIAL DESCRIPTION

Ammonium Sulfate Solution

Solution: Temp. 70° F pH 7.0-7.5 Sp. Gr. 1.08

FEED RATE

13.2 gpm

CHARACTERISTICS

± 1.0% Accuracy

Recording Chart

DUTY

This magnetic flowmeter will continually measure and record the flow of clarified barren strip solution between the barren strip feed pumps and the No. 4 stripping mixer tank.

The flowmeter will be complete with transmitter and recorder. It will have stainless steel electrodes and will be teflon lined.

SAMPLER

EQUIPMENT NO. 621

LOCATION

Washing and Dewatering Area

MATERIAL DESCRIPTION

Ammonium Sulfate Solution

Solution: Temp. 70° F   pH 7.0-7.5   Sp. Gr. 1.08

OPERATING CONDITIONS

Feed Rate: 13.2 gpm

Final Sample Size: 0.5 gal/shift

DUTY

This single stage sampler will sample the barren strip feed solution at a point after the barren strip feed pumps and before the stripping circuit.

Wetted parts of the sampler will be constructed of 316 SS. The sampler will be furnished complete with controls.

FLOWMETER

EQUIPMENT NO. 622

LOCATION

Washing and Dewatering

MATERIAL DESCRIPTION

Ammonium Sulfate Solution

Solution: Temp. 70° F pH 7.0-7.5 Sp. Gr. 1.08

FEED RATE

20 gpm

CHARACTERISTICS

$\pm$ 1.0% Accuracy

Recording Chart

DUTY

This magnetic flowmeter will continually measure and record the flow of clarified barren strip solution being bled from the barren strip feed pump discharge to the leaching circuit or tailing sump.

The flowmeter will include transmitter and recorder. It will have stainless steel electrodes and will be teflon lined.

SAMPLER

EQUIPMENT NO. 623

LOCATION

Washing and Dewatering Area

MATERIAL DESCRIPTION

Ammonium Sulfate Solution

Solution: Temp. 70°F pH 7.0-7.5 Sp. Gr. 1.08

OPERATING CONDITIONS

Feed Rate: 20 gpm

Final Sample Size: 0.5 gal/shift

DUTY

This single stage sampler will sample the barren strip bleed-off solution at a point after the barren strip feed pumps and before the tailing sump.

Wetted parts of the sampler will be constructed at 316 SS. The sampler will be furnished complete with controls.

HORIZONTAL CENTRIFUGAL PUMP

EQUIPMENT NO. 624

LOCATION

Washing and Dewatering Area

MATERIAL DESCRIPTION

Ammonium Sulfate Solution

Solution: Temp. 80^{o}F pH 7.0-7.5 Sp. Gr. 1.08

CAPACITY

30 gpm at 135 ft tdh

DUTY

This pump will provide the solution flow to purge the barren strip sand filters of accumulated fines. The pump will receive its feed from the clarified barren strip solution tank. The backwash will flow to a small filter backwash surge tank to be fed into the No. 1 yellowcake precipitation tank. The pump will operate intermittently.

The pump will be constructed of 316 SS. It will be complete with drive, guards and TEFC motor.

TANK

EQUIPMENT NO. 625

LOCATION

Washing and Dewatering Area

MATERIAL DESCRIPTION

Ammonium Sulfate Solution

Slurry: Sp. Gr. 1.08 % Solids $<$5%

Solution: Temp. 70°F pH 7.0-7.5 Sp. Gr. 1.08

Solids: Sp. Gr. 5.7

Size Analysis 100% -325 mesh

VOLUME

250 gal

DUTY

This 4' Ø x 4' deep tank will serve as a surge tank between the sand filter backwash pump and the precipitation circuit. This small tank will even the flow of backwash slurry intermittently produced by the backwash pump.

This tank will be made of FRP lined mild steel.

CENTRIFUGE

EQUIPMENT NO. 626

LOCATION

Washing and Dewatering Area

MATERIAL DESCRIPTION

Yellowcake/Ammonium Sulfate Slurry

Slurry: Sp. Gr. 1.07 % Solids by Weight 6.2%

Solution: Temp. 80^{o}F pH 6.5-7.0 Sp. Gr. 1.05

Solids: Sp. Gr. 5.7

Size Analysis: 100% -325 mesh

Wash Water: Temp. 40-70^{o}F pH 7.0 Sp. Gr. 1.00

OPERATING CONDITIONS

Feed Rate: 5 gpm Including Wash Water

Underflow: 0.5 gpm at 60% solids

Centrate: 4.5 gpm at $\leq$2% solids

DUTY

This centrifuge will dewater the yellowcake slurry from the thickener underflow tank after it has been diluted with wash water. The discharge slurry will be conveyed by screw feeder to the yellowcake dryer. The centrate will flow to the yellowcake thickener.

Wetted parts of this solid bowl type centrifuge will be constructed of 316 SS. It will be complete with drive, guards and TEFC motor.

SCREW CONVEYOR

EQUIPMENT NO. 627

LOCATION

Washing and Dewatering Area

MATERIAL DESCRIPTION

Yellowcake Slurry

Slurry: Sp. Gr. 1.98 % Solids by Weight 60%

Solution: Temp. 50-70°F pH 7.0 Sp. Gr. 1.00

Solids: Sp. Gr. 5.7

Size Analysis 100% -325 mesh

FEED RATE

1.0 gpm (317 lb/hr wet wt)

SPEED

Constant

DUTY

This screw conveyor will deliver the centrifuge discharge yellowcake to the yellowcake dryer.

This conveyor will be constructed of 316 SS. It will be complete with drive, guard and TEFC motor.

DRYER

EQUIPMENT NO. 628

LOCATION

Drying and Packaging Area

MATERIAL DESCRIPTION

Yellowcake

Slurry: Sp. Gr. 1.49 % Solids by Weight 40% (Design)

Solution: Temp. 50-70^{0}F pH 7.0 Sp. Gr. 1.00

Solids: Sp. Gr. 5.7 Bulk Density 80 lb/cu ft (loose)

Size Analysis 100% -325 mesh

OPERATING CONDITIONS

Feed Rate: 194 Dry lb/hr at 60% moisture

Discharge: 194 Dry lb/hr at 2% moisture (Max)

Max Temp. (Solids): 400^{0}C

Max Temp. (Gas): 570^{0} C (Design)(Hottest Hearth)

Max Temp. (Capability): 650oC

Dust To Scrubber: 2% (Max)

Product Size: 0.25 inch (Max)

Fuel Type: Diesel or LPG

DUTY

This multiple-hearth Herreschoff-type dryer will dry and calcine the yellowcake from the centrifuge and discharge it into a roll crusher. Dryer emissions must comply with state and federal environmental regulations.

This 6' Ø x 8½' high dryer will have three hearths. The dryer will be complete with rake arms, blades, drive, guards, TEFC motors, burners with complete combustion system for safe operation, forced draft fan, air dampers, and draft and temperature sensing, recording and control instrumentation.

ROLL CRUSHER

EQUIPMENT NO. 629

LOCATION

Drying and Packaging Area

MATERIAL DESCRIPTION

Dried Yellowcake

Bulk Density: 80 lb/cu ft (Dry Basis)

Sp. Gr.: 5.7

% Moisture: 2% (Max)

Temperature: 350-450°C

OPERATING CONDITIONS

Feed Rate: 194 lb/hr (Dry Weight)

Product Requirement: 100% will pass 3/8 inch Screen

DUTY

This roll crusher will receive the yellowcake dryer discharge product and reduce lumps to suitable size for storing in the yellowcake storage bin and for subsequent packaging in drums.

This crusher will be constructed of hardened, abrasion resistant steel. It will be complete with drives, guards and TEFC motors.

STORAGE BIN

EQUIPMENT NO. 630

LOCATION

Drying and Packaging Area

MATERIAL DESCRIPTION

Yellowcake

Bulk Density: 80 lb/cu ft (Dry Basis)

Sp. Gr.: 5.7

% Moisture: 2% (Max)

Temperature: 150-450°C

Size Analysis: 100% -3/8 inch

VOLUME

275 cu ft

RETENTION

Approx. 4 days

DUTY

This bin will store the yellowcake discharging from the roll crusher and feed it into the 55 gal shipping drums.

This 7' Ø bin with a conical bottom will be constructed of mild steel.

DRUM VIBRATOR

EQUIPMENT NO. 631

LOCATION

Drying and Packaging Area

CHARACTERISTICS

Handle 55 gal Drums

DUTY

This drum vibrator will assist in settling the bulk yellowcake as it is packaged into 55 gallon drums. The bulk density of the yellowcake should approach 100 lb/cu ft after vibrating.

PLATFORM SCALE

EQUIPMENT NO. 632

LOCATION

Drying and Packaging Area

MATERIAL DESCRIPTION

Yellowcake in 55 Gal Drums

Bulk Density: 80-100 lb/cu ft

Sp. Gr.: 5.7

CAPACITY

0-1500 lb

CHARACTERISTICS

$\pm$ 1.5 lb Accuracy

Load Cell Type

Digital Readout

Tape Printer

DUTY

This platform scale will weigh the 55 gallon drums of yellowcake product for invoicing purposes.

ROLLER CONVEYOR

EQUIPMENT NO. 633

LOCATION

Drying and Packaging Area

CHARACTERISTICS

Handle 55 gal Drums Weighing up to 1000 lb

DUTY

This 120' x 30" roller conveyor will transport and store up to 30 drums of yellowcake. The heavy duty conveyor will move up to 6 drums per day through the entire loading and weighing cycle.

SCRUBBER

EQUIPMENT NO. 634

LOCATION

Precipitation Area

MATERIAL DESCRIPTION

Yellowcake Dust: 100% -325 mesh

Ammonia Fumes

PROPERTIES

Not soluble in Water

Corrosive

FLOW RATE

Gas Volume: 1200 ACFM

Efficiency: 99.5%

DUTY

The wet scrubber in the precipitation, thickener and centrifuge areas will control emissions from the two precipitation tanks, the yellowcake thickener, the yellowcake thickener underflow tank, and the centrifuge. The system will be designed to keep the work areas in compliance with current hygiene regulations and yield a stack emission compatible with current environmental specifications. The scrubber liquid effluent will flow to the yellowcake thickener.

Wetted parts of the scrubber, including the fan, will be constructed from 316 SS. The scrubber will include any required control, fan, drive, guard and TEFC motor.

SCRUBBER

EQUIPMENT NO. 635

LOCATION

Drying and Packaging Area

MATERIAL DESCRIPTION

Yellowcake Dust: 100% -325 mesh

Ammonia Fumes

PROPERTIES

Not soluble in Water

Corrosive

Abrasive

FLOW RATE

Gas Volume: 760 ACFM

Efficiency: 99.5%

DUTY

The wet scrubber in the drying area will control emissions from the yellowcake screw feeder and the yellowcake dryer. The system will be designed to keep the work areas in compliance with current hygiene regulations and yield a stack emission compatible with current environmental specifications. The liquid effluent will flow to the yellowcake thickener.

Wetted parts of the scrubber, including the fan, will be constructed from 316 SS. The scrubber will include any required control, fan, drive, guard and TEFC motor.

SCRUBBER

EQUIPMENT NO. 636

LOCATION

Drying and Packaging Area

MATERIAL DESCRIPTION

Yellowcake Dust: 100% 3/8 inch

Radon Gas

PROPERTIES

Not Soluble in Water

Corrosive

Abrasive

FLOW RATE

Gas Volume: 500 CFM

Efficiency: 99.5%

DUTY

The yellowcake scrubber in the packaging area will control emissions from the roll crusher, the yellowcake storage bin and the packaging area. The system will be designed to keep the work areas in compliance with current hygiene regulations and yield a stack emission compatible with current environmental specifications. The liquid effluent will flow to the yellowcake thickener.

Wetted parts of the scrubber, including the fan, will be constructed from 316 SS. The scrubber will include any required control, fan, drive, guard and TEFC motor.

VERTICAL CENTRIFUGAL PUMP

EQUIPMENT NO. 637

LOCATION

Precipitation Area

MATERIAL DESCRIPTION

Yellowcake/Ammonium Sulfate Slurry

Slurry: Sp. Gr. 1.00-1.78 % Solids by Weight 0-50%

Solution: Temp. 40-100^{o}F pH 7.0-7.5 Sp. Gr. 1.00-1.78

Solids: Sp. Gr. 5.7

Size Analysis 100% -325 mesh

CAPACITY

30 gpm at 25 ft tdh

DUTY

This sump pump will deliver all materials collected in the precipitation area sump to the yellowcake thickener. The percent solids to be pumped will vary over a wide range. The pump will be selected to handle the extreme conditions.

The pump will be 316 SS. It will be complete with drive, guard and TEFC motor.

VERTICAL CENTRIFUGAL PUMP

EQUIPMENT NO. 638

LOCATION

Drying and Packaging Area

MATERIAL DESCRIPTION

Yellowcake Slurry

Slurry: Sp. Gr. 1.0-7.0 % Solids by Weight 0-50%

Solution: Temp. 40-70°F pH 7.0 Sp. Gr. 1.00

Solids: Sp. Gr. 5.7

Size Analysis 100% -3/8 inch

CAPACITY

30 gpm at 25 ft tdh

DUTY

This sump pump will deliver all materials collected in the drying and packaging area sump to the yellowcake thickener. The particle size and percent solids to be pumped will vary over a wide range. The pump will be selected to handle the extreme conditions.

The pump will be 316 SS. It will be complete with drive, guard and TEFC motor.

TANKS

EQUIPMENT NO. 701-702

LOCATION

Reagent Area

MATERIAL DESCRIPTION

Concentrated Sulfuric Acid

Solution: Temp. 80^{o} F Sp. Gr. 1.83 Concentration 93%

VOLUME

705,600 gal ea tank

RETENTION

7 days storage total

DUTY

These 65' Ø x 30' high tanks will serve as storage vessels for purchased concentrated sulfuric acid delivered by tank truck. Acid will be transferred by pump from these tanks to the acid mix tanks in the leaching circuit. The tanks will be constructed of mild steel. They will be covered, vented, and provided with an inspection manhole.

HORIZONTAL CENTRIFUGAL PUMPS

EQUIPMENT NO. 703-704

LOCATION

Reagent Area

MATERIAL DESCRIPTION

Concentrated Sulfuric Acid

Solution: Temp. 80° F Sp. Gr. 1.83 Concentration 93%

CAPACITY

70 gpm at 100 ft tdh

DUTY

These pumps will transfer concentrated sulfuric acid from storage to the acid mix tanks and to the clarifier. One operating and one standby pump will be provided.

The pumps will be horizontal centrifugal, cast iron construction, with mechanical seals. They will be furnished with drives, guards, and TEFC motors.

TANK

EQUIPMENT NO. 705

LOCATION

Reagent Area

MATERIAL DESCRIPTION

Sodium Chlorate

Solution: Temp. 90-100^{o} F   Sp. Gr. 1.38   Concentration 40%

VOLUME

50,000 gal.

RETENTION

7 days storage

DUTY

This 24' Ø x 16' tank will serve as a storage vessel for sodium chlorate solution transferred by pump from the sodium chlorate solution preparation tank.

The tank will be constructed of mild steel, covered, vented, lined with FRP and the exterior will be insulated. It will be provided with a steam sparging line to maintain solution temperature.

METERING PUMPS

EQUIPMENT NO. 706-707

LOCATION

Reagent Area

MATERIAL DESCRIPTION

Sodium Chlorate

Solution: Temp. $90\text{-}100^{o}$ F Sp. Gr. 1.38 Concentration 40%

CAPACITY

Up to 10 gpm, 30 ft tdh

DUTY

These pumps will meter sodium chlorate solution to the acid mix and leach tanks.

These pumps will be cast iron construction and will be provided with variable flow adjustment. They will be furnished with drives, guards, and TEFC motors.

VERTICAL CENTRIFUGAL PUMP

EQUIPMENT NO. 708

LOCATION

Reagent Area

MATERIAL DESCRIPTION

Spills ranging from 93% sulfuric acid and 40% sodium chlorate to solutions of glue, flocculant, sodium bicarbonate, alamine and isodecanol.

CAPACITY

50 gpm at 30 ft tdh

DUTY

This pump will be for recovery of miscellaneous spills and washdown water in the reagent area. The pump will be vertical centrifugal, constructed from 316 SS. It will be furnished complete with drive, guard, TEFC motor and level control.

TANKS

EQUIPMENT NO. 709-710

LOCATION

Reagent Area

MATERIAL DESCRIPTION

Flocculant: Dow MG-200

Solution: Temp. 80^{o} F pH 7.0-7.5 Sp. Gr. 1.01

VOLUME

37,600 each tank

RETENTION

24 hours each tank

DUTY

Two 20' Ø x 16' tanks required; one for flocculant mixing, the second for flocculant storage. The tanks will be fabricated from mild steel. They will be covered and vented. The mixing tank will be designed to support an agitator.

VIBRATING FEEDER

EQUIPMENT NO. 711

LOCATION

Reagent Area

MATERIAL DESCRIPTION

Flocculant: Dow MG-200, dry, granular

CAPACITY

250 lb/hr feed rate

DUTY

This electromagnetic type vibrating feeder will feed granular flocculant from a hopper into the flocculant preparation tank for mixing.

The feeder will be complete with variable rate control. It will be constructed from mild steel.

HORIZONTAL CENTRIFUGAL PUMP

EQUIPMENT NO. 712

LOCATION

Reagent Area

MATERIAL DESCRIPTION

Flocculant: Dow MG-200

Solution: Temp. 80^{o} F pH 7.0-7.5 Sp. Gr. 1.01

CAPACITY

150 gpm at 25 ft tdh

DUTY

This pump will transfer flocculant solution from the flocculant mixing tank to the flocculant storage tank. The pump will be horizontal centrifugal, cast iron. It will be furnished complete with drive, guard, and TEFC motor.

METERING PUMPS

EQUIPMENT NO. 713-714

LOCATION

Reagent Area

MATERIAL DESCRIPTION

Flocculant: Dow MG-200

Solution: Temp. 80^{o} F pH 7.0-7.5 Sp. Gr. 1.01

CAPACITY

50 gpm at 40 ft tdh

DUTY

These pumps will meter flocculant solution from the flocculant storage tank to the CCD thickener launders and overflow sumps. The pumps will have mild steel rotors and rubber stators. They will be furnished with drives, guards and TEFC motors.

TANKS

EQUIPMENT NO. 715-716

LOCATION

Reagent Area

MATERIAL DESCRIPTION

Glue

Solution: Temp. 80^{o} F pH 7.0-7.5 Concentration 7.2 g/l

VOLUME

3760 gal each tank

RETENTION

1 day each tank

DUTY

Two 8' Ø 10' tanks required; one for glue solution preparation, the second for glue solution storage. The glue preparation tank will be designed to support an agitator. Both tanks will be fabricated from mild steel.

HORIZONTAL CENTRIFUGAL PUMP

EQUIPMENT NO. 717

LOCATION

Reagent Area

MATERIAL DESCRIPTION

Glue

Solution: Temp. 80^{o} F pH 7.0-7.5 Concentration 7.2 g/l

CAPACITY

30 gpm at 15 ft tdh

DUTY

This pump will be used to transfer glue solution from the glue preparation tank to the glue storage tank. The pump will be horizontal centrifugal, cast iron. It will be furnished with drive, guard and TEFC motor.

METERING PUMPS

EQUIPMENT NO. 718-719

LOCATION

Reagent Area

MATERIAL DESCRIPTION

Glue

Solution: Temp. 80° F pH 7.0-7.5 Concentration 7.2 g/l

CAPACITY

5 gpm at 30 ft tdh

DUTY

These pumps will meter glue solution from the glue storage tank to the clarifier. The pumps will be cast iron construction and will be furnished complete with drives, guards, and TEFC motors.

TANK

EQUIPMENT NO. 720

LOCATION

Reagent Area

MATERIAL DESCRIPTION

Kerosene

VOLUME

4600 gal

RETENTION

7 days

DUTY

This tank will be for storage of kerosene delivered by tank truck. The tank will be fabricated from mild steel, vented, completely enclosed, and coated for underground installation.

VERTICAL CENTRIFUGAL PUMP

EQUIPMENT NO. 721

LOCATION

Reagent Area

MATERIAL DESCRIPTION

Kerosene

CAPACITY

50 gpm at 35 ft tdh

DUTY

This pump will transfer kerosene from the underground kerosene tank to the barren organic and organic sludge tanks. The pump will be vertical centrifugal, cast iron construction with mechanical seals, drive, guard, and TEFC motor.

PRESSURIZED TANK

EQUIPMENT NO. 722

LOCATION

Reagent Area

MATERIAL DESCRIPTION

Anhydrous Ammonia

VOLUME

20 ton capacity tank

RETENTION

15 days

CONSTRUCTION

This tank will be a pressurized vessel, constructed from mild steel.

VAPORIZER

EQUIPMENT NO. 723

LOCATION

Reagent Area

MATERIAL DESCRIPTION

Liquid Anhydrous Ammonia

CAPACITY

Vaporization rate of 100 lb/hr

DUTY

This vaporizer will vaporize liquid anhydrous ammonia to allow feeding a gaseous ammonia/air mixture into the yellowcake precipitation tanks.

TANK

EQUIPMENT NO. 724

LOCATION

Reagent Area

MATERIAL DESCRIPTION

Sodium Bicarbonate Solution

Temp. 80^{o} F   Concentration 10%

VOLUME

750 gal

RETENTION

Intermittent use

CONSTRUCTION

This 5' Ø x 6' tank will be constructed from mild steel.

HORIZONTAL CENTRIFUGAL PUMPS

EQUIPMENT NO. 725-726

LOCATION

Reagent Area

MATERIAL DESCRIPTION

Sodium Bicarbonate Solution

Temp. 80° F Concentration 80%

CAPACITY

5 gpm at 15 ft tdh

DUTY

These pumps will transfer sodium bicarbonate solution from the storage tank to the regeneration mixer-settler tank. The pumps will be horizontal centrifugal cast iron construction. They will be complete with drives, guards, and TEFC motors.

TANK

EQUIPMENT NO. 727

LOCATION

Reagent Area

MATERIAL DESCRIPTION

Amine Solution: Alamine 336

VOLUME

150 gal

RETENTION

Intermittent use

CONSTRUCTION

Mild Steel

TANK

EQUIPMENT NO. 728

LOCATION

Reagent Area

MATERIAL DESCRIPTION

Isodecanol Solution

Density: 6.9 lb/gal

VOLUME

150 gal

RETENTION

Intermittent use

CONSTRUCTION

Mild steel

HORIZONTAL CENTRIFUGAL PUMP

EQUIPMENT NO. 729

LOCATION

Reagent Area

MATERIAL DESCRIPTION

Sodium Chlorate

Solution: Temp. 90-100° F Sp. Gr. 1.38 Concentration 40%

CAPACITY

300 gpm at 35 ft tdh

DUTY

This pump will transfer sodium chlorate solution from the sodium chlorate preparation tank to the sodium chlorate storage tank.

The pump will be horizontal centrifugal, cast iron construction with mechanical seals. It will be complete with drive, guard, and TEFC motor.

TANK

EQUIPMENT NO. 730

LOCATION

Reagent Area

MATERIAL DESCRIPTION

Sodium Chlorate

Solution: Temp. 90-100^{o} F   Sp. Gr. 1.38   Concentration 40%

VOLUME

20,000 gal

RETENTION

1 day storage

DUTY

This 15' Ø x 16' tank will receive sodium chlorate solution from trucks. Concentration of the solution will be adjusted in this tank.

The tank will be constructed of mild steel, covered, vented, lined with phenolic resin and the exterior will be insulated. It will be provided with a steam sparging line to maintain solution temperature.

EXHIBIT III-D
GENERAL SPECIFICATIONS

EXHIBIT III-D

GENERAL SPECIFICATIONS

A. General Construction Specifications

1. General

The general philosophy followed in the present design was to set all major facilities on cut (solid ground) with the exception of the ore storage pad which is almost entirely on fill. The CCD thickener area and roadways will also be on fill.

2. Primary Receiving Hopper

The primary receiving building area is approximately 740 square feet. It will be an engineered structural steel and concrete structure with roof. This building will house the receiving hopper, apron feeder, and dust collector.

3. Conveyor

Conveyor will be open with a canopy covering the belt and a walkway on one side.

4. Mill Building

The mill building area is approximately 13,440 square feet. It will be an engineered structural steel and concrete open-type structure. This building will house the following facilities: grinding, yellowcake precipitation and thickening, yellowcake drying and packaging, product and drum storage, electrical MCC room, air compressors, emergency generator, foreman's office and control room, and sanitary facilities.

5. Leaching Area

The leach area is approximately 8600 square feet adjacent to the west side of the mill building. It is not enclosed in a building. The tanks are covered, and steel walkways are provided on top of the tanks. The tanks will be supported on concrete piers with laminated timber sills. The concrete slab shall be treated with an acid resistant compound. Sand filters and boilers are sitting on concrete pad adjacent to the north side of the leach area. Boilers will be enclosed with 10-foot high concrete block wall.

6. CCD Thickener Area

The thickener area is approximately 158,000 square feet and is located to the west of the mill and leach area. This area will include five thickeners with space for one future thickener. Steel and concrete open-type structures are used with the exception of the control room and the flocculant building which will be enclosed. There will be a roof over the drive mechanism and center well of the thickeners.

7. Solvent Extraction

The S-X area is approximately 16,600 square feet. It is located 50 feet to the north of the mill building and will be in the open. This area includes the stripping tanks, solvent extraction tanks, pregnant organic tank, barren organic tank and organic sludge tank. The concrete slab shall be treated with an acid resistant epoxy resin.

B. Materials of Construction

1. General

The selection of construction materials is governed primarily by the leaching temperature of 175° F and the addition of process chemicals, such as 12 pounds of sodium chlorate to the leaching circuit and kerosene in the solvent extraction. All lining contracts should specify that the lining contractor accept the responsibility for the condition of the surface to be covered.

2. Grinding

Pump tanks and launders in the grinding and neutral thickening areas will be of steel construction, lined with linatex. Because of the relative ease in building up worn areas, linatex is widely used for wet abrasive applications.

3. Leach Tanks

Tanks and agitators will be mild steel and rubber lined. The rubber will be laminated as follows, because the 175° F temperature will blister and harden soft natural rubber:

1/16-inch shore hardness 45 natural rubber (to metal)

1/8-inch shore hardness 90 natural rubber

*5/32-inch shore hardness 60 chlorobutyl (to the slurry)

*Goodyear LS-582, Blair 9261 P.E.

Leach tank covers will be of the same material. Each tank will be provided with a fiberglass or polyethylene vent. Steam injection pipes will be alloy 20 or carbon steel covered and lined with hard rubber. The outside of the leach tanks will be painted with a priming coat and two coats of acid resistant paint.

4. Thickeners

Thickeners in the acid circuit will be mild steel rubber-lined. The vertical shafts, rake arms and rake blades will be 316 stainless steel.

5. Clarification and Solution Storage

The pressure sand filters will be mild steel rubber-lined and the internal distribution piping will be 316 stainless steel.

Solution holding tanks will be mild steel-FRP-lined. The raffinate tank will be mild steel FRP-lined.

6. Solvent Extraction

Mixer settler tanks for the stripping and extraction circuits will be free standing concrete FRP-lined tanks with covers. 316 stainless steel will be used for the wetted parts on the pumper mixers. Storage tank for the mixer settlers will be mild steel FRP-lined. Pregnant organic heat exchanger will be of impervious graphite.

7. Precipitation, Washing and Drying

Precipitation tanks will be mild steel FRP-lined and covered. Agitators will be 316 stainless steel. Yellowcake thickener is mild steel FRP-lined. Mechanism will be all 316 stainless steel. Pregnant liquor heat exchanger will be of impervious graphite. The wetted parts of the yellowcake centrifuge will be stainless steel. Screw feeder to the dryer is of 316 stainless steel and the wet scrubber will also be 316 stainless steel.

8. Chlorate Storage

Sodium chlorate tanks are mild steel, lined with phenolic resin and covered.

9. Pumps

Pumps for acid slurry service will be rubber-lined with 316 stainless steel trim. Acid solution pumps will be 316 stainless steel, or may be rubber-lined with stainless steel trim where there is no possibility of contact with organic solvent.

Solvent extraction circuit pumps for both aqueous and organic are 316 stainless steel.

In the precipitation circuit, the yellowcake slurry pumps in an air operated O.D.S. hypalon-lined pump. Sodium chlorate solution pumps will be cast iron, self-priming and glandless. There is to be no hydrocarbon-based oil or grease lubrication.

Sulphuric acid pump will be mild steel construction with mechanical seals.

10. Piping

Carbon steel (unlined) is used for neutral pulps and soft rubber liner is used for acid pulps. Victaulic couplings will be used except in thickener underflow lines where flanged connections are to be used.

Material conducting hose will be used in limited areas, such as: Where abrasion is severe; to obtain long radius bends; to decrease pipe vibration; and to facilitate maintenance on pipe connections.

High density polyethylene will be used for slurry lines where abrasion is not expected to be severe. Acid solution lines will be PVC or FRP except in the case of manifolds around the sand filters where water hammer occurs; here rubber-lined pipe will be used.

Organic solvent lines will be PVC or FRP. Buna-N rubber is used for gaskets, sleeves, etc.

Yellowcake precipitation thickening area will be PVC or FRP piping except for the thickener underflow which will be rubber-lined steel. The tailings line is high density polyethylene with lined concrete drop boxes to maintain a reasonable velocity. For concentrated sulphuric acid schedule 80 carbon steel pipe is used with welded fittings and flanged connections. No pipe smaller than one inch will be used.

EXHIBIT III-E
MILL CAPITAL COST
ESTIMATE DETAILS

REV. DATE 7/12/78 △1

PROJECT Anderson Ranch | PREPARED BY G. Hinds | FIRST ISSUE 11/30/77

CLIENT Minerals Exploration Corp. | APPROVED BY | SHEET 1 of 69

A/C NO.	AREA Summary	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	COST/UNIT RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	COSTS TOTAL
	FACILITY														
	Total Direct Cost					153901					2,871,630	3,617,130	4,434,610	5,833,530	16,756,900
	Indirect Cost														
	Supplies														143,580
	Const. Equipment														1,396,990
	Gen. Exp & Ovhd														2,231,930
	Subtotal Indirects														3,772,500
	Total Direct plus Indirect														20,529,400
	Constr. Fee @ 3%														615,880
	Engr. @ 8% of Direct														1,340,550
	Total Estimated Installed Cost														$ 22,485,830

PROJECT NUMBER 1 1 1 4

PROJECT Anderson Ranch | PREPARED BY G. Hinos | REV. DATE 7/12/78 ⚠1 | FIRST ISSUE 11/30/77

CLIENT Minerals Exploration Corp. | APPROVED BY | SHEET 2 of 69

AREA Summary Direct Cost —

FACILITY

A/C NO.	AREA	WT.	Quantity Sht. No.	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	COSTS TOTAL
	Site Excavation		5											1030210	1030210
	Mill Site Road & Fencing		6			210					3310	4000		159730	167,040
	Mill Water Storage Tank		7			1442					29040	60590	5250		94880
	Mill Water Distribution		8			532					9470	16730			26200
	Fire Protection System		9-10			1269					22510	45040	26450	36300	130,300
	Potable Water		11-12			740					13720	20910	2500		37130
	Sanitary Sewer		13			991					16930	13920		26780	57630
	Tailings Pipeline		14			387					6770	22170		6720	35660
	Mill Building		15-18			20978					392890	498620	64590	204180	1,160,280
100	Ore Receiving & Grinding		19-26			13386					247700	137880	1246820		1,632,400
	Sheet Total					39935					742340	819860	1,345,610	1463920	4,371,730

PROJECT NUMBER / / / 4

PROJECT: Anderson Ranch | PREPARED BY: G. Hinds | REV. DATE: 7/12/78 ⚠1 | FIRST ISSUE: 11/30/77

CLIENT: Minerals Exploration Corp. | APPROVED BY: | SHEET 3 of 69

AREA: Summary Direct Cost

FACILITY:

A/C NO.	AREA	WT.	Quantity (Sht. No.)	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	COSTS TOTAL
200	Leaching		27-30			6519					120380	157570	329380	117150	724,480
300	C.C.D.		31-36			41648					767570	1316550	1252390	1332260	4,668,770
400	Clarification		37-40			4490					81630	107170	302010	74930	565,740
500	Solvent Extraction		41-49			11441					203580	215810	207970	332260	959,620
600	Y.C. Precipitation & Wash		50-57			2245					41270	21180	307550	15540	385,540
700	Reagent Handling		58-64			6510					132020	332360	71380	38750	574,510
001	Misc. Equipment		65-67			1973					36120		371200		407,320
	Process Piping		68			36050					691400	628630			1,320,070
	Painting		68			2400					42890	18000			60,890
	Electrical		69											1,694,580	1,694,580
	Sheet Total					113,276					2,116,900	2,797,270	2,841,880	3,605,470	11,361,520

PROJECT NUMBER 1 1 1 4

PROJECT: ANDERSON RANCH
PREPARED BY: G. HINDS
REV. DATE: 7/12/78 △1
FIRST ISSUE: 11/30/77

CLIENT: MINERALS EXPLORATION CORP.
APPROVED BY:
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A/C NO.	AREA: SUMMARY DIRECT COST – / FACILITY	WT.	Quantity Sht. No	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	COSTS TOTAL
	INSTRUMENTATION		68											343100	343100
	COMMUNICATIONS		68											25000	25000
	MILL EQUIPT. SPARE PARTS		68			690	17.95				12390		247120		259510
	INITIAL MILL REAGENTS & SUPPLIES		68											396000	396000
	Sheet Total					690					12390		247120	764100	1,023,650
	TOTAL DIRECT COST					153901					2,871,630	3,617,130	4,434,610	5,833,530	16,756,900

PROJECT NUMBER 1 1 1 4

REV. DATE 7/ /78 (1)

PROJECT ANDERSON RANCH PREPARED BY G. HINDS FIRST ISSUE 11/30/77

CLIENT MINERALS EXPLORATION CORP. APPROVED BY SHEET 5 of 69

A/C NO.	AREA Site Excavation Mill Site Boundaries	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	COSTS TOTAL
	FACILITY														
	Clearing & Grubbing		66	Ac						160–				10560	10560
	Excavation		72406	C.Y.						1.40				101370	101370
*	Embankment		3,027,589	C.Y.						0.30				908280	908280
	Drainage System & Containment Sumps		Allow											10000	10000
*	Material to be furnished at Mill Site by MEC from mine stripping operation.														
	AREA TOTAL													1030210	1030210

PROJECT NUMBER 1 1 1 4

PROJECT: ANDERSON RANCH

CLIENT: MINERALS EXPLORATION CORP.

PREPARED BY: G. HINDS

APPROVED BY:

REV. DATE: 7/7/78 △1

FIRST ISSUE: 11/30/77

SHEET: 6 of 69

AREA: MILL SITE ROADS, PARKING & FENCING

FACILITY:

A/C NO.	DESCRIPTION	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	COSTS TOTAL
	PLANT SITE ROADS														
	12" GRAVEL BASE		16218	CY	PROVIDED BY MEC										
	6" GRAVEL BASE & SURFACING		12007	CY											
	4" ASPH. SURFACING		4790	TON						25-				119750	119750
	PLANT SITE FENCING 6'-0" HIGH CHAIN LINK W/3 STRAND BARBED WIRE OUTRIGGERS		3820	LF						9.10				34760	34760
	BARBED WIRE FENCE		2070	LF						0.80				1560	1560
	MAN & DRIVE GATES		LOT							3660-				3660	3660
	CONCRETE SIDEWALKS		100	CY	2.1	210	15.75	33-	40-		3310	4000			7310
	AREA TOTAL					210					3310	4000		159730	167040

PROJECT NUMBER / / / 4

PROJECT ANDERSON RANCH | PREPARED BY G. HINDS | REV. DATE 7/7/78 △1
FIRST ISSUE 11/30/77

CLIENT MINERALS EXPLORATION CORP. | APPROVED BY | SHEET 7 of 69

A/C NO.	AREA MILL WATER STORAGE TANK	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	COSTS TOTAL
	FACILITY														
007	500000 GAL – 50'x34'														
	STRUCT EXCAV		52	CY	0.1	5.2	15.15	1.52			80				80
	STRUCT BKFL		40	CY	0.2	8	15.15	3.03			120				120
	CONCRETE		12	CY	11.5	138	15.75	181.–	57.75		2170	690			2860
	REINF		1400	LB	0.01	14.0	21.18	0.21	0.21		300	300			600
	STEEL TANK		47.3	TON	20	946	21.18	424.–	1260.–		20040	59600			79640
	PUMP HOUSE & EQUIPT		LOT			330	19.18				6330		5250		11580
	AREA TOTAL					1442					29040	60590	5250		94880

PROJECT NUMBER 1 1 1 4

PROJECT	ANDERSON RANCH	REV. DATE	7/7/78 △1
		PREPARED BY	G. HINDS
		FIRST ISSUE	11/30/77
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A/C NO.	AREA MILL WATER DISTRIBUTION	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	TOTAL
	FACILITY														
	STRUCT EXCAV		587	CY	0^{1}	59	15^{15}	1^{52}			890				890
	STRUCT BKFL		550	CY	0^{2}	110	15^{15}	3^{03}			1670				1670
	8"φ PERMASTRAN w/FTG		1515	LF	0^{10}	151^{5}	19^{18}	1^{92}	7^{70}		2910	11670			14580
	6"φ d.Ho		335	LF	0^{10}	33^{5}	19^{18}	1^{92}	5^{50}		640	1840			2480
	4"φ d.Ho		110	LF	0^{08}	8^{8}	19^{18}	1^{53}	3^{10}		170	340			510
	2"φ d.Ho		1060	LF	0^{08}	84^{8}	19^{18}	1^{53}	1^{10}		1630	1170			2800
	SERVICE CONNECTIONS		8	EA	8	64	19^{18}	150^{-}	157^{50}		1230	1260			2490
	THRUST BLOCKS		10	CY	2	20	16^{70}	33^{-}	45^{-}		330	450			780
	AREA TOTAL					532					9470	16730			26200

PROJECT NUMBER 1 1 1 4

REV. DATE 7/7/78 △1

PROJECT ANDERSON RANCH — PREPARED BY G. HINDS — FIRST ISSUE 11/30/77

CLIENT MINERALS EXPLORATION CORP. — APPROVED BY — SHEET 9 of 69

AREA FIRE PROTECTION SYSTEM

FACILITY

A/C NO.		WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	MATERIAL	Permanent Equipment	SUB. CONTR.	TOTAL
	STRUCT EXCAV.		1372	CY	0.1	137.2	15.15	1.52			2080				2080
	STRUCT BKFL		1300	CY	0.2	260	15.15	3.03			3940				3940
	8" ø PERMASTRAN w/FTGS		4220	LF	0.10	422	19.18	1.92	7.70		8090	32490			40580
	6" ø d.Ho		1010	LF	0.10	101		1.92	5.50		1940	5560			7500
	2" ø d.Ho		60	LF	0.08	4.8		1.53	1.10		90	70			160
	HYDRANTS		14	EA	10	140		192-	300-		2690	4760			7450
	SERVICE CONNECTIONS		2	EA	8	16	19.18	153-	157.50		310	320			630
	THRUST BLOCKS		20	CY	2	40	16.70	33-	45		670	900			1570
	PUMP HOUSE		400	SF						15.75				6300	6300
	FIRE MONITOR		4	EA	7	28	19.18	134-	235-		540	940			1480
	Sheet Total					1149					20350	45040		6300	71690

PROJECT NUMBER 1 1 1 4

PROJECT Anderson Ranch

CLIENT Minerals Exploration Corp.

PREPARED BY G. Hinds

APPROVED BY

REV. DATE 7/7/78 △1

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A/C NO.	AREA Fire Protection System	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	COSTS TOTAL
	FACILITY														
008	Fire Pump ~ Electric														
	1000 gpm ~ 125 psi	1^{5}	1	EA		40	17^{95}				720		8170		8890
	w/100 HP Motor														
009	Fire Pump - Diesel														
	1000 gpm - 125 psi	2^{5}	1	EA		80	17^{95}				1440		18280		19720
	w/drive & motor														
	S-X-CO_2 Fire System														
	13 Ton Tank & Installation		Lot											30000	30000
	Sheet Total					120					2160		26450	30000	58610
	AREA TOTAL					1269					22510	45040	26450	36300	130300

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REV. DATE 7/7/78 △1

PROJECT Anderson Ranch PREPARED BY G. Hinds FIRST ISSUE 11/30/77

CLIENT Minerals Exploration Corp. APPROVED BY SHEET 11 of 69

A/C NO.	AREA Potable Water / FACILITY	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	COSTS TOTAL
005	Domestic Water Tank														
	40000 Gal Cap - M.S.														
	Struct Excav.		21	CY	0^{1}	2^{1}	15^{15}	1^{52}			30				30
	Struct Bkfl		16	CY	0^{2}	3^{2}	15^{15}	3^{03}			50				50
	Concrete		5	CY	11^{5}	57^{5}	15^{75}	181⁻	57^{75}		910	290			1200
	Reinf		600	LB	0^{01}	6^{0}	21^{18}	0^{21}	0^{21}		130	130			260
	Steel Tank		9^{6}	Ton	20	192	21^{18}	424⁻	1260⁻		4070	12100			16170
	Struct Excav		542	CY	0^{1}	54^{2}	15^{15}	1^{52}			820				820
	Struct Bkfl		520	CY	0^{2}	104	15^{15}	3^{03}			1580				1580
	4" ϕ Permastran w/Ftgs		2060	LF	0^{08}	165	19^{18}	1^{53}	3^{10}		3160	6390			9550
	3" ϕ ditto		40	LF	0^{08}	3^{2}	19^{18}	1^{53}	2^{10}		60	80			140
	Sheet Total					587					10810	18990			29800

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REV. DATE 7/7/78 1

PROJECT ANDERSON RANCH PREPARED BY G. HINDS FIRST ISSUE 11/30/77

CLIENT MINERALS EXPLORATION CORP. APPROVED BY SHEET 12 of 69

A/C NO.	AREA POTABLE WATER	WT.	Quantity	UNIT	MANHOURS			COST/UNIT			COSTS ( )				
					PER UNIT	TOTAL	RATE	LABOR	MAT'L.	SUB. CONTR.	LABOR	MATERIAL	Permanent Equipment	SUB. CONTR.	TOTAL
	FACILITY														
	2" φ PERMASTRAN in/Figs		100	LF	0.08	11.2	19.18	1.53	1.10		210	150			360
	1" φ ditto		550	LF	0.08	44	19.18	1.53	0.60		840	330			1170
	SERVICE CONNECTIONS		5	EA	8	40	19.18	153.-	157.50		770	790			1560
	THRUST BLOCKS		5	CY	2	10	16.70	33.-	45.-		170	230			400
	CHLORINATOR		1	EA	8	8	19.18	153.-	420.-		150	420			570
	WATER PUMPS		LOT		20	40	19.18				770		2500		3270
	Sheet Total					153					2910	1920	2500		7330
	AREA TOTAL					740					13720	20910	2500		37130

PROJECT NUMBER / / / 4

REV. DATE 7/7/78 △1

PROJECT ANDERSON RANCH PREPARED BY G. HINDS FIRST ISSUE 11/30/77

CLIENT MINERALS EXPLORATION CORP. APPROVED BY SHEET 13 of 69

AREA SANITARY SEWER

FACILITY

A/C NO.	AREA / FACILITY	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	COSTS TOTAL
	STRUCT EXCAV		620	CY	0.1	62	15.15	1.52			940				940
	STRUCT BKFL		600	CY	0.2	124	15.15	3.03			1880				1880
	6"ϕ ABS PIPE & FTGS		1025	LF	0.2	205	19.18	3.84	5.90		3930	6050			9980
	4" ditto		485	LF	0.2	97	19.18	3.84	4.50		1860	2180			4040
	4" PERF. ABS PIPE		580	LF	0.2	116	19.18	3.84	5.40		2220	3130			5350
	MANHOLES		3	EA	32	96	16.70	534.-	525.-		1600	1580			3180
	CLEANOUTS		3	EA	8	24	19.18	153.-	75.-		460	230			690
	EXCAVATION		890	CY	0.1	89	15.15	1.52			1350				1350
	BACKFILL		740	CY	0.2	148	15.15	3.03			2240				2240
	GRAVEL		150	CY	0.2	30	15.15	3.03	5.00		450	750			1200
	PACKAGE TREATMENT		LOT											26780	26780
	AREA TOTAL					991					16930	13920		26780	57630

PROJECT NUMBER 1 1 1 4

PROJECT: ANDERSON RANCH

CLIENT: MINERALS EXPLORATION CORP.

PREPARED BY: G. HINDS

APPROVED BY:

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AREA: TAILING PIPELINE

FACILITY:

A/C NO.	AREA / FACILITY	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	COSTS TOTAL
	PIPELINE BERM		2800	CY						2^{40}				6720	6720
	10" DRISCOPIPE W/ FITTINGS		1800	LF	0^{1}	180	19^{18}	1^{92}	10^{90}		3450	19620			23070
	DROP BOXES 4'ø x 12'		10	EA	8	80	15^{75}	126-	175-		1260	1750			3010
	CONCRETE FTG		10	CY	11^{5}	115	15^{75}	181	55-		1810	550			2360
	REINF		1200	LB	0^{01}	12	21^{18}	0^{21}	0^{21}		250	250			500
	AREA TOTAL					387					6770	22170		6720	35660

PROJECT NUMBER: 1 1 1 4

PROJECT *Anderson Ranch* PREPARED BY *G. Hinds* REV. DATE *7/7/78* △1 FIRST ISSUE *11/30/77*

CLIENT *Minerals Exploration Corp.* APPROVED BY ______ SHEET *15* of *69*

AREA *Mill Building*

FACILITY ______

A/C NO.	AREA / FACILITY	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	COSTS TOTAL
	Struct. Excav		1320	CY	0^{1}	132	15^{15}	1^{52}			2000				2000
	Struct. Bkfl		1090	CY	0^{3}	327	15^{15}	4^{55}			4950				4950
	Concrete														
	Floor Slab		685	CY	4^{6}	3151	15^{75}	72^{-}	52^{-}		49630	35620			85250
	Reinf		82200	LB	0^{015}	1233	21^{18}	0^{32}	0^{21}		26110	17260			43370
	Suspended Slab		180	CY	12^{5}	2300	15^{75}	197^{-}	92^{-}		36230	16930			53160
	Reinf		55200	LB	0^{015}	828	21^{18}	0^{32}	0^{21}		17540	11590			29130
	Mills & Equipt. Fnds		438	CY	6^{2}	2715^{6}	15^{75}	98^{-}	54^{-}		42770	23650			66420
	Reinf		52560	LB	0^{02}	1051^{2}	21^{18}	0^{42}	0^{21}		22260	11040			33300
	Struct. Steel		252	Tons	22	5544	21^{18}	467^{-}	930^{-}		117420	230360			351780
	Sheet Total					17281^{8}					318910	350450			669360

PROJECT NUMBER 1 1 1 4

PROJECT: Anderson Ranch | PREPARED BY: G. Hinds | REV. DATE: 7/7/78 (revision 1) | FIRST ISSUE: 11/30/77

CLIENT: Minerals Exploration Corp. | APPROVED BY: | SHEET: 16 of 69

A/C NO.	AREA: Mill Building / FACILITY	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	COSTS TOTAL
	Siding		8855	SF	0.035	309.9	21.18	0.74	0.95		6560	8410			14970
	Roofing		14112	SF	0.025	352.8	21.18	0.53	0.95		7470	13410			20880
	Grating & Supports		60.8	Ton	20	1216	21.18	424	1110		25750	67490			93240
	Steps		11.2	Ton	24	268.8	21.18	509	1400		5690	15680			21370
	Handrails		820	LF	0.48	393.6	21.18	10.17	13.70		8340	11230			19570
	Block Walls		15915	SF	0.03	477.5	16.70	0.55	0.80		7970	12730			20700
	Mandoors		28	Ea	8	224	18.36	147	350		4110	9800			13910
	Windows		3	Ea	8	24	18.36	147	75		440	230			670
	Fire Doors 8'x8'		3	Ea	12	36	18.36	220	1200		660	3600			4260
	Plumbing		11	Unit	5	55	19.18	90	250		1050	2750			3800
	Sheet Total					3357.6					68040	145330			213370

PROJECT NUMBER 1 1 1 4

REV. DATE 7/7/78 △1

PROJECT ANDERSON RANCH — PREPARED BY G. HINDS — FIRST ISSUE 11/30/77

CLIENT MINERALS EXPLORATION CORP. — APPROVED BY — SHEET 17 of 69

A/C NO.	AREA Mill Building	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	COSTS TOTAL
	FACILITY														
127	Overhead Crane														
	15/5 Ton 80' Span		1	Ea		200	17.95				3590		64590		68180
	Painting		Allow											7550	7550
	HVAC & Dust Coll. Duct		Allow											70560	70560
	Piping		Allow											20160	20160
	Electrical		Allow												
			13400	SF										105910	105910
	Boiler Pad														
	Struct Excav		85	CY	0.1	8.5	15.15	1.52			130				130
	Concrete		8	CY	4.6	36.8	15.75	72.–	55.–		580	440			1020
	Reinf		960	LB	0.01	9.6	21.18	0.21	0.21		200	200			400
	Struct Bkfl		53	CY	0.2	10.6	15.15	3.03			160				160
	Sheet Total					265.5					4660	640	64590	204180	274070

PROJECT NUMBER 1 1 1 4

PROJECT ANDERSON RANCH | PREPARED BY G. HINDS | REV. DATE 7/7/78 △1 | FIRST ISSUE 11/30/77

CLIENT MINERALS EXPLORATION CORP. | APPROVED BY | SHEET 18 of 69

A/C NO.	AREA Mill Building / FACILITY	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	COSTS TOTAL
	Block Walls		1380	SF	0^{03}	41^{4}	16^{70}	0^{50}	0^{80}		690	1100			1790
	Doors Double 4'x10'		2	EA	16	32	18^{36}	588	550		590	1100			1690
	Sheet Total					73^{4}					1280	2200			3480
	AREA TOTAL					20978					392890	498620	64590	204180	1,160280

PROJECT NUMBER 1 1 1 4

PROJECT: ANDERSON RANCH — PREPARED BY: G. HINDS — REV. DATE: 7/7/78 (Rev. 1) — FIRST ISSUE: 11/30/77

CLIENT: MINERALS EXPLORATION CORP. — APPROVED BY: — SHEET 19 of 69

AREA: 100 — ORE RECEIVING & GRINDING

FACILITY:

A/C NO.	AREA / FACILITY	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	TOTAL
	Ore Receiving Hopper														
	Struct. Excav.		360	CY	0.1	36	15.15	1.52			550				550
	Struct. Bkfl.		2398	CY	0.2	480	15.15	3.03			7270				7270
	Concrete														
	Slab		34	CY	4.6	156.4	15.75	72.-	48.-		2460	1630			4090
	Walls		121	CY	9.2	1132.2	15.75	145.-	85.-		17830	10290			28120
	Reinf		18600	LB	0.01	186	21.18	0.21	0.21		3940	3910			7850
	Grating & Supports		14.9	Ton	20	298	21.18	424.-	1110.-		6310	16540			22850
	Struct Steel		5	Ton	18	90	21.18	381	930.-		1910	4650			6560
	Siding		800	SF	0.035	28	21.18	0.74	0.95		590	760			1350
	Sheet Total					1974.6					30320	37780			72100

PROJECT NUMBER 1 1 1 4

PROJECT: ANDERSON RANCH
CLIENT: MINERALS EXPLORATION CORP.
PREPARED BY: G. HINDS
APPROVED BY:
REV. DATE: 7/7/78 △1
FIRST ISSUE: 11/30/77
SHEET: 20 of 69

AREA: 100 — ORE RECEIVING & GRINDING
FACILITY:

A/C NO.	Description	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	TOTAL
	ROOFING		400	SF	0.025	10	21.18	0.53	0.95		210	380			590
	STEPS		1.8	TON	24	43.2	21.18	508	1400		910	2520			3430
	HANDRAILS		30	LF	0.48	14.4	21.18	10.17	13.70		300	410			710
101	FRONT END LOADER											Kaiser 250,000			96,000 US
101A	3½ C.Y. ~ RUBBER TIRED		2	EA	30	60	19.62				1180		158100		159280
102	SURGE HOPPER - 100 TON														
	GRIZZLY		10.9	TON	30	327	21.18	635	930		6930	10140			17070
	HOPPER & SUPPORT		7.9	TON	45	355.5	21.18	953	1260		7530	9950			17480
	AR LINER PLATE		7.5	TON	20	150	21.18	424	1260		3180	9450			12630
103	APRON FEEDER														
	48"x 16' ~ HEAVY DUTY	12.3	1	EA		195	17.95				3500		36400		39900
	W/ 7½ HP MOTOR														
	Sheet Total					1155.1					23740	32850	194500		251090

PROJECT NUMBER 1 1 1 4

PROJECT Anderson Ranch | PREPARED BY G. Hinds | REV. DATE 7/7/78 △1

FIRST ISSUE 11/30/77

CLIENT Minerals Exploration Corp. | APPROVED BY | SHEET 21 of 69

AREA 100 Ore Receiving & Grinding

FACILITY

A/C NO.		WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	COSTS TOTAL
104	Belt Conveyor (48") w/15 HP Motor		304	LF											
	Struct Excav.		200	CY	0.1	20	15.15	1.52			300				300
	Struct Bkfl		2308	CY	0.2	469.6	15.15	3.03			7110				7110
	Concrete		55	CY	8	440	15.75	126.-	55.-		6930	3030			9960
	Reinf		3916	LB	0.01	39.2	21.18	0.21	0.21		830	820			1650
	Struct Steel		27.4	Ton	20	548	21.18	424.-	930.-		11610	25480			37090
	Chute Work		1.2	Ton	45	54	21.18	953.-	1260.-		1140	1510			2650
	Grating		2.7	Ton	20	54	21.18	424.-	1060.-		1140	2860			4000
	Siding		1415	SF	0.025	35.4	21.18	0.53	0.95		750	1340			2090
	8'ϕ Tunnel		150	LF	5	750	21.18	106.-	109.-		15890	16350			32240
	Conv. Components	14.6	Lot	3 LF		912	17.95				16370		55440		71810
	Sheet Total					3322.2					62070	51390	55440		168900

PROJECT NUMBER / / / 4

PROJECT: ANDERSON RANCH

PREPARED BY: G. HINDS

REV. DATE: 7/7/78 △1

FIRST ISSUE: 11/30/77

CLIENT: MINERALS EXPLORATION CORP.

APPROVED BY:

SHEET: 22 of 69

AREA: 100 — ORE RECEIVING & GRINDING

FACILITY:

A/C NO.		WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	TOTAL
105	BELT SCALE (48")	0^{18}	1	EA		298	17^{95}				5350		5420		10770
106	SEMIAUTOGENOUS														
	GRINDING MILL 16'ϕ x 5'														
	W/500 HP MOTOR	132^{5}	1	EA	22	2915	17^{95}				52320		520800		577120
107	SAG DISCHARGE PUMP														
	900 GAL. CAP		0^{8}	TON	45	36	21^{18}	953-	1260-		760	1010			1770
108	ROD MILL FEED PUMP														
109	HORIZ CENTRI - R.L														
	SS TRIM ~ 700 gpm	1^{6}	2	EA	20	40	17^{95}				720		6680		7400
	W/ 25 HP MOTOR EA														
110	TROMMEL OVERSIZE BELT														
	CONVEYOR No. 1 (18")		18	LF											
	W/5 HP MOTOR														
	STRUCT. STEEL		0^{95}	TON	18	17^{1}	21^{18}	381	930-		360	880			1240
	Sheet Total					3306^{1}					59510	1890	536900		598300

REV. DATE 7/7/78 △1

PROJECT ANDERSON RANCH PREPARED BY G. HINDS FIRST ISSUE 11/30/77

CLIENT MINERALS EXPLORATION CORP. APPROVED BY SHEET 23 of 69

A/C NO.	AREA 100 ORE RECEIVING & GRINDING / FACILITY	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	TOTAL
	CHUTE WORK		0^{9}	TON	45	40^{5}	21^{18}	508	1260		860	1130			1990
	CONVEYOR COMPONENTS	1^{6}	LOT		5LF	90	17^{95}				1620		4580		6200
111	TROMMEL OVERSIZE BELT														
	CONVEYOR NO. 2 (18")		64	LF											
	W/5 HP MOTOR														
	STRUCT. STEEL		9^{6}	TON	18	172^{8}	21^{18}	381	930		3660	8930			12590
	CHUTE WORK		0^{9}	TON	45	40^{5}	21^{18}	858	1260		860	1130			1990
	CONVEYOR COMPONENTS	2^{7}	LOT		5LF	320	17^{95}				5740		6460		12200
112	TRAMP IRON MAGNET														
	SELF CLEANING	1^{4}	1	EA		65	17^{95}				1170		5680		6850
	W/3 HP MOTOR														
113	ROD MILL 9^{5} ø x 16'	97^{5}	1	EA	22	2145	17^{95}				38500		336570		375070
	W/600 HP MOTOR														
	Sheet Total					2873^{8}					52410	11190	353290		416890

PROJECT NUMBER 1 1 1 4

REV. DATE 7/7/78 (1)
FIRST ISSUE 11/30/77

PROJECT ANDERSON RANCH — PREPARED BY G. HINDS

CLIENT MINERALS EXPLORATION CORP. — APPROVED BY — SHEET 24 of 69

A/C NO.	AREA 100 Ore Receiving & Grinding / FACILITY	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	TOTAL
114	Rod Mill Discharge														
	Pump ~ 1200 Gal Cap		1	Ton	45	49.5	21.18	953	1260		1050	1390			2440
115	Classifier Screen Feed														
116	Pump ~ Horiz. Centri														
	R.L. ~ SS Trim 700 gpm	1.6	2	Ea	20	40	17.95				720		6680		7400
	w/25 HP Motor Ea														
117	Classifier Screen														
	Sieve Bend Type - 6' wide	0.8	1	Ea		19	17.95				340		5610		5950
118	Sampling System														
	Complete 3 Stage	0.4	1	Ea		72	17.95				1290		7950		9240
	w/1 HP Motor														
119	Leach Feed Pump														
	1200 Gal Cap.		1	Ton	45	49.5	21.18	953	1260		1050	1390			2440
	Sheet Total					230					4450	2780	20240		27470

PROJECT NUMBER / / / 4

REV. DATE 7/7/78 △1

PROJECT Anderson Ranch PREPARED BY G. Hinds FIRST ISSUE 11/30/77

CLIENT Minerals Exploration Corp. APPROVED BY ______ SHEET 25 of 69

A/C NO.	AREA 100 Ore Receiving & Grinding / FACILITY	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	COSTS TOTAL
120	Leach Feed Pumps														
121	Horiz. Centri - R.L.	1^{6}	2	Ea	17	34	17^{95}				610		6260		6870
	S.S trim ~ 700 gpm														
	w/15 HP Motor Ea														
122	Density Flowmeter	0^{9}	1	Ea		190	17^{95}				3410		8020		11430
	Leach Feed														
123	Wet Scrubber														
	Ore Receiving Area	0^{8}	1	Ea		47	17^{95}				840		9250		10090
	6000 CFM ~ M.S. Const.														
	w/15 HP Motor														
124	Sump Pump - Ore														
125	Receiving & Grinding														
	Vert. Centri ~ R.L.	0^{5}	2	Ea	40	80	17^{95}				1440		3140		4580
	S.S Trim ~ 50 gpm														
	w/7.5 HP Motor Ea														
	Sheet Total					351					6300		26670		32970

PROJECT NUMBER 1 1 1 4

PROJECT: ANDERSON RANCH

CLIENT: MINERALS EXPLORATION CORP.

PREPARED BY: G. HINDS

APPROVED BY:

REV. DATE: 7/7/78 △1

FIRST ISSUE: 11/30/77

SHEET 26 of 69

AREA: 100 ORE RECEIVING & GRINDING

FACILITY:

A/C NO.	AREA / FACILITY	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	COSTS TOTAL
126	ROD MILL ROD CHARGER MACHINE	3.0	1	EA		93	17.95				1670		9150		10820
127	OVERHEAD CRANE	(INCL IN	MILL	BLDG)											-0-
127	SAG MILL LINER HANDLER W/15 HP MOTOR	4.3	1	EA		180	17.95				3230		50630		53860
	Sheet Total					273					4900		59780		64680
												Raised	773		1548
	AREA TOTAL					13385.8					247700	137880	1246820		1632400

PROJECT ANDERSON RANCH — PREPARED BY G. HINDS — REV. DATE 7/7/78 △1 — FIRST ISSUE 11/30/77

CLIENT MINERALS EXPLORATION CORP. — APPROVED BY — SHEET 27 of 69

A/C NO.	AREA 200 LEACHING / FACILITY	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	TOTAL
	LEACHING AREA PAD														
	STRUCT EXCAV		1377	CY	0.1	137.7	15.15	1.51			2090				2090
	STRUCT BKFL		535	CY	0.2	107.0	15.15	3.03			1620				1620
	CONCRETE PAD		271	CY	4.6	1246.6	15.75	72.-	48.50		19630	13140			32770
	REINF		24390	LB	0.01	243.9	21.18	0.21	0.21		5170	5120			10290
	CONCRETE TANK BEAMS		55	CY	7.5	412.5	15.75	118.-	85.-		6500	4680			11180
	REINF		6600	LB	0.015	99	21.18	0.32	0.21		2100	1390			3490
	CONCRETE RETAINING WALL		47	CY	10	470	15.75	158.-	85.-		7400	4000			11400
	REINF		9400	LB	0.015	141	21.18	0.32	0.21		2990	1970			4960
	SUMP GRATING		49	SF		2	21.18		3.00		40	150			190
	Sheet Total					2859.7					47540	30450			77990

PROJECT NUMBER 1 1 1 4

PROJECT: ANDERSON RANCH

CLIENT: MINERALS EXPLORATION CORP.

PREPARED BY: G. HINDS

APPROVED BY:

REV. DATE: 7/7/78 △1

FIRST ISSUE: 11/30/77

SHEET: 28 of 69

AREA: 200 LEACHING

FACILITY:

A/C NO.		WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	COSTS TOTAL
	12"x12" WOOD BEAMS		5184	BF	0^{02}	80	17^{78}	0^{36}	0^{65}		1420	3370			4790
	STEPS		3	TON	24	72	21^{18}	508	1400		1520	4200			5720
	GRATING & SUPPORTS		17^{4}	TON	20	348	21^{18}	424	1110		7370	19310			26680
	HANDRAILS		409	LF	0^{48}	196^{3}	21^{18}	10^{17}	13^{70}		4160	5600			9760
201-	ACID MIX TANKS														
202	22' ø x 26' MILD STEEL		27^{8}	TON	20	556	21^{18}	424	1260		11780	35030			46810
	RUBBER LINED		4355	SF						9^{00}				39200	39200
203-	LEACH TANKS														
206	20' ø x 22' MILD STEEL		42^{4}	TON	20	848	21^{18}	424	1260		17960	53420			71380
	RUBBER LINED		6786	SF						11^{20}				76000	76000
	Sheet Total					2100^{3}					44210	120930		115200	280340

PROJECT NUMBER 1 1 1 4

REV. DATE 7/7/78 △1

PROJECT ANDERSON RANCH — PREPARED BY G. HINDS — FIRST ISSUE 11/30/77

CLIENT MINERALS EXPLORATION CORP. — APPROVED BY ______ — SHEET 29 of 69

AREA 200 LEACHING

FACILITY

A/C NO.	AREA / FACILITY	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	COSTS TOTAL
207-	Agitators ~ Acid &														
212	Leach Tanks 316 SS	69-	6	EA		1035	17.95				18580		312480		331060
	w/ 150 HP Motor Ea														
213	Leach Discharge Sump														
	6' ø x 10' Mild Steel		1.1	TON	20	22	21.18	424	1260		470	1390			1860
	Rubber Lined		217	SF						9.00				1950	1950
214	Leach Discharge Pumps														
215	Horiz Centrifugal														
	R.L. SS Trim 750gpm	1.6	2	EA	20	40	17.95				720		6260		6980
	w/ 25 HP Motor Ea														
216	Wet Scrubber														
	5000 cfm ~ SS Const.	0.8	1	EA		182	19.18				3490		9060		12550
	w/ 15 HP Motor														
	Duct Work		Allow			260	19.18				4990	4800			9790
	Sheet Total					1539					28250	6190	327800	1950	364190

PROJECT NUMBER / / / 4

REV. DATE 7/7/78 △1

PROJECT ANDERSON RANCH PREPARED BY G. HINDS FIRST ISSUE 11/30/77

CLIENT MINERALS EXPLORATION CORP. APPROVED BY SHEET 30 of 69

A/C NO.	AREA 200 LEACHING	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	MATERIAL	Permanent Equipment	SUB. CONTR.	TOTAL
	FACILITY														
217	Sump Pump														
	Vert. Centrifugal	0.23	1	Ea	20	20	19.18				380		1580		1960
	R.L. ~ S.S. Trim														
	w/5 HP Motor														
	Sheet Total					20					380		1580		1960
	AREA TOTAL					6519					120380	157570	329380	117150	724480

PROJECT NUMBER / / / 4

PROJECT: ANDERSON RANCH

PREPARED BY: G. HINDS

REV. DATE: 7/7/78 △1

FIRST ISSUE: 11/30/77

CLIENT: MINERALS EXPLORATION CORP.

APPROVED BY:

SHEET 31 of 69

A/C NO.	AREA 300 C.C.D. / FACILITY	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	COSTS TOTAL
	C.C.D. THICKENERS ~ 190 DIA ~ 5 EA														
	STRUCT EXCAV		11910	CY						1.40				16670	16670
	COMPACTED BKFL.		8548	CY						3.30				28210	28210
	SEALER		78510	SF	0.005	392.6	13.67	0.07	0.20		5370	15700			21070
	CONCRETE														
	TANK RING		646	CY	9.2	5943.2	15.75	145.-	54.-		93610	34880			128490
	REINF STEEL		77520	LB	0.01	775.2	21.18	0.21	0.21		16420	16280			32700
	PADS		90	CY	4.6	414	15.75	72.-	48.-		6520	4320			10840
	REINF STEEL		10800	LB	0.01	108	21.18	0.21	0.21		2290	2270			4560
	ACCESS ROOM		167	CY	9.2	1536.4	15.75	145.-	85.-		24200	14190			38390
	REINF STEEL		20040	LB	0.01	200.4	21.18	0.21	0.21		4240	4210			8450
	Sheet Total					9369.5					152650	91850		44890	289390

PROJECT NUMBER 1 1 1 4

REV. DATE 7/7/78 1

PROJECT ANDERSON RANCH | PREPARED BY G. HINDS | FIRST ISSUE 11/30/77

CLIENT MINERALS EXPLORATION CORP. | APPROVED BY | SHEET 32 of 69

A/C NO.	AREA 300 C.C.D. / FACILITY	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	COSTS TOTAL
	TUNNELS		702	CY	11.5	8073	15.75	181.-	85.-		127150	59670			186820
	REINF STEEL		84240	LB	0.01	842.4	21.18	0.21	0.21		17840	17690			35530
	GRATING & SUPPORTS		75.5	TON	18	1359	21.18	381.-	1060.-		28780	80030			108810
	STAIRS		6.5	TON	24	156	21.18	508.-	1400.-		3300	9100			12400
	HANDRAILS		2170	LF	0.48	1041.6	21.18	10.17	13.70		22060	29730			51790
	STEEL TANKS		791	TON	16	12656	21.18	340.-	1260.-		268050	996660			1264710
326	1/2" RUBBER LINED BOTTOM		76970	SF						13.25				1019850	1019850
330															
	1/4" RUBBER LINED SIDES		26390	SF						9.00				237510	237510
	FLOC. STORAGE BLDG														
	STRUCT EXCAV.		24	CY	0.1	2.4	15.15	1.52			40				40
	Sheet Total					24130.4					467220	1192880		1257360	2917460

PROJECT NUMBER 1 1 1 4

REV. DATE 7/7/78 △1

PROJECT ANDERSON RANCH PREPARED BY G. HINDS FIRST ISSUE 11/30/77

CLIENT MINERALS EXPLORATION CORP. APPROVED BY SHEET 33 of 69

A/C NO.	AREA 300 C.C.D.	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	COSTS TOTAL
	FACILITY														
	CONCRETE		50	CY	4^{6}	230	15^{75}	73-	48-		3620	2400			6020
	REINF		6000	LB	0^{01}	60	21^{18}	0^{21}	0^{21}		1270	1260			2530
	STRUCT STEEL		5^{8}	TON	22	127^{6}	21^{18}	466-	930-		2700	5390			8090
	ROOFING		1085	SF	0^{025}	27^{1}	21^{18}	0^{53}	0^{95}		570	1030			1600
	SIDING		2460	SF	0^{035}	86^{1}	21^{18}	0^{74}	0^{95}		1820	2340			4160
	LIGHTING		957	SF						3^{00}				2870	2870
301	THICKENER FEED SUMP														
305	8'Ø x 8' M.S.		6^{4}	TON	20	128	21^{18}	424-	1260-		2710	8060			10770
	RUBBER LINED		1257	SF						9^{00}				11310	11310
306	THICKENER FEED PUMP														
315	HORIZ CENTRI. R.L.	25^{3}	10.	EA	31	310	17^{95}				5560		87600		93160
	SS TRIM ~ 2700 gpm														
	W/100 HP MOTOR EA														
	Sheet Total					968^{8}					18250	20480	87600	14180	140510

PROJECT NUMBER 1 1 1 4

PROJECT: ANDERSON RANCH | PREPARED BY: G. HINDS | REV. DATE: 7/7/78 (1) | FIRST ISSUE: 11/30/77

CLIENT: MINERALS EXPLORATION CORP. | APPROVED BY: | SHEET 34 of 69

AREA: 300 C. C. D.

FACILITY:

A/C NO.	AREA / FACILITY	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	COSTS TOTAL
316	MIX TANK 8'φ×8' M.S.		6.4	TON	20	128	21.18	424	1260		2710	8060			10770
320															
	RUBBER LINED		1257	SF						9.00				11310	11310
321	AGITATOR MIX TANKS														
325	RUBBER COVERED M.S.	4.5	5	EA		90	17.95				1620		19250		20870
	W/ 7½ HP MOTOR EA														
331	THICKENER MECHANISMS														
335	CENTER PIER TYPE	216.0	5	EA		5316	17.95				95420		872050		967470
	316 SS RAKE ARMS														
	W/ 5 & 1½ HP MOTOR EA														
336	THICKENER U'FLOW PUMP														
345	DIAPHRAGM ~ R.L.		10	EA	38.5	385	17.95				6910		214100		221010
	910 gpm ~ W/ 7½ HP MOTOR EA														
346	THICKENER U'FLOW STANDBY														
350	PUMPS ~ HORIZ. CENTRI ~		5.	EA	20	100	17.95				1800		20700		22500
	R.L. ~ SS TRIM 910 gpm														
	W/ 20 HP MOTORS EA														
	Sheet Total					6019					108460	8060	1126100	11310	1253930

PROJECT NUMBER 1 1 1 4

REV. DATE 7/7/78 △1

PROJECT Anderson Ranch | PREPARED BY G. Hinds | FIRST ISSUE 11/30/77

CLIENT Minerals Exploration Corp. | APPROVED BY | SHEET 35 of 69

AREA 300 C.C.D.

FACILITY

A/C NO.	AREA / FACILITY	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	COSTS TOTAL
351	Density Flowmeter														
355	Gamma Gauge Type	2^{8}	5	EA	190	950	17^{95}				17050		22800		39850
	w/ magnetic flowmeter														
356	No 1 Thickener O'Flow														
	Sump 8'Ø x 8' M.S.		1^{3}	Ton	20	26	21^{18}	424	1260		550	1640			2190
	Rubber Lined		251	SF						9^{00}				2260	2260
357	No. 1 Thickener O'Flow														
358	Sump Pump ~ R.L.														
	S.S. Trim ~ Horiz. Centri	1^{8}	2	EA	20	40	17^{95}				720		8940		9660
	1800 gpm w/ 20 HP Motor Ea														
359	Sampling System														
	Two Stage ~ Tailings	0^{3}	1	EA		78	17^{95}				1400		5430		6830
	w/ 1 HP Motor														
	Sheet Total					1094					19720	1640	37170	2260	60790

PROJECT NUMBER 1 1 1 4

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PROJECT	ANDERSON RANCH
CLIENT	MINERALS EXPLORATION CORP.
PREPARED BY	G. HINDS
APPROVED BY	
REV. DATE	7/7/78 △1
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SHEET	36 of 69

AREA 300 C. C. D.

FACILITY

A/C NO.	AREA / FACILITY	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	TOTAL
360	TAILINGS SUMP														
	8'φ x 8' M.S.		1^{3}	TON	20	26	21^{18}	424	1260		550	1640			2190
	RUBBER LINED		251	SF						9^{00}				2260	2260
361	SUMP PUMP – C.C.D. AREA														
	VERT. CENTRI – R.L.														
	S.S. TRIM 50 gpm	0^{2}	1	EA		40	17^{95}				720		1520		2240
	w/ 5 HP MOTOR														
	Sheet Total					66					1270	1640	1520	2260	6690
	AREA TOTAL					41648					767570	1316550	1252390	1332260	4,668,770

PROJECT NUMBER / / / 4

PROJECT: ANDERSON RANCH | PREPARED BY: G. HINDS | REV. DATE: 7/7/78 △1 | FIRST ISSUE: 11/30/77

CLIENT: MINERALS EXPLORATION CORP. | APPROVED BY: | SHEET: 37 of 69

AREA: 400 CLARIFICATION

FACILITY:

A/C NO.		WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	MATERIAL	Permanent Equipment	SUB. CONTR.	TOTAL
401	CLARIFIER TANK 70 ϕ x 18'														
	STRUCT EXCAV.		70	CY	0.1	7	15.15	1.52			110				110
	CONCRETE FNDS		60	CY	4.6	276	15.75	73.-	48.-		4350	2880			7230
	CONCRETE STRUCT.		21	CY	9.2	193.2	15.75	145.-	85.-		3040	1790			4830
	REINF		9720	LB	0.01	97.2	21.18	0.21	0.21		2060	2040			4100
	COMPACTED BKFL		720	CY	0.3	216	15.15	4.55			3270				3270
	SEALER		3849	SF	0.004	14	13.67	0.05	0.20		190	770			960
	STRUCT STEEL		6.1	TON	18	109.8	21.18	381.-	930.-		2330	5670			8000
	GRATING & SUPPORTS		13.8	TON	20	276	21.18	424.-	1110.-		5850	15320			21170
	STAIRS		2.3	TON	24	55.2	21.18	508.-	1400.-		1170	3220			4390
	HANDRAILS		502	LF	0.48	241	21.18	10.17	13.70		5100	6880			11980
	Sheet Total					1625					27470	38570			66040

PROJECT NUMBER 1 1 1 4

PROJECT ANDERSON RANCH PREPARED BY G. HINDS REV. DATE 7/7/78 △1 FIRST ISSUE 11/30/77

CLIENT MINERALS EXPLORATION CORP. APPROVED BY SHEET 38 of 69

A/C NO.	AREA 400 CLARIFICATION	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	MATERIAL	Permanent Equipment	SUB. CONTR.	TOTAL
	FACILITY														
402	CLARIFIER MECHANISM														
	316 SS W/6 - TOTAL HP	17.5	1	EA		769	17.95				13720		69880		83600
403	CLARIFIER U'FLOW PUMP														
	R.L. ~ SS TRIM ~ 20 gpm	0.15	1	EA		20	17.95				360		1860		2220
	W/3 HP MOTOR														
404	SAND FILTER FEED PUMP														
405	HORIZ. CENTRI ~ R.L.	2.3	2	EA	28	56	17.95				1010		11340		12350
	SS trim ~ 1800 gpm														
	W/60 HP MOTOR EA														
406	SAND FILTERS 11Ø x 6'														
408	M.S. ~ RUBBER COVERED	80.0	1	EA		560	17.95				10050		194110		204160
	SKID MOUNTED														
	FILTER FOUNDATION														
	STRUCT EXC.		78	CY	0.1	7.8	15.15	1.52			120				120
	Sheet Total					1407.8					25260		277190		302450

PROJECT NUMBER 1 1 1 4

REV. DATE 7/7/78 △1

PROJECT ANDERSON RANCH — PREPARED BY G. HINDS — FIRST ISSUE 11/30/77

CLIENT MINERALS EXPLORATION CORP. — APPROVED BY — SHEET 39 of 69

AREA 400 CLARIFICATION

FACILITY

A/C NO.		WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	TOTAL
	CONCRETE		9	CY	4^{6}	41^{9}	15^{75}	73^{-}	42^{-}		650	380			1030
	REINF		1080	LB	0^{01}	10^{8}	21^{18}	0^{21}	0^{21}		230	230			460
	STRUCT BKFL		49	CY	0^{2}	9^{8}	15^{15}	3^{03}			150				150
409	PREGNANT SOLUTION TANK 50Ø x 28' M.S.														
	STRUCT EXCAV.		35	CY	0^{1}	3^{5}	15^{15}	1^{52}			50				50
	CONCRETE		12	CY	9^{2}	110^{4}	15^{75}	145^{-}	65^{-}		1740	780			2520
	REINF STEEL		1440	LB	0^{01}	14^{4}	21^{18}	0^{21}	0^{21}		300	300			600
	STRUCT BKFL		73	CY	0^{2}	14^{6}	15^{15}	3^{03}			220				220
	STEEL TANK		53^{1}	TON	18	955^{8}	21^{18}	381^{-}	1260^{-}		20200	66910			87150
	RUBBER LINED		8325	SF						9^{00}				74930	74930
	Sheet Total					1160^{7}					23580	68600		74930	167110

PROJECT NUMBER 1 1 1 4

REV. DATE 7/7/78 △1

PROJECT ANDERSON RANCH — PREPARED BY G. HINDS — FIRST ISSUE 11/30/77

CLIENT MINERALS EXPLORATION CORP. — APPROVED BY ________ — SHEET 40 of 69

A/C NO.	AREA 400 CLARIFICATION	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	MATERIAL	Permanent Equipment	SUB. CONTR.	TOTAL
	FACILITY														
410	SAND FILTER BACKWASH														
411	PUMP ~ HORIZ. CENTRI														
	R.L. ~ SS TRIM ~ 1000 gpm	2^3	2	EA	30	60	17^{95}				1080		11340		12420
	W/ 75 HP MOTOR EA														
412	SX EXTRACTION FEED PUMP														
413	HORIZ. CENTRI ~ R.L.														
	SS TRIM ~ 1800 gpm	2^3	2	EA	23	46	17^{95}				830		8840		9670
	W/ 30 HP MOTOR EA														
403A	FLOWMETER		1	EA		190	17^{95}				3410		4640		8050
	Sheet Total					296					5320		24820		30140
	AREA TOTAL					4490					81630	107170	302010	74930	565740

PROJECT NUMBER / / / 4

REV. DATE 7/7/78 △1

PROJECT Anderson Ranch PREPARED BY G. Hinds FIRST ISSUE 11/30/77

CLIENT Minerals Exploration Corp. APPROVED BY SHEET 41 of 69

A/C NO.	AREA 500 Solvent Extraction	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	TOTAL
	FACILITY														
	Solvent Extraction Area Pad														
	Struct Excav.		1293	CY	0.1	129.3	15.15	1.52			1960				1960
	Struct Bkfl.		857	CY	0.2	171.4	15.15	3.03			2600				2600
	Concrete														
	Slab		560	CY	4.6	2576	15.75	73.-	48.50		40570	27160			67730
	Reinf		67200	LB	0.01	672	21.18	0.21	0.21		14230	14110			28340
503-6	S-X Tanks		294	CY	10	2940	15.75	158.-	85.-		46310	24990			71300
527-30	Reinf		35280	LB	0.015	529.2	21.18	0.32	0.21		11210	7410			18620
	Wood Covering		9200	SF	0.02	184	18.36	0.37	0.42		3380	3860			7240
	Wood Walkways		2063	SF	0.02	41.3	18.36	0.37	0.42		760	870			1630
	Walkway Steel Framing		10.7	Ton	20	214	21.18	424	1110.-		4530	11880			16410
	Sheet Total					7457.2					125550	90280			215830

PROJECT NUMBER 1 1 1 4

REV. DATE 7/7/78 △1

PROJECT ANDERSON RANCH PREPARED BY G. HINDS FIRST ISSUE 11/30/77

CLIENT MINERALS EXPLORATION CORP. APPROVED BY SHEET 42 of 69

A/C NO.	AREA 500 SOLVENT EXTRACTION	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	TOTAL
	FACILITY														
	STAIRS		3^{1}	TON	24	74^{4}	21^{18}	508-	1400-		1580	4340			5920
	HANDRAILS		1027	LF	0^{48}	493	21^{18}	10^{17}	13^{70}		10440	14070			24510
503-06 527-30	S-X TANK LINING		15680	SF						13^{50}				211680	211680
501	SAMPLING SYSTEM														
	S-X FEED SINGLE STAGE	0^{01}	1	EA		39	17^{95}				700		1850		2550
502	FLOWMETER ~ S-X FEED														
	MAGNETIC TYPE	0^{07}	1	EA		190	17^{95}				3410		6410		9820
507-	AGITATORS, EXTRACTION														
510-	MIXERS 316 S.S.	5^{2}	4	EA	20	80	17^{95}				1440		31800		33240
	W/10 HP MOTOR EA														
511	RAFFINATE FEED PUMP														
512	HORIZ CENTRIFUGAL	2^{4}	2	EA	20	40	17^{95}				720		12560		13280
	316 S.S. ~ 1800 gpm														
	W/25 HP MOTOR EA														
	Sheet Total					916^{4}					18290	18410	52620	211680	301000

PROJECT NUMBER 1 1 1 4

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REV. DATE 7/7/78 △1

PROJECT ANDERSON RANCH

PREPARED BY G. HINDS

FIRST ISSUE 11/30/77

CLIENT MINERALS EXPLORATION CORP.

APPROVED BY

SHEET 43 of 69

A/C NO.	AREA 500 Solvent Extraction	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	TOTAL
	FACILITY														
513	Sampling System														
	Raffinate Single Stage	0.01	1	EA		39	17.95				700		1850		2550
	w/1 HP Motor														
514	Raffinate Tank														
	65 ø x 12' M.S.														
	Struct Excav		42	CY	0.1	4.2	15.15	1.52			60				60
	Concrete		14	CY	9.2	128.8	15.75	145.-	85.-		2030	1190			3220
	Reinf		1680	LB	0.01	16.8	21.18	0.21	0.21		360	350			710
	Struct Bkfl		105	CY	0.2	21	15.15	3.03			320				320
	Steel Tank		57.9	TON	18	1002.2	21.18	381.-	1260.-		22070	72950			95020
	FRP Lined		9087	SF						8.00				72700	72700
	Sheet Total					1252					25540	74490	1850	72700	174580

PROJECT NUMBER 1 1 1 4

PROJECT: ANDERSON RANCH
PREPARED BY: G. HINDS
REV. DATE: 7/7/78 △1
FIRST ISSUE: 11/30/77
CLIENT: MINERALS EXPLORATION CORP.
APPROVED BY:
SHEET 44 of 69

A/C NO.	AREA 500 SOLVENT EXTRACTION	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	MATERIAL	Permanent Equipment	SUB. CONTR.	TOTAL
	FACILITY														
515	RAFFINATE TANK														
516	DISCHARGE PUMP-316 SS	2^{4}	2	EA	20	40	17^{95}				720		12560		13280
	1800 gpm w/25 HP Motor														
517	FLOWMETER ~ RAFFINATE	0^{07}	2	EA	190	380	17^{95}				6820		12680		19500
517A	MAGNETIC TYPE														
518	PREGNANT ORGANIC														
519	FEED PUMPS 316 SS	0^{6}	2	EA	10	20	17^{95}				360		11320		11680
	VERT CENTRIFUGAL														
	220 gpm w/5 HP Motor Ea														
520	PREGNANT ORGANIC TANK														
	18' ø x 14' MS		6^{7}	TON	20	134	21^{18}	424	1260		2840	8440			11280
	FRP LINED		1300	SF						10^{50}				13650	13650
521	PREG. ORGANIC TANK														
522	DISCHARGE PUMP	0^{5}	2	EA	10	20	17^{95}				360		3140		3500
	HORIZ. CENTRIF 316 SS														
	220 gpm w/5 HP Motor Ea														
	Sheet Total					594					11100	8440	39700	13650	72890

PROJECT NUMBER / / / 4

PROJECT: Anderson Ranch
PREPARED BY: G. Hinds
REV. DATE: 7/7/78 △1
FIRST ISSUE: 11/30/77
CLIENT: Minerals Exploration Corp.
APPROVED BY:
SHEET: 45 of 69

AREA: 500 Solvent Extraction
FACILITY:

A/C NO.	AREA / FACILITY	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	COSTS TOTAL
523	Preg. Organic Bleed														
	Off Pump 316 SS														
	Horiz. Centri ~ 20gpm	0^{12}	1	Ea	10	10	17^{95}				180		1220		1400
	w/ 1 HP Motor														
524	Heat Exchanger														
	Preg. Organic ~														
	Impervious block		1	Ea	12	12	17^{95}				220		4250		4470
	graphite ~ Steam														
525	Sampling System														
	Preg. Organic, Single	0^{01}	1	Ea	39	39	17^{95}				700		1050		1750
	Stage-														
526	Flowmeter														
	Preg. Organic	0^{04}	1	Ea		190	17^{95}				3410		4650		8060
	Magnetic Type														
531	Agitators, Stripping	2^{5}	4	Ea	20	80	17^{95}				1440		16400		17840
534	Mixers 316 SS														
	w/ 3 HP Motor Ea														
	Sheet Total					331					5950		27570		33520

PROJECT NUMBER / / / 4

REV. DATE 7/7/78 △1

PROJECT Anderson Ranch | PREPARED BY G. Hinds | FIRST ISSUE 11/30/77

CLIENT Minerals Exploration Corp. | APPROVED BY | SHEET 46 of 69

A/C NO.	AREA 500 Solvent Extraction / FACILITY	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	TOTAL
535	Barren Organic Feed														
537	Pump – Vert. Centri –	0^{9}	3	Ea	20	60	17^{95}				1080		16980		18060
	316 SS – 220 gpm														
	w/ 5 HP Motor Ea														
538	Sampling System														
	Barren Organic	0^{01}	1	Ea		39	17^{95}				700		1850		2550
	Single Stage														
539	See Concrete Tanks		~												~
540	Agitator Regeneration														
	Mixer 316 SS	0^{6}	1	Ea	20	20	17^{95}				360		4110		4470
	w/ 3 HP Motor														
541	Regeneration Aqueous														
	Discharge Pump –														
	Vert. Centri. – 316 SS	0^{3}	1	Ea		10	17^{95}				180		4510		4690
	10 gpm w/ 1 HP Motor														
	Sheet Total					129					2320		27450		29770

PROJECT NUMBER 1 1 1 4

REV. DATE 7/7/78 △1

PROJECT ANDERSON RANCH PREPARED BY G. HINDS FIRST ISSUE 11/30/77

CLIENT MINERALS EXPLORATION CORP. APPROVED BY SHEET 47 of 69

A/C NO.	AREA 500 SOLVENT EXTRACTION / FACILITY	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	COSTS TOTAL
542	BARREN ORGANIC TANK														
	18'ø x 14' M.S.		6.7	TON	20	134	21.18	424	1260		2840	8440			11280
	FRP LINED		1300	SF						10.50				13650	13650
543	BARREN ORGANIC														
544	TANK DISCHARGE														
	PUMP ~ 316 SS ~ 220 gpm	0.5	2	EA	10	20	17.95				360		4440		4800
	W/5 HP MOTOR EA														
545	BARREN ORGANIC TANK														
	BLEED OFF PUMP	0.1	1	EA		10	17.95				180		1220		1400
	HORIZ-CENTRI ~ 316 SS														
	20 gpm W/1 HP MOTOR														
546	FLOWMETER														
	BARREN ORGANIC	0.04	1	EA		190	17.95				3410		4630		8040
	MAGNETIC TYPE														
547	BARREN ORGANIC SLUDGE		12.5	TON	18	225	21.18	381	1260		4770	15750			20520
	TANK 24'ø x 20' MS														
	Sheet Total					579					11560	24190	10290	13650	59690

PROJECT NUMBER 1 1 1 4

PROJECT ANDERSON RANCH

CLIENT MINERALS EXPLORATION CORP.

PREPARED BY G. HINDS

APPROVED BY

REV. DATE 7/7/78 △1

FIRST ISSUE 11/30/77

A/C NO.	AREA 500 SOLVENT EXTRACTION / FACILITY	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	MATERIAL	Permanent Equipment	SUB. CONTR.	TOTAL
	FRP LINED		1960	SF						10^{50}				20580	20580
548	AGITATOR ORGANIC														
	SLUDGE TANK	6^{0}	1	EA		24	17^{95}				430		24310		24740
	316 SS W/40 HP MOTOR														
549	ORGANIC SLUDGE TANK														
	SUPERNATANT CRUD PUMP														
	HORIZ. CENTRI ~ 316 SS	0^{6}	1	EA		10	17^{95}				180		1220		1400
	30 gpm W/1 HP MOTOR														
550	SAMPLING SYSTEM														
	SUPERNATANT CRUD &														
	REGENERATION AQUEOUS	0^{01}	1	EA		39	17^{95}				700		1850		2550
	DISCHARGE ~ SINGLE STAGE														
551	ORGANIC SLUDGE TANK														
	DISCHARGE PUMP														
	HORIZ. CENTRI ~ 316 S.S.	0^{6}	1	EN		10	17^{95}				180		1220		1400
	30 gpm W/1 HP MOTOR														
	Sheet Total					83					1090		28600	20580	50270

PROJECT NUMBER 1 1 1 4

PROJECT	ANDERSON RANCH	PREPARED BY	G. HINDS
CLIENT	MINERALS EXPLORATION CORP.	APPROVED BY	
REV. DATE	7/7/78 △1	FIRST ISSUE	11/30/77
SHEET	49 of 69		

A/C NO.	AREA 500 Solvent Extraction / FACILITY	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	COSTS TOTAL
552	Pregnant Strip Sol.														
553	Feed Pump - 316 SS	0^{5}	2	Ea	10	20	17^{95}				360		8980		9340
	Vert. Centri - 30 gpm														
	w/ 1 HP Motor Ea														
554	Sampling System														
	Preg. Strip Solution	0^{01}	1	Ea		39	17^{95}				700		1850		2550
	Single Stage														
555	Sump Pump -														
556	Stripping & Extraction														
	Area - Vert. Centri -	0^{5}	2	Ea	20	40	17^{95}				720		9060		9780
	316 SS - 50 gpm														
	w/ 2 HP Motor Ea														
	Sheet Total					99					1780		19890		21670
	AREA TOTAL					11441					203580	215810	207970	332260	959620

PROJECT NUMBER 1 1 1 4

REV. DATE 7/7/78 △1

PROJECT ANDERSON RANCH PREPARED BY G. HINDS FIRST ISSUE 11/30/77

CLIENT MINERALS EXPLORATION CORP. APPROVED BY SHEET 50 of 69

A/C NO.	AREA 600 Y.C. PRECIPITATION & WASHING / FACILITY	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	MATERIAL	Permanent Equipment	SUB. CONTR.	TOTAL
601	HEAT EXCHANGER														
	PREG. STRIP SOLUTION		1	EA	12	12	17.95				220		3050		3270
602	Y.C. PRECEIPITATION TANK														
603	5'φ x 6' M.S.		1.2	TON	10	12	21.18	212	1260		250	1510			1760
	FRP LINED		228	SF						10.50				2390	2390
604	AGITATORS, Y.C. PRECIP.														
605	TANKS ~ 316 SS	1.1	2	EA	20	40	17.95				720		5060		5780
	W/ 5 HP MOTOR														
606	Y.C. THICKENER														
	18'φ x 5' M.S.		4.1	TON	20	82	21.18	424	1260		1740	5170			6910
	STRUCT STEEL		2.1	TON	40	41	21.18	847	930		870	1950			2820
	FRP LINED		538	SF						10.50				5650	5650
	Sheet Total					187					3800	8630	8110	8040	28580

PROJECT NUMBER 1 1 1 4

PROJECT Anderson Ranch

CLIENT Minerals Exploration Corp.

PREPARED BY G. Hinds

APPROVED BY

REV. DATE 7/7/78 △1

FIRST ISSUE 11/30/77

AREA 600 Y.C. Precipitation & Washing

FACILITY

A/C NO.	AREA / FACILITY	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L	COST/UNIT SUB. CONTR.	COSTS LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	COSTS TOTAL
607	Y.C. Thickener														
	Mechanism – 316 SS	2^{3}	1	EA	41	94	17^{95}				1690		17240		18930
	w/ 1½ Motor														
608	Y.C. Thickener U'Flow Pump														
	Air Operated Diaphragm	0^{2}	1	EA		8	17^{95}				140		1740		1880
	Hypalon Lined 1 gpm														
609	Flowmeter – Y.C. U'Flow														
	Magnetic Type	0^{03}	1	EA		190	17^{95}				3410		4090		7500
	Tantalum Electrodes														
	w/ trans & recorder														
610	Y.C. Thickener U'Flow														
	Tank 8'ϕ x 8' M.S.		1^{3}	TON	10	13	21^{18}	212-	1260		280	1640			1920
	FRP Lined		251	SF						10^{50}				380	380
	Sheet Total					305					5520	1640	23070	380	30610

PROJECT NUMBER 1 1 1 4

REV. DATE 7/7/78 ⚠1

PROJECT ANDERSON RANCH PREPARED BY G. HINDS FIRST ISSUE 11/30/77

CLIENT MINERALS EXPLORATION CORP. APPROVED BY SHEET 52 of 69

AREA 600 Y.C. PRECIPITATION & WASHING

FACILITY

A/C NO.	AREA / FACILITY	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	MATERIAL	Permanent Equipment	SUB. CONTR.	TOTAL
611	AGITATOR, YC U'FLOW TANK														
	316 SS ~ W/7.5 HP MOTOR	0^{9}	1	EA		20	17^{95}				360		3850		4210
612	Y.C. CENTRIFUGE FEED														
	PUMP W/1 HP MOTOR	0^{14}	1	EA		10	17^{95}				180		1860		2040
613	UNCLARIFIED BARREN														
	STRIP SOLUTION TANK														
	8'ø x 8' M.S.		1^{5}	TON	10	15	21^{18}	222	1260		320	1890			2210
	FRP LINED		302	SF						10^{50}				3170	3170
614	BARREN STRIP SAND														
615	FILTER FEED PUMP														
	HORIZ. CENTRI ~ 316 SS	0^{5}	2	EA	20	40	17^{95}				720		1210		1930
	30 gpm W/5 HP MOTOR EA														
616	BARREN STRIP SAND														
	FILTER 2'ø M.S.	1^{2}	1	EA		16	17^{95}				290		22750		23040
	RUBBER LINED W/ SKID														
	Sheet Total					101					1870	1890	29670	3170	36600

PROJECT NUMBER 1 1 1 4

PROJECT ANDERSON RANCH
PREPARED BY G. HINDS
REV. DATE 7/7/78 △1
FIRST ISSUE 11/30/77
CLIENT MINERALS EXPLORATION CORP.
APPROVED BY
SHEET 53 of 69

A/C NO.	AREA 600 Y.C. PRECIPITATION & WASHING / FACILITY	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	MATERIAL	Permanent Equipment	SUB. CONTR.	TOTAL
617	CLARIFIED BARREN STRIP														
	SOLUTION TANK														
	8' ϕ x 8' M.S.		15	TON	10	15	21.18	222	1260		320	1890			2210
	FRP LINED		302	SF						10.50				3170	3170
618	BARREN STRIP FEED PUMP														
619	HORIZ-CENTRI 316 SS	0.12	2	EA	10	20	17.95				360		2460		2820
	30 gpm w/ 1 HP MOTOR														
620	FLOWMETER ~ BARREN														
	STRIP FEED SOLUTION	0.03	1	EA		190	17.95				3410		4090		7500
	MAGNETIC TYPE														
	w/ trans & recorder														
621	SAMPLING SYSTEM														
	BARREN STRIP FEED	0.01	1	EA		39	17.95				700		1860		2560
	SOLUTION ~ SINGLE STAGE														
	Sheet Total					264					4790	1890	8410	3170	18260

PROJECT NUMBER 1 1 1 4

PROJECT: ANDERSON RANCH PREPARED BY: G. HINDS REV. DATE: 7/7/78 (rev. 1)

FIRST ISSUE: 11/30/77

CLIENT: MINERALS EXPLORATION CORP. APPROVED BY: SHEET 54 of 69

AREA: 600 — Y.C. PRECIPITATION & WASHING

FACILITY:

A/C NO.	Description	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	COSTS TOTAL
622	FLOWMETER, BARREN STRIP BLEED OFF SOLUTION ~ MAGNETIC TYPE ~ W/TRANS & recorder	0.03	1	EA		190	17.95				3410		4090		7500
623	SAMPLING SYSTEM BARREN STRIP BLEED OFF SOLUTION ~ SINGLE STAGE	0.01	1	EA		39	17.95				700		1860		2560
624	SAND FILTER BACKWASH PUMP ~ HORIZ CENTRI 316 SS ~ 30 gpm W/3 HP MOTOR	0.12	1	EA		10	17.95				180		1250		1430
625	BACKWASH SURGE TANK 4'ø x 4' M.S.		0.4	TON	10	4	21.18	222	1260		80	500			580
	FRP LINED		75	SF						10.50				780	780
	Sheet Total					203					4370	500	7200	780	12850

PROJECT NUMBER: 1 1 1 4

REV. DATE 7/7/78 △1

PROJECT ANDERSON RANCH PREPARED BY G. HINDS FIRST ISSUE 11/30/77

CLIENT MINERALS EXPLORATION CORP. APPROVED BY SHEET 55 of 69

AREA 600 Y.C. PRECIPITATION & WASHING

FACILITY

A/C NO.	AREA / FACILITY	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	COSTS TOTAL
626	Y.C. CENTRIFUGE 316 SS														
	W/ 20 HP MOTOR	0.6	1	EA		54	17.95				970		30090		31060
627	Y.C. SCREW CONVEYOR														
	to DRYER 316 S.S.	0.15	1	EA		16	17.95				290		2030		2320
	W/ 1 HP MOTOR														
628	Y.C. DRYER														
	MULTIPLE HEARTH TYPE	22.5	1	EA	21	473	17.95				8490		144420		152910
	W/ 20 HP MOTOR														
629	Y.C. ROLL CRUSHER	1.0	1	EA		48	17.95				860		9320		10180
	W/ 10 HP MOTOR														
630	Y.C. STORAGE BIN														
	275 c.f. - 7ϕ CONICAL		0.5	TON	45	23	21.18	548	1260		490	630			1120
	BOTTOM - M.S. CONST														
631	DRUM VIBRATOR		1	EA		8	17.95				140		970		1110
	ELECTRIC TYPE														
	Sheet Total					622					11240	630	186830		198700

PROJECT NUMBER 1 1 1 4

PROJECT: Anderson Ranch
PREPARED BY: G. Hinds
REV. DATE: 7/7/78 △1
FIRST ISSUE: 11/30/77
CLIENT: Minerals Exploration Corp.
APPROVED BY:
SHEET 56 of 69

AREA: 600 Y.C. Precipitation & Washing
FACILITY:

A/C NO.		WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	COSTS TOTAL
632	Y.C. Platform Scales		1	Ea		32	17^{95}				570		8970		9540
633	Roller Conveyor														
	20" x 120' Heavy Duty	0^{15}	1	Ea		240	17^{95}				4310		6560		10870
	w/ 1 HP Motor														
634	Wet Scrubber														
	Y.C. Precip, Thickener														
	& Centrifuge Area	0^{53}	1	Ea		42	17^{95}				750		6870		7620
	3000 CFM 316SS Const														
	w/10 HP Motor														
635	Wet Scrubber – 1200 CFM														
	Y.C. Drying – 316 SS Const	0^{53}	1	Ea		37	17^{95}				660		6420		7080
	w/ 5 HP Motor														
636	Wet Scrubber – 1200 CFM														
	Y.C. Packing – 316 SS Const.	0^{53}	1	Ea		37	17^{95}				660		6420		7080
	w/ 5 HP Motor														
	Sheet Total					388					6950		35240		42190

PROJECT NUMBER 1 1 1 4

PROJECT: Anderson Ranch

PREPARED BY: G. Hinds

REV. DATE: 7/7/78 △1

FIRST ISSUE: 11/30/77

CLIENT: Minerals Exploration Corp.

APPROVED BY:

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A/C NO.	AREA 600 Y.C. Precipitation & Washing / FACILITY	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	MATERIAL	Permanent Equipment	SUB. CONTR.	TOTAL
	Scrubber Duct Work		Allow			95	21.18				2010	6000			8010
637	Sump Pump ~ 316 S.S.														
638	Vert. Centri ~ 30 gpm	0.54	2	Ea	20	40	17.95				720		9020		9740
	w/1 HP Motor Ea														
	Sheet Total					135					2730	6000	9020		17750
	AREA TOTAL					2205					41270	21180	307550	15540	385540

PROJECT NUMBER / / / 4

PROJECT: ANDERSON RANCH

CLIENT: MINERALS EXPLORATION CORP.

PREPARED BY: G. HINDS

APPROVED BY:

REV. DATE: 7/7/78 △1

FIRST ISSUE: 11/30/77

SHEET 58 of 69

AREA: 700 REAGENT HANDLING

FACILITY:

A/C NO.	AREA / FACILITY	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	COSTS TOTAL
701	SULFURIC ACID TANKS														
702	65'φ x 30' M.S.		2	EA											
	BERM EMBANKMENT		2053	CY						2^{40}				4930	4930
	BERM LINING		24000	SF	0^{004}	96.	13^{67}	0^{05}	0^{30}		1310	7200			8510
	STRUCT EXCAV		90	CY	0^{1}	9	15^{15}	1^{52}			140				140
	CONCRETE		30	CY	11^{5}	345	15^{75}	181.-	58.-		5430	1740			7170
	REINF		3600	LB	0^{01}	36	21^{18}	0^{21}	0^{21}		760	760			1520
	STRUCT BKFL		245	CY	0^{2}	49	15^{15}	3^{03}			740				740
	STEEL TANKS 3/8" R		195	TON	20	3900	21^{18}	424.-	1260.-		82600	245700			328300
703	ACID TRANSFER PUMP														
704	HORIZ. CENTRI - C.I.	0^{5}	2	EA	20	40	17^{95}				720		2440		3160
	70 gpm w/ 5 HP Motor EA														
	Sheet Total					4475					91700	255400	2440	4930	354470

PROJECT NUMBER 1 1 1 4

REV. DATE 7/7/78 (1)

PROJECT Anderson Ranch — PREPARED BY G. Hinds — FIRST ISSUE 11/30/77

CLIENT Minerals Exploration Corp. — APPROVED BY ______ — SHEET 59 of 69

AREA 700 Reagent Handling

FACILITY

A/C NO.	Description	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	MATERIAL	Permanent Equipment	SUB. CONTR.	TOTAL
705	Sodium Chlorate Tank														
	24'ϕ x 16" M.S.														
	Struct Excav		20	CY	0.1	2	15.15	1.52			30				30
	Concrete		6	CY	11.5	23	15.75	181.-	58.-		360	350			710
	Reinf Steel		720	LB	0.01	7.2	21.18	0.21	0.21		150	150			300
	Struct Bkfl.		20	CY	0.2	4	15.15	3.03			60				60
	Steel Tank		13.5	Ton	20	270	21.18	424.-	1260		5720	17010			22730
	Phenolic Lining		2111	SF						10.50				22170	22170
706	Sodium Chlorate														
707	Metering Pump		2	EA	10	20	17.95				360		6560		6920
	C.I. 10 gpm w/2 HP Motor														
708	Reagent Area Sump Pump	0.3													
	Vert Centri ~ 316 SS		1	EA	20	20	17.95				360		4560		4920
	50 gpm ~ 2 HP Motor														
	Sheet Total					346.2					7040	17510	11120	22170	57840

PROJECT NUMBER 1 1 1 4

PROJECT: ANDERSON RANCH

CLIENT: MINERALS EXPLORATION CORP.

PREPARED BY: G. HINDS

APPROVED BY:

REV. DATE: 7/7/78 △1

FIRST ISSUE: 11/30/77

SHEET: 60 of 69

AREA: 700 REAGENT HANDLING

FACILITY:

A/C NO.	AREA / FACILITY	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	COSTS TOTAL
709	FLOCCULANT STORAGE TANK														
710	24'φ x 16' MTS		2	EA											
	STRUCT EXCAV.		40	CY	0.1	4	15.15	1.52			60				60
	CONCRETE		12	CY	11.5	138	15.75	181-	58-		2170	700			2870
	REINF		1400	LB	0.01	14.4	21.18	0.21	0.21		300	300			600
	STRUCT BKFL.		40	CY	0.2	8	15.15	3.03			120				120
	STEEL TANK		27.0	TON	20	540	21.18	424-	1260		11440	34020			45460
711	FLOCCULANT VIBRATING FEEDER 250#/HR	0.01	1	EA	8	8	17.95				140		250		390
712	FLOCCULANT TRANSFER PUMP - HORIZ. CENTRI C.I. 150 GPM W/ 15 HP MOTOR	1.1	1	EA	20	20	17.95				360		5290		5650
	Sheet Total					732.4					14590	35020	5540		55150

PROJECT NUMBER: 1 1 1 4

PROJECT: ANDERSON RANCH

PREPARED BY: G. HINDS

REV. DATE: 7/7/78 △1

FIRST ISSUE: 11/30/77

CLIENT: MINERALS EXPLORATION CORP.

APPROVED BY:

SHEET: 61 of 69

AREA: 700 REAGENT HANDLING

FACILITY:

A/C NO.	AREA / FACILITY	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	TOTAL
713	FLOCCULANT METERING														
714	PUMPS - MS - 50 gpm	1.0	2	EA	12	24	17.95				430		5660		6090
	w/ 5 HP MOTOR EA														
715	GLUE PREPARATION TANKS														
716	8'φ x 10' MS OPEN TOP		2	EA											
	CONCRETE		7	CY	11.5	80.5	15.75	181.–	58.–		1270	410			1680
	REINF		840	LB	0.01	8.4	21.18	0.21	0.21		180	180			360
	STEEL TANKS		3.8	TON	30	114	21.18	635.–	1260.–		2410	4790			7200
717	GLUE SOLUTION PUMP														
	MS - 30 gpm	0.5	1	EA	15	15	17.95				270		2430		2700
	w/ 3 HP MOTOR														
718	GLUE SOLUTION METERING														
719	PUMP 5 gpm	0.9	2	EA	10	20	17.95				360		2200		2560
	w/ 1 HP MOTOR														
	Sheet Total					261.9					4920	5380	10290		20590

PROJECT NUMBER: 1 1 1 4

REV. DATE 7/7/78 △1

PROJECT Anderson Ranch PREPARED BY G. Hinds FIRST ISSUE 11/30/77

CLIENT Minerals Exploration Corp. APPROVED BY SHEET 62 of 69

A/C NO.	AREA 700 Reagent Handling / FACILITY	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	COSTS TOTAL
720	Kerosene Tank														
	6'φ x 22' M.S.		2.4	Ton	30	72	21.18	635-	1260		1520	3020			4540
721	Kerosene Transfer Pump														
	C.I. ~ 50 gpm	0.13	1	EA	15	15	17.95				270		500		770
	w/2 HP Motor														
722	Liquid Anhydrous														
	Ammonia Tank														
	20 Ton Cap ~ 10'x15'		4.8	Ton	30	144	21.18	635-	1320-		3050	6340			9390
	Concrete		3.7	CY	11.5	42.6	15.75	181-	85		670	310			980
	Reinf		400	LB	0.02	8.9	21.18	0.42	0.21		190	90			280
723	Ammonia Vaporizer	0.3	1	EA		12	17.95				220		2040		2260
	100#/hr														
724	Sodium Bicarbonate		0.8	Ton	20	20	21.18	424-	1260-		420	1010			1430
	Tank 5'φ x 6' MS														
	Sheet Total					314.5					6340	10770	2540		19650

PROJECT NUMBER 1 1 1 4

REV. DATE 7/7/78 △1

PROJECT ANDERSON RANCH — PREPARED BY G. HINDS — FIRST ISSUE 11/30/77

CLIENT MINERALS EXPLORATION CORP. — APPROVED BY — SHEET 63 of 69

A/C NO.	AREA 700 REAGENT HANDLING / FACILITY	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	MATERIAL	Permanent Equipment	SUB. CONTR.	TOTAL
725	Sodium Bicarbonate														
726	Solution Pump C.I.	02	2	Ea	10	20	17.95				360		1400		1760
	5 gpm w/1 HP Motor														
727	Alamine Solution Tank		0.3	Ton		4	21.18				80	360			440
	3'ø x 3' MS														
728	Isodecanel Tank		0.3	Ton		4	21.18				80	360			440
	3'ø x 3' MS														
729	Sodium Chlorate														
	Transfer Pump C.I.	03	1	Ea	20	20	17.95				360		2920		3280
	Horiz. Centri 300 gpm														
	w/7.5 HP Motor														
730	Sodium Chlorate Tank														
	15'ø x 16' MS		6	Ton	30	180	21.18	635	1260		3810	7560			11370
	Phenolic Resin Lined		1110	SF						10.50				11650	11650
	Sheet Total					228					4690	8280	4320	11650	28940

PROJECT NUMBER 1 1 1 4

PROJECT ANDERSON RANCH PREPARED BY G. HINDS REV. DATE 7/7/78 △1 FIRST ISSUE 11/30/77

CLIENT MINERALS EXPLORATION CORP. APPROVED BY SHEET 64 of 69

A/C NO.	AREA 700 REAGENT HANDLING	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	COSTS TOTAL
	FACILITY														
731	Agitator for 8'φ x 10'														
	Glue Prep. Tank	0.9	1	EA		16	17.95				290		3750		4040
	w/5 HP Motor														
732	Agitator for 20'φ x 16'														
	Flocculant Tank	3.5	1	EA		60	17.95				1080		14680		15760
	w/30 HP Motor														
733	Agitator for 5'φ x 6'														
	Sodium Bicarbonate Tank	0.8	1	EA		16	17.95				290		3240		3530
	w/5 HP Motor														
734	Agitator for 15'φ x 16'														
	Sodium Chlorate Tank		1	EA		60	17.95				1080		13460		14540
	w/30 HP Motor														
	Sheet Total					152					2740		35130		37870
	AREA TOTAL					6510					132020	332360	71380	38750	574510

PROJECT NUMBER 1 1 1 4

REV. DATE 7/11/78 △1

PROJECT ANDERSON RANCH PREPARED BY G. HINDS FIRST ISSUE 11/30/77

CLIENT MINERALS EXPLORATION CORP. APPROVED BY SHEET 65 of 69

A/C NO.	AREA 001 Misc. Equipment	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	COSTS TOTAL
	FACILITY														
002	Air Compressor														
	Rotary Screw Type														
	125 psig max –	1^{7}	1	Ea		60	17^{95}				1080		15530		16610
	100 HP														
003	Boilers w/ 50 HP Ea														
004	22000 Lb/Hr 125 psig	125^{8}	2	Ea	11	1383	21^{46}				29680		229580		259260
	w/ water treatment														
006	Forklift Truck														
	1 Ton Cap	2^{1}	1	Ea		16	19^{62}				310		11910		12220
	Sheet Total					1459					31070		257010		288090

PROJECT NUMBER / / / 4

PROJECT ANDERSON RANCH

CLIENT MINERALS EXPLORATION CORP.

PREPARED BY G. HINDS

APPROVED BY

REV. DATE 7/11/78 △1

FIRST ISSUE 11/30/77

SHEET 66 of 69

A/C NO.	AREA 001 Misc. Equipment	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	COSTS MATERIAL	COSTS Permanent Equipment	COSTS SUB. CONTR.	COSTS TOTAL
	FACILITY														
010	Instrument Air Compressor														
	45 cfm ~ 60 psig	0.9	1	EA		16	17.95				310		1970		2280
	w/ 7 1/2 HP Motor														
012	Sulfuric Acid Unloading														
	Compressor 100 cfm	0.6	1	EA		32	17.95				570		4570		5140
	100 psig w/ 25 HP Motor														
013	Emergency Power														
	Generator 1000 KW														
	480 V ~ 3 phase ~ 60 hz	11.3	1	EA	17	192	17.95				3450		103130		106580
	diesel power ~														
	Skid Mounted														
	Sheet Total					240					4330		109670		114000

PROJECT NUMBER 1 1 1 4

PROJECT ANDERSON RANCH — PREPARED BY G. HINDS — REV. DATE 7/11/78 △1

FIRST ISSUE 11/30/77

CLIENT MINERALS EXPLORATION CORP. — APPROVED BY — SHEET 67 of 69

A/C NO.	AREA 001 Misc. Equipment / FACILITY	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	MATERIAL	Permanent Equipment	SUB. CONTR.	TOTAL
014	FRESH WATER PUMP														
	150 gpm ~	02	1	EA	10	10	17.95				180		900		1080
	w/ 5 HP MOTOR														
015	GLANDWATER PUMP														
016	150 gpm	06	2	EA	15	30	17.95				540		3620		4160
	w/ 10 HP MOTOR														
	Sheet Total					40					720		4520		5240
	AREA TOTAL					1739					36120		371200		407320

PROJECT NUMBER 1 1 1 4

REV. DATE 7/7/78 △1

PROJECT ANDERSON RANCH PREPARED BY G. HINDS FIRST ISSUE 11/30/77

CLIENT MINERALS EXPLORATION CORP. APPROVED BY ______ SHEET 68 of 69

A/C NO.	AREA	WT.	Quantity	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	RATE	COST/UNIT LABOR	COST/UNIT MAT'L.	COST/UNIT SUB. CONTR.	COSTS ( ) LABOR	MATERIAL	Permanent Equipment	SUB. CONTR.	TOTAL
	FACILITY														
	PROCESS PIPING		ALLOWANCE			36050		19.18			691440	628630			1,320,070
	PAINTING (4 MEN @ 15 WKS)					2400		17.87			42890	18000			60,890
	ELECTRICAL													1,694580	1,694,580
	INSTRUMENTATION		ALLOWANCE											343140	343140
	COMMUNICATIONS		ALLOWANCE											25000	25000
	MILL EQUIPT SPARE PARTS (5% OF PERM. EQUIPT COST)					690	17.95				12390		247120		259510
	INITIAL MILL REAGENTS & SUPPLIES													396000	396000

PROJECT NUMBER / / / 4

MORRISON-KNUDSEN COMPANY, INC.

OPERATION ELECTRIC ESTIMATE — ITEM NO. — SHEET OF PAGE

MINERALS EXPLORATION — JOB 1114

QUANTITY — UNIT — EST. BY ALLEN — CK'D BY — DATE 6-30-78

M-K FORM ENG 58/74 PRINTED IN U.S.A.

	MAN HOURS	LABOR RATE 20.60	EQUIPMENT USE	MATERIAL	TOTAL DIRECT	O&P	LINE TOTAL
MILL SITE:							
AREA LIGHTING	1754	36132	2529	26205	64866	12973	77839
TRANSFORMERS & SERVICE EQUIPMENT	1310	26986	1889	470961	499836	99967	599803
MOTOR WIRING & CONTROLS	18630	383778	26864	420413	831055	166211	997266
OVERHEAD LINE TO PUMP HOUSE	80	1648	115	1600	3363	673	4036
OVERHEAD LINE TO SUBSTATION	208	4285	300	8444	13029	2606	15635
							1,694,580

EXHIBIT III-F
MILLING COMMENTS

EXHIBIT III-F

MILLING COMMENTS

a. <u>ORE RECEIVING AND GRINDING</u>

(1) It may be possible to re-arrange the SAG mill-rod mill setup to obtain a more compact plant layout.

(2) The turntable under the SAG mill feed chute could be eliminated by purchasing a re-liner machine mounted on solid rubber wheels.

(3) Both the SAG mill and the rod mill will be equipped with variable speed drives. Although this is an expensive solution (it costs approximately three times as much as a standard motor), it provides protection against the extreme ore hardness variability.

b. <u>LEACHING</u>

To obtain the required 45 percent solids in the leaching circuit, dilution water will be added. However, it may be possible to reach the same solids concentration by using clarifier underflow solution. This would reduce the fresh water consumption.

c. <u>CCD CIRCUIT</u>

(1) As specified in the A.H. Ross report, the thickeners in the CCD circuit will be equipped with diaphragm pumps to handle the thickener underflow product. The maximum design flow will be about 900 gpm with 35 percent solids. There is no diaphragm pump on the market that can handle this volume of pulp. The largest flow that can be handled is 600 gpm with a Dorr-Oliver

W8 diaphragm pump. The only alternative considered at this time was to install two W8 pumps for handling the required volume. The cost of this alternative is high. Each pump is priced at $21,000, consequently, each thickener underflow pumping system will cost $42,000.

A more economic alternative is to install a centrifugal pump instead. Deco offered a SRL pump of ample capacity to handle this flow for $6,785. Two of these pumps would be required, one in operation and one standby for a total cost of $13,570.

It is recommended that the use of centrifugal pumps, instead of diaphragm pumps, be investigated for the thickener underflow.

(2) The thickener tanks (140' Ø) will be installed on engineered fill. This may create future foundation problems due to subsidence. Smaller diameter thickeners such as Enviroclear thickeners should be investigated.