CONTACT INFORMATION
Mining Records Curator
Arizona Geological Survey
416 W. Congress St., Suite 100
Tucson, Arizona 85701
602-771-1601
http://www.azgs.az.gov
inquiries@azgs.az.gov

The following file is part of the Fred Hohne Mining Collection

ACCESS STATEMENT

These digitized collections are accessible for purposes of education and research. We have indicated what we know about copyright and rights of privacy, publicity, or trademark. Due to the nature of archival collections, we are not always able to identify this information. We are eager to hear from any rights owners, so that we may obtain accurate information. Upon request, we will remove material from public view while we address a rights issue.

CONSTRAINTS STATEMENT

The Arizona Geological Survey does not claim to control all rights for all materials in its collection. These rights include, but are not limited to: copyright, privacy rights, and cultural protection rights. The User hereby assumes all responsibility for obtaining any rights to use the material in excess of "fair use."

The Survey makes no intellectual property claims to the products created by individual authors in the manuscript collections, except when the author deeded those rights to the Survey or when those authors were employed by the State of Arizona and created intellectual products as a function of their official duties. The Survey does maintain property rights to the physical and digital representations of the works.

QUALITY STATEMENT

The Arizona Geological Survey is not responsible for the accuracy of the records, information, or opinions that may be contained in the files. The Survey collects, catalogs, and archives data on mineral properties regardless of its views of the veracity or accuracy of those data.

M7585

WYOMING MINERAL CORPORATION

DRIPPING SPRING PROJECT

FEASIBILITY STUDY

FOR

URANIUM MINE & MILL

1h00-10-3661

Dravo

Scanned 2/08 4p

M7585

WYOMING MINERAL CORPORATION

DRIPPING SPRING PROJECT

FEASIBILITY STUDY

FOR

URANIUM MINE & MILL

Dravo

WYOMING MINERAL CORPORATION
DRIPPING SPRING PROJECT
INDEX

SECTION	ITEM	PAGE
I	INTRODUCTION	1-5
II	MINE PLAN	1-103
	Index	1-3
	Geology	4-22
	Open Pit Feasibility	23-51
	Underground Feasibility	52-76
	Appendices	77-101
	Bibliography	102-103
	Drawings	
III	MILL	1-29
	Description of Facilities	1-8
	Commentary	9-12
	Equipment List	13-29
	Drawings	
IV	ENVIRONMENTAL	1-9
V	ESTIMATED COST	1-43
	Summary	1
	Mine	2-13
	Mill	14-26
	Environmental	27-31
	Miscellaneous	32-36
	Labor Schedule	37-43

INTRODUCTION

On August 26, 1980, Wyoming Mineral Corporation (WMC) authorized Dravo Engineers and Constructors to begin a study to determine the capital and operating costs for the mine and mill complex in Gila County, Arizona, known as the Dripping Spring Project. This volume presents the results of that study.

This report is divided into sections as follows:

I. Introduction and Summary

II. Mine (includes tailing disposal).

III. Mill

IV. Environmental

V. Cost Estimate

Two areas of ore have been defined and preliminary mining plan has been developed for both. This method uses a combination of open pit and underground mining in both areas. Estimated in-the-ground resource at a cut-off grade of 0.05% U_3O_8 is 4,408,000 tons containing 9,805,000 lbs. U_3O_8. Identified reserve is estimated at 3,249,000 tons containing 7,495,000 lbs. U_3O_8 and mineable reserves are 3,190,000 tons containing 6,643,000 lbs. U_3O_8. At a mill recovery of 93%, in the can U_3O_8 should be about 6,178,000 lbs.

Open pit mined ore is estimated to total approximately 2,130,000 tons containing approximately 3,799,000 pounds of U_3O_8 for an average grade of approximately 0.09%. To mine this ore approximately 6,702,000 BCY of associated waste and 11,327,000 BCY of stripping waste must be extracted for a total approximately 18,029,000 BC Y of waste material. This yields combined waste to mined ore ratio of approximately 8.46 BXY to one ton of ore sent to the mill.

Scanned 2/08 YP

WYOMING MINERAL CORPORATION
DRIPPING SPRING PROJECT
INDEX

SECTION	ITEM	PAGE
I	INTRODUCTION	1-5
II	MINE PLAN	1-103
	Index	1-3
	Geology	4-22
	Open Pit Feasibility	23-51
	Underground Feasibility	52-76
	Appendices	77-101
	Bibliography	102-103
	Drawings	
III	MILL	1-29
	Description of Facilities	1-8
	Commentary	9-12
	Equipment List	13-29
	Drawings	
IV	ENVIRONMENTAL	1-9
V	ESTIMATED COST	1-43
	Summary	1
	Mine	2-13
	Mill	14-26
	Environmental	27-31
	Miscellaneous	32-36
	Labor Schedule	37-43

I INTRODUCTION

INTRODUCTION

On August 26, 1980, Wyoming Mineral Corporation (WMC) authorized Dravo Engineers and Constructors to begin a study to determine the capital and operating costs for the mine and mill complex in Gila County, Arizona, known as the Dripping Spring Project. This volume presents the results of that study.

This report is divided into sections as follows:

I. Introduction and Summary

II. Mine (includes tailing disposal).

III. Mill

IV. Environmental

V. Cost Estimate

Two areas of ore have been defined and preliminary mining plan has been developed for both. This method uses a combination of open pit and underground mining in both areas. Estimated in-the-ground resource at a cut-off grade of 0.05% U_3O_8 is 4,408,000 tons containing 9,805,000 lbs. U_3O_8. Identified reserve is estimated at 3,249,000 tons containing 7,495,000 lbs. U_3O_8 and mineable reserves are 3,190,000 tons containing 6,643,000 lbs. U_3O_8. At a mill recovery of 93%, in the can U_3O_8 should be about 6,178,000 lbs.

Open pit mined ore is estimated to total approximately 2,130,000 tons containing approximately 3,799,000 pounds of U_3O_8 for an average grade of approximately 0.09%. To mine this ore approximately 6,702,000 BCY of associated waste and 11,327,000 BCY of stripping waste must be extracted for a total approximately 18,029,000 BC Y of waste material. This yields combined waste to mined ore ratio of approximately 8.46 BXY to one ton of ore sent to the mill.

INTRODUCTION (Continued)

Mining is expected to operate on a 250-day year (5-day week, 2-shift day) to produce about 1400 tons per day of ore. In the early phases (7 years) mining will be by open pit methods, with the later production coming largely from undergound drifts and stopes. The useful life of the mine is presently estimated at 10 years, but could be longer as continuing exploration develops new reserves. As a matter of fact, since this study began, further drilling has shown a strong possibility of additional reserves available in the area.

The mill was designed to operate 7 days/week, 3-shifts per day, 340 days a year, processing the ore at a nominal rate of 1000 tons per day. The mill design was based on the presently estimated 10 year life of the mine. The actual rate of milling would be about 1029 tons per day. The process is a conventional acid leach, solvent extraction, ammonia precipitation for recovery of U_3O_8. While the process is conventional, some modifications have been made over present mills, such as:

1. Liquid - solid separation by horizontal belt filters rather than by counter-current decantation thickeners.
2. Tails are to be disposed of as a "dry" filter cake, returned by truck to selected areas of the pit, and buried there rather than the more conventional wet tailings pond.

Belt filters were chosen as the primary liquid-solid separation device as we believe that overall recovery of the uranium will be 3% to 5% better than obtainable in a CCD circuit, at a cost comparable to CCD. In addition, laboratory settling tests after leach have indicated very poor settling rates, which would lead to difficult control of CCD circuit.

INTRODUCTION (Continued)

In-pit disposal of tails was chosen for two reasons. In reviewing the topographical maps of the area, we found that the only areas usable for wet tailings ponds would require excessive capital outlay for dams. In addition, environmental control of the tailings will be much simplified with in-pit disposal.

The schedule of events (as anticipated by WMC) was reviewed and we are in agreement with it. If the project is begun with environmental studies starting in January 1981, permitting should be obtained by June 1983. Mine operations begin at this time, and mill construction is begun. Ore is delivered to the mill, and milling begins in January 1985, continuing through the usable life of the mine, or 10 years. The mine is reclaimed at this time. No reclamation is shown for the mill, because of the possible discovery of additional ore or use of the mill as a toll mill beyond the expiration of the mine.

All major capital and operating costs have been developed by Dravo, and represent cost in third quarter 1980 dollars, with no forward escalation applied. All costs are reported except:

1. Income Tax
2. Corporate Burdens
3. Interest
4. All risk insurance, except during plant construction.
5. Depletion allowances, damage payments, surcharges, appropriation expenses.
6. Overtime on labor
7. Incentives to attract labor

INTRODUCTION (Continued)

Labor costs were developed by conversations with operating companies in the area, and overhead burdens were set at 20% for salaried personnel, and 35% for hourly employees, in agreement with WMC. It should also be noted that no development costs are entered for the period of September 1980 through mine start-up (January 1983) since Dravo has no way to predict these cost.

Mill recovery of U_3O_8 was calculated at 93% as presently established by testing, and the overall production, life of mine, is 6,178,000 lbs based on present reserves.

Estimated costs, life of mine, are as follows:

Mine capital cost	10,932
Mill capital cost	27,957
Total operating cost	147,142

or an overall cost of \$30/lb U_3O_8 produced. Accuracy of the estimate is considered to be $\pm$ 25%.

Reference has been made above to the possibility of extended reserves. A word of caution is in order with respect to those comments. If the tonnage reserves are extended by exploration, but the grade remains the same as presently indicated, reduction in the overall cost per pound will be small, since the only reduction would arise through extended amortization of the capital. On the other hand, an increase in reserves in terms of grade from 0.10% to 0.15% would yield a third more pounds of U_3O_8 at the same operating cost, or a one-third reduction in cost per pound U_3O_8.

WYOMING MINERAL CORPORATION
DRIPPING SPRING PROJECT
SUMMARY OF ESTIMATED EXPENDITURES (CASH FLOW)
In Thousands

	Extended prior to 1/1/81	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	TOTAL
MINE																
Capital Cost																
Open Pit				2902	2741	8	1021	572	829	24	16		24			8137
Underground										1440	1272	78	5			2795
Operating Cost																
Open Pit				2970	5368	5368	5458	5686	5685	5514	2650	1724	1465	1295	360	43543
Underground									26	2610	6783	6879	5873	4435	296	26902
MILL & ANCILLIARIES																
Capital Cost				9200	18757											27957
Operations																
Labor					379	1463	1464	1463	1463	1464	1463	1463	1464	1463	1463	15012
Overheads						243	244	243	244	243	244	243	244	243	244	2435
Operating Cost						3913	3913	3913	3913	3914	3913	3913	3913	3913	3914	39132
ENVIRONMENTAL		647	827	353												1827
ROYALTIES (See Letter Dated 10/6/80)	725	231	130	130	130	830	30	30	160	459	874	70	994	1338	508	6639
RECAPTURABLE EXPLORATION	407															407
DEVELOPEMNT COST THRU 8/80	1645															1645
SALES & USE TAX				58	59	312	318	318	318	318	285	215	215	198	186	2800
PERSONAL PROPERTY TAX					585	1005	1011	873	804	732	654	441	329	231	135	6800
TOTAL ESTIMATED EXPENDITURES PER YEAR	2777	878	957	15613	28019	13142	13459	13098	13442	16718	18154	15026	14526	13116	7106	186031
U_3O_8 PRODUCED & MILLED (lbs.) (Overall)																6178
COST PER POUND U_3O_8 PRODUCED & MILLED																30.11

II MINE PLAN

WYOMING MINERAL CORPORATION

Dripping Spring Project

Mining Report Outline

1.0 GEOLOGY

- 1.1 Introduction
- 1.2 Location
- 1.3 General Stratigraphy
- 1.4 Stratigraphy of Dripping Spring
- 1.5 Diabase
- 1.6 Structure
- 1.7 Mineralization
- 1.8 Reserves
- 1.9 Determination of Minable Ore
- 1.10 Comments
- 1.11 Recommendations

2.0 OPEN-PIT MINE FEASIBILITY

- 2.1 Open Pit Design and Mining Method
- 2.2 Open Pit Limits and Configuration
  - 2.2.1 Cut-off Grade Determination
  - 2.2.2 Determination of Stripping Ratio
  - 2.2.3 Identifying Economic Polygons

2.2.4 Master Pit Plans

-- Bench Designs

-- Ore Zone Mining

-- Quantity Measurements

2.2.5 Mining Recovery and Dilution

2.3 Waste Rock Handling

2.3.1 Out-of-Pit Dumps

2.3.2 Pit Backfilling

2.3.3 In-Pit Disposal of Mill Tailings

2.4 Mine Haul Roads

2.5 Equipment Selected

2.6 Equipment Productivity and Operating Costs

2.7 Auxiliary Facilities

2.8 Manpower Schedule

2.9 Production Schedule

2.10 Pit Reclamation

2.11 Conclusions

2.12 Comments

3.0 UNDERGROUND MINE FEASIBILITY

3.1 Design Parameters

3.2 Definition of Minable Units and Minable Ore

3.3 Mine Design

3.4 Mine Development

3.5 Stoping Method

3.6 Production Schedule

3.7 Equipment Selection

3.8 Manpower Requirements

3.9 Mine Costs

3.10 Ventilation System

3.11 Reclamation

3.12 Conclusions

3.13 Recommendations

APPENDICIES

2.3.3 Tailing Disposal Cost Separation

2.5-1 Mined Rock Loading Ore and Associated Waste

2.5-2 Rock Haulage Ore and Waste

3.4 Development Heading Cycle Time

3.5-1 Underground Mining Recovery

3.5-2 Stoping Cycle Time

3.9.1-1 Operating Material Costs

BIBLIOGRAPHY

Section 1.0

Section 2.0

Section 3.0

1.0 GEOLOGY

1.1 Introduction

A detailed geological evaluation was not part of the study to be performed by Dravo Corporation for Wyoming Mineral Corporation's Dripping Spring Uranium deposits. In order to present some geological background information of the area, a brief review of published material is presented. Most of this information was obtained from U.S.G.S. Professional Paper 595 by Granger and Raup, published in 1969.

1.2 Location

Wyoming Mineral Corporation's Dripping Spring uranium deposits are located in east-central Arizona in Gila County. The deposits are located approximately 30 miles north of Miami, Arizona.

1.3 General Stratigraphy

Uranium mineralization occurs in the upper member of the Dripping Spring Quartzite of younger Precambrian age. This formation is part of the Apache Group which is a sequence of sedimentary rocks, dolomitic limestone, and basalt flows. A disconformity separates the Dripping Spring Quartzite from the overlying Mescal Limestone. The Mescal Limestone is composed of argillaceous and siliceous limestones and dolomites with poorly sorted sandstone and siltstones at the base and feldspar-rich siltstone at the top. The Pioneer Formation underlies the Dripping Spring Quartzite. Intruded into this sequence of sedimentary rocks is a series of diabase sills interconnected by dikes. The precise age of this diabase is not known, but it is thought to be approximately 1100 million years.

1.4 Stratigraphy of Dripping Spring

The Dripping Spring Quartzite is divided into three members: the basal Barnes Conglomerate; the Middle member; and the Upper member (see Fig. 1.4-1). The Barnes Conglomerate member is commonly 0 to 25 feet thick and consists of conglomerate and sandstone with well-rounded quartzose pebbles in an arkosic matrix. The Middle member is generally 140 to 369 feet thick, but locally may be missing. The Middle member consists of medium-grained feldspathic sandstone that is arkosic and conglomeratic near the base and grading to orthoquartzite near the top. Colors range from reddish brown at the base to grayish pink near the top. Uranium mineralization of economic interest has not been encountered in either the Barnes Conglomerate or Middle member.

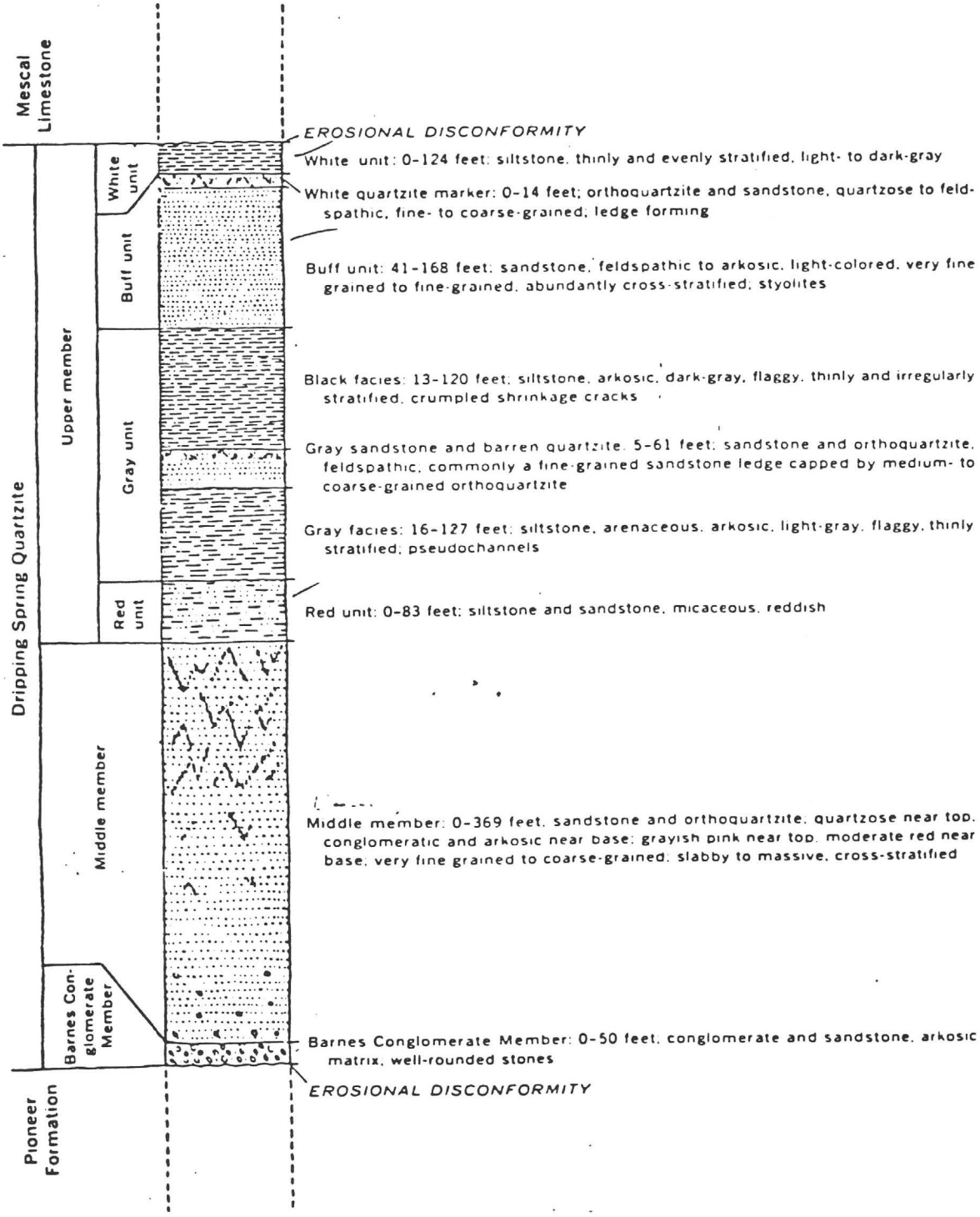
The Upper member is divided into four units. In ascending order these are the Red unit, the Gray unit, the Buff unit, and the White unit. The Red unit is generally less than 60 feet thick and consists of red, micaceous siltstone and very fine-grained arkosic sandstone. The Gray unit is of greatest economic interest and contains the significant uranium deposits of the area. The Gray unit is subdivided into three facies: the lower gray facies, a middle gray sandstone; and an upper black facies. The gray facies consists of thinly stratified feldspar-rich siltstone and occasional interbeds of very fine-grained sandstone. Average thickness is approximately 60 feet. This facies contains uranium mineralization.

The gray sandstone which separates the gray facies from the black facies is composed of very fine-grained feldspathic sandstone and orthoquartzite. The thickness generally ranges from 15 to 35 feet. A thin, medium-grained quartzite bed referred to as the barren

Figure 1.4-1

General Geologic Column

Dripping Spring Quartzite



From: Granger and Raup, 1969.

quartzite, caps the gray sandstone. This barren quartzite bed is usually less than two feet thick and rarely contains any significant uranium mineralization.

The black facies contains the major uranium deposits in the Dripping Spring Quartzite. The facies consists of dark gray thinly-bedded, feldspar-rich siltstone. Thicknesses of this facies are usually between 60 to 105 feet. Potassium feldspar is a major constituent with the dark gray color attributed to finely divided carbon and pyrite.

in what form?

The buff unit consists of feldspathic and arkosic sandstone inter-bedded with orthoquartzite. It is buff in color and ranges from 41 to 168 feet thick.

Overlying the buff unit is the white unit which consists of thin arkosic to feldspathic siltstones with a total thickness usually less than 20 feet. The color of this unit is light orange to pale yellow-brown.

1.5 Diabase

A considerable amount of diabase has been intruded into the sedimentary rocks of the Apache Group. These intrusions are in the form of discordant sheets or sills and have associated interconnected dikes. These massive diabase sheets are commonly found in the Pioneer Formation, the lower member of the Mescal Limestone, and the upper member of the Dripping Spring Quartzite. The sheets of diabase range from a few feet to approximately 200 feet in thickness. The Sierra Ancha diabase sheet is thicker than most and is nearly 1000 feet thick. It is associated in geographic proximity to many of the known uranium

deposits in this district. It appears that the extent of the diabase intrusions is controlled to a degree by pre-intrusive structures. The age of the intrusives has not been adequately determined, but has been estimated by L. T. Silver to be 1075 million years. A report by John V. Heyse also indicates an age of approximately 1100 million years, but the exact age of the intrusives has been the subject of many controversies. Metamorphic effects of the intrusion are not widespread or intense, although they are most prevalent in the Sierra Ancha. Metamorphism appears to be restricted to a baking of rocks within a few feet of the contact between the sediments and the diabase. The Workman Creek area locally shows contact metamorphic action that has affected the rocks for tens of feet in areas where greater quantities of differentiated alkalic facies are present. The resulting metamorphic rocks are usually described as hornsfels and spotted rocks.

1.6 Structure

The major structural element of the area is the Sierra Ancha monocline which has a north-south trend and is downwarped to the east. The monocline formed before or during the intrusion of diabase. The diabase intruded the Pioneer Formation and lower Dripping Spring Quartzite on the west side of the monocline, and intruded the upper member of the Dripping Spring Quartzite on the east side.

Faults in the Sierra Ancha region are often prediabase or syndiabase and have a northerly trend that is parallel or subparallel to the Sierra Ancha monocline. A few faults have a general east-west trend and cut across the monocline structural trend. Normal faulting appears to be predominant, but reverse faults have also been noted.

Two types of joints are recognized in the Sierra Ancha region. These have been referred to as tension joints and shear joints, but this nomenclature refers to joint type and not to the forces that formed them. The shear joints are the more prominent and are nearly perpendicular to stratification and have planar surfaces. Many of the shear joints have occurred after mineralization and they have a fairly constant strike and dip. Tension joints have irregular strikes and dips, but have greater vertical and strike continuity than do the shear joints. Two sets of major joints have been noted. One is N17^{o}E and the other is N77^{o}W. Two minor sets at N30^{o}W and N45^{o}E have also been described.

1.7 Mineralization

Uranium mineralization in the Dripping Spring Quartzite occurs in the lower part of the upper member. The most favorable hosts are the black facies and gray facies within the gray unit of the upper member. Descriptions of the uranium deposits indicate that there are three general shapes of deposits: vein-shaped; blanket-shaped and irregular-shapes.

The vein-shaped deposits have been the most significant economically during past mining activities in the late 1950's. They are not true vein deposits in that they do not occur in well defined fissures and they do not have a different appearance from the surrounding rock. They are vein-like only in the fact that they have abnormally high radioactivity in a vertical to near-vertical orientation. The width of these "veins" is often three feet or less and the length can vary from 50 to 300 feet. The vertical dimensions are commonly 10 to 30 feet, but may reach 80 feet. In some areas it is not possible to distinguish the

"veins" from the surrounding rock.

Blanket-shaped deposits are tabular and concordant with stratification. They are generally thin with a width of a few tens of feet and a length of up to several hundred feet. These deposits may be associated with "vein" deposits or may have features similar to both. These deposits are usually low grade and no ore had been mined from this type of deposit by the late 1950's.

The irregular-shaped deposits are zones of high radioactivity found on weathered surfaces of the Dripping Springs. They are usually very small in size, low grade and located in strongly oxidized rock.

Mineralization appears to have a regional relationship to the major structural features. Deposits appear to have a trend parallel or subparallel to the Sierra Ancha Monocline. Direct correlation to minor structural features is less distinct but could exist.

The relationship of mineralization to the diabase is a highly controversial one. Granger and Raup (1969) consider the diabase as the source of the uranium and that uranium in fluids emanated from the diabase in denteric veins, joints and fractures to emplacement in the gray unit of the Upper member of the Dripping Spring. Heyse (1979) believes that uranium deposits existed in the Upper member prior to the diabase intrusion. These deposits were mobilized and recrystallized when the magmatic intrusion took place. Both theories leave some unanswered questions, but it appears from the presented evidence that uranium deposits were present in the Upper member of the Dripping Spring and that recrystallization and the present shape of the deposits is due, in part, to the diabase intrusion approximately 1100 million years ago.

1.8 Reserves

Reserves were calculated for Wyoming Mineral Corporation's Dripping Spring uranium deposits in the Workman Creek area by geostatistical means. Data were received from Wyoming Mineral Corporation for all drill holes. Dravo Corporation ran a conversion program to condense and reformat these data to a form usable in Dravo's computer program. Horizontally drilled holes and the few holes without geographic coordinates were eliminated from the data base. Holes purposely drilled at angles other than horizontal were retained in the data base and corrected depths and thicknesses were used for mineralized zones. Approximately 432 drill holes and core holes were considered in the reserve analysis. The data base was divided into two segments: one for North Workman Creek and one for South Workman Creek. South Workman Creek contains 259 drill holes, while North Workman Creek contains the remaining 173 holes.

All intercepts that had been considered as mineralization by Wyoming Mineral Corporation were included in the data base. The program used by Dravo in the calculation of uranium resources is one that had been developed by Kim and Knudsen in 1977 for ERDA (now the Department of Energy) for analyzing uranium deposit characteristically found in sandstones of the Western United States. This program has also been used for calculating reserves for other commodities.

One of the first steps in determining resources by geostatistical methods is the development of variograms. Variograms are used to describe the spatial correlation between grades, thicknesses of mineralization or other characteristics within an ore deposit. They indicate the continuity of mineralization, zones of influence, and

whether zones of influence are different along different directions. Variograms were constructed for thickness and for grade x thickness characteristics of the deposit. Varying search multiples of 50, 100, 150, and 200 feet were used to determine the best representation for the property. The 100 foot interval was best and variograms were constructed for each of the four directions: North-South; East-West; Northeast-Southwest and Northwest-Southeast. Variograms were constructed using both a normal and log normal approach. It was determined that the best results would be obtained by using normal variograms for the north area and log normal variograms for the south area. Geostatistically, there is no preferred direction of orientation for the deposit and the radius of influence of drill holes is approximately the same in all directions.

Examples of variograms for grade x thickness for the south and north areas are seen in Fig. 1.8-1 & 2 respectively. C_0 represents the nugget effect which indicates the amount of variance expected between drill holes regardless of how closely they are spaced. The range is the maximum distance of influence that one drill hole would have. Any drill holes beyond that distance will have a completely random relationship to other drill holes. The sill (which can be computed manually or with the computer) indicates the maximum variance expected within the range of influence of the drill holes.

The geostatistical program used to calculate the amount and grade of ore in individual blocks is known as Kriging. A search radius of 200 feet was used in the north area. Because of irregularities in the south area, radii of influence of 200, 295, and 395 feet were used. Results obtained using the 395 foot radius appear to be the most reliable.

Computer plots were then produced which divided the north and south areas into 100 foot blocks. Each block indicates reserves in pounds, tons, grade and thickness.

Resources were calculated using all mineralization containing greater than 0.035% U_3O_8. Low grade material with less than 0.035% U_3O_8 was eliminated from consideration. Ore reserves were calculated using an average minimum grade of 0.05% U_3O_8 and a minimum grade x thickness cut-off of 0.10% U_3O_8. Therefore, the minimum amount of mineralization for ore is a zone two feet thick with a grade of 0.05% U_3O_8 or a zone one-foot thick with a grade of 0.10% U_3O_8.

Factors used in the calculation of reserves were supplied by Wyoming Mineral Corporation. The factors include the following items:

Density:	164.75 pounds/cubic foot
Disequilibrium Factor:	1:1 (in equilibrium)
Minimum Average Grade:	0.05% U_3O_8
Minimum Grade x Thickness:	0.10% U_3O_8

In summary, the total reserves above an average grade of 0.05% U_3O_8 are as follows:

	Pounds of U_3O_8	Tons of Ore
North Area	4,407,734	2,219,517
South Area	5,396,946	2,188,871
Total	9,804,680	4,408,388

Average grade is 0.111% U_3O_8

The reserve numbers are indicative of the pounds in-place and do not necessarily represent the amount of uranium that can be mined.

Additional reserve data are seen in Table 1.8-1 and Figure 1.8-3.

1.9 Determination of Minable Ore

As agreed upon by Wyoming Mineral Corporation and Dravo mining engineers, Wyoming Mineral Corporation would supply to Dravo it's own polygon slice-maps and related computer printouts as well as the drill hole data on magnetic computer tape. These maps and printouts would then become the basis for engineering design and cost determinations. Geostatistical ore reserve calculations were made using the drill hole data, but the results of these studies were not the design criteria for mine planning and costing.

Reserve determination factors and data also supplied by Wyoming Mineral Corporation and assumed to be correct are:

1. The disequilibrium factor for all areas is unity.
2. The tonnage factor for all ore and rock is 12.14 cubic feet per ton.

The polygon-slice maps were computer drawn by Wyoming Mineral Corporation every ten feet through the mineralized vertical interval. Computer printouts provided the grades, grade-thicknesses, tons of ore and pounds of U_3O_8 alloted to each polygonal area of that ten-foot horizontal slice.

As a guideline to separating ore from mineralized waste, certain criteria were also assumed based on prior experience and study:

GEOSTATISTICAL ORE RESERVE SUMMARY

TABLE 1.8-1

North Area

Minimum Average Cutoff	Lbs. U_3O_8	Tons Ore	Average Grade
.07% U_3O_8	4,178,673	2,030,411	0.103%
.06	4,354,938	2,163,684	0.101%
.05	4,407,734	2,219,517	0.099%

South Area

Minimum Average Cutoff	Lbs. U_3O_8	Tons Ore	Average Grade
.07% U_3O_8	5,241,466	2,061,669	0.127%
.06	5,351,228	2,146,483	0.125%
.05	5,396,946	2,188,871	0.123%

Total Area

Minimum Average Cutoff	Lbs. U_3O_8	Tons Ore	Average Grade
.07% U_3O_8	9,420,139	4,092,080	0.115%
.06	9,706,166	4,310,167	0.113%
.05	9,804,680	4,408,388	0.111%

CONFIDENCE LEVEL	% DEVIATION	
Percent	North Area	South Area
90	26.0	19.4
80	20.2	15.2
70	16.4	12.4
60	13.3	10.0
50	10.7	8.0

FIGURE 1.8-1

TYPICAL VARIOGRAM OF GT-SOUTH SECTION

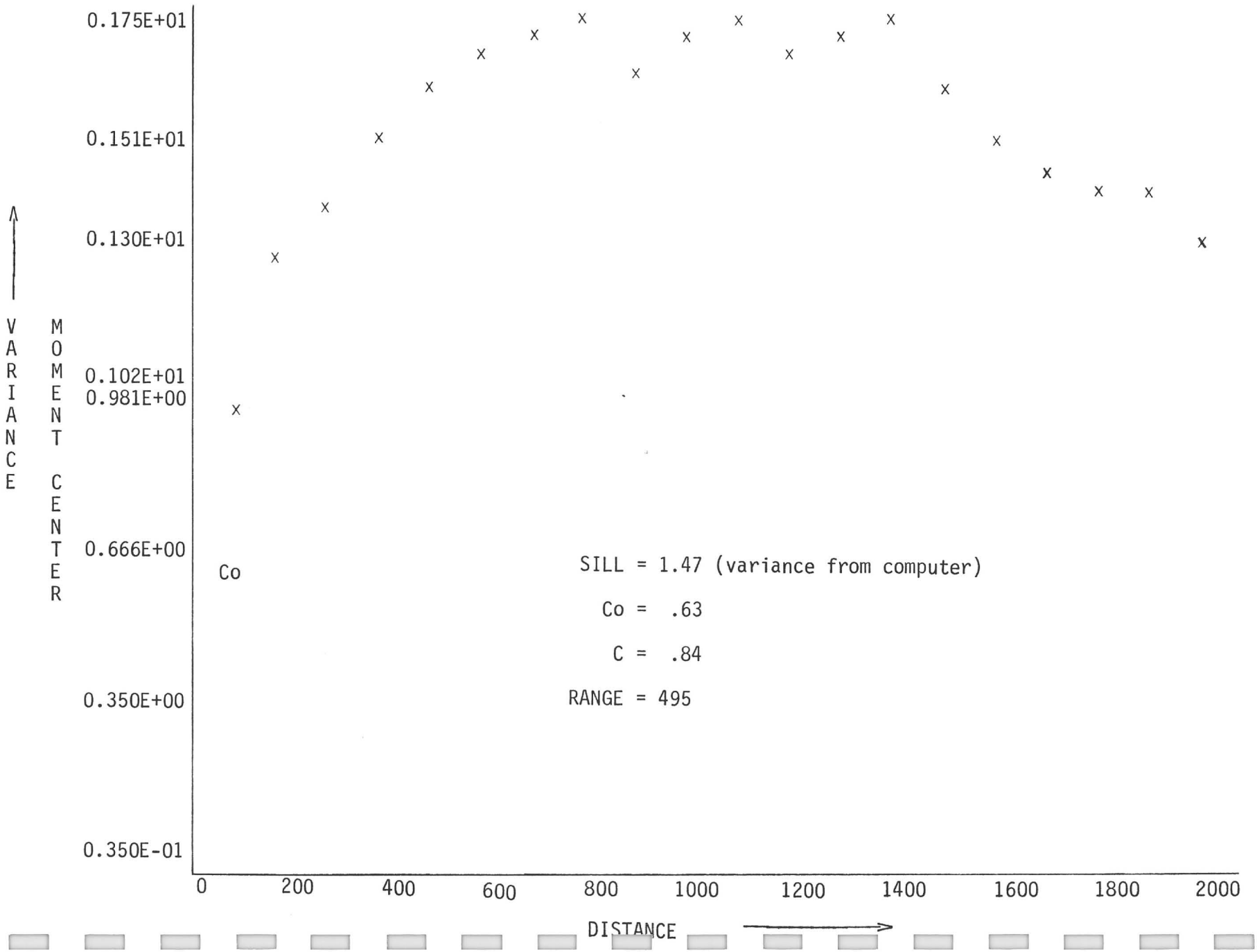
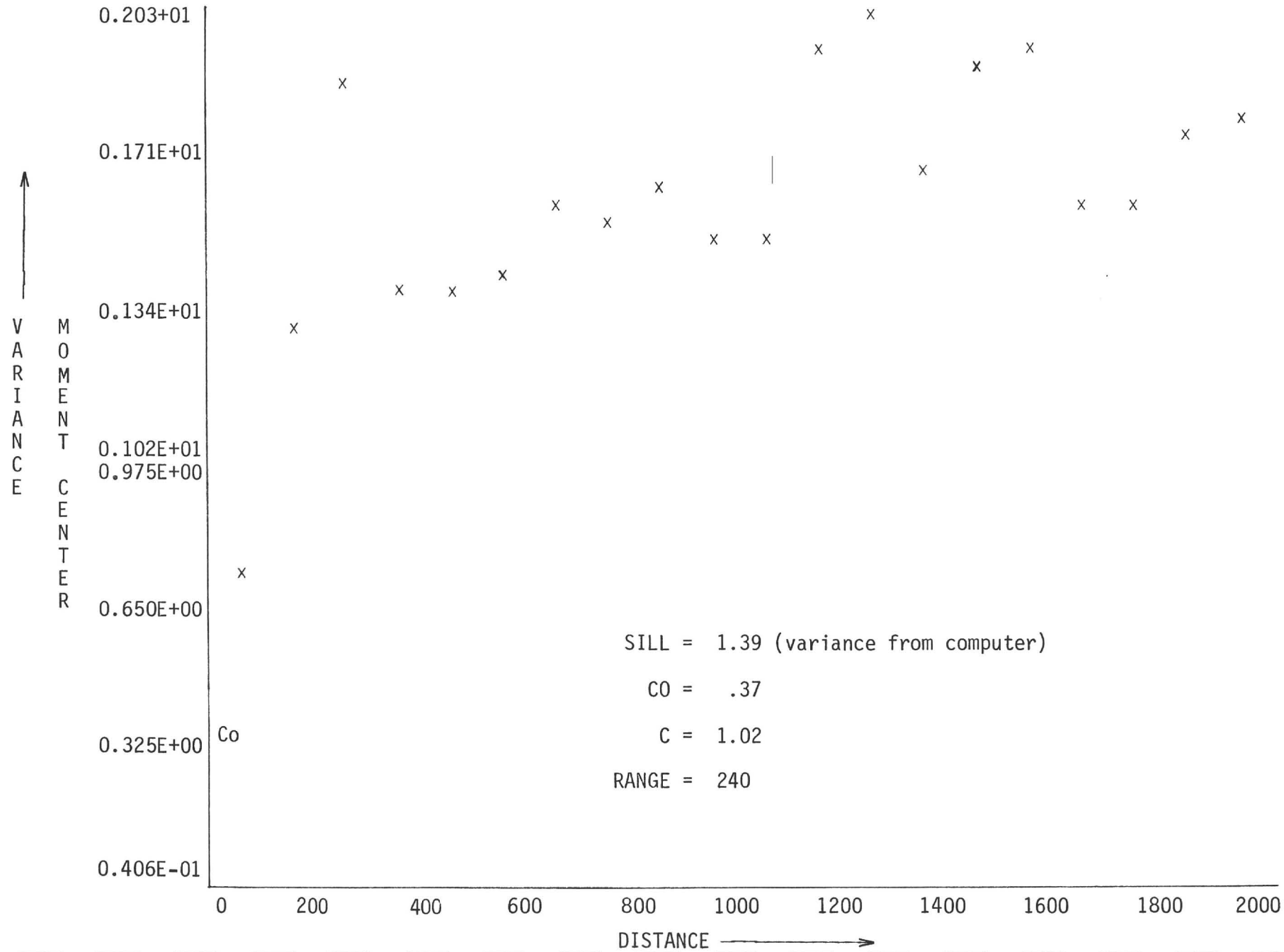


FIGURE 1.8-2

TYPICAL VARIOGRAM OF GT-NORTH SECTION



Bravo
PITTSBURGH, PENNSYLVANIA

ENGINEERING COMPUTATIONS

COMPANY
LOCATION
DESCRIPTION

DATE
DR CH
REF

EST NO.
CONT NO.
DIVISION

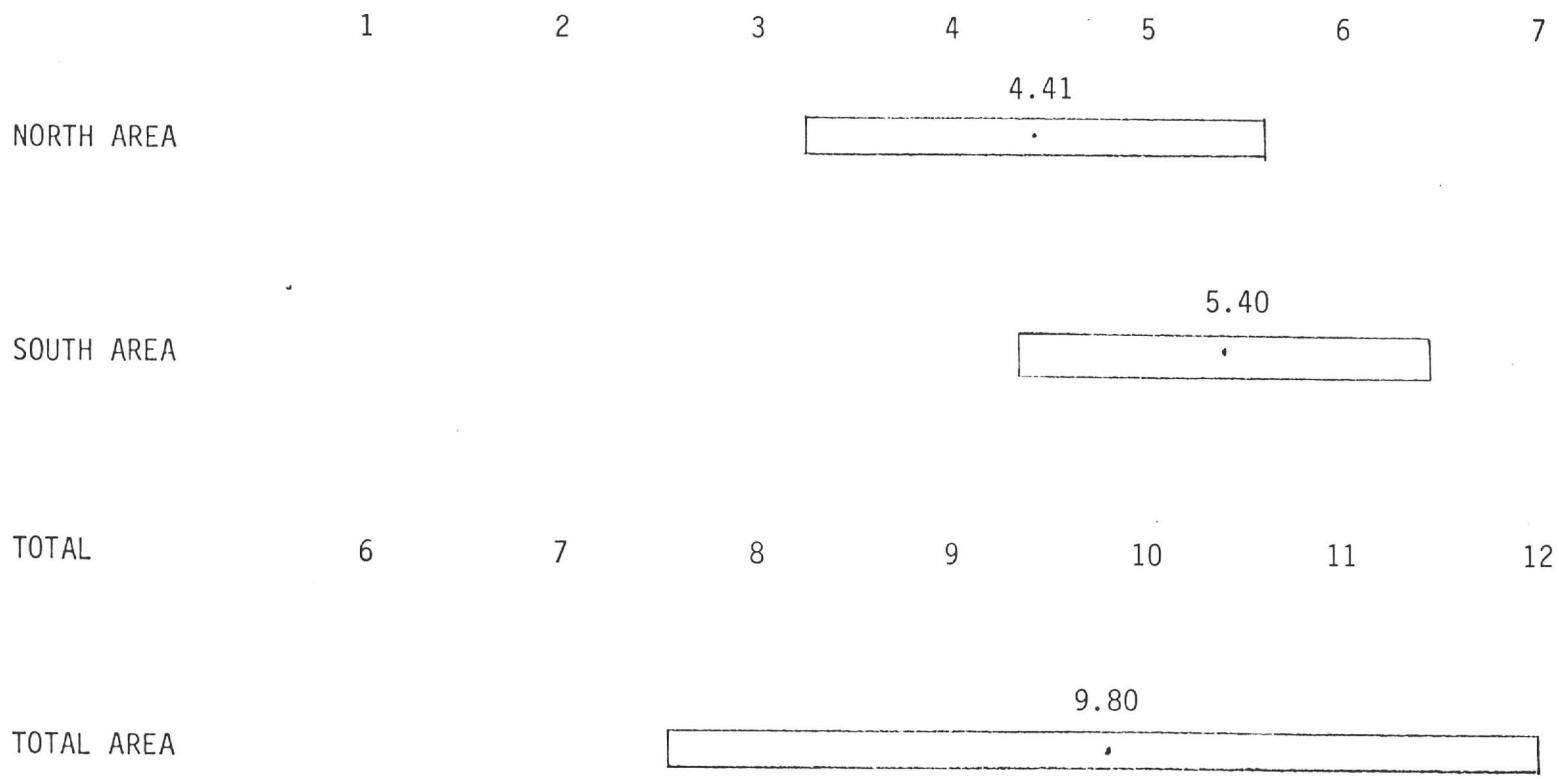
FIGURE 1.8-3

GEOSTATISTICAL RESERVE ANALYSIS

GRAPHICAL REPRESENTATION

90% Confidence Range, Average Grade $\geq$ 0.05% U_3O_8

Pounds of U_3O_8 (in millions)



SHEET NO.

1. No mineralized thickness averaging less than 0.05% U_3O_8 was considered minable.
2. No mineralization with a grade of 0.05% U_3O_8 but a grade-thickness less than 0.10% was considered minable by either underground or open pit methods.
3. No mineralization with a grade of 0.05% U_3O_8 but a grade-thickness less than 0.30% was considered minable by underground methods.
4. Mineralization with a grade of 0.05% U_3O_8 or better and a grade-thickness of .10% but less than 0.30% might be minable by open pit methods if within open pit boundaries.

As stated in section 1.10, the basis for minable reserves was to be the polygon slice maps and reserve data supplied by Wyoming Mineral Corporation. The computer polygon program used, however, filled the total drilled area with polygons regardless of size and shape. The program thereby assigned areas of influence to drill hole intercepts that were not justifiable when considering the spotty nature of the ore. When using a polygon program on discontinuous mineralization, it is customary to apply a maximum polygon radius to limit the area of influence assignable to ore volume determinations when drill hole spacing exceeds the normal or where drill holes do not exist. For this reason modifications were made to the values given on the Wyoming Mineral Corporation computer printouts to reflect this fact.

A longitudinal section was constructed from North to South along easting coordinate 259,799 to verify the relationship between the North and South ore bodies. This section and other observations lead to the opinion that both ore bodies were once the same. Erosion has removed

the portion of ore between the areas; therefore, information gained from one area will be applicable to the other.

South pit minable ore was determined by measuring areas in both the open pit and underground based on the actual drill hole intercepts and minable pods. These minable tons were found to be approximately 75% of the tons summarized from the polygon printout for the South Area. When the tons estimated by geostatistical methods became available they were found to closely approximate the polygon produced tons, consequently no further factoring of these values was necessary.

In order to utilize the polygon derived data for determining minable ore reserve in the North Area, without detailed analysis, applicable factors were estimated from the South Area analysis.

Final minable ore tonnages in the North Area were determined after the geostatistical reserve figures became available allowing a comparison with the polygon estimate. This comparison showed that the geostatistical North Area tonnage was approximately 80% of that of the polygon estimate. Consequently it was deemed prudent to reduce the polygon estimate by 80% along with the 75% minable ore factor derived from the South Area. For the North Area, an overall factor of 60% was determined as follows:

$$100\ (.75 \times .80) = .60 \times 100$$

This factor of 60% was applied to the polygon derived data to give an overall minable ore tonnage for the North Area.

Grades of ore were not changed by this tonnage reduction as they are determined by borehole intercepts and became the basis for the

calculation of pounds U_3O_8. The reduction of tons, consequently, has a proportional reduction of pounds U_3O_8.

It is recognized that this factoring of the ore reserve basis is conservative, but, it is also realistic. More geologic knowledge in the future may well justify modification of this reduction in tonnage.

Total reserve tons and pounds were determined to be:

	% Grade	Tons	lbs. U_3O_8
North Pit	.107	1,204,747	2,569,452
North Underground	.099	441,008	869,224
Total North Area	.104	1,645,755	3,438,676
South Pit	.116	803,614	1,867,719
South Underground	.137	799,373	2,188,635
Total South Area	.127	1,602,987	4,056,354
Total All Mines	.115	3,248,752	7,495,030
Total Pits	.110	2,008,361	4,437,171
Total Underground	.123	1,240,381	3,057,859

These reserve values do not reflect mining recovery or mining dilution.

1.10 Comments

A certain amount of caution should be exercised when considering the tons and grade of uranium ore calculated for these properties. Geological constraints were not considered when using the geostatistical approach for reserve analysis since a detailed geologic study of the property was not within the scope of work. Past mining production from this district has been primarily from narrow veins and not from ore

bodies with as much lateral extent as those indicated by Wyoming Mineral Corporation's exploration program. This district appears to be unique to the production of uranium from this type of deposit and factors used in other deposits for the calculation of reserves can not be directly compared to Dripping Spring

1.11 Recommendations

It is recommended that a detailed geological study of the deposit be conducted to determine the precise nature of the uranium mineralization. It is suggested that cross sections from drill hole to drill hole be constructed to aid in correlating mineralized zones across the deposit. These cross sections should utilize a geologic or stratigraphic datum and not be restricted to specific intervals determined by elevation.

Geological mapping should be conducted in order to determine the actual extent of mineralization, the configuration of the deposit, and the factors controlling mineralization. Grade-thickness maps would be useful for mapping individual areas of mineralization.

The information obtained from this study would aid in a detailed analysis of ore reserves and in mine planning. This study would also delineate locations for the optimum utilization of additional drill holes.

It is advisable to continue drilling, extend the limits of ore bodies in areas where the boundary of the ore body has not been delineated by barren holes

A study should be made to establish a relationship between actual uranium values obtained from chemical analysis versus those obtained from geophysical logging in case the calibration factors used for this particular deposit are incorrect.

2.0 OPEN PIT MINE FEASIBILITY

The Dripping Spring Quartzite outcrops along canyon and valley walls in the Workman Creek area creating a contour mining-like situation for open pit mining possibilities (Drawing 2.-1). However, because of the very steep slope of these hillsides, stripping ratios of open pit ore will increase very rapidly in advancing pit perimeters away from the outcrops. A point is reached where underground mining becomes a better alternative to recovering these deeply buried ores.

2.1 Open Pit Design and Mining Method

Open pit ore occurs in both North and South Workman Creek. It is apparent that the ore was once continuous across the canyon before it's erosion; consequently the same general pit designs and mining methods can be applied to both mining areas. Both pits will be small in size making it preferable to use small, maneuverable, versatile equipment which might be transferred from one property to the other. Mining will begin at the outcrops, producing ore early in the project with little pre-stripping and capitalized development.

2.2 Open Pit Limits and Configuration

The factors governing the size and shape of both the North and South Pits are geographical, geometrical, and economic. The ore lies in more or less flat beds and outcrops along the canyon walls. This "day lighting" of the quartzite beds limits the pits along at least one side.

The geometry of the backslope overburden, mining bench height, and safety benches dictate that the surface expression of the pit floors encircle a much larger area than the mere ore area.

After considering the above two limiting factors, it is still necessary to cut off the pit extensions because of economic criteria. In this case, because of the ability to continue mining by underground methods, the economic open pit limit was determined to be the point at which the estimated open pit mining cost per ton equals the estimated underground mining cost. Stripping ratio of overburden to tons of ore was the variable cost factor that caused the open pit cost to rise as mining boundaries advanced into the steeply inclined hillside characteristic of this area. A detailed discussion of this process and reasoning is included under Section 2.2.2.

From observation of the area and some knowledge of the rock, it was reasoned that pit walls would be stable at overall back slopes of 45° or 1:1. All of the overburden as well as the ore and associated waste will require drilling and blasting.

2.2.1 Cut-Off Grade Determination

Only after considering all economic factors can a true site specific grade cut-off be derived, however, for initial mine planning, a reasonable cut-off must be developed or assumed. Past experience with similar operations indicated that milling costs per ton would be no less than $15 and mining would be no less than $20 on a average of open pit and underground for a total of $35.00 per ton. At $32.00 per pound of yellow cake, the value of one pound of U_3O_8 per ton of ore approximates the costs of production. Therefore, the grade cut-off was assumed to be 0.05% U_3O_8 for all mineralization.

This grade cut-off can not tolerate significant dilution. Underground stoping cannot efficiently mine bedded deposits thinner than six feet. Consequently, it was assumed that a thickness cut-off of 0.05% ore could not be less than six feet. The grade-thickness cut-off was set at 0.30 for underground ore.

Open pit mining operations can, however, efficiently recover two foot thick ore with dilution. Two feet of 0.05% ore establishes the grade-thickness cut-off at 0.10 for open pit ore.

The above established criteria was applied to the slice polygon maps provided by Wyoming Mineral Corporation, using the data listed on the printouts.

2.2.2 Determination of Stripping Ratio

As mentioned under Section 2.2 above, the maximum stripping ratio of the pits was not established solely by their economics, but in addition, by the underground mining ability to compete with the open pit costs. The procedure for establishing this breakpoint between the two methods is as follows:

1) Underground mining costs were assumed to be approximately $40 per ton.
2) Open pit mining costs were estimated with the stripping ratio as a variable.
3) The two costs were equalized and the stripping ratio determined.
4) East-West cross sections were drawn every 100 feet through both deposits including the areas of ore polygons.

5) Pit wall outlines were drawn onto the cross sections as they might appear as a pit section. Areas of ore polygons and of the overburden and associated waste were accurately measured.

6) The derived stripping ratio was changed from bank cubic yard of waste per ton of ore to square foot of waste to square foot of ore, for calculation purposes.

7) The areas measured from the cross sections were compared with the stripping ratio criteria. Cross sections with waste to ore area ratios greater than the determined ratio were deemed to represent underground ore only.

Using the above procedure, the open pit areas were established for the first design and economic study. The South area produced a definite break while in the North area it appeared that all of the known ore could best be mined by open pit.

After the first cost figures were derived for the two mining methods, it was found that the assumed underground mining cost per pound U_3O_8 was significantly less than the cost per pound U_3O_8 for open pit. This resulted from an assumed underground cost that was excessive for this property and because of the high dilution ratio estimated for the open pits. With this in mind, it was decided that the North area could be more efficiently mined by excluding a very high stripping ratio portion from the pit and mining it instead by underground methods.

2.2.3 Identifying Economic Polygons

The above derived criteria was applied to identifying the economically minable polygons by both mining methods. Because of the excessive areal size of some of the polygons, these were reduced and joined into mining units or pods. Ore pods were sliced into 10-foot thick polygons arbitrarily by the Wyoming Mineral Corporation computer program. These slice maps were superimposed on each other to more precisely identify the ore areas. This selection of minable ore is discussed in detail in Section 1.9 under Determination of Minable Ore. This subject is open to considerable interpretation with the consequence that there may be variances in pounds of U_3O_8 and tons of ore available for mining. For purposes of this feasibility study, conservative judgment was used which might be modified by later drilling and geological study.

Polygons considered minable by open pit met the grade cut-off of 0.05% U_3O_8 and the Grade-Thickness (G.T.) cut-off of 0.10. These were colored on the slice maps. Outcrop lines were then superimposed on the maps to limit the areal extent of the outcropping polygons. Minable polygons were then grouped into pods beginning with the lowest slice map. Using a 1:1 backslope this ore area was projected to the next overlying slice map. Ore encountered on that slice map was included in the pod and the combined area projected with the 1:1 backslope on to the next slice and the procedure repeated until the top slice containing ore was reached. This combination of pods projected to surface determine the pit configuration.

2.2.4 Master Pit Plans

As mentioned in other sections, both North and South mining areas can be operated along the same general procedure. Topsoil, trees, and shrubs will be cleared from a mining unit, then stripping of overburden will commence in preplanned benches exposing ore early in the operation and maintaining a constant in-pit available ore reserve through the pit life. Initial waste rock will be deposited in a dump just off and below the ore area. As soon as sufficient mined-out pit floor is available, back-filling with newly excavated waste will begin. Openings will be left for underground mine development where planned and the backfilled pits will be partially reclaimed.

Stripping benches were chosen to be twenty feet high to facilitate quality blasting control and ease of loading with the selected equipment. A safety bench will be left every third bench to achieve the overall 1:1 backslope desired to insure slope stability. These safety benches will be at least thirty feet wide, making them usable as access roads. It was assumed that the individual bench backslopes would be stable at ½:1 but, because of the strength of the rock and the blasting and loading control, these slopes will probably stand at ¼:1 (Drawings 2.2.4-1 and 2.2.4-2).

Ore zone mining will be designed for ore quality control; consequently, ten-foot high benches were specified with the same ½:1 backslope and necessary safety benches. By limiting ore zone benches to 10-foot, greater selectivity in mining will be achieved than is possible with the twenty-foot benches. Ore

intercepts ten feet thick or greater will be taken in selective slices to minimize dilution of ore by waste and low grade. Six examples are outlined in Figure 2.2.4. Three to five times as much associated mining waste will be mined in gaining access to the ore. In general, both ore and associated waste will be drilled with vertical 3-4" holes to twelve-foot depths on five-foot centers. All these blast holes will be probed and recorded to determine and measure any ore intercepts. Procedures as shown on Figure 2.2.4 will be used to separate this ore and waste.

Ore and waste loading will also be selective to avoid dilution. Ore controlmen, or probemen, will evaluate each pile of broken rock and stake it to facilitate selection by the loader operators. All trucks carrying mineralized rock will pass under a gamma-ray truck scanner, where the loads will be more accurately assayed. The scanner operator will route the truck directly to the mill, a stockpile of similar grade, or to the waste disposal area depending on its grade.

Drawing 2.2.4-1 is a plan of the North Workman Creek pit and 2.2.4-2 is a plan of the South pit surrounding area. The pits have different shapes but are basically similar in the design features mentioned.

Rock quantity measurements were made by digitizing the perimeter of the mined-out pit plan at each bench median. The sums of these bench volumes were converted to bank cubic yards of material. Ore quantities from measurement or from the computer printouts were converted to bank cubic yards and subtracted from the total pit volume. All material not determined to be ore was

G-414
REV.11/62

Dravo
PITTSBURGH, PENNSYLVANIA

ENGINEERING COMPUTATIONS

EST NO. _____
CONT NO. _____
DIVISION _____

COMPANY WYOMING MINERAL CORPORATION
LOCATION DRIPPING SPRING
DESCRIPTION Ore Extraction Procedures

DATE _____
DR _____ CH _____
REF _____

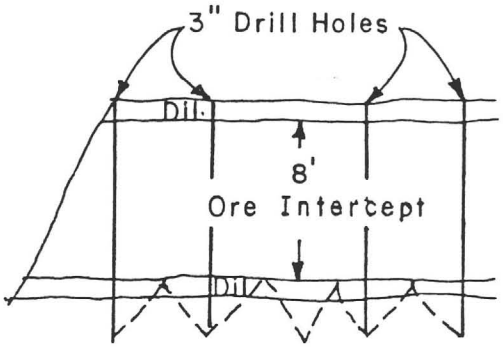
FIGURE 2.2.4

A. Ore Intercept 8' + Thick

-- Take entire 10' of bench with Dil.

-- Drill 12' holes on 5' centers

-- Load and blast hole without bottom stemming.



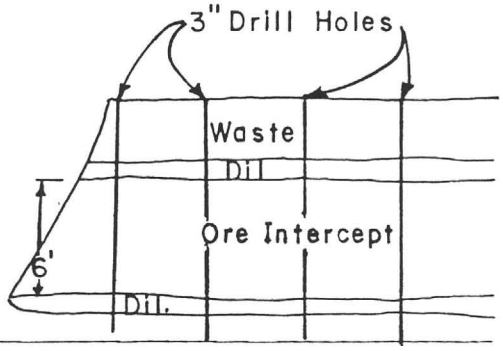
B. Ore Intercept 6' to 8' Thick at Bottom of Bench

-- Take 6' of ore with Dilution

-- Drill 12' holes on 5' centers

-- Load and blast hole without stemming.

-- Probe broken ore and load top waste material separately from ore.



C. Ore Intercept 6' to 8' Thick at Upper Part of Bench

-- Take 6' of ore with Dilution

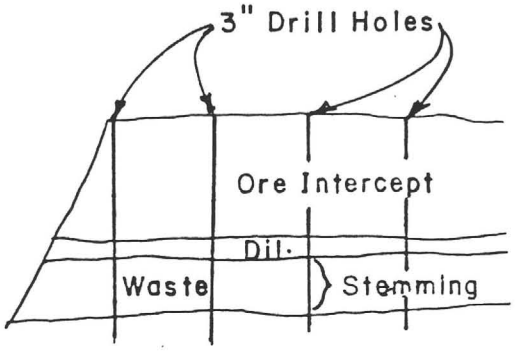
-- Drill 12' holes on 5' centers

-- Probe holes and stem from bottom up to within one-foot of ore.

-- Blast only ore portion of bench

-- Load ore with bottom dilution.

-- Redrill bottom waste and blast with lower bench when possible



SHEET NO. _____

G-414
REV.11/62

Dravo
PITTSBURGH, PENNSYLVANIA

ENGINEERING COMPUTATIONS

EST NO. _____
CONT NO. _____
DIVISION _____

COMPANY WYOMING MINERAL CORPORATION
LOCATION DRIPPING SPRING
DESCRIPTION Ore Extraction Procedures

DATE _____
DR _____ CH _____
REF _____

FIGURE 2.2.4 (cont)

D. Ore Intercept 4' to 6' Thick at Bottom of Bench

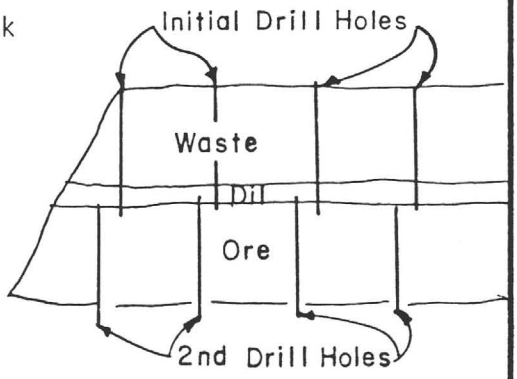
-- Take upper 5' or 6' of waste leaving diluting material or picking up some ore.

-- Take 4' to 6' of ore with dilution.

-- Drill 6' ± holes through waste, then stem back to top of ore.

-- Drill 6' ± holes after waste removed to 2' below bench grade.

-- Load ore with bottom and top dilution.



E. Ore Intercept 4' to 6' Thick at Top of Bench

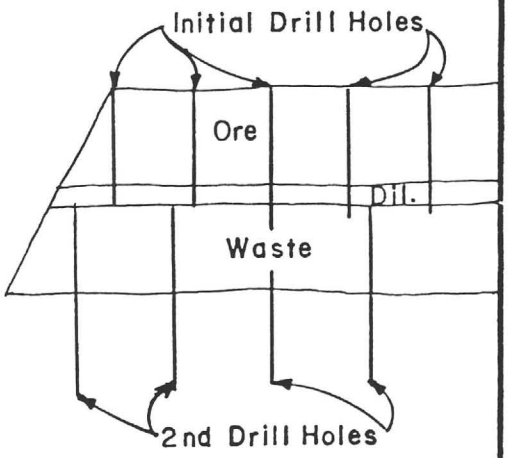
-- Take ore off top of bench with diluting material

-- Drill 6' ± holes through ore into waste stem back to one-foot of bottom of ore.

-- Load ore cleanly off bench.

-- If no ore underlies area, leave waste in place.

-- If ore underlies area, mine the waste off to bench elevation.



SHEET NO. _____

G-414
REV.11/62

Dravo
PITTSBURGH, PENNSYLVANIA

ENGINEERING COMPUTATIONS

EST NO. _____
CONT NO. _____
DIVISION _____

COMPANY WYOMING MINERAL CORPORATION
LOCATION DRIPPING SPRING
DESCRIPTION Ore Extraction Procedures

DATE _____
DR _____ CH _____
REF _____

FIGURE 2.2.4 (cont)

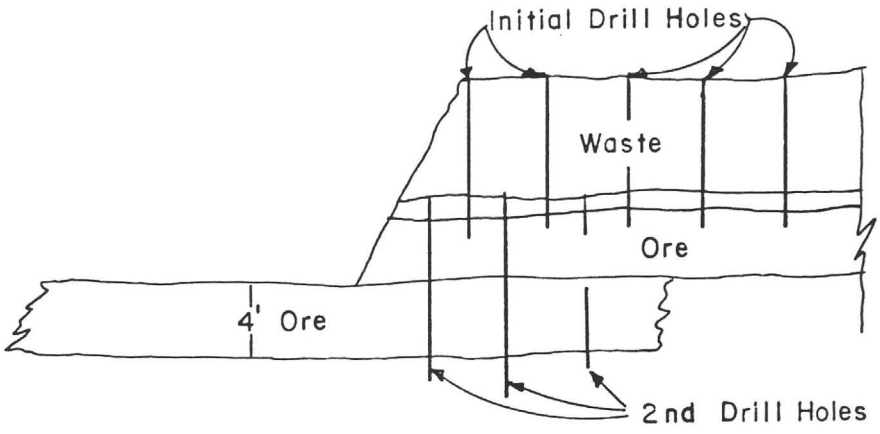
F. Ore Intercept 2'-4' Thick at Bottom of Bench

-- Take waste off top of bench leaving some diluting material and taking some ore.

-- Drill 8' ± holes through waste, then stem back to top of ore.

-- Drill holes through ore into waste even though the bottom of ore is below bench elevation.

-- Load bench ore and any continuing ore below bench elevation up to four feet thick.



SHEET NO. _____

considered as waste, but may in fact contain some recoverable mineralization. However, a prudent, conservative estimate is best in feasibility studies, thus avoiding unrealistic evaluation.

2.2.5 Mining Recovery and Dilution

Ore actually produced from a mine is different from the minable reserves by two factors. These are recovery and dilution. The first involves a loss of tons and their contained pounds of U_3O_8. The second involves the addition of tons of waste and low grade.

Open pit mining operations lose ore in two major areas. One is to the overlying waste or low grade. The other is to the peripheral waste or low grade. For this study, it was assumed that one-half-foot of ore would be lost from the top and bottom of the ore horizon. Consequently, the highest percentage of loss will be for the thin streaks and decrease as the thickness increases. Peripheral loss was determined to be one-half percent per foot of thickness, based on a 100-foot by 100-foot block of ore. This loss will then increase with thickness. Approximate representations were made for each of a variety of ore thicknesses and the corresponding losses weighted by this representation. The sum of these weighted losses divided by 100% yields the average loss and corresponding percent recovery at 82.4% as detailed in Appendix 2.5.5-1.

Dilution of mined ore is caused by waste and low grade being mixed with the calculated recovered ore to give a greater volume of ore at a slightly less overall grade. There appears

TABLE 2.2.5-1

	Reserve lbs. U_3O_8	Reserve Tons Ore	Average Reserve Grade	Recovered Pound U_3O_8 @ 82.4%*	Recovered Tons Ore @ 82.4%
North Pit	2,569,452	1,204,757	0.107	2,117,228	992,720
South Pit	1,867,719	803,614	0.116	1,539,000	662,178
Total Pits	4,437,171	2,008,371	0.110	3,656,228	1,654,898

	Dilution Tons @ 28.7% **	Dilution lbs. @ .015% U_3O_8	Mined lbs. U_3O_8	Mined Tons Ore	Average Mine Grade
North Pit	284,911	85,473	2,202,701	1,277,631	0.086
South Pit	190,045	57,014	1,596,014	852,223	0.094
Total Pits	474,956	142,487	3,798,715	2,129,854	0.089

* Appendix 2.2.5-1

** Appendix 2.2.5-2

to be no easily discernable boundary between ore and waste. The only manner in which ore can be separated from waste and low grade is by hand probing the broken ore piles. Hand held probes can only determine the boundary within six inches. Even careful blasting will cause some mixing of ore and waste as will the loading process. This mixing of ore and waste and the inability to closely define the ore-waste boundaries makes it necessary to factor the recovered reserve tons with an estimated dilution based on reserve thicknesses. An analysis similar to the one used for estimating recovery and mining losses is used and detailed in Appendix 2.2.5-2. One foot of diluting material was assumed to be added to the top and bottom of the mineralized streak. Peripheral dilution was again assumed to be one-half of one percent per foot of thickness based on a 100-foot by 100-foot block. The average dilution was determined to be 28.7%. This dilution factor was applied to the recovered tons to yield the dilution tons. Diluting rock can safely be assumed to contain some Uranium. In this case it was estimated to contain an average of approximately 0.015% U_3O_8. The pounds of U_3O_8 thereby derived were added to the recovered pounds of U_3O_8 to give the total mined pounds. Table 2.2.5-1 summarizes this process. Overall mining recovery based on the reserve pounds of U_3O_8 is estimated to be 85.6%.

2.3 Waste Rock Handling

The two open pits, as planned, will produce approximately 19 times more waste than ore. This material, consequently, occupies the major portion of mining effort and it's expanded volume creates a bulk capable of filling a large voided area. This excavated material will be deposited in two manners at each pit. These are out-of-pit dumps and in-pit backfilling. Another facet of this waste handling is the in-pit disposal of mill tailings. For all practical purposes, all rock material removed from the pit will be returned to the area but swollen by fragmentation to occupy 25 to 35 percent more volume.

2.3.1 Out-Of-Pit Dumps

While the pits were designed and scheduled to begin in low stripping ratio areas, considerable amounts of waste must be deposited outside the pits initially as shown on Drawings 2.2.4-1 and 2.2.4-2. The North Pit initial dump is placed along the hillside just below the ore horizon to minimize the haulage distance and prevent covering other possible ore (Drawing 2.2.4-1). The South Pit initial dump is placed in a draw immediately east of the pit where ore will not be buried. Waste haul trucks will bring the waste around the hillside more or less on contour and dump waste on benches as shown in Drawing 2.2.4-2. Minimizing waste haul distances was a prime consideration. Additional waste material may be placed in the smaller draw immediately west of the pit during the stripping of the high overburden southern part of the South Pit. This is to facilitate the overfilling of this pit during the latter stage of production.

The out-of-pit dump areas will be cleared of vegetation and slash prior to covering. Should significant topsoil be found in the areas, it will be removed and stored for reclamation work.

2.3.2 Pit Backfilling

Immediate pit backfilling accomplishes two major objectives. First, waste haul distances are minimized. Second, topographic restoration and mined land reclamation are made possible at an earlier time and at a lesser cost. Both pits are amenable to backfilling, from production, at an early date by mining out the low overburden areas at the start. Ore mined in excess of production goals will be stockpiled at the mill site to free the pit floor for waste backfilling. Associated mining waste will be placed at the bottom of the pit in the same horizontal zone from which it was mined. Stripping waste will then be placed over this mined waste. Where mill tailings are deposited in the pit, associated waste will be used for an immediate covering with stripping waste surrounding both as described in Section 2.3.3. It is recognized that some of the associated mining waste contains low grade mineralization. Should some of this material be deemed recoverable at a future date through higher commodity prices or lower recovery costs, then it can be stockpiled in the mined-out pits free of waste covering. Any value for this sub-ore grade material was not considered relevant to this feasibility study.

2.3.3 In-Pit Disposal of Mill Tailings

For several reasons it was determined that it would be

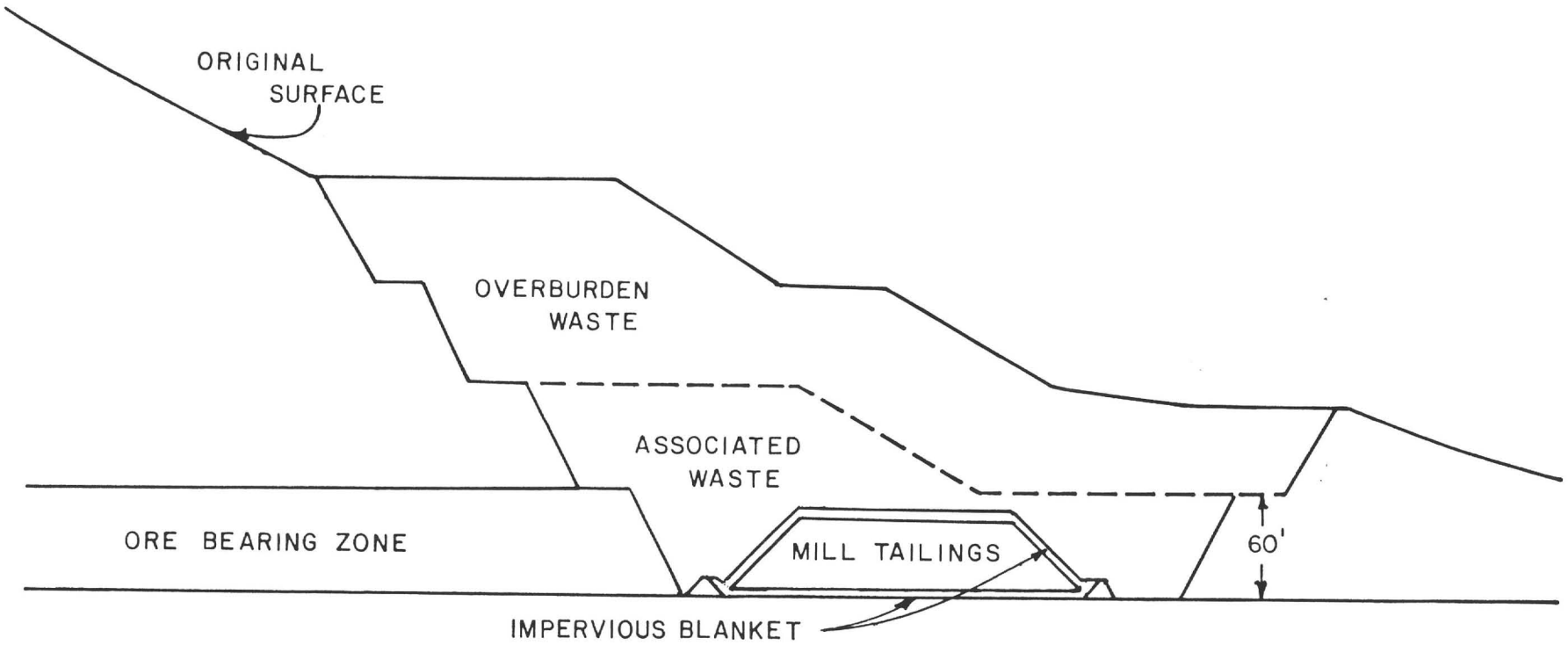


Figure 2.3.3-1 — TYPICAL WASTE DISPOSAL CROSS SECTION

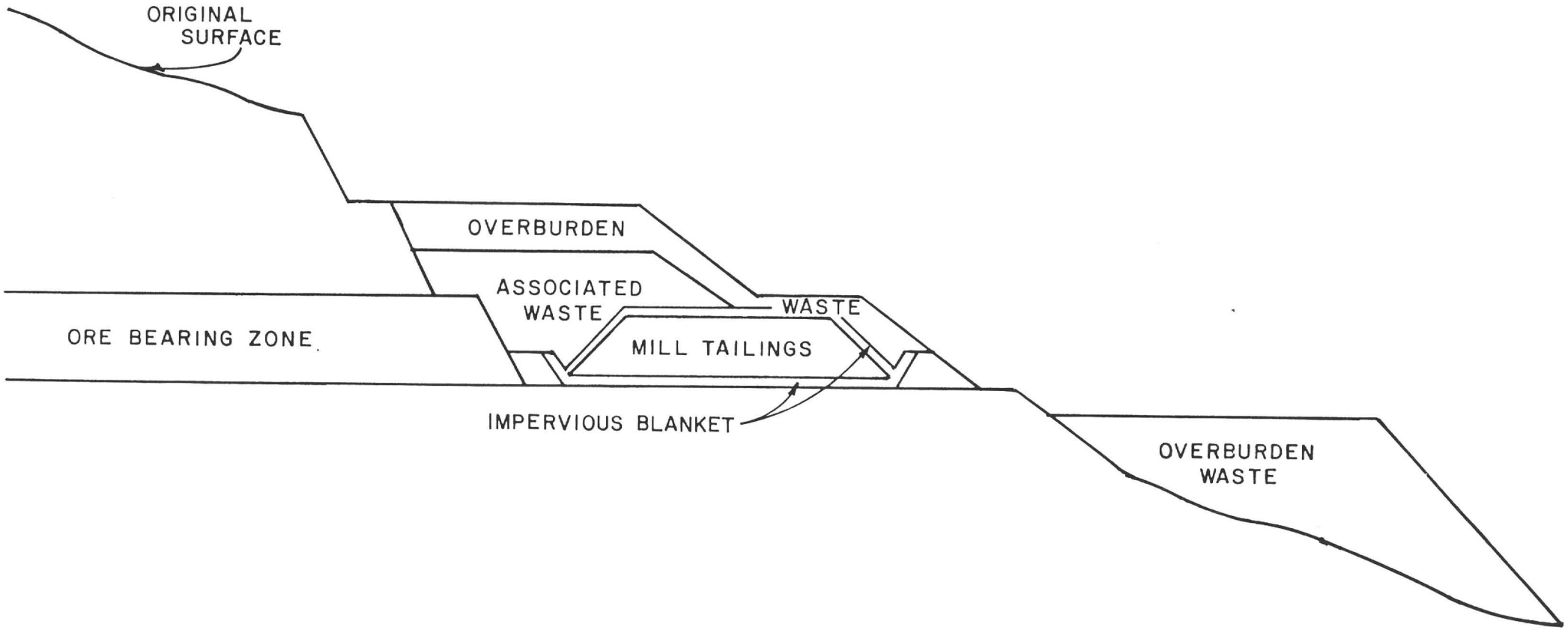


Figure 2.3.3-2 — TYPICAL WASTE DISPOSAL CROSS SECTION

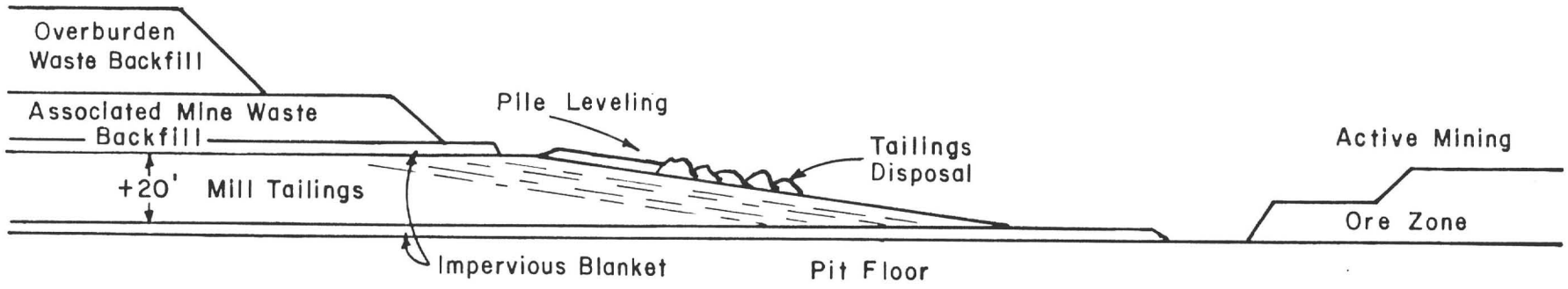


Figure 2.3.3-3 — TAILINGS DISPOSAL PRACTICE

advantageous to avoid the use of wet tailings disposal ponds but instead to filter the mill discharge and dispose of the moist sand tailings as a solid. The open pit backfilling procedure gives an opportunity for permanent disposal in a manner consistent with environmental protection and cost efficiency. A procedure for placing these tailings is outlined below with typical pit cross sections exhibited as Figures 2.3.3-1 and 2.3.3-2.

--Following extraction of all ore from the lowest mining bench, the resulting floor is smoothed to make a level surface.

--Berms or dams are constructed to surround the disposal area using waste rock.

--An impervious blanket is laid over the prepared surface and berms to form a basin.

--Mill tailings will be trucked to the disposal site by ore haul trucks returning from the mill. They will dump piles on top of the impervious surface for the first lift, then on top of each succeeding lift again in piles.

--The rubber-tired dozer will flatten these piles into lifts that will compact sufficiently to bear loaded trucks through succeeding lifts. This practice will construct a feature much like an ore stockpile, the ramp of which retreats in the direction of mining (Figure 2.3.3-3).

--The sealing blanket will then be placed on top and on the sides of the tailing pile.

--Final reclamation will envelop the prism shaped tailing pile and impervious layer with an encapsulating blanket of waste material preventing its erosion and exposure.

Engineering work done in this section has only been carried to the point of illustrating the disposal concept and provides a basis for costing, like other sections of the study. Detailed testing and analysis must be done prior to final design of the system. An estimate of the separated costs for in-pit tailing disposal is presented in Appendix 2.3.3.

2.4 Mine Haul Roads

The haul trucks selected do not require an overly wide road nor wide turns. A 50-foot wide travel surface is sufficient for two-way traffic; therefore, the haul roads were specified to be 70 feet in total width to allow for a ditch on the uphill side and a safety berm on the downhill side. No grades steeper than 8% were designed into the roads as shown on Drawings 2.-1, 2.2.4-1 and 2.2.4-2. A 60" heavy duty steel culvert was specified for the crossing of Workman Creek by the North Pit haul road (Drawing 2.-1).

2.5 Equipment Selection

All equipment selected for this operation was chosen for it's adaptability, versatility and ease of transport. The major pieces of equipment should all last through the life of the described open pit mining phase. Table 2.5-1 lists the selected equipment. These equipment items are simply representative for size, type and costing purposes. They should not be construed as endorsement of any particular manufacturer.

Table 2.5-1

Selected Open Pit Equipment

Description	Make and Model	No. of Units
Vertical Blast hole Drill	IR DM 25 SP	2
Haul Truck	Cat. 769 B	9 then 13
Front-End Loader	Cat. 992 C	2
Front-End Loader	Cat. 988	1
Crawler Tractor	Cat. D-9H	2
Wheel Tractor	Cat. 816	1
Crawler Tractor	Cat. D-8K	1
Motor Grader	Cat. 120 G	1
Anfo Truck	Ripco	1
Anfo Bin	--	1
Powder Truck 2-Ton		1
Low Boy	Ford LT-900	1
Truck Scanner	Eberline	1
Pit Pump		1
Water Truck	Paramount P-3000	1
Fork Lift		1
Haudraulic Crane		1
Lube Truck		1
Tire Truck		1
Welding Truck		1
Pickup Truck		4
Manager Car		1
Ambulance		1
Light Towers		3
Radio System		1
Hand Probes		3
Diesel Storage Tank		1
Bridge Culvert		1
Explosive Magazine		1

2.6 Equipment Productivity and Operating Costs

The size and number of major units of equipment is based on analysis of production requirements. Procedures were generally derived from the Caterpillar Performance Handbook.

An analysis was used to estimate the number for front-end loaders required for both stripping and ore loading. These are exhibited in Appendix 2.5-1.

Haul distances were measured for determination of truck cycle times both for stripping and ore haulage. The number of trucks required were then determined by analysis as shown in Appendix 2.5-2.

Equipment Operating Costs are listed in the Estimated Cost Section V.

2.7 Auxillary Facilities

All facilities not herein listed are covered by the plant site description including the maintenance shop, the change house, and the offices.

2.8 Manpower Schedule

Table 2.8-1 lists the manpower requirements both salaried and hourly for each classification.

The average daily manpower requirement during the production years is 85, thereby giving a productivity of 16.5 tons per man-shift.

2.9 Production Schedule

Early in the project it was determined by Dravo Engineers and Wyoming Mineral Corporation personnel that daily production through the mill should be set at 1,000 tons of ore. With the assumption

Table 2.8-1

WYOMING MINERAL MANPOWER REQUIREMENTS

OPEN PIT

Year	1	2	3	4	5	6	7	8	9	10	11	12
	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
JOB CLASSIFICATION					Number of Administrative							
Mine Manager	1	1	1	1	1	1	1	.5	.5	.5	.5	.5
Mine Superintendent	1	1	1	1	1	1	1	1	1	1	-	-
Chief Engineer	1	1	1	1	1	1	.5	-	-	-	-	-
Chief Geologist	1	1	1	1	1	1	1	-	-	-	-	-
Environmental Engineer	1	1	1	1	1	1	1	1	1	1	1	1
Mine Engineers	2	2	2	2	2	2	1	-	-	-	-	-
Drafter	1	1	1	1	1	1	1	-	-	-	-	-
Safety Engineer	1	1	1	1	1	1	1	.5	.5	.5	.5	.5
Accountant	2	2	2	2	2	2	2	1	1	1	1	1
Purchasing Agent	1	1	1	1	1	1	1	.5	.5	.5	.5	.5
Personnel Man	1	1	1	1	1	1	1	.5	.5	.5	.5	-
Maintenance Super.	1	1	1	1	1	1	1	.5	.5	.5	.5	-
Maintenance Foreman	1	2	2	2	2	2	2	1	1	1	1	1
Mine Foreman	3	3	3	3	3	3	3	1	1	-	-	-
Managers Secretary	1	1	1	1	1	1	1	.5	.5	.5	.5	.5
Receptionist	1	1	1	1	1	1	1	-	-	-	-	-
Warehouse Super.	1	1	1	1	1	1	1	.5	.5	.5	.5	.5
Warehouse Foreman	2	2	2	2	2	2	2	1	1	1	1	1
Warehouse Helper	1	1	1	1	1	1	1	.5	.5	.5	.5	.5
Total Admin. Personnel	24	25	25	25	25	25	23.5	10	10	9	8	7
					Number of Hourly Maintenance							
Mechanic	4	4	4	4	4	4	2	2	2	2	1	1
Mechanic Helper	2	4	4	4	4	4	2	2	2	2	1	1
Electrician	1	1	1	1	1	1	1	1	1	1	-	-
Lube Man	1	1	1	1	1	1	1	1	1	1	1	-
Fuel Truck Operator	1	1	1	1	1	1	1	1	1	1	1	-
Total Hourly Main.	9	11	11	11	11	11	7	7	7	7	4	2
					Open Pit Operating Manpower							
Drill Operator	1.5	3	3	3	3	3	3	-	-	-	-	-
Drill Helper	1.5	3	3	3	3	3	3	-	-	-	-	-
Loader Operator	3	6	6	6	6	6	6	2	2	-	-	-
Haul Truck Driver	7	14	14	7	-	-	-	-	-	-	-	-
Haul Truck Driver				10	20	20	20	5	5	-	-	-
Buldozer Operator	6	6	6	6	6	6	6	6	6	6	6	6
R.T. Bulldozer Oper.	1	2	2	2	2	2	2	2	2	2	2	-
Grader Operator	1	2	2	2	2	2	2	2	2	2	2	-
Dump Man	1	2	2	2	2	2	2	-	-	-	-	-
Scanner Operator (1)	.5	1	1	1	1	1	1	1	1	1	-	-
Probe Man	2	2	2	2	2	2	2	-	-	-	-	-
Field Maintenance	2	2	2	2	2	2	2	2	2	2	2	-
Blasting Crew	1.5	3	3	3	3	3	3	-	-	-	-	-
Labor Pool	2	4	4	4	4	4	4	-	-	-	-	-
Total Open Pit	30	50	50	53	56	56	56	20	20	13	12	-
					Open Pit Manpower Summary							
Administration	24	25	25	25	25	25	23.5	10	10	9	8	7
Hourly Maintenance	9	11	11	11	11	11	7	7	7	7	4	2
Hourly Operating	30	50	59	53	56	56	56	20	20	13	12	-
ANNUAL TOTALS	63	86	86	89	92	92	86.5	37	37	29	24	9

Figure 2.9-1

ENGINEERING & CONSTRUCTION SCHEDULE

DRAVO CORPORATION ENGINEERING CONSTRUCTION DIVISION

BY _____ DATE 9/29/80 REV. 3

CONTRACT NO. M-7585

SHEET NO. ____ OF ____ SHEETS

CUSTOMER Wyoming Mineral

JOB Dripping Spring

LOCATION Arizona

M-400 REV 2/80

DESCRIPTION OF WORK	Percent Complete
North Pit Clearing and Grubbing Area 1	
Pre-stripping North Pit Area 1	
Ore Production North Pit Area 1	
North Pit Clearing and Grubbing Area 2	
Pre-stripping North Pit Area 2	
Ore Production North Pit Area 2	
North Pit Clearing and Grubbing Area 3	
Pre-stripping North Pit Area 3	
Ore Production North Pit Area 3	
Underground Mine Development	
North Area	
Ore Production U.G. North Area	
Pit Reclamation North Area	
South Pit Clearing and Grubbing	
Pre-stripping South Pit	
Ore Production South Pit	
Underground Mine Development	
South Pit	
Pit Reclamation South Area	
Ore Production U.G. south Pit	
U.G. Mine Reclamation	
Roads and Surface Facilities Reclamation	

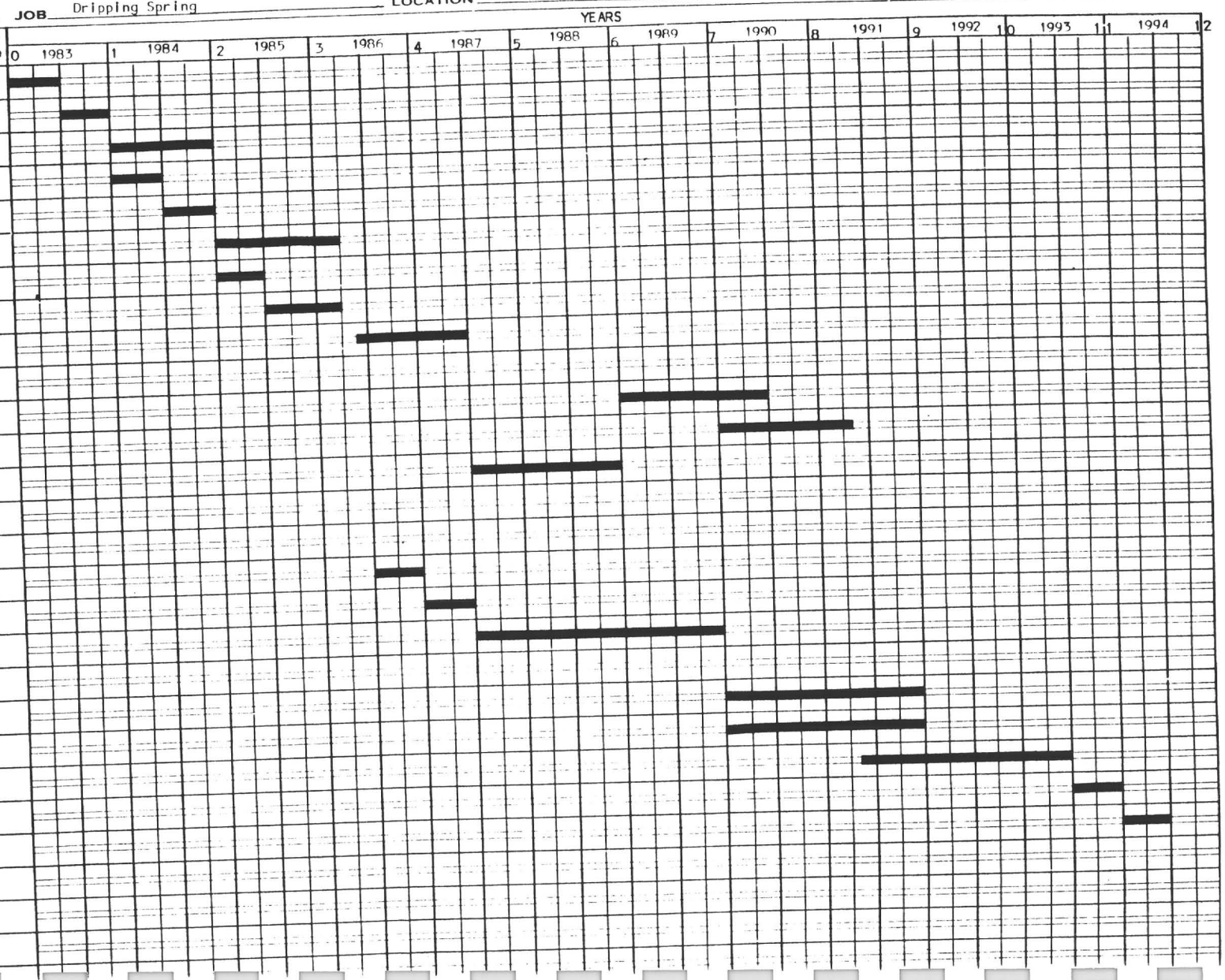


TABLE 2.9-1

ESTIMATED MINE PRODUCTION

WYOMING MINERAL CORPORATION

CALENDAR YEAR	1 1983	2 1984	3 1985	4 1986	5 1987	6 1988	7 1989	8 1990	9 1991	10 1992	11 1993	12 1994	Totals
PRODUCTION													
Tons		350,000	350,000	350,000	227,631 (.086%)* 122,369 (.094%)* 350,000	350,000	350,000	29,854 (.094%)* 320,146 (.099%)* 350,000	89,991 (.099%)* 260,009 (.137%)* 350,000	350,000	133,408		3,283,408
Pounds U_3O_8		602,000	602,000	602,000	396,701 230,054 626,755	658,000	658,000	49,960 633,889 683,849	174,489 712,425 886,914	959,000	364,006		6,642,524
Average Grade		0.086	0.086	0.086	0.090	0.094	0.094	0.098	0.127	0.137	0.137		0.101
		← North Pit →				← South Pit →			North Area Underground	← South Area Underground →			

* Percent Grade

that the mill would operate 340 days per year, the annual production schedule was based on 350,000 tons of mill feed. The mine, however, will only operate 250 days per year, two eight-hour shifts per day, consequently, the goal of daily mine production is 1,400 tons.

Figure 2.9-1 graphically illustrates the production schedule of both the open pit and underground operations. Table 2.9-1 lists the expected annual tonnages and pounds of U_3O_8 produced for each year.

2.10 Open Pit Reclamation

The exact criteria for reclaiming non-coal open pits are not well defined, however, it is good mining practice and prudent engineering to design open pit reclamation to achieve certain goals:

--The general character of the land form will be restored.

--The reclaimed surface will support revegetation.

--Exposed ore bearing horizons will be covered.

--Mill tailings and associated mining waste will be covered by stripping waste.

--Drainage patterns will be restored in a manner that will minimize erosion.

Drawing 2.10-1 illustrates the planned reclamation topography for the North Pit. Along the eastern edge of the pit, the highwall benches will be covered with waste and topsoil to reduce the visual effect and cause it to appear similar to the steep hillside and cliff features evident on to the east.

The South Pit reclaimed topography is shown on Drawing 2.10-2. The most prominent feature change in this plan is the reclamation of the initial waste dump east of the pit. Drainage of the immediate area was with a small channel that probably only carries water during spring

snow melt and severe storms. To avoid this water from eroding the fill material, the drainage channel was routed to the west into another small channel between the pit and the dump. The southern highwall benches will be covered with waste and topsoil giving it a character similar to other steep faces in the area.

The major amount of this reclamation activity will be done while backfilling mined-out areas during the operation. Underground mining will delay final reclamation in both pits by the need to preserve the adit area open and to accommodate the mill tailings from underground mined ore. Final milling of stockpiles will yield more tailings that will also delay final reclamation of the South Pit. Approximately one year will be required for final reclamation after milling ceases.

2.11 Conclusions

Open pit mining of the ore occurrences outcropping along the hillsides in both North and South Workman Creek areas appear technically feasible. Should the ore continue deep into the mountains, however, underground methods will become more economical. Mining will require great care to maintain good recovery without excessive dilution.

2.12 Comments

The minable ore reserve quantities used in this study are intentionally conservative due to the lack of actual hands-on knowledge and experience with this specific ore. Certainly as mining progresses and this specific knowledge becomes available, ore reserves will be predictable with a lesser degree of conservatism. Even before a mining commitment is made, small test pits and underground excavations can be excavated and their yields of U_3O_8 measured. By comparing these values

with drill probe readings made prior to excavation in the same ore, reliability and confidence in the exploration data may justify increasing the estimated minable ore reserves. Expanded geologic knowledge gained from this test mining will also aid in planning further exploration.

Exploration holes in areas where the mineralization limits have not been defined may produce considerable reserves especially for underground mining. Exploration holes drilled after this report data was frozen, have already verified this fact.

As discussed in Section 2.2, open pitting of these deposits was maximized and underground mining only used where its estimated costs per pound U_3O_8 are less than open pit costs. The reasoning behind this is to maximize resource recovery while maintaining the most economically efficient approach. As more ore is discovered, it may be found that the future of the total property will be as underground mines. Other factors such as environmental permitting requirements may also supersede economics to reduce or eliminate the open pit mining of this ore.

Open pit ore extraction practices should be studied in the actual ore. By carefully monitoring the ore waste separation, it may be found that the relatively high dilution ratio herein predicted may be reduced. For example, smaller or shallower benches may be used or by drilling horizontal blast holes more selectivity in production might be accomplished.

The North Pit area ore reserve is shown to extend a short distance beyond the present Wyoming Mineral Corporation ownership line. For purposes of this report, this area was included in the mining reserve as it may be obtained. Should this area not be obtained, approximately

50,000 tons containing 80,000 pounds of U_3O_8 should be removed from the reserves.

3.0 UNDERGROUND MINE FEASIBILITY

In this study, drill hole data and polygon maps supplied by the client, provided the basis to thoroughly analyze a portion of the South Workman Creek property for the feasibility of developing an underground mine. Minable ore reserves were calculated and then the study examined the mining method, access, development scheduling, manpower requirements and equipment selection. Capital and operating cost estimates were then determined.

A portion of the North Workman Creek property also lends itself to underground mining. A separate and detailed analysis was not done on these reserves, but rather the unit costs derived for the South Workman Creek property were considered to apply there as well. Initially in this study, it was believed that all the existing North Workman Creek reserves would be mined by open pit methods, but increasing stripping ratios and additional ore reserves to the east suggested the advantage of underground mining. Justification in assuming the same unit costs as in the South Workman Creek property lies in the comparable degree of accessibility, and the same mining method, equipment and workforce.

3.1 Design Parameters

The following design criteria, or study parameters, were provided by Wyoming Mineral Corporation, operating and engineering experience of Dravo Engineers and Constructors. These parameters are shown in Table 3.1-1.

3.2 Definition of Minable Units and Minable Ore

The client provided a series of 100-foot to the inch polygon maps, each representing 10 feet of elevation. It was necessary to review each of the logs to determine the exact elevation of the

Table 3.1-1

Underground Design Parameters

Subject	Criteria	Source
Planned Mine Production	1400 tons per day	Wyoming Mineral & Dravo
Mine Operating Days	250 per year, 2 shifts per day	Dravo
Mining Recovery	93% of minable reserves	Dravo Analysis
Ore Factors	12.14 cu. ft. per ton in place 15.8 cu. ft. per ton broken	Wyoming Mineral
Development Costs	Treated as an operating expense --Not capitalized	Dravo
Ore Haulage	Rubber-tired trackless	Dravo
Haulage Heading Ground Support	Rock Bolting and Wire Mesh	Dravo
Minimum Stoping Height Minable Reserve	6 ft. of .05% U_3O_8 for a G-T Grade-thickness of 0.30	Dravo
Mine Entry	Multiple adits	Dravo
Development Headings	10 ft. high by 10 ft. wide	Dravo
Stope Headings	8 ft. high by 10 ft. wide	Dravo
Underground Haul Ramps	Not to exceed 10%	Dravo
Water In-flow	Minimal amount	Wyoming Mineral
Ventilation	Negative pressure - end line vent holes	Dravo

Mineralization within the 10-foot intercept. Each computer printout sheet reported the grade on a one-half-foot incremental basis so to determine the grade-thickness, the values for 12 or more consecutive intervals were totalled and the sum then divided by two. At least 12 intervals must be aggregated to provide the grade-thickness for the minimum stoping height of six feet [1].

Dilution has been accounted for by adding in one-half-foot increment below .05% grade at the top and bottom of the incremental series. For example, if the series of values on the computer printout sheet indicated, by plus .05% grade limits, that exactly 6 feet should be extracted, then the dilution ore intercept would be 7 feet. If, of course, both ends of the 12 incremental series were already waste, then no further dilution was necessary.

In a few cases, the situation was considered where two relatively thin ore intercepts were separated by a few feet of waste. If the total grade-thickness was substantial so that by dividing by the total thickness the ore grade exceeded 0.05%, the entire ore-waste ore section could be taken. Whether or not to mine this included waste would then be made based upon the specific conditions of ore grade and waste thickness.

Results of this summary showed a total mining reserve for South Workman Creek of 799,373 tons, including dilution, at an average grade of 0.135% U_3O_8 and with an average mining thickness of 10.8 feet.

---

[1] Dravo made the assumption that minable reserves would have to contain an average of .05% U_3O_8. Therefore, in a six-foot seciton, the aggregate grade-thickness (G.T.) must be at least .30.

North Workman Creek underground minable ore was determined after removing the ore areas included in the revised North Pit from the minable reserve. This remaining ore qualifying under the other underground criteria was designated as underground ore (Drawing 2.2.4-1). The stoping procedure described in Section 3.5 was estimated to achieve an average recovery rate of 93%. Table 3.1-2 summarizes the underground recoverable ore.

Table 3.1-2

UNDERGROUND RECOVERABLE ORE

	Reserve lbs. U_3O_8	Reserve Tons Ore	Average Reserve Grade
North Workman Creek	869,224	441,008	0.099%
South Workman Creek	2,188,635	799,373	0.137%
TOTAL UNDERGROUND	3,057,859	1,240,381	0.123%

	Recovered lbs. U_3O_8 @ 93%	Recovered Tons Ore @ 93%	Average Mined Grade
North Workman Creek	808,379	410,137	0.099%
South Workman Creek	2,035,430	743,417	0.137%
TOTAL UNDERGROUND	2,843,809	1,153,554	0.123%

After the minable intercepts represented within each drill hole were established, this information was noted onto both the polygon maps and onto a long section extending through the property from North to South. It was then important to consider both the coordinate positioning and the elevation relationship of these indicated ore intercepts before laying out the mine and preparing the best development plan.

3.3 Mine Design

After defining each drill hole's minable ore content and it's two-dimensional relationship to other ore intercepts, it was then necessary to relate the elevation of each intercept to all other drill hole intercepts. This overall three-dimensional relationship of the ore intercepts served as the initial conceptual design basis upon which to conceive the mine, meet design decision points, and formulate the planning structure upon which the mine design was established.

The drill hole intercepts indicated that the ore in the South Workman Creek area and immediately south of the open pit lies underneath a 350-to 450-foot waste cover, increasing to the south. The ore extends immediately adjacent to the south edge of the pit for a strike distance of approximately one-half mile. In elevation it is ideally suited to be developed from the bottom levels of the pit. The thickness of the ore intercepts vary from 6 feet to about 24 feet, with one notable extreme value of 40 feet. The average of all ore intercepts was 10.75 feet thick. Approximately one-third of the intercepts represent a 7-foot ore thickness and perhaps another third

is between 18 feet and 25 feet.

The 10-foot interval polygon maps provided by Wyoming Mineral Corporation served as the initial point in conceptualizing a mine. Pit limits were shown on these maps and the ore grades and thicknesses corresponding to each polygon were noted. Concurrently, longitudinal cross sections were also prepared to give the vertical relationships between holes. The layout of the development headings is discussed in Section 3.4, Mine Development. Trackless headings, with a convenient 10-foot by 10-foot cross section, driven with a 2-boom jumbo and other rubber-tired equipment, were selected to develop the mine for the following primary reasons:

1) As previously mentioned, horizontal access from the pit is desirable.
2) The dimensions of the mine are suitable for trackless rubber-tired equipment haulage.
3) Most prospective workings are well concentrated and can be easily reached by short access ramps.
4) Flexibility in the use of trackless rubber-tired equipment provides a definite advantage. Scheduling of men and equipment is facilitated with the development of additional pods of ore.

The ore and host rock are believed to be competent. The meta-sandstone shows distinct bedding planes, and is a dense material with a high compressive strength. Neither timber nor steel supports should be required; however, because of the potential rock spalling and blockiness created by blasting this bedded material, it is believed that some rock bolting and the use of wire mesh will be required.

Although some water is known to be present, it is not thought to be in sufficient quantity that pre-drainage of the ore horizon will be necessary. Whenever possible, the headings have been designed to be located along the peripheries of the ore blocks. The benefits are that ore defrays a portion of the development cost, while at the same time a large amount of ore is not tied up in pillars necessary to maintain the haulage drifts.

The drifts have been designed to break into ventilation boreholes, located along the headings at intervals of approximately 700 feet or which have also been placed at the end-lines of known stope blocks. They will have 75 hp. fans on surface to provide for the efficient removal of contaminated air.

A stope-panel system of mining has been proposed for this mine in Section 3.5, Stoping Method. All mining will be as mechanized with rubber-tired equipment. The mining method will provide for the systematic retreat stoping toward the portal to the North. They will then always be working under the better supported ground and away from contaminated and spent air being drawn up the end-line boreholes. A series of working places will be available so that each crew will have multiple working faces without interfering with each other. Once the ore is broken, it will be transported a short distance by load-haul-dump units to a transfer location then loaded into 10-ton trucks for the haul to surface.

The underground minable ore in South Workman Creek is expected to continue along the general southerly trend much farther than the herein designated ore. This fact was recognized in the mine designs. While the intention is here proposed to extract ore in a retreating direction;

development of the ore to the south is not precluded by this approach. Eventually, however, should the ore trend continue; these initial haulage ways should be discontinued in favor of crosscuts driven from the canyon walls as shown on Drawing 2.-1.

Ore will be stockpiled at the portal then reloaded into the 35-ton open pit trucks for the haul to the mill.

3.4 Mine Development

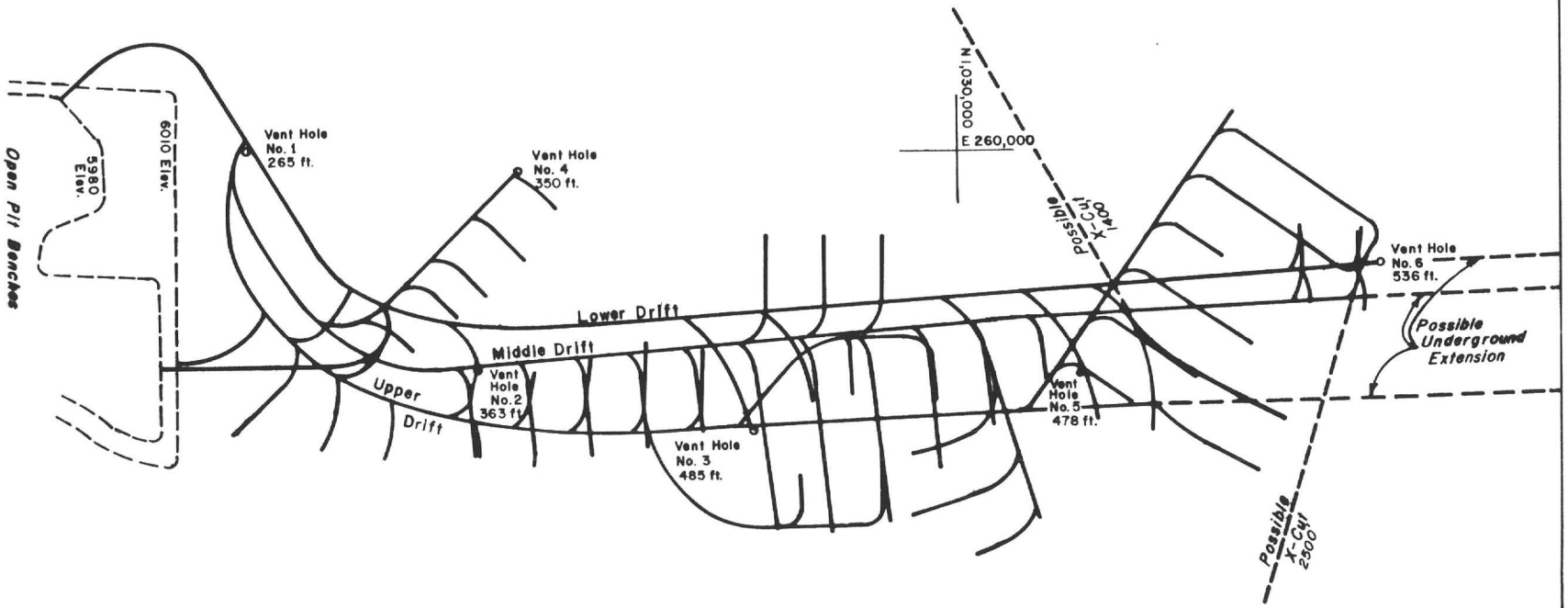
After the minable ore intercepts were determined and their locations related to each other, it was then necessary to select mine access in order to mine in the most efficient way.

As discussed in Section 3.3, all mine development headings were designed to be rockbolted trackless 10-foot by 10-foot headings. Further criteria for development headings are:

1) Use heading gradients no steeper than 10%.
2) Develop the mine with the minimum necessary footage and in the shortest possible time.
3) Place the drifts so that the maximum percentage of development is within the ore and just on the edge of the ore block.
4) Minimize overbreak whenever possible.

Under these requirements, it was then determined that the best solution would be to have an adit, the Lower Drift, coming into the underground mining area from the 5980 bench. At a convenient location inside, mine ramps would be driven up to both the intermediate or Middle Drift and also to the Upper Drift. This development has been shown on both the Mine Composite, Figure 3.4-1, and on the Underground Mine Level Plans, Drawing 3.4-1.

Development was designed using both the polygon maps and the long section (Drawing 3.4-2). The best drift locations on each level polygon map were selected. Drift locations were checked to insure either sufficient vertical separation or horizontal offset. Generally, a pillar at least 10 feet high and 50 feet horizontally has been left between haulage levels.



REV	REVISION DESCRIPTION	DATE	BY

WYOMING MINERAL
GILA COUNTY, ARIZONA
UNDERGROUND MINE COMPOSITE
SOUTH WORKMAN CREEK

DES	DATE	APPROVED	
DR	DATE	DATE	
CHK	DATE		
SCALE 1" = 200'		CONTRACT M-7585	
Dravo	FIG. 3.4-1	REVISION	

This drawing, including the information it contains, is the property of Dravo Corporation. It is submitted only in connection with the transaction to which it pertains and must not be used in any manner detrimental to the interests of Dravo Corporation. The drawing is not to be copied and must be returned upon request.

CIVIL, MINING and MARINE SERVICES GROUP
DRAVO CORPORATION DENVER COLORADO 80293

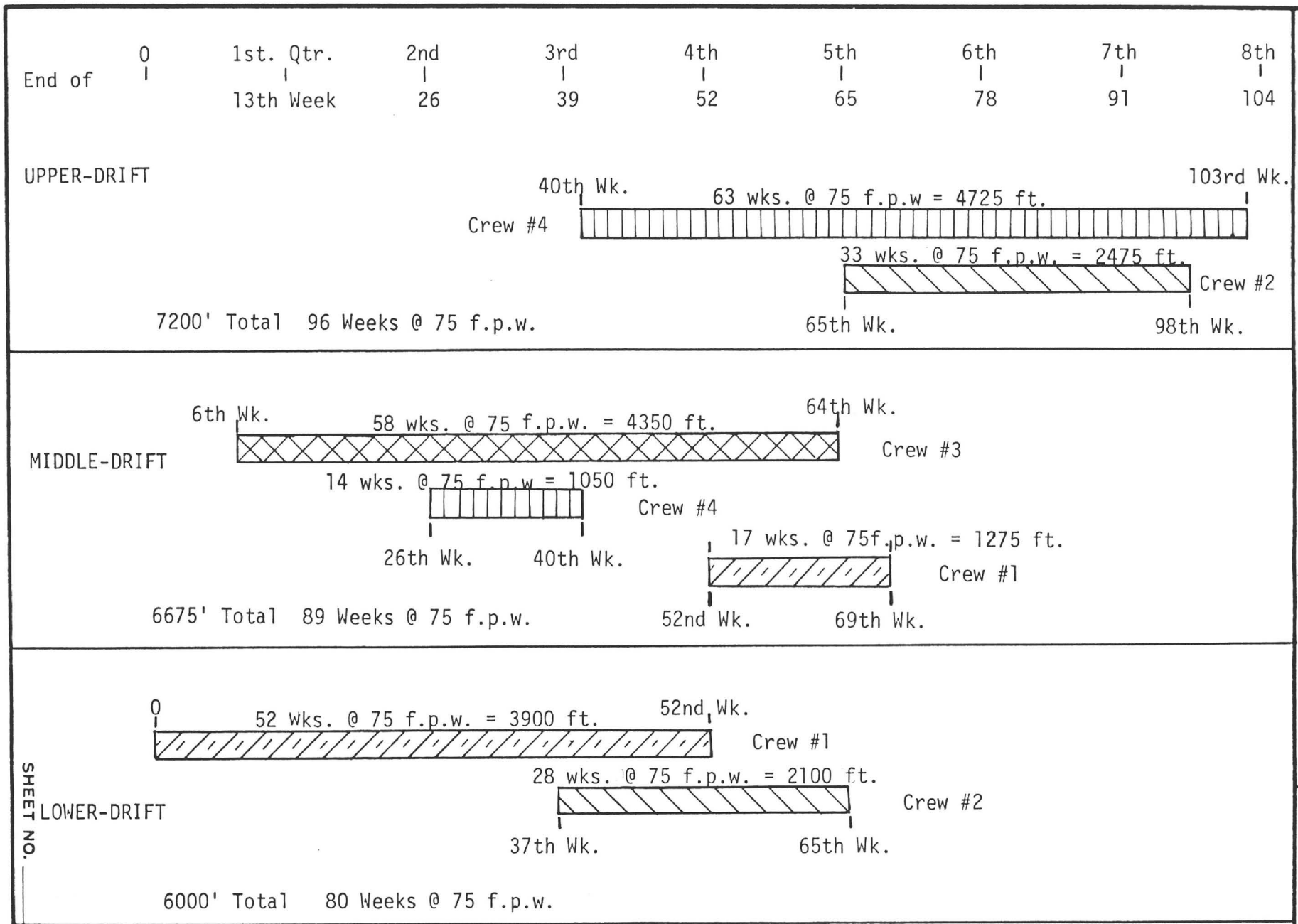
A total development footage of 19,875 feet has been established, representing 6000 feet, 6675 feet, and 7200 feet for the Lower, Middle and Upper Drifts respectively.

The development plan was such that the mine would be developed from the bottom up. Other considerations were that the water-bearing formations would be pre-drained and that any necessary ramps could be driven upgrade while the flow of broken rock out of the mine would be downgrade.

Longhole drilling to delineate the ore will be conducted from the development headings and synchronized with development to optimize development direction.

The development schedule in the South Workman Creek mine has been shown on Figure 3.4-2. The development will be conducted normally by two crews. They will start work on the Lower Drift and then be transferred to upper workings as both their work is completed and additional work areas become available. The lead time shown in Figure 3.4-2 that work must be done on the Lower Drift before starting on the other levels is necessary because the ramps to the upper levels are developed from this Lower Drift.

Headings will be drilled out with small double-boom jumbo's, and mucked with load-haul-dump units (LHD's). In the early stages of development, these LHD units would likely haul the broken rock to the dumps outside. After haul distances exceed 500 feet, LHD units will take the material to an ore transfer point where trucks will be loaded to take the material out of the mine. Equipment has been discussed in Section 3.7 on Equipment Selection. The basis for the Development Schecule was by a cycle-time analysis which is furnished in the appendix.



UNDERGROUND MINE DEVELOPMENT BY QUARTER

South Workman Creek

Figure 3.4. - 2

Dravo
PITTSBURGH, PENNSYLVANIA

ENGINEERING COMPUTATIONS

COMPANY WYOMING MINERAL CORPORATION
LOCATION DRIPPING SPRING PROJECT
DESCRIPTION UNDERGROUND MINE DEVELOPMENT BY QUARTER

DATE
DR CH
REF

EST NO.
CONT NO.
DIVISION

SHEET NO.

3.5 Stoping Method

Stoping is the actual extraction of the ore. Figure 3.5-1 is a plan illustrating a typical stoping block or panel. Each of the stoping panels is approximately 100 feet wide with an end-line drift to connect the crosscuts to provide complete peripheral access and ventilation circuit for the exhaust of spent air through a borehole. Individual stopes are centered every 50 feet along the panel.

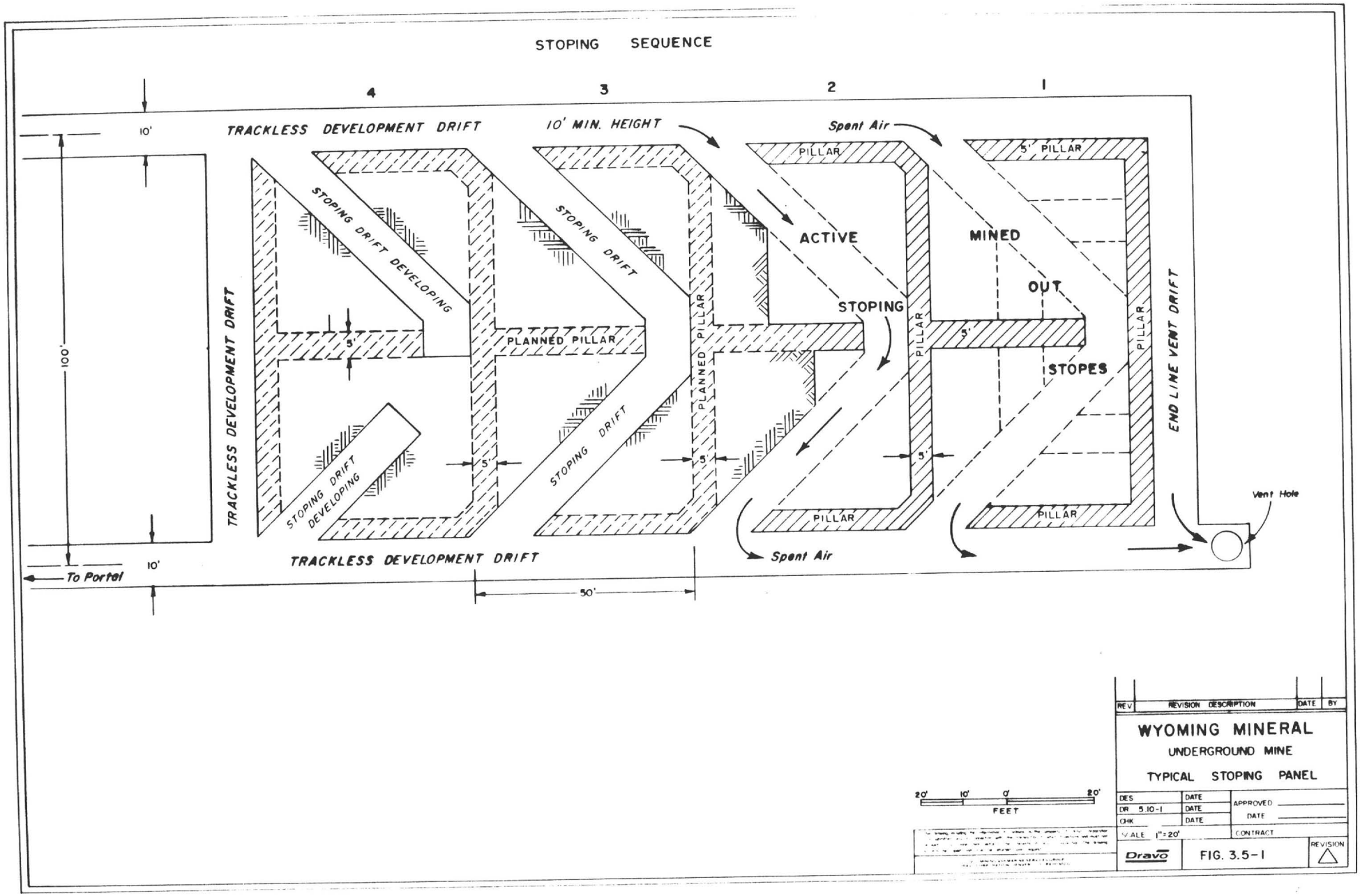
Stoping begins by driving 8-foot high by 10-foot wide stope development drifts off the main haulageways or crosscuts at 45 degree angles to allow for easy turning of equipment.

After completion of the stope development drifts, slabbing of the remaining ore begins. Here again a retreating sequential system of extraction has been proposed by slabbing out the ore beginning at the center of the stope and progressing back to the drifts on both sides of the stope. Planned ore pillars are 5 feet thick and form a "U" shape to separate each stope into two halves. Recovery of these pillars is estimated to be 50% in this competent ground.

The basic concepts behind this retreating stope panel system of mining are the following:

1) Each stoping crew has a stoping panel to work in, thereby presenting a multitude of work faces.
2) Miners work under competent or supported back.
3) Contaminated spent air is drawn away from the miners' working area and directed back to an end-line ventilation borehole.

Ore will be mined at the thickness determined by probe holes to a minimum of 6 feet. Selectivity in mining can be maintained by



REV	REVISION DESCRIPTION	DATE	BY

WYOMING MINERAL

UNDERGROUND MINE

TYPICAL STOPING PANEL

20' 10' 0' 20'
FEET

DES	DATE	APPROVED
DR 5.10-1	DATE	DATE
CHK	DATE	
SCALE 1"=20'		CONTRACT

Dravo

FIG. 3.5-1

REVISION

gamma-ray probing of long holes prior to blasting.

It is believed that rubber-tired equipment, namely a small two-boom jumbo for drilling and a load-haul-dump unit for stope slabbing may well present situations where the use of jackleg drills will supplement the use of mechanized jumbo drilling.

Stoping by double blasting should be considered in situations where waste of appreciable thickness is encountered in the face. The procedure then would be to shoot the bottom waste first and then mine the ore. This type of mining would reduce dilution but, on the other hand, would be more costly mining at a reduced productivity. In the thick ore situations; that is, where the ore bed thickness exceeds the normal height of face of perhaps 15 to 18 feet, the procedure would be to simply ramp up on ore and mine out the top half of the stope, rockbolt the back and walls, and then mine this lower portion by an underhand procedure.

3.6 Production Schedule

The underground work is scheduled as shown in Figure 2.9-1:

a) Development work at North Workman Creek in Year 7.(1989)

b) Mine Production from North Workman Creek and Development work at South Workman Creek in Year 8. (1990)

c) Development work at South Workman Creek in Year 9. (1991)

d) Production from South Workman Creek in Years 10 and 11 (1992,1993)

It is likely that stoping could be started during the development period and then would have a buildup period to reach full production of 1400 TPD. Additionally, it might be desirable to consider the possibility of the underground mines augmenting the open pit production.

Table 3.6-1

SOUTH WORKMAN CREEK
STOPING TONNAGES

Level	Total Tons Incl. Dil.	Development Tons (deducted)	Recoverable Stoping Tons @ 93% Recovery	% of Stoping	Stoping Life (Days)
Upper	322,735	32,919	269,529	40.4	193
Middle	288,960	29,519	241,280	36.2	172
Lower	187,678	19,143	156,738	23.4	112
Totals	799,373 tons	81,581 tons	667,547 tons	100.0%	477

or $\frac{477 \text{ days}}{250 \text{ days/year}}$ = 1.91 years of full production

NORTH WORKMAN CREEK
STOPING TONNAGES

	Total Tons Incl. Dil.	Development Tons (deducted)	Recoverable Stoping Tons @ 93% Recovery	Stoping Life (Days)
	441,008	19,357	392,135	280

or $\frac{280 \text{ days}}{250 \text{ days/year}}$ = 1.12 years of full production

Totals	1,240,381	100,938	1,059,862	757

For the purpose of this study, it was decided to consider that all daily required production to satisfy mill requirement come from one mine or the other.

Individual stopes, as shown in Figure 3.5-1, will produce approximately 4117 tons using the average mining thickness. A total of approximately 260 of these stopes will be required. Development headings were assumed to produce 10% of the daily ore requirements, with the remaining 90% coming from stoping operations.

An average number of stopes needed for daily production based on 112 TPD per stoping crew, will be $\frac{1400 \text{ TPD} \times .90}{112 \text{ TPD/crew}} = 11.25$ stopes. Twelve stopes must, therefore, be in operation simultaneously. In order to make available these 12 stopes as they are needed, 4 stope development crews will be required.

3.7 Equipment Selection

Flexibility and mobility of equipment was a prime consideration in selecting the equipment list in Table 3.7-1 of this report. A brief summary of typical suitable pieces of the primary rubber-tired units is included. It should be noted that these items are simply to represent equipment for size, type, and costing purposes. They should not be construed as endorsements of any particular manufacturer.

Table 3.7-1

Underground Equipment Purchase Schedule

		1989	1990	1991	1992	1993
	YEARS	7	8	9	10	11
No.	Item	No. Undg. Devel.	No. Prod. So. Devel.	So. Devel.	So. Prod.	So. Prod.
3	Two-Boom Jumbos	282,960	141,480	----	----	----
4	Rubber-Tired Loaders Eimco 913LHD	256,490	256,490	----	----	----
9	Trucks Eimco 980-T10	340,140	425,175	----	----	----
16	Jackleg Drills	----	34,290	20,574	----	----
5	Stoper Drills	----	7,218	10,827	----	----
2	Air Compressors	235,440	235,440	----	----	----
1	Air Compressors	58,333	----	----	----	(standby only)
2	Powder & Cap Magazines	22,566	22,566	----	----	----
2	Bus	24,000	----	----	----	----
6	Ventilation Fans (75hp)	----	32,610	32,610	----	----
3	Pumps & Acces.	1,600	3,200	----	----	----
2	Underground Tele. System	21,600	21,600	----	----	----
2	Lighting Equipment	8,500	8,500	----	----	----
2	Ventilation Test Equip.	7,772	----	----	----	----
1	Surveying Equipment	16,200	----	----	----	----
8	Hand Probes	7,876	7,876	----	----	----
16	Hand Tools (sets)	8,640	4,320	2,160	2,160	----
4	Generators	13,600	13,600	----	----	----
2	Portable Buildings	17,305	17,305	----	----	----
5	Impact Wrenches	4,917	4,917	1,639	1,639	----
2	Fuel Tanks	8,220	8,220	----	----	----
2	Flammable Storage	10,380	----	----	----	----
2	Potable Water Tanks	16,200	----	----	----	----
2	Non Potable Water Tanks	16,200	----	----	----	----
10	Roof Jacks	----	905	----	905	----
4	Air Tuggers	7,744	----	----	----	----
20	Fire Extinguishers 20 lb.	609	609	522	----	----
30	Fire Extinguishers 5 lb.	9,900	9,900	9,900	----	----
1	Safety Equipment	43,200	----	----	----	----
	TOTALS	1,440,392	1,272,421	78,232	4,704	

1) Jumbo Drills

Gardner-Denver Medi-Bore Jumbo, two-boom machine, powered by a Deutz Model F4L-912W, 54 hp, air-cooled diesel engines. The drills are controlled by a hydraulic pump unit. Jumbo dimensions are 6 feet - 3 inches high, 6 feet - 7 inches wide, and 31 feet long. It can work in headings as small as 8 feet by 8 feet and has a maximum drilling height of 18 feet. Maneuverability is shown by a maximum speed of 5.2 mph, ability to climb a grade of 35%, and a turning radius of 15 feet - 6 inches.

2) Rubber-Tired Loaders

Eimco 913 LHD with a 12,000 lb. payload capacity. It is powered by a 110 hp water cooled enginer. Overall dimensions are approximately 24-foot length, 5-foot height and 78 inches width (the standard bucket). The standard bucket has a nominal 3 cu. yd. capacity. Fully loaded, it can travel at speeds up to 10 mph. This capability would make it quite suitable to muck out a face and tram back to a transfer station not over 300 feet from the face. It has approximately a 16-foot turning radius.

3) Trucks

Eimco 980-T10 Truck, with a 10-ton haulage capacity, is powered by a 135 hp air-cooled diesel engine. Unit dimensions are approximately a 20-foot length, 6-foot height, and a 7-foot width. The outside turning radius is 20 feet - 8 inches, and fully loaded it can travel 10 mph at a 4% grade in 3rd gear.

3.8 Manpower Requirements

Manpower requirements during both the development and stoping periods were divided into the three basic classifications of administrative, hourly maintenance, and operating.

Production crews consist of miners and helpers doing the drilling, blasting, ground support, and muckering. Trammers operate the underground ore haulage trucks. Supporting these will be probemen, long hole drillers, Nipper-lampmen, and a labor pool.

All manpower requirements are listed in summary on Table 3.8-1.

3.9 Mine Costs

All underground mine costs have been listed in the Estimated Cost Section of this report (Section V).

3.10 Ventilation System

Ventilation will be provided to ensure a good working environment for men to work in. Sufficient airflow must be provided to overcome and deal with three principal contributors to bad air situations:

1) Accumulation of radon-daughter concentrations released from uranium-bearing formations.
2) Carbon monoxide concentration produced from the diesel engines in the rubber-tired equipment.
3) Carbon dioxide, nitrous oxides, and carbon monoxide produced by blasting.

Additionally, the number of men working in the mine as well as dust levels, will affect the total air requirements. It is recommended

TABLE 3.8-1 WYOMING MINERAL MANPOWER REQUIREMENTS

UNDERGROUND

Year	1	2	3	4	5	6	7	8	9	10	11	12
	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
JOB CLASSIFICATION					Number of Administrative							
Mine Manager	-	-	-	-	-	-	-	.5	.5	.5	.5	.5
Mine Superintendent	-	-	-	-	-	.5	1	1	1	1	1	1
Chief Engineer	-	-	-	-	-	-	.5	1	1	1	1	-
Chief Geologist	-	-	-	-	-	-	-	1	1	1	1	-
Mine Engineer	-	-	-	-	-	-	1	2	2	2	2	-
Drafter	-	-	-	-	-	-	-	1	1	1	-	-
Safety Engineer	-	-	-	-	-	-	-	.5	.5	.5	.5	.5
Account	-	-	-	-	-	-	-	1	1	1	1	1
Purchasing Agent	-	-	-	-	-	-	-	.5	.5	.5	.5	.5
Personnel Man	-	-	-	-	-	-	-	.5	.5	.5	.5	-
Maintenance Super.	-	-	-	-	-	-	-	.5	.5	.5	.5	-
Maintenance Foreman	-	-	-	-	-	-	-	1	1	1	1	-
Mine Foreman	-	-	-	-	-	-	4	4	4	4	4	-
Managers Secretary	-	-	-	-	-	-	-	.5	.5	.5	.5	.5
Receptionist	-	-	-	-	-	-	-	1	1	1	-	-
Warehouse Super.	-	-	-	-	-	-	-	.5	.5	.5	.5	.5
Warehouse Foreman	-	-	-	-	-	-	-	1	1	1	1	1
Warehouse Helper	-	-	-	-	-	-	-	.5	.5	.5	.5	.5
Total Admin. Personnel	-	-	-	-	-	.5	6.5	18	18	18	16	6
					Number of Hourly Maintenance							
Mechanic	-	-	-	-	-	-	2	2	2	2	2	2
Mechanic Helper	-	-	-	-	-	-	2	2	2	2	2	2
Total Hourly Main.	-	-	-	-	-	-	4	4	4	4	4	4
					Underground Operating Manpower							
Probemen	-	-	-	-	-	-	4	7	9	6	3	-
Longhole Drillers	-	-	-	-	-	-	2	4	3	2	1	-
Nipper-Lampman	-	-	-	-	-	-	2	4	3	2	1	-
Miners (Devel.)	-	-	-	-	-	-	10	15	20	-	-	-
Miners Helpers (Dev)	-	-	-	-	-	-	5	7.5	5	-	-	-
Miners (Extract.)	-	-	-	-	-	-	-	38	38	38	19	-
Miners Helpers (Ext.)	-	-	-	-	-	-	-	24	24	24	24	-
Trammers (Devel.)	-	-	-	-	-	-	-	6	18	12	6	-
Trammers (Extract.)	-	-	-	-	-	-	6	9	7	-	-	-
Labor Pool (Devel.)	-	-	-	-	-	-	-	4.5	3	-	-	-
Labor Pool (Extract.)	-	-	-	-	-	-	-	5	10	10	5	-
Total Underground Oper.	-	-	-	-	-	-	29	124	140	94	59	-
					Underground Manpower Summary							
Administrative	-	-	-	-	-	.5	6.5	18	18	18	16	6
Hourly Maintenance	-	-	-	-	-	-	4	4	4	4	4	4
Hourly Operating	-	-	-	-	-	-	29	124	140	94	59	-
ANNUAL TOTALS	-	-	-	-	-	.5	39.5	146	162	116	79	10

AVERAGE PROD. YEARS = 141

that the total quantity of air in the stopes be changed every five minutes. As previously discussed in this report, the basic stoping method has been designed so that contaminated spent air is exhausted away from the working places and up the endline vent holes out of the mine.

The basic concept is that the adit as well as the other headings later driven into the pit will provide fresh air flow into the mine. A flow circuit will be created with the boring from surface of 4-foot diameter vent holes. It is estimated that 6 properly placed ventilation holes will be sufficient. They will be so located that distances between boreholes along the haulage levels do not exceed 700 feet. Additionally, they will serve as many of the three levels as possible. Each borehole will have a 75 hp axial fan located at the collar of the hole. A negative-pressure system will thereby be used to remove contaminated air from and introduce fresh air into the workings. It is possible that during the life of the mine, not all the boreholes will be needed or that in a particular situation it may be advantageous to reverse the flow of air and have certain boreholes downcast.

In all, there will be six 48-inch ventilation holes, varying in depth from 265 feet to 536 feet, with a total footage of 2477 feet. These holes, which would probably be drilled by a contractor, have been treated as an operating expense in the cost section of the report. They are shown on Drawing 3.4-1.

A somewhat different system will be used in the North Workman Underground Mine. In this case multiple haulageways will be available for circulating air with the consequence that no vent holes will be needed.

3.11 Reclamation

This report proposes that the mine sites be restored by returning them to their original condition. A concrete plug approximately 10 feet deep will be poured at the top of bedrock in each ventilation hole. These holes will then be backfilled with material similar to that which was previously excavated. Each adit will also be filled by a 10-foot thick concrete plug.

All surface structures will be removed and all disturbed areas, including waste stockpiles, will be restored with topsoil and revegetation. Concrete footings and structures will be removed and buried in the vent holes.

3.12 Conclusions

1) Portions of both the North and South Workman Creek properties appear to be quite suitable for underground mining for the following reasons:

   a. The quantity and grade of ore appeared sufficient and well located for underground mine design.

   b. Indications from rock samples and drilling are that there is competent ground. Support needed should only be to contain spalling of this bedded material.

   c. Although it is stated that water is present, there is not considered to be any notable problem. Undoubtedly, water measurement testing will be done which will aid in future planning.

   d. Known underground reserves are not deep and access by adits is made possible by topography.

2) The short lateral extent of the ore body, close proximity of mine reserves to each other, and a ventilation flow pattern with adits for intake and short ventilation holes for exhaust all make practical the use of rubber-tired equipment for a trackless operation.

3) The overall underground productivity calculated for a time when the mine is operating at 1400 TPD is 9.9 tons per manshift. This figure includes all operating, maintenance, and administration.

3.13 Comments

It may be desirable to consider underground mining simultaneously with the open pit operations. For certain years of the project life, present planning calls for sole reliance on the underground to produce the necessary daily tonnage for the mill. This is an appreciable tonnage from an underground mine which does not contain a massive-type deposit. The effect has been to make the mine rather labor and equipment intensive over a very short life. Decreasing daily ore output from underground operations would have the advantages of blending higher grade underground ore with the lower grade pit ore thereby, reducing equipment and labor requirements to create a more constant labor work force mix of underground and surface mining personnel.

APPENDICES

G-414
REV.11/62

Dravo
PITTSBURGH, PENNSYLVANIA

ENGINEERING COMPUTATIONS

EST NO.
CONT NO. II-78
DIVISION

COMPANY Wyoming Mineral Corporation
LOCATION Dripping Spring
DESCRIPTION Open Pit Recovery Estimate

DATE
DR CH
REF

APPENDIX 2.2.5-1

Ore Thickness	% Ore Lost Because of Thickness*	% Ore Lost At Periphery**	Total % Ore Lost	Assumed % Of Represent-ation	Weighted % Ore Lost***
2'	50	1	51	3	153
4'	25	2	27	7	189
6'	17	3	20	7	140
8'	12	4	16	10	160
10'	10	5	15	10	150
12'	8	6	14	13	182
16'	6	8	14	14	196
20'	5	10	15	15	225
25'	4	12	16	10	160
30'	3	15	18	8	144
35'	3	17	20	2	40
40'	2.5	20	22.5	1	22.5
				100	1762

% of Ore Lost 1762/100 = 17.6%

% Recovery = 100% - 17.6% = 82.4%

*Based on a 1/2 ft lost at both the top and bottom of ore intercept thickness.

**Based on a 1/2% loss per foot of thickness.

***Average Weighted % Ore Lost = $\frac{\text{(Total \% Ore lost x assumed \% of representation)}}{\text{(Assumed \% of Representation)}}$

SHEET NO.

G-414
REV. 11/62

Dravo
PITTSBURGH, PENNSYLVANIA

ENGINEERING COMPUTATIONS

EST NO. _____
CONT NO. II-79
DIVISION _____

COMPANY Wyoming Mineral Corporation
LOCATION Dripping Spring
DESCRIPTION Open Pit Dilution Estimate

DATE _____
DR _____ CH _____
REF _____

APPENDIX 2.2.5-2

Ore Thickness	%Low Grade Added To Ore*	%Low Grade Added at Periphery**	Total % Low Grade Added To Ore	Assumed % of Representation	Total % x Representation
2'	100	1	101	5	505
4'	50	2	52	5	260
6'	33	3	36	5	180
8'	25	4	29	10	290
10'	20	5	25	10	250
12'	17	6	23	12	276
16'	13	8	21	13	273
20'	10	10	20	15	300
25'	8	12	20	10	200
30'	7	15	22	10	220
35'	6	17	23	3	69
40'	5	20	25	2	50
				100	2,873

$$\text{\% Average Dilution} = \frac{\Sigma\,(\text{Total Low Grade}) \times (\text{Assumed \% Representation})}{100} = \frac{2873}{100} = 28.7\%$$

Estimated Grade of Diluting Material = 0.015%

* Based on 1 ft. added to both top and bottom of ore intercept.

**Based on 1/2% added per ft. of ore thickness

SHEET NO. _____

G-414
REV.11/62

Dravo
PITTSBURGH PENNSYLVANIA

ENGINEERING COMPUTATIONS

EST NO. _____
CONT NO. II_80
DIVISION _____

COMPANY WYOMING MINERAL CORPORATION
LOCATION Dripping Spring
DESCRIPTION Tailing Disposal Split

DATE _____
DR _____ CH _____
REF _____

APPENDIX 2.3.3

TAILING DISPOSAL COST SEPARATION

			Estimated Cost $1,000
Administrative and Supervision			
Environmental Eng.	25%	=	11.3
Mine Engineer	25%	=	7.9
Mine Foreman	10%	=	4.8
Total			24.0
Hourly Maintenance			
Mechanic and Helper	10%	=	3.0
Fuel & Lube Man	5%	=	1.5
Total			4.5
Operating Labor			
1 Truck Driver	100%	=	30.1
Dozer Operator	15%	=	4.5
Labor Pool 1 man	50%	=	14.1
Total			48.7
Equipment Operating Cost			
1 Truck	100%	=	45.6
Dozer	15%	=	11.0
Total			56.6

SHEET NO. _____

WYOMING MINERAL M-7585 TAILING DISPOSAL COST SEPARATION

Appendix 2.3.3

ITEM	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	Total
Admin. & Supervision	24	24	24	24	24	24	24	24	24	24	240
Hourly Maint. Labor	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	45
Operating Labor	48.7	48.7	48.7	48.7	48.7	48.7	48.7	48.7	48.7	48.7	487
Equipment Oper. Cost	56.6	56.6	56.6	56.6	56.6	56.6	56.6	56.6	56.6	56.6	566
Lining Material	470	470	470	470	470	470	470	470	470	470	4,700
Misc. Materials	10	10	10	10	10	10	10	10	10	10	100
Totals											6,138

Average Cost Per Ton = $1.89

Average Cost Per Pound U_3O_8 Shipped = $ .99

G-414
REV.11/62

Dravo
PITTSBURGH PENNSYLVANIA

ENGINEERING COMPUTATIONS

EST NO. _____
CONT NO. II-82
DIVISION _____

COMPANY WYOMING MINERAL CORPORATION
LOCATION DRIPPING SPRING
DESCRIPTION Open Pit Operating Cycle Times

DATE _____
DR _____ CH _____
REF _____

APPENDIX 2.5-1

MINED ROCK LOADING ORE AND ASSOCIATED WASTE

Pit Production Ore = 1,400 TPD for 250 days per year, two shifts per day, or 629 BCY per day.

Ratio of Associated waste to ore = 3.43:1 BCY/Ton*

$$1{,}400 \text{ Ton} \times 3.43 \frac{\text{BCY}}{\text{TON}} = 4{,}802 \text{ BCY Associated Waste}$$

4,802 BCY Waste + 629 BCY Ore = 5,431 BCY to be loaded per day.

Total Daily Rock Loading

Assume swell = 35%

5,431 BCY x 1.35 = 7,333 loose cu. yd.

Front End Loader Cycle Times

Basic Cycle Time	=	.40 Min.
+ Materal Factor (bank)	=	.05 "
+ Inconsistent Operation	=	.05 "
Total Cycle Time	=	.50 Min.

$$\text{Cycles Per 50 Min hr. @ 100\% Eff} = \frac{50 \text{ Min}}{.50}$$

= 100 Cycles per hour

* Based on North Pit waste to ore ratios

SHEET NO. _____

G-414
REV.11/62

Dravo
PITTSBURGH PENNSYLVANIA

ENGINEERING COMPUTATIONS

EST NO. _____
CONT NO. II-83
DIVISION _____

COMPANY WYOMING MINERAL CORPORATION
LOCATION DRIPPING SPRING
DESCRIPTION Open Pit Operating Cycle Times Page 2

DATE _____
DR _____ CH _____
REF _____

APPENDIX 2.5-1

Mined Rock Loading

Loading Cond.	Efficiency	Percent of Time	Eff. x Percent
Full Face	100	50%	5,000
3/4 Face	80	20	1,600
1/2 Face	60	20	1,200
1/4 Face	40	10	400
		100	8,200

Average Loading Condition Efficiency = 82%

Average Cycles per hour = 100 cy/hr x .82 = 82 cy/hr

Volume of Total Rock to be handled per hour.

(6.5 oper. hrs. per shift)

= 7.333 loose cy.yd. ÷ 13 hrs = 564 cu.yd./hr.

Bucket Capacity:

Fill Factor Poorly blasted rock = 65%

Fill Factor Average blasted rock = 75%

use 70%

Bucket Capacity = 564 cu.yd./hr ÷ 82 cy/hr ÷ .70

= 9.83 cu. yds.

SHEET NO. _____

G-414
EV.11/62

Dravo
PITTSBURGH, PENNSYLVANIA

ENGINEERING COMPUTATIONS

EST NO. _____
CONT NO. II-84
DIVISION _____

COMPANY WYOMING MINERAL CORPORATION
LOCATION DRIPPING SPRING
DESCRIPTION Open Pit Operating Cycle Times

DATE _____
DR _____ CH _____
REF _____

APPENDIX 2.5-1
Stripping Waste Loading

Daily Production Rate

Pit production rate of ore = 1400 TON per day

Ratio of Stripping Waste to ore = 5.32 : 1 BCY/TON

Stripping Waste per day =

1,400 TON x 5.32 BCY/TON = 7,448 BCY

Waste Material in loose cu. yds.

= 7,448 x 1.35 = 10,055

Front End Loader Cycle Times = 100/hr

Average Loading Cond. Efficienty = 91%

Average Cycles per hr = 100 x .91 = 91 cy/hr

Volume of Total Rock to be handled per hour

= 10,055 ÷ 13 hr = 773 BCY Loose

Total Bucket Capacity =

773 ÷ 91 cy/hr ÷ .75 (fill factor)

= 11.33

Total O.P. Loading Capacity needed =

11.33 (stripping) + 9.83 (Mined Rock) = 21.16 cu. yd.

Avilability = 80%

21.16 cu. yd ÷ .80 = 26.5 cu yd Total Capacity

Use 2 10 yd^3 + 1 6 yd^3 Loaders

SHEET NO. _____

G-414
REV.11/62

Dravo
PITTSBURGH, PENNSYLVANIA

ENGINEERING COMPUTATIONS

EST NO.
CONT NO. II-85
DIVISION

COMPANY WYOMING MINERAL CORPORATION
LOCATION DRIPPING SPRING
DESCRIPTION O.P Operating Cost Est.

DATE
DR CH
REF

APPENDIX 2.5-2

ROCK HAULAGE ORE AND WASTE

Truck size selected = 35 Ton

Payload in Tons Struck = 32 Tons

Payload in Loose cu yds.Struck = 22 yd^3

Loading Time Ore and Associated waste =

$50 \text{ min/hr.} \div 82 \frac{\text{buckets}}{\text{hour}} = 0.61 \text{ min. per bucket}$

$0.61 \text{ min.} \times 3 \frac{\text{buckets}}{\text{load}} = 1.83 \text{ min.}$

Loading Time Stripping

$50 \text{ min} \div 91 \frac{\text{buckets}}{\text{hour}} = 0.55 \text{ min. per bucket}$

$0.55 \text{ min} \times 3 \frac{\text{buckets}}{\text{load}} = 1.65 \text{ min.}$

South Pit

Ore and Associated Waste Average Daily Production

= 10,080 Tons*

Ore to Mill = 1,400 Ton/day

Truck-Tons per hour = 192

Associated Waste to Dump = 8,680 Tons

Truck-Tons per hour = 272

$$\text{Average Truck-Tons} = \frac{(1{,}400 \times 192) + (8{,}680 \times 276)}{10{,}080} = 264$$

No. Trucks = 10,080 ÷ 264 ÷ 13 hrs = 2.94

* Average between mining & stripping cycle times

SHEET NO.

APPENDIX 2.5-2

Truck Haulage

North Pit

Ore and Associated Waste Average Daily Production

= 10,682 Tons Waste + 1,400 Tons ore

= 12,082 Tons/day

Ore Truck-Tons per hour = 95.5*

Associated Waste Truck - Tons per hr = 310 *

$$\text{Weighted Average Truck-Tons} = \frac{(1{,}400 \times 95.5) + (10{,}682 \times 310)}{12{,}082}$$

= 285 Truck-Tons

No. Trucks = 12,082 Tons/day ÷ 285 Truck-Ton ÷ 13 hr/day

= 3.26 Trucks

Stripping Waste Daily Production

1400 x 3.79 BCY/Ton x 1.35 = 7,163 loose cu. yd,

Average Truck Cu.yd. per hr. = 213*

No. Trucks = 7,163 ÷ 213 ÷ 13 = 2.58

* Profile Sheets

G-414
REV. 11/62

Dravo
PITTSBURGH, PENNSYLVANIA

ENGINEERING COMPUTATIONS

EST NO.
CONT NO. II-87
DIVISION

COMPANY WYOMING MINERAL CORPORATION
LOCATION DRIPPING SPRING
DESCRIPTION O.P. Operating Cost Est.

DATE
DR CH
REF

APPENDIX 2.5-2

Stripping Waste Haulage

South Pit

Ave. Bank Cubic yds. Stripping Waste to Dump

1,400 x 8.07 Bcy/Ton x 1.35 = 15,252 Loose cu. yd.

Ave. Truck-cu. yds. per hour = 190

No. Working hrs. per day = 13

No. Trucks = 15,254 ÷ 190 ÷ 13 = 6.18

SHEET NO.

G-414
REV.11/62

Dravo
PITTSBURGH, PENNSYLVANIA

ENGINEERING COMPUTATIONS

EST NO.
CONT NO. II-88
DIVISION

COMPANY WYOMING MINERAL CORPORATION
LOCATION DRIPPING SPRING
DESCRIPTION O.P Operating Cost Est. Revised

DATE
DR CH
REF

APPENDIX 2.5-2

Haulage Truck Requirement Summary

Revised North Pit

	Ore and Assoc. Waste	Stripping	Total Operat.	Total 80% Avail.
South Pit Only	2.94	6.18	9.12	11.4 (12)
North Pit Only	3.26	2.58	5.84	7.3 (8)
Ore North Pit Stripping South	3.26	6.18	9.44	11.8 (12)
Ore South Pit Stripping North	2.94	2.58	5.52	6.9 (7)

Add one truck for Tailing Handling

Buy 9 trucks initially while stripping in North Pit

Add 4 trucks when stripping begins in South Pit .

SHEET NO.

G-414
REV.11/62

Dravo
PITTSBURGH, PENNSYLVANIA

ENGINEERING COMPUTATIONS

EST NO. _____
CONT NO. II-89
DIVISION _____

COMPANY WYOMING MINERAL CORPORATION
LOCATION DRIPPING SPRING - SOUTH WORKMAN CREEK
DESCRIPTION DEVELOPMENT HEADING CYCLE TIME

DATE _____
DR _____ CH _____
REF _____

APPENDIX 3.4

DEVELOPMENT HEADING CYCLE TIME

Main Haulage and Cross cut's 10 foot high x 10 foot wide.

10 ft. x 10 ft. = 100 sq. ft $\frac{100 \text{ sq. ft.}}{3.5 \text{ sq. ft.}} = 28.6$ Use 29 holes

1. Drilling

Drill 10 ft. and pull 9 ft.

Assume penetration of 24 in. per min.

10 ft. x 29 holes = 290 ft. = 3480 in.

$\frac{3480 \text{ in.}}{24 \text{ in/min.}} = \frac{145 \text{ min. drilling}}{2 \text{ machines}}$ = 72.5 min.

Set up Time and Tear Down = 30.0 min.

Positioning and Steel Change,

2 min/hole x 29 holes = 58 min.

$\frac{58 \text{ min.}}{2 \text{ machines}}$ = 29.0 min.

2. Load and Blast = 60.0 min.

3. Mucking

9 ft. x 10 ft. x 10 ft. = 900 cu. ft. in place @ 164.75 lb/cu. ft.

$\frac{164.75 \text{ lb/cu. ft.} \times 900 \text{ cu. ft.}}{2000 \text{ lb/ton}} = 74$ tons per round

Est. 10 ton trucks; 4 trucks per hour, therefore,

$\frac{74 \text{ tons per round}}{10 \text{ tons per truck}} = 7.4$ trucks Use 8 trucks = 120.0 min.

4. Ground Support

Est. 1.5 rockbolts per ft. of advance

$\frac{1.5 \text{ RB} \times 9 \text{ ft of advance}}{\text{ft. of advance}} = 13.5$ RB Use 14 RB

SHEET NO. _____

G-414
REV.11/62

Dravo
PITTSBURGH, PENNSYLVANIA

ENGINEERING COMPUTATIONS

EST NO.
CONT NO. II-90
DIVISION

COMPANY WYOMING MINERAL CORPORATION
LOCATION DRIPPING SPRING - SOUTH WORKMAN CREEK
DESCRIPTION DEVELOPMENT HEADING CYCLE TIME page 2

DATE
DR CH
REF

APPENDIX 3.4

Allow 4 min. per rockbolt:

$$\frac{14 \text{ RB} \times 4 \text{ min}}{\text{RB}} = 56 \text{ min.} \quad \text{Use 60 min.} \qquad = 60 \text{ min.}$$

Install wire mesh = 60 min

Total elapsed time per round 431.5 min.

$$\frac{360 \text{ min at face/shift}}{431.5 \text{ min/round}} \times 9 \text{ ft./round} = 7.5 \text{ ft/shift}$$

Use 15 ft/day, 2 shifts, 3-man crew or 2.5 ft/ms

Therefore; 15 ft/day x 5 days = 75 ft/week

SHEET NO.

G-414
EV.11/62

Dravo
PITTSBURGH, PENNSYLVANIA

ENGINEERING COMPUTATIONS

EST NO. _____
CONT NO. _____
DIVISION _____

COMPANY WYOMING MINERAL CORPORATION
LOCATION DRIPPING SPRING
DESCRIPTION Underground Mining Recovery

DATE _____
DR _____ CH _____
REF _____

APPENDIX 3.5-1

UNDERGROUND MINING RECOVERY

Three Cases: 1) 6.0 ft. thick ore intercept

2) 10.75 ft. thick

3) 20.0 ft. thick

Case 1:

In-place ore per stope 6.0 ft. average thick

= 100 ft. x 50 ft. x 6 ft. = 30,000 cu. ft.

Pillars:

2 x 35 ft. x 5 ft x 6 ft = 2100 cu. ft.

1 x 27 ft. x 5 ft. x 6 ft.= 810 cu. ft.

1 x 80 ft. x 5 ft. x 6 ft.= 2400 cu. ft

5310 cu. ft. in pillar

In this ground est. could pull 50% of pillars

.50 x 5310 cu. ft. = 2655 cu. ft. left in pillars

$$\% \text{ Recoverable Ore} = \frac{30{,}000-2655}{30{,}000} = 91.15\%$$

Mining Loss = 5000 sq. ft. x .9115 x .25 ft. = 1139 cu. ft.

1139 cu. ft. x .80 = 911 cu. ft. based on 25% swell factor

$$\frac{911 \text{ cu. ft.}}{(30{,}000 - 5310) \text{ cu. ft.}} = \frac{911}{24{,}690} = 3.7\% \text{ Loss}$$

Total Loss = 100.0 - (91.2 - 3.7) = 12.5%

Total Recovery = 87.5%

SHEET NO. _____

G-414
EV.11/62

Dravo
PITTSBURGH, PENNSYLVANIA

ENGINEERING COMPUTATIONS

EST NO. _____
CONT NO. _____
DIVISION _____

COMPANY WYOMING MINERAL CORPORATION
LOCATION DRIPPING SPRING
DESCRIPTION UNDERGROUND MINING RECOVERY

DATE _____
DR _____ CH _____
REF _____

APPENDIX 3.5-1

Case 2:

In-place ore with stope 10.75 ft.

100 ft. x 50 ft.x 10.75 ft. = 53,750 cu. ft.

Pillars:

2 x 35 ft. x 5 ft. x 10.75 ft. = 3762.50 cu. ft.

1 x 26 ft. x 5 ft. x 10.75 ft. - 1451.30 cu. ft.

1 x 80 ft. x 5 ft. x 10.75 ft. - 430.00 cu. ft.

5643.80 cu. ft.

50% of 5644 cu. ft. = 2822 cu. ft.

$$\% \text{ Recoverable Ore} = \frac{53{,}750 - 2822}{53{,}750} = 94.75\%$$

Mining Loss = 5000 sq. ft. x .9475 x .25 ft. = 1184 cu. ft.

1184 cu. ft. x .80 = 947 cu. ft.

$$\frac{947 \text{ cu. ft.}}{(53{,}750 - 2822) \text{ cu. ft.}} = \frac{947}{50{,}928} = 1.9\%$$

Total Loss = 100.0 - (94.8 - 1.9) = 7.1%

Total Recovery = 92.9%

SHEET NO. _____

G-414
REV.11/62

Dravo
PITTSBURGH, PENNSYLVANIA

ENGINEERING COMPUTATIONS

EST NO. _____
CONT NO. _____
DIVISION _____

COMPANY WYOMING MINERAL CORPORATION
LOCATION DRIPPING SPRING
DESCRIPTION UNDERGROUND MINING RECOVERY

DATE _____
DR _____ CH _____
REF _____

APPENDIX 3.5-1

Case 3:

In-place ore with stope 20.0 ft. thick

100 ft. x 50 ft. x 20 ft. x = 100,000 cu. ft.

Pillars:

2 x 35 ft. x 5 ft. x 20 ft. = 7000 cu. ft.

1 x 27 ft. x 5 ft. x 20 ft. = 2700 cu. ft.

1 x 80 ft. x 5 ft. x 20 ft. = 8000 cu. ft.

17,700 cu. ft. in pillar

50% of 17,700 cu. ft. = 8850 cu. ft.

$$\% \text{ Recoverable Ore} = \frac{100{,}000 - 8850}{100{,}000} = 91.15\%$$

Mining Loss = 5000 sq. ft. x .9115 x .25 ft = 1139 cu. ft.

1139 cu. ft. x .80 = 911 cu. ft.

$$\frac{911 \text{ cu. ft.}}{(100{,}000 - 8850) \text{ cu. ft.}} = \frac{911}{91{,}150} = 1.00\%$$

Total Loss - 100.0 (91.2 - 1.0) = 9.8%

Total Recovery = 90.2%

SHEET NO. _____

G-414
REV.11/62

Dravo
PITTSBURGH, PENNSYLVANIA

ENGINEERING COMPUTATIONS

EST NO. _____
CONT NO. _____
DIVISION _____

COMPANY WYOMING MINERAL CORPORATION
LOCATION DRIPPING SPRING
DESCRIPTION STOPING CYCLE - STOPE DRIFTING

DATE _____
DR _____ CH _____
REF _____

APPENDIX 3.5-2

STOPING CYCLE - STOPE DRIFTING

For average thickness of 10.75 ft.

$$10 \times 8 \text{ stope Heading} = \frac{80 \text{ sq. ft.}}{3.5 \text{ sq. ft./hole}} = 22.9 \quad \text{Use 23 holes}$$

Drilling

Drill 8 ft. and pull 7 ft.

Penetration estimate 24 in./min.

8 ft x 23 holes - 184 ft. = 2208 in

$$\frac{2208 \text{ in}}{24 \text{ in/min}} = \frac{92 \text{ min. drilling}}{} \quad \frac{92 \text{ min. drilling}}{2 \text{ machines}} = 46.0 \text{ min.}$$

Set up and Tear Down Time = 30.0 min.

Positioning and Steel change

2 min/hole x 23 holes = 46 min.

$$\frac{46 \text{ min}}{2 \text{ machines}} = 23.0 \text{ min.}$$

Load and Blast = 60.0 min.

Mucking

7 ft/round x 8 ft. x 10 ft. = 560 cu. ft. in place/round

$$\frac{560 \text{ cu. ft.} \times 164.75 \text{ lb/cu. ft.}}{2000 \text{ lb./ ton}} = 46 \text{ Tons per round}$$

Therefore, use five trucks at 4 trucks/hr. = 75.0 min.

Ground Support

Est. 1.5 rock bolts per ft. of advance

1.5 RB/ft. x 7 ft. adv. = 10.5 Use 11 RB

Use 4 min. to install 1 RB

4 min/RB x 11 RB = 44.0 min.

SHEET NO. _____

G-414
EV.11/62

Dravo
PITTSBURGH, PENNSYLVANIA

ENGINEERING COMPUTATIONS

EST NO. _____
CONT NO. _____
DIVISION _____

COMPANY WYOMING MINERAL CORPORATION
LOCATION DRIPPING SPRING
DESCRIPTION STOPING CYCLE - STOPE DRIFTING page 2

DATE _____
DR _____ CH _____
REF _____

APPENDIX 3.5-2

Install Wire mesh	=	60.0 min.
Clean up, probe, services, misc.	=	30.0 min.
Total Cycle Time	=	368.0 min.

$$\frac{360 \text{ min/shift}}{368 \text{ min/round}} = 0.978 \text{ rounds/shift}$$

46 Tons/round x 0.978 rounds/shift = 45 Tons/shift

SHEET NO. _____

G-414
REV.11/62

Dravo
PITTSBURGH, PENNSYLVANIA

ENGINEERING COMPUTATIONS

EST NO. _____
CONT NO. _____
DIVISION _____

COMPANY WYOMING MINERAL CORPORATION
LOCATION DRIPPING SPRING
DESCRIPTION STOPING CYCLE - SLABBING CUTS page 3

DATE _____
DR _____ CH _____
REF _____

APPENDIX 3.5-2

Area: Use Face 20 ft. x 10.75 ft. = 215 sq. ft.

Estimated Number of Holes 10 x 4 = 40 Holes

Drilling

Penetration 24 in/min.

40 Holes x 6 ft. = 240 ft. of hole

$$\frac{240 \text{ ft} \times 12 \text{ in/ft}}{24 \text{ in/min.}} = 120 \text{ min.}; \quad \frac{120 \text{ min.}}{2 \text{ machines}} = 60.0 \text{ min.}$$

Set Up and Tear Down Time = 45.0 min.

Positioning and Steel Change

$$\frac{2 \text{ min/hole} \times 40 \text{ holes}}{2 \text{ machines}} = 40.0 \text{ min.}$$

Load and Blast = 90.0 min.

Mucking

20 ft. x 10.75 ft. x 6 ft. = 1290 cu. ft. in place/round

$$\frac{1290 \text{ cu. ft/round} \times 164.75 \text{ lb/cu. ft.}}{2000 \text{ lb/ton}} = 106 \text{ tons per round}$$

$$\frac{106 \text{ tons/round}}{10 \text{ ton trucks}} = 10.6$$ Therefore, use 11 trucks and 4 trucks/hr. = 165.0 min.

Ground Support = 180.0 min.

Clean up, probe, services, misc. = 45.0 min.

Total Cycle Time = 625.0 min.

SHEET NO. _____

G-414
REV.11/62

Dravo
PITTSBURGH, PENNSYLVANIA

ENGINEERING COMPUTATIONS

EST NO. _____
CONT NO. _____
DIVISION _____

COMPANY WYOMING MINERAL CORPORATION
LOCATION DRIPPING SPRING
DESCRIPTION STOPING CYCLE - SLABBING CUTS page 4

DATE _____
DR _____ CH _____
REF _____

APPENDIX 3.5-2

$$\frac{360 \text{ min/shift}}{625 \text{ min/round}} = 0.576 \text{ rounds/shift}$$

106 Tons/round x 0.576 round/shift = 61 Tons/shift

In Summary:

Tons drifting ore per shift = 45 Tons/shift

Tons slabbing ore per shift = 61 Tons/shift

Stope drifting ore per shift = 33.3%

Stope slabbing ore per shift = 66.7%

45 x .333 = 15 tons

61 x .667 = 41 tons

56 tons Weighted average for stoping

Average Tons ore stoping per shift = 56 TPS

Average Tons ore stoping per day = 112 TPD

SHEET NO. _____

G-414
EV.11/62

Dravo
PITTSBURGH, PENNSYLVANIA

ENGINEERING COMPUTATIONS

EST NO. _____
CONT NO. _____
DIVISION _____

COMPANY WYOMING MINERAL CORPORATION
LOCATION DRIPPING SPRING
DESCRIPTION Material Costs

DATE _____
DR _____ CH _____
REF _____

APPENDIX 3.9.1

MATERIAL COSTS

1. 10 x 10 Heading - pull 9 ft.

Use 29 drill holes 74 Tons/round

Rock Bolts:

15 RB x 6 ft. x .60/ft. = $54/round

$$\frac{\$54/\text{round}}{74\text{Tons/round}} = \$0.73/\text{Ton}$$

Wire Mesh:

Back 10 ft. x 9 ft. x $.43/sq. ft = 38.70
Ribs 2 ft. x 8 ft. x 9 ft. x .43/sq. ft. = 61.92
$100.62

$$\frac{100.62/\text{round}}{74\ \text{Tons/round}} = \$1.36/\text{Ton}$$

$0.73/Tons + $1.36/Ton = $2.09/Ton = $ 2.09/Ton

or Total Cost = $54 + 100.62 = $154.62

$154.62/9 ft. = $17.18/ft. = $17.18/ft.

Blast

Anfro 74 Tons x 2 lb/Ton x $10.95/100 lbs = 16.21

Sticks 1/hole x 29 holes x ½ lb = 14.5 lbs

$$14.5\ \text{lbs} \times \frac{\$82}{100\ \text{lbs}} = \$11.89 = 11.89$$

Caps and fuse 29 holes x $220/100 = $63.80 = 63.80

TOTAL COST (blast) $91.90

$$\text{Cost per Ton} = \frac{\$91.90}{74\ \text{Tons}} = \$1.24/\text{Ton}$$

$$\text{Cost per ft.} = \frac{\$91.90}{9\ \text{ft.}} = \$10.21/\text{ft.}$$

SHEET NO. _____

G-414
REV.11/62

Dravo
PITTSBURGH, PENNSYLVANIA

ENGINEERING COMPUTATIONS

EST NO. _____
CONT NO. _____
DIVISION _____

COMPANY WYOMING MINERAL CORPORATION
LOCATION DRIPPING SPRING
DESCRIPTION Material Costs page 2

DATE _____
DR _____ CH _____
REF _____

APPENDIX 3.9.1

2. 8 ft. x 10 ft. stope drifting round - 1/3 of the stoping

1.5 RB per ft. of advance x 7 ft. = 10.5 RB

Use 23 holes to pull 46 tons and 11 RB/shift and Wire Mesh

Rock Bolts:

6 ft x 11 RB/ft x $0.60/ft = $39.60

$\frac{\$39.60}{46 \text{ Tons}}$ = $0.86/Ton

Wire Mesh: (7 ft x 10 ft) + 2 (8ft. x 7 ft.) = 70 + 56 = 126 sq. ft.

$\frac{126 \text{ sq. ft. x } \$0.43/\text{sq. ft.}}{46 \text{ Tons}}$ = $1.18/Ton

Blast:

Anfo: 46 Ton x 2 lb/Ton x $10.95/100 lbs = $10.07 = $10.07

Powdersticks: 1/hole x 23 x ½ lb. = 11.5 lbs

11.5 lbs x $82.00/100 lbs. = $ 9.43 = $ 9.43

Caps and fuse: 23 holes x $220/100 = $50.60 = $50.60

TOTAL COST = $70.10

Cost per Ton = $\frac{\$70.10}{46 \text{ Tons}}$ = $1.52/Ton

Cost per ft = $\frac{\$70.10}{7}$ = $10.01/ft.

Slabbing 2/3 of the stoping

46 holes to pull 106 Tons

Rock Bolts

20 ft. x 1.5 RB/ft = 30 RB x 6 ft/RB x $.60/ft. ; $\frac{\$108}{106 \text{ Tons}}$ = $1.02/Ton

SHEET NO. _____

G-414
EV.11/62

Dravo
PITTSBURGH, PENNSYLVANIA

ENGINEERING COMPUTATIONS

EST NO. _____
CONT NO. _____
DIVISION _____

COMPANY WYOMING MINERAL CORPORATION
LOCATION DRIPPING SPRING
DESCRIPTION Material Costs page 3

DATE _____
DR _____ CH _____
REF _____

APPENDIX 3.9.1

Wire Mesh: $\frac{20 \text{ ft} \times 8.5 \text{ ft} \times \$.43/\text{sq. ft.}}{106 \text{ Tons}}$ = \$0.69/Ton = \$0.69

\$1.71/Ton

Weighted Average for stope rockbolting = \$2.04 x .333 = \$0.68
+ \$1.71 x .667 = 1.14
\$ 1.82/Ton

Slab blast

Anfo: 106 Tons x 1 lb /Ton x $\frac{\$10.95}{100 \text{ lbs}}$ = \$11.61 =\$ 11.61

Caps and fuse 220 x 36/100 = \$79.20 =\$ 79.20

Powdersticks 1/hole x 36 holes x ½ lb = 18 lbs.

18 lbs. x $\frac{\$82.00}{100 \text{ lbs.}}$ = \$14.76 =\$ 14.76

TOTAL COST \$105.57

Cost per Ton $= \frac{\$105.57}{106 \text{ Tons}}$ = \$1.00/Ton

Weighted Average for blasting = \$1.52/Ton x .333 = \$0.51

\$1.00/ton x .667 = 0.67
\$1.18/Ton

SHEET NO. _____

G-414
REV.11/62

Dravo
PITTSBURGH, PENNSYLVANIA

ENGINEERING COMPUTATIONS

EST NO. _____
CONT NO. _____
DIVISION _____

COMPANY WYOMING MINERAL CORPORATION
LOCATION DRIPPING SPRING
DESCRIPTION UNDERGROUND OPERATING COSTS - Materials

DATE _____
DR _____ CH _____
REF _____

APPENDIX 3.9.1

Development ft.	=	19,875 ft.
Stope tons	=	667,588
Total tons	=	749,124

Ground Support	Cost per Recovered Ton	Cost per ft.
Development	$2.09/Ton	$17.18/ft.
Stoping	$1.82/Ton	----
Explosives		
Development	$1.24/Ton	$10.21/ft.
Stoping	$1.41/Ton	----
Hoses @ 0.10/Ton		
Development	$0.10/Ton	$ 0.82
Stoping	$0.10/Ton	----
Tools and Misc. @ 0.50/Ton		
Development	$0.50	$4.10
Stoping	$0.50	----
Pipe		
Development	----	$7.85

Vent Holes				
	#1	265 ft.	$ 66,250	
	#2	363 ft.	90,750	
	#3	485 ft.	121,250	
	#4	350 ft.	87,500	
	#5	478 ft.	119,500	
	#6	536 ft.	134,000	
	Total	2477 ft.	$619,250/749,124	$0.83/Ton

BIBLIOGRAPHY

Section 1.0

Granger, H. C., and Raup, R. B., 1969, Geology of uranium deposits in the Dripping Spring Quartzite, Gila County, Arizona;, U. S. Geological Survey Professional Paper 595, 108 p.

Heyse, J. V. , 1979, The mineralogy and paragenesis of the Dripping Spring uranium deposits, Gila County, Arizona;, Unpublished report to Wyoming Mineral Corporation 87 p.

Silver, L. T., 1960, Age determinations on Precambrian diabase differentiates in the Sierra Ancha, Gila County, Arizona; (abs); Geological Society of America Bulletin, v. 71 no.12 pt. 2, P. 1973-1974.

Section 2.0

Caterpillar, Catepillar Performance Handbook, U. S. A. 1979.

Equipment Guide Book Company, Cost Reference Guide for Construction Equipment U. S. A. 1980.

Section 3.0

Capital and Operating Cost Estimating System Handbook., Mining and Beneficiation of Metallic and Nonmetallic Minerals Except Fossil Fuels in the United States and Canada., U. S. Bureau of Mines., July, 1980.

Equipment Guide-Book Co., Cost Reference Guide for Construction Equipment U. S. A., 1980.

Rental Rate Blue Book for Construction Equipment. U. S. A., 1980

III MILL

this should be checked. a jaw crusher may not be required depending on the size of R.O.M. ore

DESCRIPTION OF FACILITIES

Ore Processing cont'd

will drop into a 30-ton feed bin, (11102). The ore will be fed from the surge bin by a vibrating grizzly feeder, (20201). This grizzly feeder will have 4-inch spacing. The undersize of the grizzly feeder will drop onto belt conveyor (19101). This conveyor is a 24-inch wide belt. The oversize from the grizzly will be crushed by a 21" x 36" jaw crusher, (25801). The jaw crusher will be set at 4-inches. The product from the jaw crusher will also discharge onto the belt conveyor (19101). The belt conveyor will pass by a tramp metal magnet (28301), and a metal detector, (28302). Belt conveyor (19101) will then discharge into a 4000-ton coarse ore storage bin, (11101).

A 21,500 ACFM baghouse, (31501), will collect dust from the primary grizzly, jaw crusher, and transfer points. The dust from the baghouse will be transported back to the primary conveyor via screw conveyor, (19301).

The -4" ore will be removed from the coarse ore bin by two 24" x 30' pan feeders, (20501), and (20502). The pan feeders will discharge onto conveyor (19102). This conveyor is 24" wide and is equipped with a belt scale (22102), which regulates the feed to the sag mill.

The sag mill, (25301), is a 12' diameter by 5' sidewall equipped with a discharge trommel, drive and automatic lube system. The sag mill will be equipped with an air clutch and a 250 HP motor. The discharge from the mill will be pumped to one, three-deck, high frequency vibrating screen, (23401). This screen will be equipped with rubber decks with 3 mm openings to accomplish the scapling separation. The oversize material will flow by gravity into a ball

a pilot scale SAG test must be run to determine the power requirement once the design parameters are set — need 50 tons of ore

a great deal of testing is required to optimize the V_3O_8 recovery by testing the recovery at varying

1) grind
   a) -28 mesh grind
   b) -35
   c) -48
   d) -65
2) temp.
   a) 40 °C
   b) 60 °C
   c) 80 °C
c) acid concentration

d) time
   8 → 36 hours

DESCRIPTION OF FACILITIES

The new uranium plant described herein will provide a high quality product and an operation that is flexible, repeatable, and reliable.

The Dripping Spring plant is being designed to process a nominal 1,000 TPD of ore. The average quantity of uranium is 2.0 pounds of uranium per ton of ore. The overall recovery of the process will be approximately 93%. The plant will produce approximately 700,000 pounds of yellow cake per year at an average grade of 83% U_3O_8.

The primary jaw-crusher is designed to operate 8-hours per day, ~~7~~ 5-days per week, 50-weeks per year. The screen, secondary crushing and grinding operations are designed to run 24-hours per day, 7-days per week, 50-weeks per year. The processing of the ground slurry is designed to run 24-hours per day, 7-days per week, 340-days per year. The yellow cake handling system is designed to operate on a basis of drying to 8-hours per day and packaging 7-days per week, 8-hours per day.

no slurry tanks and these will operate on same ~~time~~ schedule

ORE PROCESSING

In the following description, numbers in parentheses refer to equipment numbers on the flow sheets and equipment lists.

Uranium ore will arrive from the open-pit or underground mine by over-the-road trucks and will be unloaded directly onto one of three stock piles. A front-end loader will pick up from each of the high, low, and middle grade stock piles for blending purposes. The ore will be fed onto a primary grizzly with an 18" open spacing, (23301). The oversize will be removed by a front-end loader and broken down to size by a rock breaker, (28601). The undersize

This bin design is used @ the Western Nuclear Sherwood mill. It was a ~~[illegible]~~ major problem. Changes were made in the design and Dravo tells me that it now functions very well. This must be checked

If a primary jaw crusher is required because of the blockiness of the R.O.M. ore, ~~a~~ an evaluation of a jaw crusher → rod mill → ball mill circuit should be made evaluated. SAG mills are normally attractive in Uranium mills due to the large ϕ feed chute which eliminates the need ~~for~~ for crushing and ore storage — but they are not as attractive from an energy efficiency stand point. The need (?) for a crusher reduces the attractiveness of a SAG mill.

this needs to be checked once the optimum grind has been established

DESCRIPTION OF FACILITIES

Ore Processing cont'd

mill. The ball mill, (25201), is a 9' diameter by 12' sidewall equipped with a lubrication system and a 350 HP motor. The ball mill discharge will be combined with the vibrating screen undersize in the ball mill discharge sump, (35227), and pumped to the cyclone classifiers.

Two 26" diameter cyclone classifiers, (35401) and (35402) will be used to effect a 28 mesh separation on the in-coming slurry. The +28 mesh underflow will discharge by gravity back to the ball mill for regrinding. The -28 mesh overflow will discharge into the cyclone overflow sump, (35228). The overflow slurry will be sampled at this point by a Vezin three-stage sampler, (22401), and then pumped to an intermediate thickener.

LOOK @ WIG-WAG SAMPLER

why not gravity?

A 28,000 ACFM scrubber, (31101), will maintain dust control and an acceptable air turnover rate around the sag mill, screen, and pan feeder areas. The collected dust will be returned in a slurry form to the feed distributor on the vibrating screen.

A 10-ton hoist, (26401) and a 1-ton hoist, (26402), will serve the primary crushing and conveyor belt area. A 10-ton hoist, (26403), will also serve the grinding mill area. The sag mill, ball mill, screen, and cyclone area will be equipped with three floor sump pumps.

An intermediate thickener, (35701), 75' in diameter and of wood construction, will receive the cyclone overflow. This thickener will be equipped with a thickener mechanism, (35702), with a semi-automatic lift. The thickener overflow will be pumped back to the sag mill for grinding water. The thickener underflow will be pumped to the leach tank system at 55% solids.

a thickener is probably redundant unless a 2-stage leach is used. Properly sized cyclones can probably achieve an o'flow @ 55% solids

"square" (ϕ = height) tanks are considered more efficient by some

DESCRIPTION OF FACILITIES

Ore Processing cont'd

The leach system will consist of ten wood stave tanks, (35903) through (35912), and give approximately 24 hours of batch residence time. Each tank will be 16' in diameter by 24' high and equipped with 70" leach agitators that are rubber covered and driven by 40 HP motors. The slurry will be leached at approximately 120°F and 50% solids. The leach tanks are arranged such that any tank can be bypassed. The leach tanks are covered and equipped with a vent collection system. The vented gas will pass through a PVC de-mister, (35302), and will be vented directly to the atmosphere via a 10HP fan, (30303).

The discharge from the No. 9 or No. 10 leach tank will flow by gravity into a sump. The sump is equipped with two rubber-lined pumps, (29117) and (29118). The 50% leached slurry is then pumped to a belt filter feed tank, (35712). The 15' diameter by 15' high rubber lined steel feed tank is equipped with a 25HP rubber-lined agitator. The 50% solids are pumped to a pulp distributor (35501) via pump (29121).

The pulp distributor (35501) will distribute the slurry to one or both of the two belt filters on a demand basis, via a flowmeter and an automatic valve. The distributor is equipped with an overflow that flows back to the belt filter feed tank.

The belt filters, (35601), and (35602), each are equipped with five sections: a form section, a three-stage wash section, and a drying section. Each belt filter is fed by a belt filter feed mix tank, (35724), and (35725). This tank

DESCRIPTION OF FACILITIES

Ore Processing cont'd

will mix the flocculant and the pulp to feed onto the belt filter. The belt filters are each equipped with two filtrate receivers, (35201), (35202), and (35206), (35207), and have two filtrate pumps (29123) through (29126). The belt filters have approximately 431 sq. feet of filter area each. Each filter is equipped with its own vacuum pump, (29901), and (29902), and moisture trap, (35203), and (35208). Each filter will also be equipped with a belt support fan, (30304), and (30305). Each of the filters will be equipped with a belt wash system for both the fabric filter cloth and the transporter belt. Raffinate generated from the solvent extraction circuit and stored in a rubber lined steel raffinate storage tank, (35952), will be used as the belt wash water for both filters.

The solids will be discharged from the belt filters as a "dry" cake (approximately 75% solids) and loaded into trucks for disposal at the open-pit mine.

The raffinate not used for belt filter wash water will be neutralized with milk of lime in a mixing tank, (35713). The limed raffinate will then be recirculated to the grinding circuit for use as make-up water.

All four filtrates will be pumped from the filtrate receivers and combined to feed the claricone (35223). The claricone underflow slurry will be pumped back, at 10% solids, to one belt filter feed mix tank (35725). The claricone overflow will be pumped to rubber lined steel storage tank, (35951), and this clarified pregnant solution will be fed to the solvent extraction circuit.

should evaluate motionless mixer - settler systems plus the Krebs system as alternatives. Both will probably save money.

NOTE: the higher the amine strength, the poorer the phase disengagement.

DESCRIPTION OF FACILITIES

Ore Processing cont'd

Two 7.5 ton hoists, (26405) and (26404), will serve the belt filter and filtrate receiver area. The belt filter and claricone areas will each be equipped with a floor sump.

The clarified pregnant solution will be pumped to the No. 1 extraction mixer, (35731). The extraction circuit consists of four stages. Each stage is equipped with a mixer tank, (35731) through (35734), an agitator, (35815), through (35818), and a settler section, (35212) through (35215). The solution will be placed in counter-current flow with an organic stream. This organic solution, made up of 90% kerosene, 5% alamine, and 5% isodecanol, will effectively remove the uranium from the incoming pregnant solution. The barren solution or raffinate, will be pumped from the fourth stage of the extraction circuit to the rectangular raffinate holding tank (35915). The raffinate solution is then pumped to the outside rubber lined steel storage tank (35952). The loaded organic, now containing the uranium, will flow from the No. 1 extraction stage to the wash stage preceding the strip circuit.

higher than normal 95+2½+2½

The stripping circuit consists of four stages plus a wash and moly-scrub stage. Each stage includes a mixing tank, (35735) through (35741), and agitator, (35819) through (35825), and settler section, (35216) through (35222). The loaded organic flows through the wash stage where sulfuric acid is added for pH control and proceeds in counter-current flow with ammonium sulphate stripping solution throughout the four strip stages of the circuit. The uranium in now transferred back into the aqueous phase via the stripping solution at

DESCRIPTION OF FACILITIES

Ore Processing cont'd

a higher purity and more concentrated level than it was in the feed solution. The pH in the No.'s 1,2,3, and 4 mixing tanks will be controlled and adjusted by ammonia additions. After flowing through the moly-scrub stage, in which sodium carbonate solution is added, the barren organic will flow by gravity into the rectangular barren organic holding tank, (35916).

The make-up orangic will be mixed in the barren organic holding tank. Kerosene, isodecanol, and alamine will be added in their proper porportions. The kerosene will be held in an 8,000 gallon tank while isodecanol and alamine will be held in drum quantities.

The pregnant aqueous solution pumped from the solvent extraction circuit will be received in the precipitation tanks, (35921) and (35922). Ammonia and air are mixed at a ratio of 4 to 1 and added to the solution until the pH reaches 4.2.. Steam is injected to maintain the solution temperature between 50° and 70° C. . The resulting slurry flows by gravity to the No. 2 precipitation tank. Ammonia, air, and steam are added to maintain conditions in the No. 2 precipitation tank. The pH is raised in this tank to 7.0.

The precipitated yellow cake slurry flows by gravity to a yellow cake thickener, (35703). The overflow from this yellow cake thickener flows by gravity to the barren aqueous sump, (35231), and is pumped back to the solvent extraction circuit. If required, a bleed or bypass stream of the barren aqueous will be pumped to the leach circuit. The underflow solids from the yellow cake thickener will be pumped to the No. 2 yellow cake thickener, (35704).

DESCRIPTION OF FACILITIES

Ore Processing cont'd

The yellow cake thickener circuit is arranged for a three-stage, counter-current wash consisting of No. 1 and No. 2 yellow cake thickeners and the solid bowl centrifuge (35301). The underflow solids from the No. 2 yellow cake thickener will be pumped to a mixing tank (35723), where fresh make-up water will be added to create a 20% solids slurry. This slurry is fed by gravity to the centrifuge. The solids from the centrifuge will fall by gravity to the porcupine dryer.

A porcupine dryer, (28401), heated with circulating oil from a hot oil heater (28402), will dry the yellow cake on an 8 hour day. The dried yellow cake (approximately .5% moisture)will discharge into the hammer mill (25401). The hammer mill will be equipped with quarter inch grates. The hammer mill product will flow by gravity into a yellow cake surge bin (11104).

The yellow cake product will be drummed on an 8 hour day. The material will be transported from the bin by a rotary feeder in 55 gallon drums. A drum filling system, (24501), will weigh and transport empty drums to the filling position where they will be semi-automatically loaded and re-weighed. The drums will be washed down, sealed, and flow on a roller conveyor to a shipment area. The entire loading operation will be located in a dust-tight enclosure. The dust collection system for the yellow cake area will provide dust collection for the entire yellow cake handling area. Dust will be removed from the porcupine dryer, hammer mill, drum handling area, and surge bin and collected in a wet scrubber, (31102). The scrubber water which contains the fine dust will be pumped to the No. 2 yellow cake thickener.

MILL COMMENTARY

The mill has been designed using the best equipment and test data now available, but between now and the time of mill start-up, technology could make substantial strides, and time is available for more definitive test work. This commentary is intended to address some of these possibilities.

Mill Equipment

Belt filters are incorporated in this design for liquid-solid separation. These units are very good for the design at this time, but Filters Gaudfrin are in process of introducing a new continuous pressure filter which shows great promise. It appears that these units would occupy substantially less space, cost significantly less, and be subject to much less operating maintenance.

While a CCD circuit is not a part of this design, some consideration should be given at a later time to use of a CCD using the new high rate thickeners.

Recovery of Other Metals

The mine lies in an area famous for the production of copper, molybdenum, lead, gold, and silver. The ore body should be carefully examined for the presence of recoverable amounts of these metals. The occurence of some of these metals in this ore is already known. In terms of non-metallic minerals, the ore body contains large amounts of feldspar, which could be a possible source of revenue, if it could be successfully recovered.

MILL COMMENTARY (Continued)

Tailings Disposal

For the purpose of this estimate, clay has been used as a lining material for tailings disposal area. Before the design is finalized, however, other materials should be studied. Tailings stabilized with materials such as Dravo's Calcilox, or other soil sealants might be as effective a barrier as clay. Liners of hypalon or other plastics should be evaluated in terms of cost versus cost of clay. There are areas near the ore body itself that contain a clay-like material (a weathered diabase), which might be used as a liner if the permeability of the material is low enough.

Reagent Consumption

One of the high costs associated with this project is the high acid and sodium chlorate consumption. Tests should be run to correlate acid consumption to U_3O_8 recovery to determine if there is a point at which lowered acid consumption justifies a small loss in recovery.

The largest consumer of acid appears to be the feldspar. If this could be separated from the ore, and perhaps recovered as noted above, a substantial reduction in acid consumption should be realized. Removal of the feldspar should be studied even if such treatment does not produce a salable product, since the reduction in the cost of the acid could conceivably more than pay for the cost of the feldspar removal circuit.

MILL COMMENTARY (Continued)

Test Work

We would recommend further testwork on the ore as noted below:

1. SAG mill grindability tests. This will require 60 to 100 tons of ore to obtain a satisfactory test. In the course of collecting this sample, WMC should be able to get a feel for whether or not the ore will fracture into less than six-inch chunks. If this is so, perhaps the crushing circuit preceding the SAG mill could be eliminated.
2. Analysis of as representative a sample as possible for the presence and amount of other metals, particularly copper, molybdenum, gold, and silver.
3. If metals as noted in 2 above are detected, a series of flotation tests should be run to determine if the metals are recoverable in a ~~flat~~ FLOAT concentrate suitable for direct sale, or subsequent on-site treatment.
4. Flotation testing and/or wet magnetic separation of the feldspar to determine if the spar can be economically removed or recovered without a substantial loss of U_3O_8.
5. Further leach testing to produce a curve relating acid consumption to U_3O_8 recovery.
6. Permeability tests on the "clay" contained in the ore body to determine its possible suitability as a tailings lining material.
7. Settling rates obtainable in a high rate thickener should be defined.

MILL COMMENTARY (Continued)

Low Grade Material

Presently this material is to be stockpiled for eventual disposal back in the pit. We believe a study should be undertaken to determine if there is a feasible leaching scheme to recover a portion of this low-grade uranium, such as dump leaching or thin layer leaching. Since moving, stockpiling, and disposal of this material is already carried by the overall mining cost, any recovery of the U_3O_8 contained would represent a low cost source of yellow cake.

Contract No. M-7585

Wyoming Minerals
Dripping Springs

EQUIPMENT LIST - AREA

10/8/80

Rev. No.	Equipment No.	Spec. No.	No. Req'd	Description & Operating Capacity Each	Motor HP @ RPM Each	Oper. Weight Pounds Each	Manufacturer & Model	Inter-face
	23301		1	Grizzly 18" Openings 20' X 20'	--			
	11102		1	Feed Bin - 30 Ton	--			
	20201		1	Vibrating Grizzly Feeder 3' X 16' - 125 TPH	25 HP	9000	Allis-Chalmers	
	25801		1	Jaw Crusher - 21" X 36" 125TPH	75 HP	25650	Rexnord - 2136	
	28601		1	Rock Breaker- 19' Boom	50 HP	789	Joy - PSB-206 HEFTI	
	19101		1	Belt Conveyor-Coarse Ore Bin Feed 125 TPH 24" X 200'	15 HP		Conveyor Specialists	
	22101		1	Truck Scanner	--			
	28301		1	Magnet- 92" X 45" X 27"	--		Eriez- E7220	
	28302		1	Metal Detector	1200 W		Tectron - 8000	
	31501		1	Baghouse - 21500 ACFM			Zurn- J-360-8	
	30301		1	Baghouse Fan - 45" Diam 10" W.G.	100		Zurn	
	31701 31702		2	Discharge Valve-Bag House	--			
	19301		1	Screw Conveyor-Bag House, 6"	3		Zurn	
	26401		1	Hoist-Primary Crushing 10 Ton 50' Lift	5		EMS	

Contract No. M-7585
Wyoming Minerals
Dripping Springs

EQUIPMENT LIST - AREA

10/8/80

Rev. No.	Equipment No.	Spec. No.	No. Req'd	Description & Operating Capacity Each	Motor HP @ RPM Each	Oper. Weight Pounds Each	Manufacturer & Model	Inter-face
	26402		1	Hoist - Ho. Pulley Maint. 1 Ton 50' Lift	5		EMS	
	11101		1	Coarse Ore Bin - 4000 Ton 40' X 40'	--			
	20501-20502		2	Pan Feeder - 24" X 30'	5	20,000	USE NICO Allis- Chalmers, AF-5 FEEDERS	
	22102		1	Belt Scale- 24"				
	19102		1	Belt Conveyor- Feed to SAG Mill - 24" x 50' 41.7 TPH	3		Conveyor Specialists	
	25301		1	Sag Mill - 12' x 5' 60 TPH	250	150000	Rexnord	
	35225		1	Sump-Sag Mill Dis-Charge 5' x 5' x 5'				
	29104		1	Pump-Sag Mill Discharge 150 GPM SG 1.76	75			
	29105		1	Pump-Sag Mill Discharge Standby 150 GPM SG1.76	75			
	31101		1	Scrubber - 2800 _ACFM			Zurn - Model DX	
	30302		1	Fan-Scrubber 28000 ACFM 10" W.G.	100		Zurn	
	35224		1	Sump-Scrubber 28000 ACFM 3' x 3' x 3'				

Contract No. M-7585

Wyoming Minerals
Dripping Springs

EQUIPMENT LIST - AREA

10/8/80

Rev. No.	Equipment No.	Spec. No.	No. Req'd	Description & Operating Capacity Each	Motor HP @ RPM Each	Oper. Weight Pounds Each	Manufacturer & Model	Inter-face
	29101		1	Pump-Scrubber Sump 100 GPM	10			
	26403		1	Hoist Grinding Areas 10 Ton 50' Lift	5		EMS	
	29102		1	Pump- Floor Sump 50 GPM	10			
	29103		1	Pump- Floor Sump 50 GPM	10			
	23401		1	Vibrating Screen 3-Deck, 3MM Opening	1.5		Derrick- K-48-96MS-3	OK
	35226		1	Sump-Screen Underflow 3' x 3' x 3'				
	29106		1	Pump-Screen Underflow Sump 60 GPM SG 1.27	15			
	29107		1	Pump Screen Underflow Standby , 60 GPM SG 1.27	15			
	25201		1	Ball Mill - 9' x 12'	350	200000	Allis Chalmers	OK
	35227		1	Sump Ball Mill Discharge 6' x 6' x 6'				
	29108		1	Pump Ball Mill Discharge Sump - 470 GPM SG 1.62	25			
	29109		1	Pump-Ball Mill Discharge Sump Standby 470 GPM SG 1.62	25			
	35401 35402 35403		3	Cyclone- 26" Diam. 60 In ^{2} Inlet			Krebs D026B	OK

Contract No. M-7585
Wyoming Minerals
Dripping Springs

EQUIPMENT LIST - AREA

10/8/80

Rev. No.	Equipment No.	Spec. No.	No. Req'd	Description & Operating Capacity Each	Motor HP @ RPM Each	Oper. Weight Pounds Each	Manufacturer & Model	Interface
	22401		1	3-Stage Vezin Sampler	1		Denver OK	
	35228		1	Sump Cyclone Overflow 5' X 5' X 5'				
	29111		1	Pump Cyclone Overflow Sump 235 GPM SG 1.44	15			
	29112		1	Pump Cyclone Overflow Sump Standby 235 GPM SG 1.44	15			
	29113		1	Pump Floor Sump- 50 GPM	10			
	35701		1	Thickener- Intermediate 75' Diam. x 12' Wood			Enviro Tech.	
	35702		1	Thickener Mechanism 75' Diam. x 12'	5		Enviro Tech. OK	
	29114		1	Pump Thickener Underflow 201 GPM SG 1.51	15		Dorr-Oliver	
	29115		1	Pump Thickener Underflow Stby 201 GPM SG 1.51	15		Dorr-Oliver	
	29155		1	Pump Thickener Overflow 50 GPM SG 1.0	10			
	29116		1	Pump Floor Sump Thickener Area 50 GPM SG 1.0	10			
	35903 thru 35912		10	Tank Leach 16' x 24' Wood Stave		336100	National Tank	

check "square" tanks

Contract No. M-7585
Wyoming Minerals
Dripping Springs

EQUIPMENT LIST - AREA

10-8-80

Rev. No.	Equipment No.	Spec. No.	No. Req'd	Description & Operating Capacity Each	Motor HP @ RPM Each	Oper. Weight Pounds Each	Manufacturer & Model	Inter-face
	35801 thru 35811		10	Agitator - Leach Tank 70" Impeller Rubber Covered	40	5000	Alldredge & McCabe ? not familiar w/ this impeller	
	35302		1	Demister - Leach Tank Exhaust				
	30303		1	Fan - Leach Demister	10			
	35229		1	Sump - Leach Discharge 6' x 6' x 6'				
	29117		1	Pump - Leach Discharge Sump 220 GPM SG 1.54	15			
	29118		1	Pump - Leach Discharge Sump Standby 220 GPM SG 1.54	15			
	35712		1	Tank - Belt Filter Feed 15' x 15' Wood		20500	National Tank	
	35812		1	Agitator Belt Filter Feed Tank 70" Impeller, Rubber Covered	25	4000	Alldredge & McCabe	
	26404		1	Hoist Leach Tank Area 7.5 Ton 50' Lift	5		EMS	
	29119		1	Pump Floor Sump Leach Area 50 GPM	10			
	29121		1	Pump Belt Filter Feed 220 GPM SG 1.53	15			

Contract No. M-7585
Wyoming Minerals
Dripping Springs

EQUIPMENT LIST - AREA

10/8/80

Rev. No.	Equipment No.	Spec. No.	No. Req'd	Description & Operating Capacity Each	Motor HP @ RPM Each	Oper. Weight Pounds Each	Manufacturer & Model	Inter-face
	29122		1	Pump Belt Filter Feed Standby 220 GPM SG 1.53	15			
	35501		1	Pump Distributor 4' x 4'				
	35724		1	Tank Belt Filter Feed Mix. 5' x 5' S.S.			Hockmeyer Equipment	
	35725		1	Tank Belt Filter Feed Mix. 5' x 5' SS			Hockmeyer Equipment	
	35834		1	Agitator Belt Filter Feed Mix. Tank 28" Impeller S.S.	3		Hockmeyer Equipment	
	35835		1	Agitator Belt Filter Feed Mix Tank 28" Impeller S.S.	3		Hockmeyer Equipment HVA- 3-6	
	35925		1	Tank Floculant Dilution 7' x 8' FRP			Mesa Fiberglass	
	35832		1	Agitator Floculant Dilution Tank 36" Impeller	5		-	
	6405		1	Hoist Belt Filter Area 7.5 Ton 50' Lift	5		EMS	
	35601-35602		2	Belt Filter No. 1 & No. 2 40 M^2 (430.6 Ft^2)	40		Enviro Tech. Probably a good choice	
	35201		1	Filtrate Receiver No. 1 Belt Filter 5' x 5' FRP			Enviro. Tech.	
	35202		1	Filtrate Receiver No.1 Belt Filter 4' x 4' FRP			Enviro. Tech.	

Contract No. M-7585
Wyoming Minerals
Dripping Springs

EQUIPMENT LIST - AREA

10/8/80

Rev. No.	Equipment No.	Spec. No.	No. Req'd	Description & Operating Capacity Each	Motor HP @ RPM Each	Oper. Weight Pounds Each	Manufacturer & Model	Interface
	29123		1	Pump-Filtrate, No. 1 Belt Filter 135 GPM SG 1.1	With 35601		Enviro. Tech.	
	29124		1	Pump-Filtrate No.1 Belt Filter 60 GPM SG 1.1	With 35601		Enviro. Tech.	
	30304		1	Fan Belt Suspension, No. 1 Belt Filter	10		Enviro. Tech.	
	35203		1	Moisture Trap - No.1 Belt Filter			Enviro. Tech.	
	29901		1	Pump- Vacuum, No.1 Belt Filter	With 35601		Enviro. Tech.	Not familiar w/ this pump
	35205		1	Silencer- Vacuum Pump No. 1 Belt Filter			Enviro. Tech.	
	35206		1	Filtrate Receiver No. 2 Belt Filter- 5' x 5' FRP			Enviro. Tech.	
	35207		1	Filtrate Receiver- No.2 Belt Filter 4' x 4' FRP			Enviro. Tech.	
	29125		1	Pump - Filtrate, No. 2 Belt Filter 135 GPM SG. 1.1	With 35602		Enviro. Tech.	
	29126		1	Pump Filtrate, No.2 Belt Filter 60 GPM SG 1.1	With 35602		Enviro. Tech.	
	30305		1	Fan. Belt Suspension No. 2 Belt Filter	10		Enviro. Tech.	

Note: Eimco notoriously underizes Vacuum pumps for disc filters

Contract No. M-7585

Wyoming Minerals
Dripping Springs

EQUIPMENT LIST - AREA

10/8/80

Rev. No.	Equipment No.	Spec. No.	No. Req'd	Description & Operating Capacity Each	Motor HP @ RPM Each	Oper. Weight Pounds Each	Manufacturer & Model	Interface
	35208		1	Moisture Trap- No. 2 Belt Filter			Enviro. Tech.	
	29902		1	Pump Vacuum, No. 2 Belt Filter	With 35602		Enviro. Tech.	
	35211		1	Silencer-Vacuum Pump, No. 2 Belt Filter			Enviro. Tech.	
	19103		1	Belt Conveyor Belt Filter Tailings Discharge 24" x 55'				
	19104		1	Belt Conveyor Tailings Transport 24" x 105'				
	19105		1	Belt Conveyor Tailings Surge Bin Feed 24" x 380'				
	11103		1	Bin-Tailings Surge 15' x 15'				
	26406		1	Hoist-Filtrate Receiver Area 7.5 Ton 50' Lift	5		EMS	
	29133		1	Pump-Floor Sump Filter Area 50 GPM	10			
	35223		1	Claricone 28' Diam. 400 GPM		25000	Walker Process	YES
	29131		1	Pump Claricone Overflow 400 GPM SG 1.10	15			

Contract No. M-7585
Wyoming Minerals
Dripping Springs

EQUIPMENT LIST - AREA

10/8/80

Rev. No.	Equipment No.	Spec. No.	No. Req'd	Description & Operating Capacity Each	Motor HP @ RPM Each	Oper. Weight Pounds Each	Manufacturer & Model	Inter-face
	29132		1	Pump Claricone Underflow 10 GPM SG 1.17	1			
	29134		1	Pump Floor Sump Claricone Area 50 GPM	10			
	35713		1	Tank Raffinate- Lime Mixing 10 x 10' FRP			Mesa Fiberglass YES - but there are others	
	35813		1	Agitator-Raffinate-Lime Mixing Tank 36" Impeller	5			
	29127		1	Pump-Raffinate-Lime Mix Tank Discharge 120 GPM SG 1.05	10			
	11105		1	Bin-Lime Stroage 15' x 15'				
	35232		1	Lime Slaker 4' x 5'	10			
	29149		1	Pump-Lime Slaker Discharge 10 GPM SG 1.07	2			
	35924		1	Tank-Milk of Lime 15' x 15' Wood Stave			National Tank	
	35831		1	Agitator - Milk of Lime Tank 48" Impeller	10			
	29151		1	Pump Milk of Lime Discharge 10 GPM SG 1.07	2			
	35951		1	Tank Pregnant Aqueous Storage Tank 26' x 26' Rubber Lined		42800	why not FRP lining?	

Contract No. M-7585
Wyoming Minerals
Dripping Springs

EQUIPMENT LIST - AREA

10/8/80

Rev. No.	Equipment No.	Spec. No.	No. Req'd	Description & Operating Capacity Each	Motor HP @ RPM Each	Oper. Weight Pounds Each	Manufacturer & Model	Inter-face
	29152		1	Pump Pregnant Aqueous Feed 400 GPM SG 1.10	15			
	35952		1	Tank Raffinate Storage 26' x 26' Rubber Lined		42800		
	29153		1	Pump Raffinate Holding Tank Discharge 400 GPM SG 1.10	15			
	26407		1	Hoist Solvent Extraction Area 2 Ton 50' Lift	5		EMS	
	35731		1	Tank Solvent Extraction Mix No. 1 5' x 6' FRP			Mesa Fiberglass	
	35732		1	Tank Solvent Extraction Mix No. 2 5' x 6' FRP			Mesa Fiberglass	
	35733		1	Tank Solvent Extraction Mex No. 3 5' x 6' FRP			Mesa Fiberglass	
	35734		1	Tank Solvent Extraction Mix No. 4 5' x 6' FRP			Mesa Fiberglass	
	35815		1	Agitator No. 1 Solvent Extraction Mix Tank S. S. Wetted Parts	10		Alldredge & McCabe	
	35816		1	Agitator No. 2 Solvent Extraction Mix Tank S. S. Wetted Parts	10		Alldredge & McCabe	
	35817		1	Agitator No. 3 Solvent Extraction Mix Tank S. S. Wetted Parts	10		Alldredge & McCabe	

look @ motorless mixer/settler systems and Krebs unit

Contract No. M-7585

Wyoming Minerals
Dripping Springs

EQUIPMENT LIST - AREA

10-8-80

Rev. No.	Equipment No.	Spec. No.	No. Req'd	Description & Operating Capacity Each	Motor HP @ RPM Each	Oper. Weight Pounds Each	Manufacturer & Model	Inter-face
	35818		1	Agitator - No. 4 Solvent Extraction Mix Tank S.S. Wetted Parts	10		Alldredge & McCabe	
	35212		1	Tank- Solvent Extraction Settler No. 1 14.5' x 29' x 3' FRP			Mesa Fiberglass	
	35213		1	Tank-Solvent Extraction Settler No. 2 14.5' x 29' x 3' FRP			Mesa Fiberglass	
	35214		1	Tank-Solvent Extraction Settler No. 3 14.5' x 29' x 3' FRP			Mesa Fiberglass	
	35215		1	Tank-Solvent Extraction Settler No. 4 14.5' x 29' x 3' FRP			Mesa Fiberglass	
	35915		1	Tank- Raffinate Holding 29' x 29' x 5' FRP			Mesa Fiberglass	
	29136		1	Pump-Raffinate Holding Tank Feed 400 GPM SG. 1.05	15			
	29129		1	Pump-Floor Sump, Solvent Extraction 50 GPM	10			
	35735		1	Tank- Wash Mix 4' x 4' FRP			Mesa Fiberglass	

Contract No. M-7585
Wyoming Minerals
Dripping Springs

EQUIPMENT LIST - AREA

10-8-80

Rev. No.	Equipment No.	Spec. No.	No. Req'd	Description & Operating Capacity Each	Motor HP @ RPM Each	Oper. Weight Pounds Each	Manufacturer & Model	Inter-face
	35736		1	Tank-Solvent Extraction Strip Mix No.1 4' x 4' FRP			Mesa Fiberglass	
	35737		1	Tank- Solvent Extraction Strip Mix No. 2 4' x 4' FRP			Mesa Fiberglass	
	35738		1	Tank - Solvent Extraction Strip Mix No. 3 4' x 4' FRP			Mesa Fiberglass	
	35739		1	Tank-Solvent Extraction Strip Mix No. 4 4' x 4' FRP			Mesa Fiberglass	
	35741		1	Tank-Moly Scrub Mix 4' x 4' FRP			Mesa Fiberglass	
	35819		1	Agitator-Wash Mix Tank S.S. Wetted Parts	3		Alldredge & McCabe	
	35821		1	Agitator No. 1 Strip Mix Tank - S. S. Wetted Parts	3		Alldredge & McCabe	
	35822		1	Agitator No. 2 Strip Mix Tank - S.S. Wetted Parts	3		Alldredge & McCabe	
	35823		1	Agitator No. 3 Strip Mix Tank - S. S. Wetted Parts	3		Alldredge & McCabe	
	35824		1	Agitator No. 4 Strip Mix Tank - S. S. Wetted Parts	3		Alldredge & McCabe	

Contract No. M-7585
Wyoming Minerals
Dripping Springs

EQUIPMENT LIST - AREA

10-8-80

Rev. No.	Equipment No.	Spec. No.	No. Req'd	Description & Operating Capacity Each	Motor HP @ RPM Each	Oper. Weight Pounds Each	Manufacturer & Model	Inter-face
	35825		1	Agitator - Moly Scrub Mix Tank - S.S. Wetted Parts	3		Alldredge & McCabe	
	35216		1	Tank Wash Settler 5' x 10' x 3' FRP			Mesa Fiberglass	
	35217		1	Tank No. 1 Strip Settler 5' x 10' x 3' FRP			Mesa Fiberglass	
	35218		1	Tank No. 2 Strip Settler 5' x 10' x 3' FRP			Mesa Fiberglass	
	35219		1	Tank No. 3 Strip Settler 5' x 10' x 3' FRP			Mesa Fiberglass	
	35221		1	Tank No. 4 Strip Settler 5' x 10'x3' FRP			Mesa Fiberglass	
	35222		1	Tank Moly Scrub Settler 5' x 10' x 3' FRP			Mesa Fiberglass	
	35916		1	Tank Barren Organic Holding 10' x 10' x 3' FRP			Mesa Fiberglass	
	29137		1	Pump Barren Organic Feed to Extraction 60 GPM SG .80	2			
	29138		1	Pump Barren Organic Entrainment 10 GPM	2			

Contract No. M-7585
Wyoming Minerals
Dripping Springs

EQUIPMENT LIST - AREA

10-8-80

Rev. No.	Equipment No.	Spec. No.	No. Req'd	Description & Operating Capacity Each	Motor HP @ RPM Each	Oper. Weight Pounds Each	Manufacturer & Model	Inter-face
	35917		1	Tank- Moly Scrub Surge 10' x 10' FRP			Mesa Fiberglass	
	29139		1	Pump Floor Sump, Moly Scrub Area 25 GPM	5			
	29141		1	Pump Moly Scrub Surge Tank Discharge- 10 GPM	2			
	35918		1	Tank- Pregnant Aqueous 10' x 10' FRP			Mesa Fiberglass	
	29142		1	Pump- Pregnant Aqueous Tank Discharge 6 GPM SG 1.05	1.5			
	29143		1	Pump Floor Sump, Stripping Area 25 GPM	5			
	35919		1	Tank Regenerant Mixing 10' x 10' FRP			Mesa Fiberglass	
	35826		1	Agitator- Regenerant Mixing Tank 48" Impeller	5			
	29144		1	Pump Regenerant Mix Tank Discharge 5 GPM	1			
	35921		1	Tank- No.1 Y. C. Precipitation 7' x 8' FRP			Mesa Fiberglass	

Contract No. M-7585

Wyoming Minerals
Dripping Springs

EQUIPMENT LIST - AREA

10-8-80

Rev. No.	Equipment No.	Spec. No.	No. Req'd	Description & Operating Capacity Each	Motor HP @ RPM Each	Oper. Weight Pounds Each	Manufacturer & Model	Inter-face
	35922		1	Tank No. 2 Y.C. Precipitation 7' x 8' FRP			Mesa Fiberglass	
	35827		1	Agitator No. 1 PPT Tank - S. S. Parts	5		Alldredge & McCabe	
	35828		1	Agitator - No. 2 PPT Tank - S. S. Parts	5		Alldredge & McCabe	
	29145		1	Pump- Floor Sump, Thickener Area 25 GPM	5			
	35703		1	Thickener No. 1 Yellow Cake 20' x 6' C.S. Rubber Lined			Enviro. Tech	
	35705		1	Thickener Mechanism, No. 1 Y.C. 20' Diameter	1		Enviro. Tech.	
	35704		1	Thickener - No. 2 Yellow Cake 6' x 3' C.S. Rubber Lined			Enviro. Tech.	
	35706		1	Thickener Mechanism, No. 2 Y.C. 6' Diameter	1		Enviro. Tech.	
	35231		1	Sump- Barren Aqueous Over-flow 4' x 4' x 4'				
	29146		1	Pump Barren Aqueous Feed to Strip Circuit 6 GPM SG 1.05	2			

Contract No. M-7585
Wyoming Minerals
Dripping Springs

EQUIPMENT LIST - AREA

10-8-80

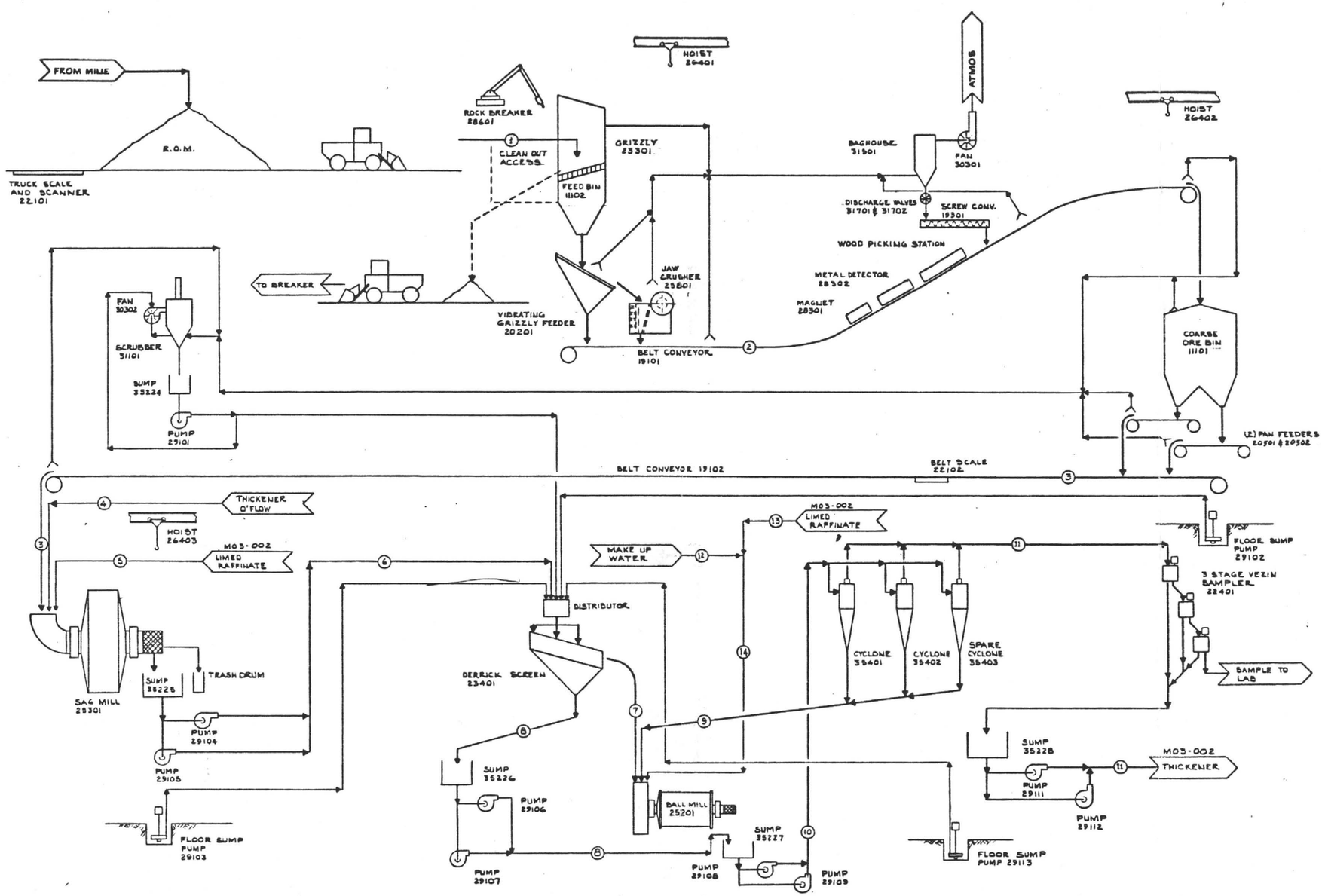
Rev. No.	Equipment No.	Spec. No.	No. Req'd	Description & Operating Capacity Each	Motor HP @ RPM Each	Oper. Weight Pounds Each	Manufacturer & Model	Inter-face
	29147		1	Pump Barren Aqueous By-pass to Leach 6 GPM SG 1.05	2			
	29801		1	Pump Y.C. Thickener #1 Underflow 1 GPM SG. 1.32	2			
	29802		1	Pump Y.C. Thickener #2 Underflow L GPM SG.1.32	2			
	30306		1	Fan Yellow Cake Thickener Vent	5			
	30307		1	Fan Yellow Cake Scrubber 40" W. G.	15			
	31102		1	Scrubber - Yellow Cake 500 ACFM			Ducon	
	29148		1	Pump Yellow Cake Scrubber 10 GPM	1			
	35723		1	Tank Yellow Cake Mixing 5' x 5' S.S.			Hockmeyer	
	35829		1	Agitator Yellow Cake Mixing Tank 28" Impeller S.S.	3		Hockmeyer	
	35301		1	Centrifuge - Yellow Cake W/Feed Box 9" 316 S.S.	15		Dorr Oliver Merco Bowl 9L	
	26408		1	Hoist Centrifuge Area 3 Ton 50' Lift	5		EMS	

Contract No. M-7585
Wyoming Minerals
Dripping Springs

EQUIPMENT LIST - AREA

10-8-80

Rev. No.	Equipment No.	Spec. No.	No. Req'd	Description & Operating Capacity Each	Motor HP @ RPM Each	Oper. Weight Pounds Each	Manufacturer & Model	Inter-face
	28401		1	Dryer Porcupine 2' Diameter x 7' S.S.		4900	Acrodyne Model 2Q1206 JTC	
	28402		1	Hot Oil Heater W/Circ. Pump	3		Acrodyne	
	25401		1	Hammer Mill ¼" Openings	2		Koppers	
	11104		1	Bin Y.C. Surge 9' x 12'				
	24501		1	Drum Filler System W/Slide Gate Rotary Valve, Fell Hood, Vibrator, Semi-Auto. Scale, Conveyor	2		Colorado Conveyor	
	22103		1	Truck Scale				
	20801 20802		2	Pug Mills	2			



STREAM NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
TPH SOLIDS	126	125	41.7	–	–	41.7	35.4	6.3	75.1	116.8	41.7	–	–	–
TPH LIQUID	–	–	–	7.9	10.0	17.9	6.2	11.7	29.2	71.2	42.0	4.8	19.3	24.1
TPH TOTAL	125	126	41.7	7.9	10.0	59.6	41.6	18.0	104.3	188.0	83.7	4.8	19.3	24.1
SG SOLIDS	2.6	2.6	2.6	–	–	2.6	2.6	2.6	2.6	2.6	2.6	–	–	–
SG LIQUID	–	–	–	1.0	1.05	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.05	1.0
SG SLURRY	–	–	–	–	–	.76	2.10	1.27	1.80	1.62	1.66	–	–	–
GPM SOLIDS	1521	1921	660	–	–	640	544	96	1154	1735	660	–	–	–
GPM LIQUID	–	–	–	31.6	38.1	71.5	24.8	46.7	116.7	286.5	167.8	19.2	77.1	96.3
GPM SLURRY	–	–	–	–	–	1552	792	54.6	2321	4642	2328	–	–	–
% SOLIDS	100	100	100	0	0	70.0	85.1	35.0	72.0	61.1	49.8	0	0	0
LB/HR U_3O_8	250	250	83.3	0	.019	83.3	70.8	12.5	150.2	233.6	83.3	0	.039	0

NO	BY	DESCRIPTION	J.E.	S.E
		REVISIONS		

WYOMING MINERAL CORPORATION
DRIPPING SPRINGS PROJECT

PROCESS FLOW SHEET

PRELIMINARY NOT APPROVED FOR CONSTRUCTION

ISSUE NO. 1 DATE PRINTED 10-26-80

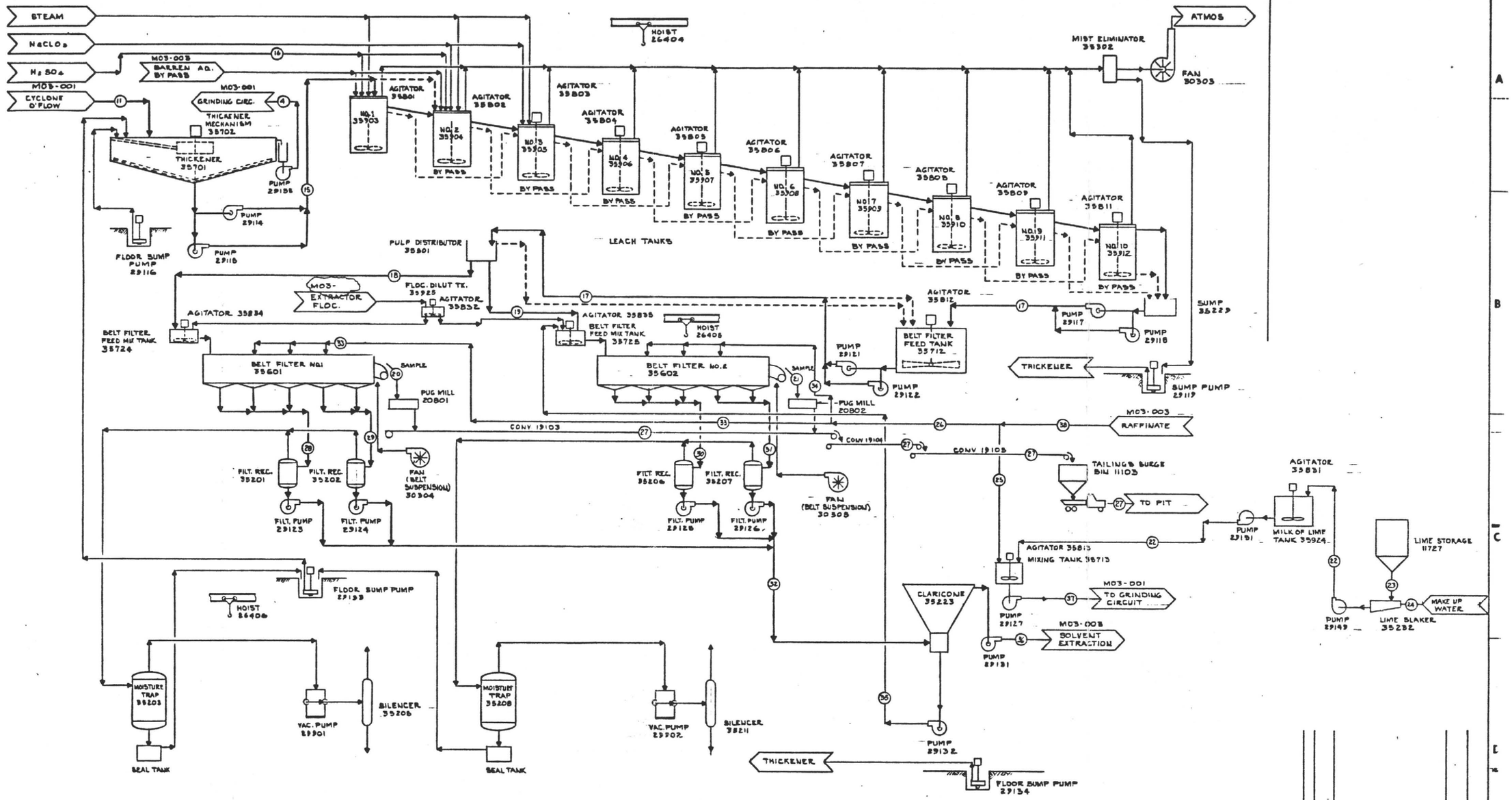
DR E.V.B. 3/6/ CH ____ J.E. ____ SCALE NONE SECT. MECH CODE 493 CHF. S.E. ____ APP'D ____ CONTRACT NO. M-7585

DRAWING NO. M03-001

Dravo

DENVER OPERATIONS OFFICE ORIGINALS & DETAILS DIV

This drawing, including the information it contains, is the property of Dravo Corporation. It is submitted only in connection with the transaction to which it pertains and must not be used in any manner detrimental to the interest of Dravo Corporation. This drawing is not to be copied and must be returned upon request.



STREAM NO.	11	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
TPH SOLIDS	41.7	41.7	–	–	41.7	20.85	20.85	20.85	20.85	.21	.21	0	0	0	41.7	–	–	–	–	.01	–	–	.01	–	0	0
TPH LIQUIDS	42.0	34.1	7.9	7.3	41.4	20.7	20.7	7.0	7.0	1.85	0	1.85	27.4	72.6	14.0	36.6	18.4	34.6	18.4	100.0	36.3	36.3	.09	100.0	29.3	100.0
TPH TOTAL	83.7	75.8	7.9	7.3	83.1	41.55	41.55	27.85	27.85	2.10	.21	1.99	27.4	72.6	55.7	36.6	18.4	34.6	18.4	100.01	36.3	36.3	.10	100.0	29.3	100.0
SG SOLIDS	2.6	2.6	–	–	2.6	2.6	2.6	2.6	2.6	3.31	3.31	–	–	–	2.6	–	–	–	–	2.6	–	–	2.6	–	–	–
SG LIQUIDS	1.0	1.0	1.0	1.0	1.09	1.09	1.09	1.05	1.05	1.0	–	1.0	1.05	1.05	1.05	1.10	1.10	1.10	1.10	1.10	1.05	1.05	1.10	1.10	1.05	1.05
SG SLURRY	1.64	1.51	–	–	1.34	1.34	1.34	1.30	1.30	1.07	–	–	–	–	1.30	–	–	–	–	1.10	–	–	1.17	–	–	–
GPM SOLIDS	64.0	64.0	–	–	64.0	32.0	32.0	32.0	32.0	.25	.25	–	–	–	64.0	–	–	–	–	.015	–	–	.015	–	–	–
GPM LIQUIDS	167.8	136.3	31.6	18.9	191.8	95.9	95.9	26.6	26.6	7.55	–	7.55	104.3	276.3	53.3	185.7	89.9	189.7	89.9	363.3	138.2	138.2	.327	363.3	115.2	380.4
GPM SLURRY	232.0	200.4	–	–	255.6	127.8	127.8	58.7	58.7	7.84	–	–	–	–	117.2	–	–	–	–	363.3	–	–	.342	–	–	–
% SOLIDS	49.8	55.0	0	0	50.2	50.2	50.2	74.9	74.9	10.0	100.0	0	0	0	74.9	0	0	0	0	.01	0	0	10.0	0	0	0
LB/HR U_3O_8	83.3	83.3	0	0	83.3	41.65	41.65	4.315	4.315	–	–	–	.052	.138	8.63	23.9	11.5	23.9	11.5	74.9	.069	.069	.069	74.9	.058	.130
#/# U_3O_8	–	–	–	–	.397	.397	.397	.011	.011	–	–	–	.001	.001	.011	.011	.011	.011	.011	.012	.001	.001	.012	.012	.001	.001
#/# H_2SO_4	–	–	–	–	17.62	3.10	3.10	3.10	.01	.01	–	–	–	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10

NO	BY	DESCRIPTION	J.E	S.E
		REVISIONS		

WYOMING MINERAL CORPORATION
DRIPPING SPRINGS PROJECT

PROCESS FLOW SHEET

PRELIMINARY — NOT APPROVED FOR CONSTRUCTION
ISSUE NO. 1 DATE PRINTED 10-24-80

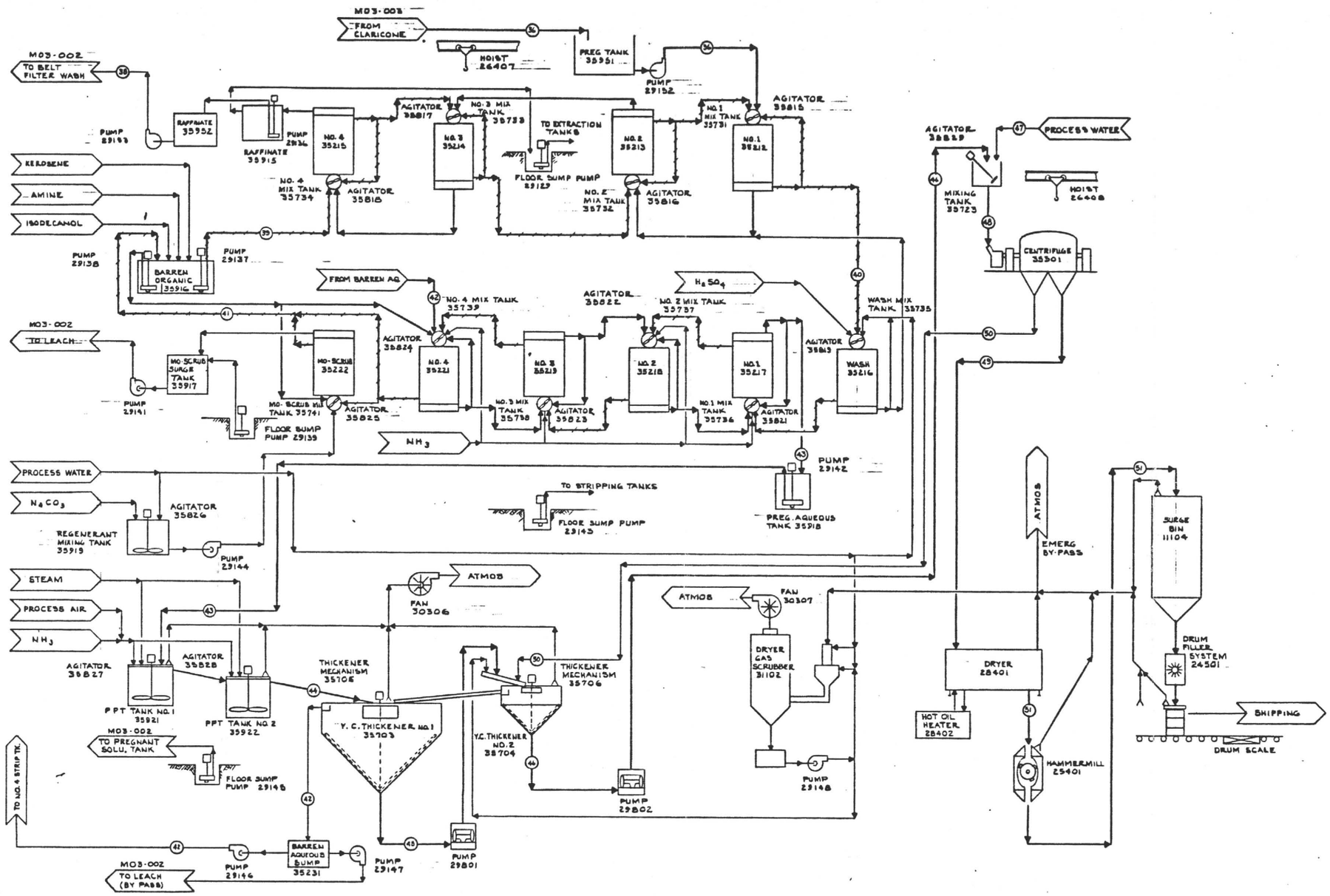
DR FEB 8-1-80 | SCALE NONE | CHF. S. E.
CH | SECT. MECH | APP'D
J. E. | CODE 403 | CONTRACT NO. M 7885

Dravo

DRAWING NO. M03-002

This drawing, including the information it contains, is the property of Dravo Corporation. It is submitted only in connection with the transaction to which it pertains and is not to be used in any manner contrary to the interest of Dravo Corporation. This drawing is not to be copied and must be returned upon request.

DENVER OPERATIONS OFFICE | ORIGINALS & DETAILS ON



STREAM NO.	34	38	39	40	41	42	43	44	45	46	47	48	49	50	51
TPH SOLIDS	–	–	–	–	–	–	–	.042	.042	.062	–	.062	.042	–	.062
TPH LIQUIDS	100.0	100.0	12.01	12.01	12.01	1.58	1.58	1.54	.097	.097	.083	.180	.042	.139	.002
TPH TOTAL	100.0	100.0	12.01	12.01	12.01	1.58	1.58	1.58	.139	.159	.083	.222	.084	.139	.064
SG SOLIDS	–	–	–	–	–	–	–	3.4	3.4	3.4	–	3.4	3.4	–	3.4
SG LIQUIDS	1.10	1.05	.80	.80	.80	1.05	1.05	1.05	1.05	1.05	1.0	1.05	1.05	1.05	1.08
SG SLURRY	–	–	–	–	–	–	–	1.07	1.32	1.32	–	1.21	1.60	–	3.06
GPM SOLIDS	–	–	–	–	–	–	–	.05	.05	.05	–	.05	.05	–	.05
GPM LIQUIDS	363.3	380.4	60.0	60.0	60.0	6.00	6.00	5.84	.369	.369	.333	.684	.158	.528	.008
GPM SLURRY	–	–	–	–	–	–	–	5.89	.420	.420	–	.735	.207	–	.057
#/# U_3O_8	.012	.001	.02	2.50	.02	.02	25.0	.02	.02	.02	0	.02	.02	.02	.02
#/# H_2SO_4	.10	.10	0	.10	0	.10	.10	.10	.10	.10	0	.10	.01	.10	0
LB/HR YELLOW CAKE	–	–	–	–	–	–	–	83.22	83.22	83.22	0	83.22	83.22	0	83.22
LB/HR U_3O_8	74.9	.190	.601	74.9	.601	.060	74.9	74.9	74.9	74.9	0	74.9	74.9	.009	74.9
% SOLIDS	0	0	0	0	0	0	0	2.64	30.0	30.0	0	18.8	30.0	0	95.0

NO	BY	DESCRIPTION	J.E.	S.E.
		REVISIONS		

WYOMING MINERAL CORPORATION
DRIPPING SPRINGS PROJECT

PROCESS FLOW SHEET

PRELIMINARY — NOT APPROVED FOR CONSTRUCTION
ISSUE NO. 1 DATE PRINTED 10-24-80

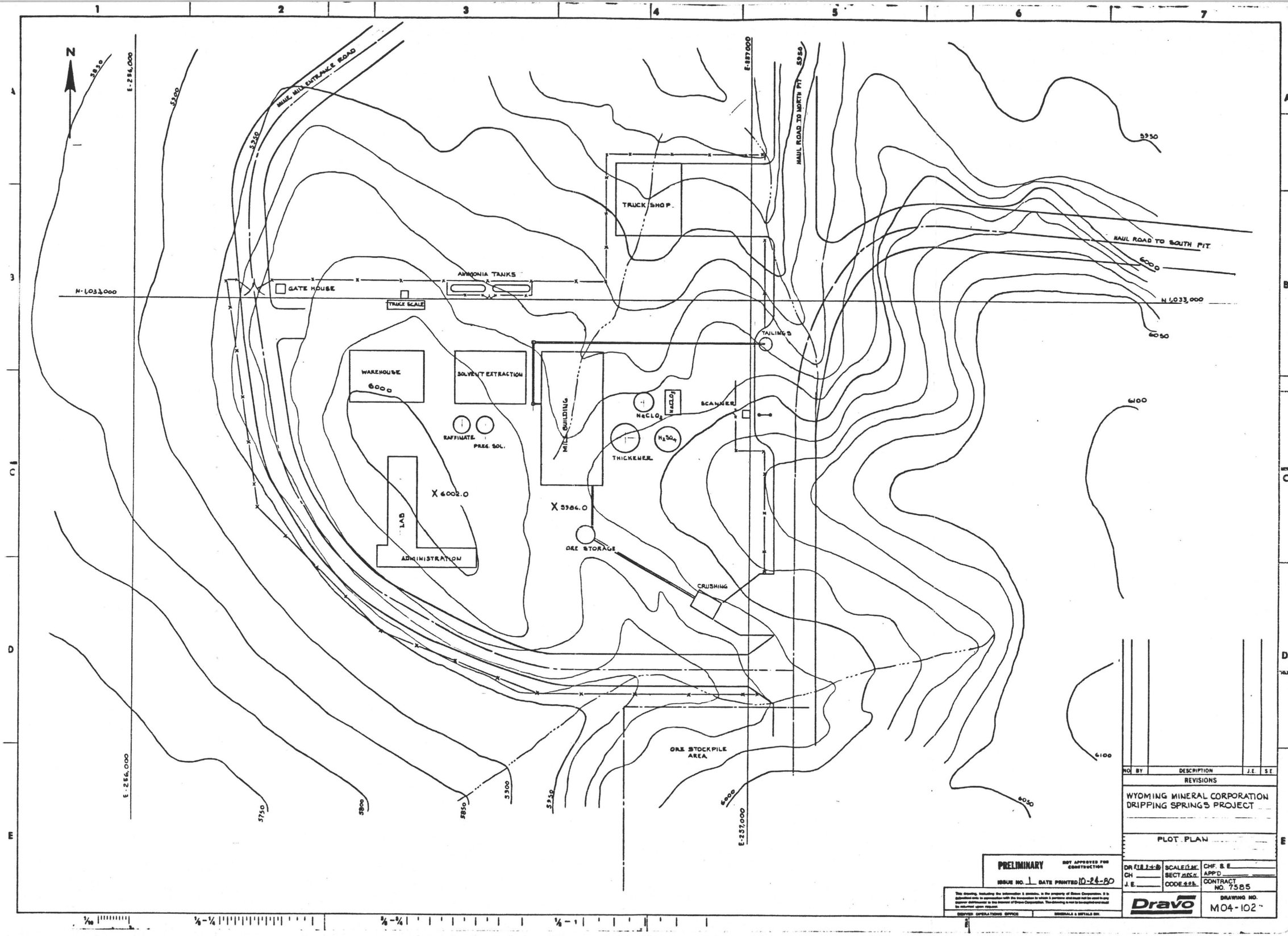
DR FHB 8-5-80 | CH | J.E. | SCALE NONE | SECT. MECH. | CODE 403 | CHF. S.E. | APP'D | CONTRACT NO. M7585

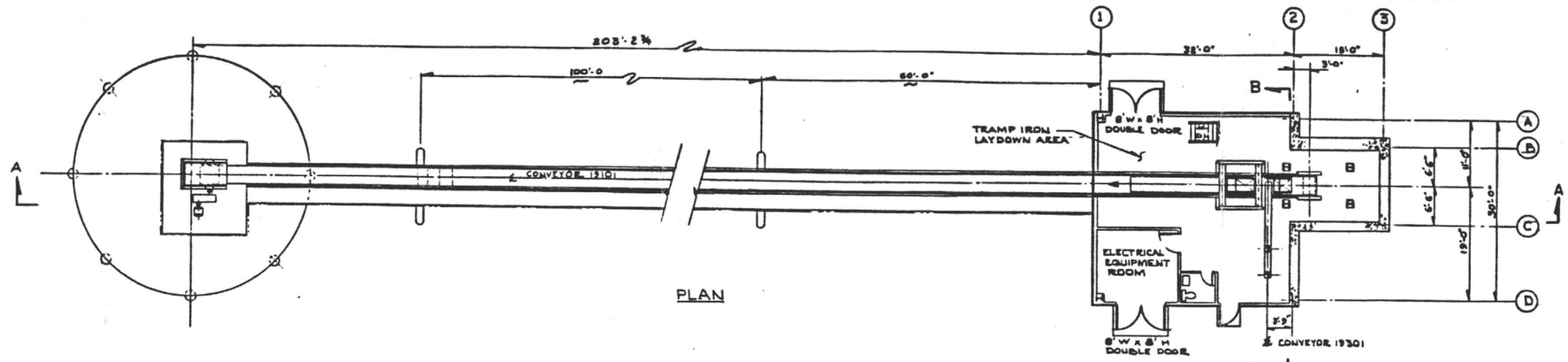
Dravo

DRAWING NO. M03-003

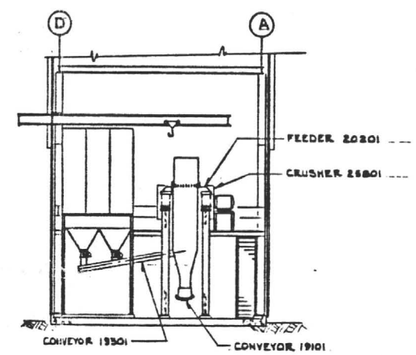
This drawing, including the information it contains, is the property of Dravo Corporation. It is submitted only in connection with the transaction to which it pertains and shall not be used in any manner detrimental to the interest of Dravo Corporation. The drawing is not to be copied and must be returned upon request.

DENVER OPERATIONS OFFICE | MINERALS & METALS DIV.

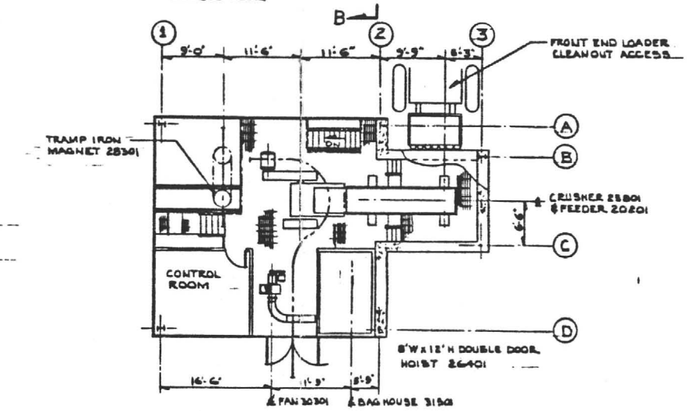

N
HAUL, MILL ENTRANCE ROAD
HAUL ROAD TO NORTH PIT
HAUL ROAD TO SOUTH PIT
TRUCK SHOP
GATE HOUSE
TRUCK SCALE
AMMONIA TANKS
N-1,033,000
N 1,033,000
E-256,000
E-257,000
TAILINGS
WAREHOUSE
6000
SOLVENT EXTRACTION
MILL BUILDING
RAFFINATE
PREG. SOL.
$NaClO_3$
$NaClO_2$
SCANNER
THICKENER
H_2SO_4
X 6002.0
X 5986.0
LAB
ADMINISTRATION
ORE STORAGE
CRUSHING
ORE STOCKPILE AREA
5950
6050
6100
5750
5800
5850
5900
5950
6000
6050
6100
PRELIMINARY
NOT APPROVED FOR CONSTRUCTION
ISSUE NO. 1 DATE PRINTED 10-24-80
DRAVO OPERATIONS OFFICE
MINERALS & METALS DIV.
DR
CH
J. E.
SCALE
SECT.
CODE
CHF. E.
APP'D
CONTRACT NO. 7585
DRAWING NO. M04-102
Dravo
NO BY DESCRIPTION J.E. S.E.
REVISIONS
WYOMING MINERAL CORPORATION
DRIPPING SPRINGS PROJECT
PLOT PLAN

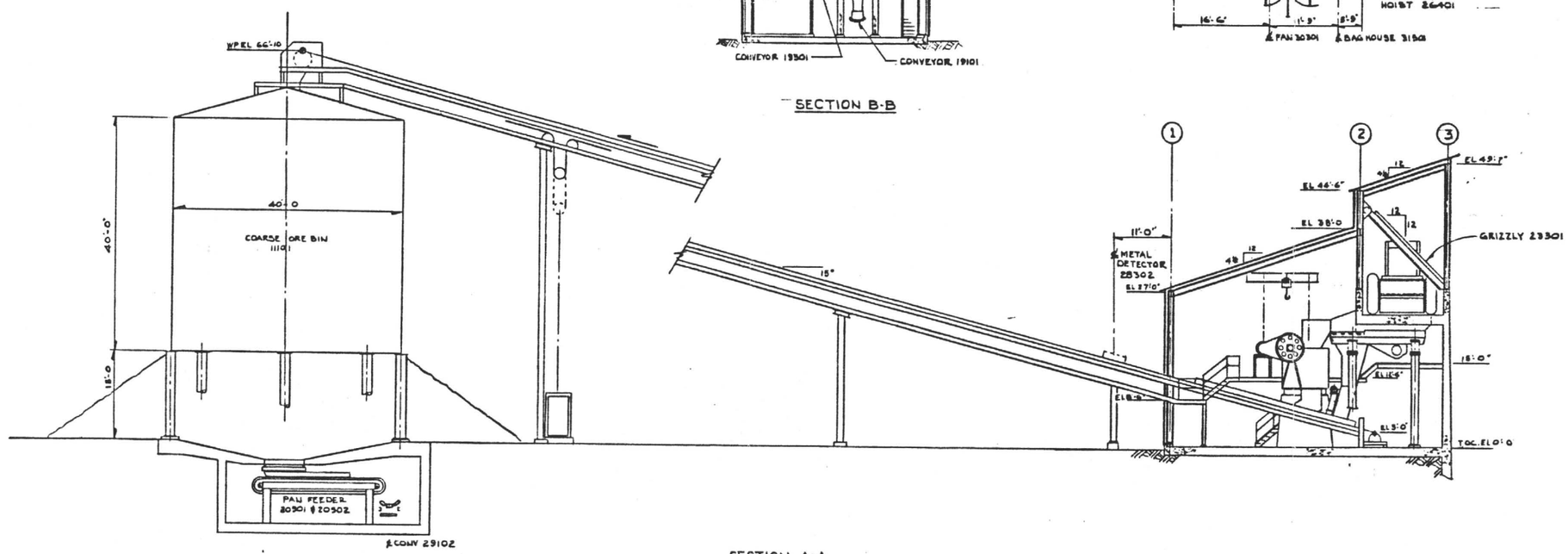


PLAN



SECTION B-B





SECTION A-A

NO	BY	DESCRIPTION	J.E.	S.E.

REVISIONS

WYOMING MINERAL CORPORATION
DRIPPING SPRINGS PROJECT

GENERAL ARRANGEMENT
CRUSHING & ORE STORAGE
PLANS & SECTIONS

PRELIMINARY — NOT APPROVED FOR CONSTRUCTION

ISSUE NO. 1 DATE PRINTED 10-24-80

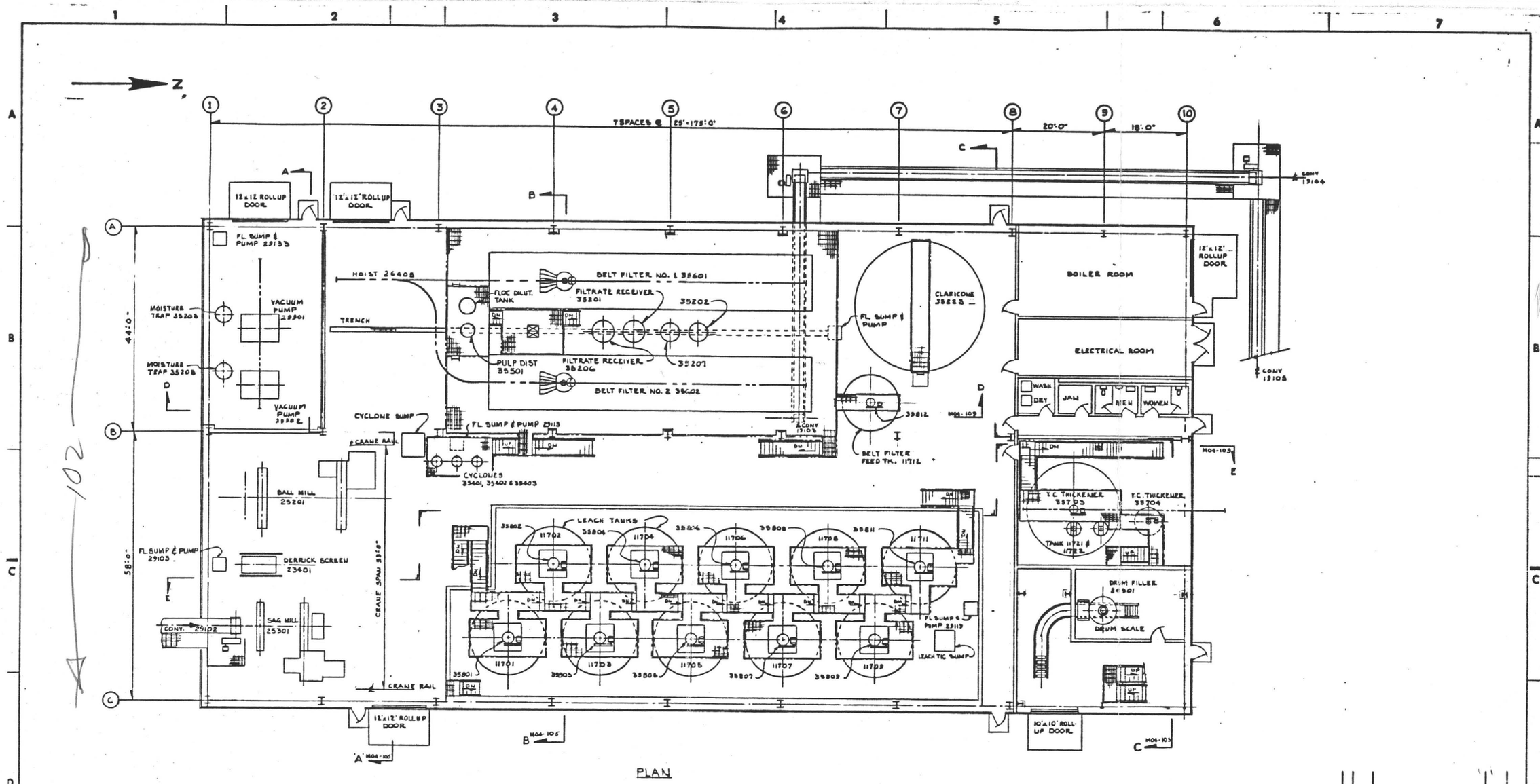
DR RVB 8-11-80 | SCALE 1/8" | CHF. S. E.
CH | SECT. MECH | APP'D
J. E. | CODE 404 | CONTRACT NO. M 7585

Dravo

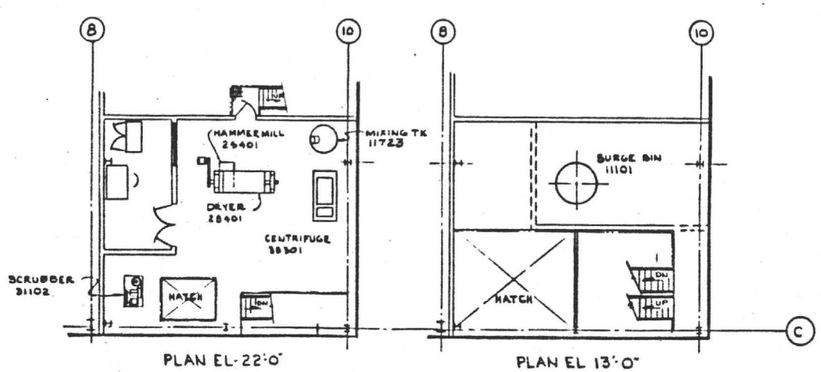
DRAWING NO. M04-103

This drawing, including the information it contains, is the property of Dravo Corporation. It is submitted only in connection with the transaction to which it pertains and must not be used in any manner detrimental to the interest of Dravo Corporation. This drawing is not to be copied and must be returned upon request.

DENVER OPERATIONS OFFICE | MINERALS & METALS DIV.



PLAN



PLAN EL 22'-0"

PLAN EL 13'-0"

NO	BY	DESCRIPTION	J.E.	S.E.

REVISIONS

WYOMING MINERAL CORPORATION
DRIPPING SPRINGS PROJECT

GENERAL ARRANGEMENT
MILL BUILDING
PLANS

PRELIMINARY — NOT APPROVED FOR CONSTRUCTION

ISSUE NO. 1 DATE PRINTED 10-24-80

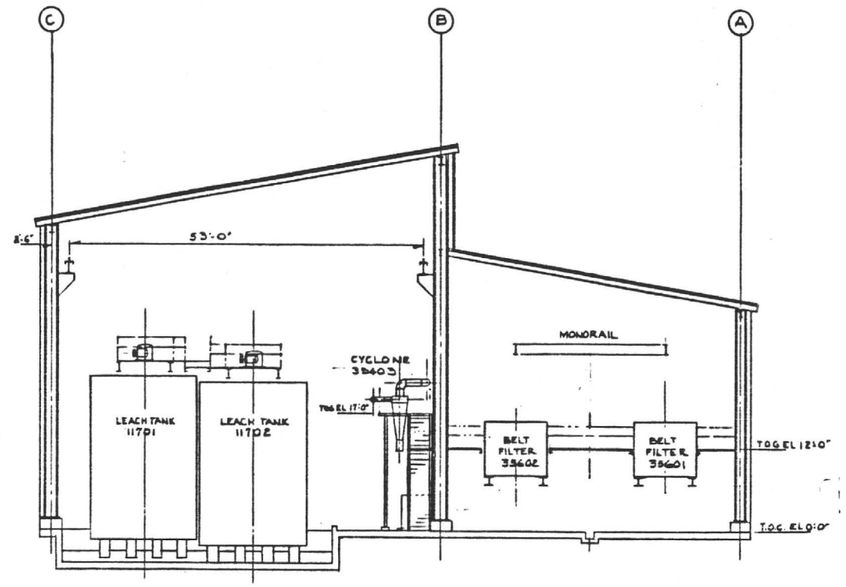
DR. SB 2 PP. | SCALE 1/8"=1'0" | CHF. S. E.
CH. | SECT. MECH | APP'D
J. E. | CODE 404 | CONTRACT NO. M-7585

Dravo

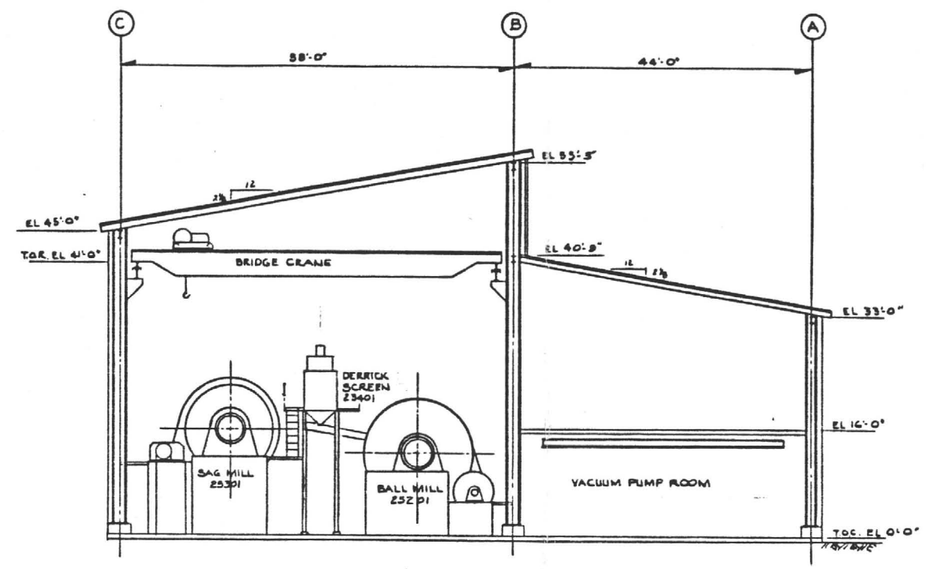
DRAWING NO. M04-104

This drawing, including the information it contains, is the property of Dravo Corporation. It is submitted only in connection with the transaction to which it pertains and must not be used for any purpose unauthorized by the director of Dravo Corporation. This drawing is not to be copied and must be returned upon request.

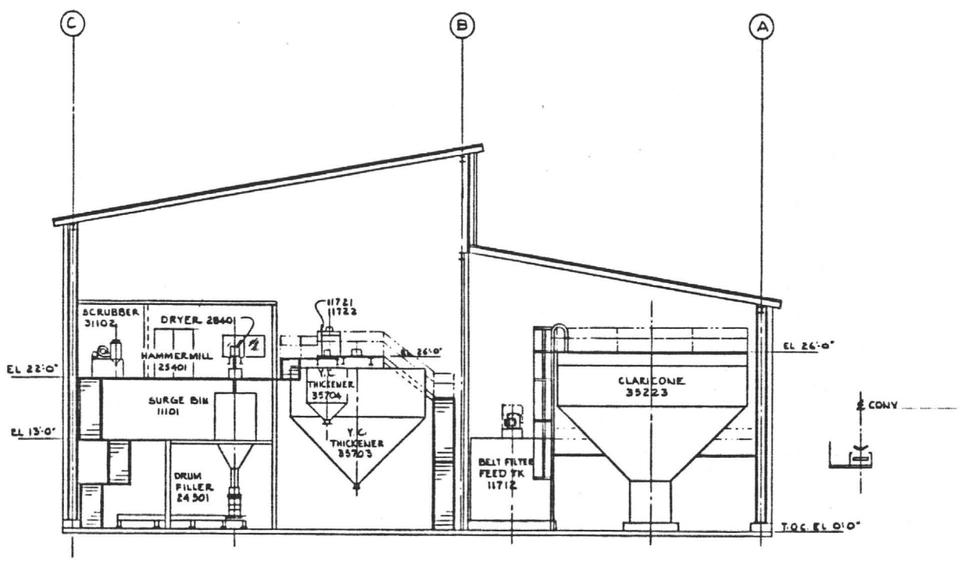
DENVER OPERATIONS OFFICE | ORIGINALS & DETAILS ON



SECTION B-B (M04-104)



SECTION A-A (M04-104)



SECTION C-C (M04-104)

NO	BY	DESCRIPTION	J.E.	S.E.

REVISIONS

WYOMING MINERAL CORPORATION
DRIPPING SPRINGS PROJECT

GENERAL ARRANGEMENT
MILL BUILDING
SECTIONS A-A, B-B & C-C

DR FEB 1-16-81 | SCALE 1/16"=1'-0" | CHF. S.E.
CH | SECT. MECH | APP'D
J.E. | CODE 404 | CONTRACT NO. M-7585

Dravo

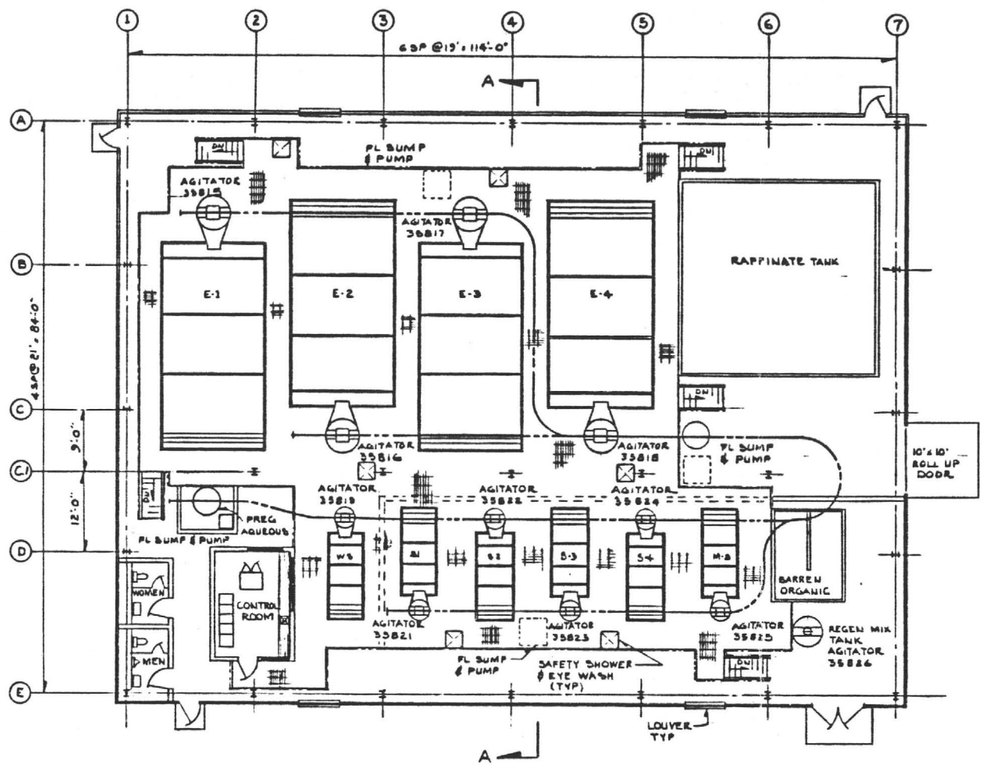
DRAWING NO. M04-105

PRELIMINARY NOT APPROVED FOR CONSTRUCTION

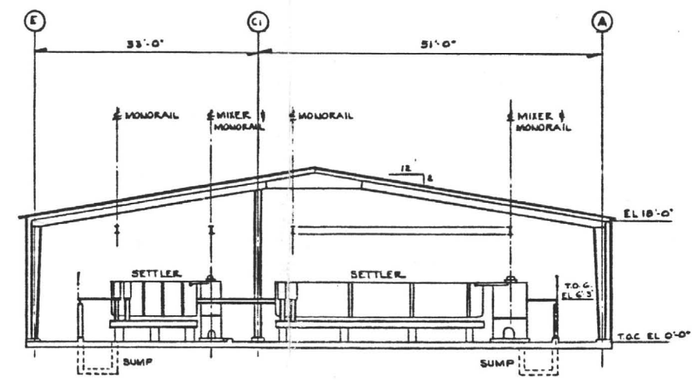
ISSUE NO. 1 DATE PRINTED 10-28-80

This drawing, including the information it contains, is the property of Dravo Corporation. It is submitted only in connection with the transaction to which it pertains and must not be used in any manner detrimental to the interest of Dravo Corporation. This drawing is not to be copied and must be returned upon request.

DENVER OPERATIONS OFFICE | SEMINALS & DETAILS DIV.



PLAN



SECTION 'A-A'

NO	BY	DESCRIPTION	J.E	S.E

REVISIONS

WYOMING MINERAL CORPORATION
DRIPPING SPRINGS PROJECT

GENERAL ARRANGEMENT
SOLVENT EXTRACTION BLDG
PLAN AND SECTION

DR EVB 3-10-80 | SCALE 1/8"/1'-0" | CHF. S. E.
CH | SECT. MECH | APP'D
J. E. | CODE 494 | CONTRACT NO. M 7585

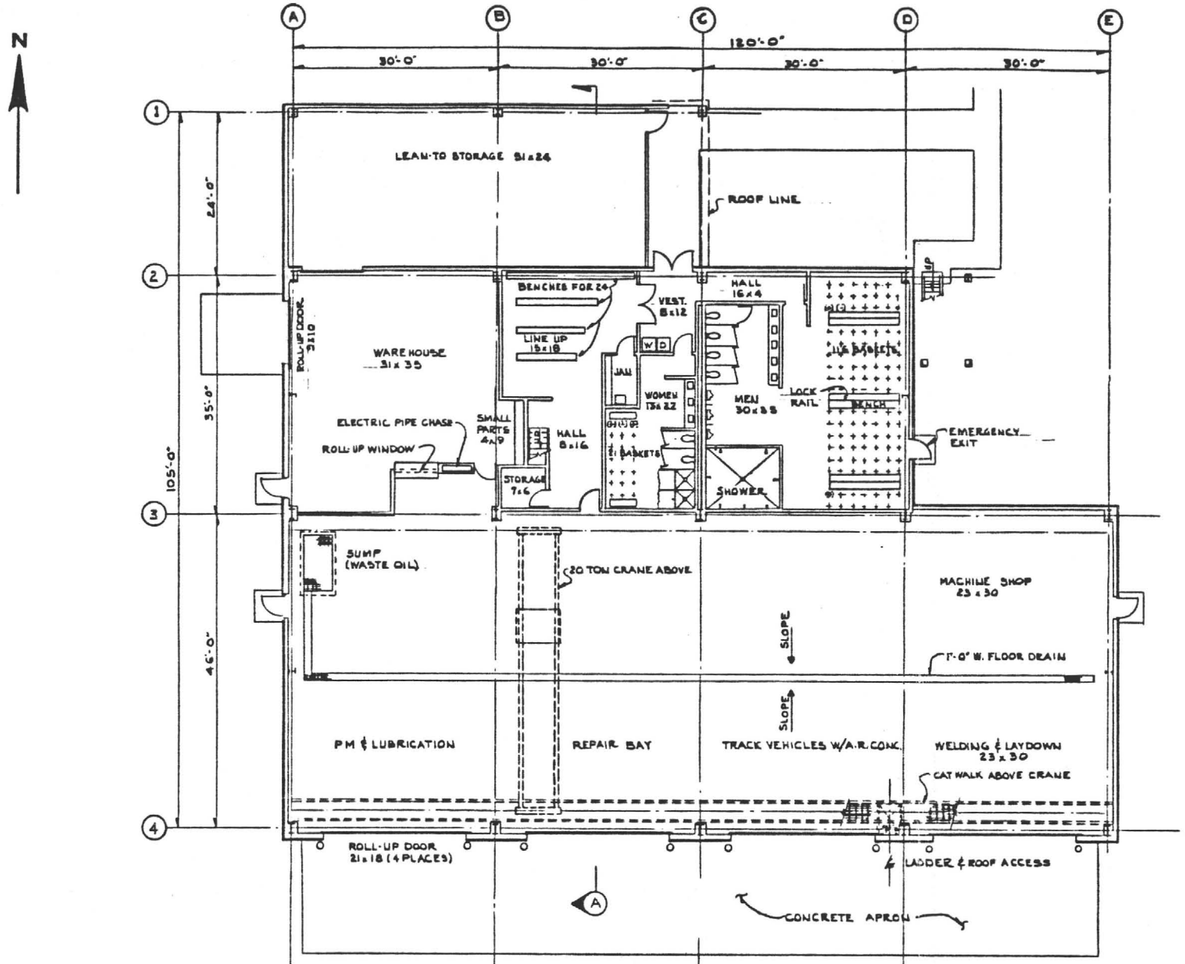
Dravo

DRAWING NO. M04-106

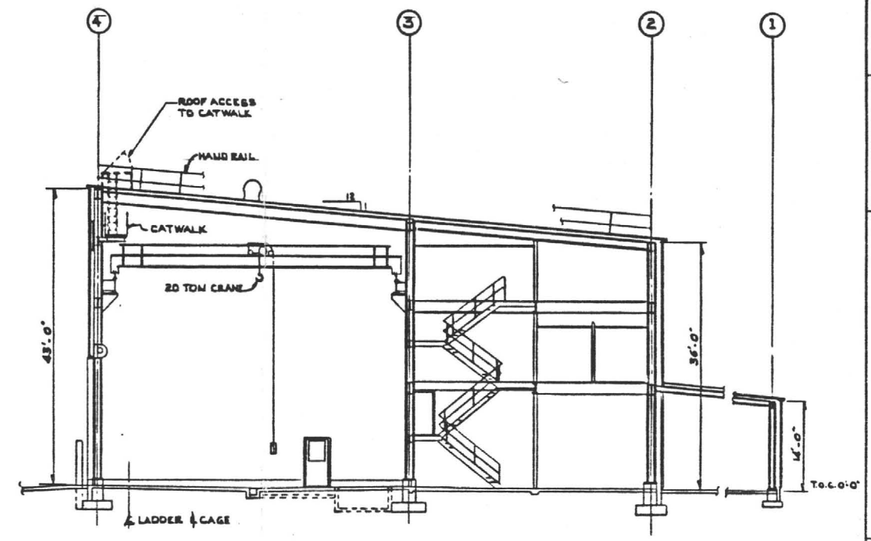
PRELIMINARY — NOT APPROVED FOR CONSTRUCTION
ISSUE NO. 1 DATE PRINTED 10-24-80

This drawing, including the information it contains, is the property of Dravo Corporation. It is submitted only in connection with the transaction to which it pertains and must not be used in any manner detrimental to the interest of Dravo Corporation. This drawing is not to be copied and must be returned upon request.

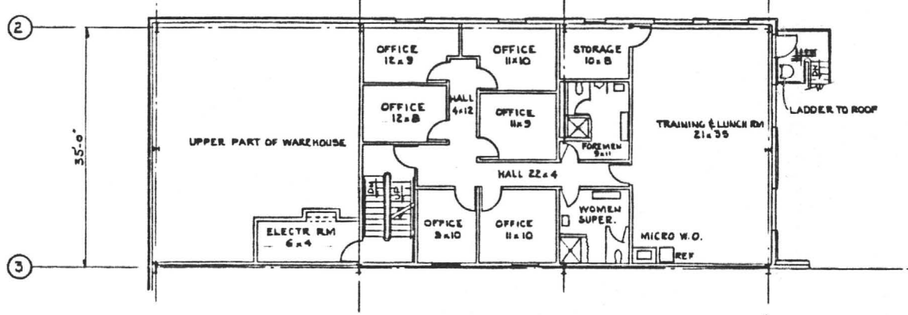
DENVER OPERATIONS OFFICE | MINERALS & METALS DIV.



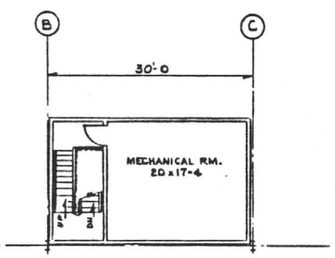
FIRST FLOOR PLAN



SECTION A-A



SECOND FLOOR PLAN



THIRD FLOOR PLAN

NO	BY	DESCRIPTION	J.E.	S.E.

REVISIONS

WYOMING MINERAL CORPORATION
DRIPPING SPRINGS PROJECT

GENERAL ARRANGEMENT
TRUCK SHOP
FLOOR PLANS, SECTION

DR. 8-15-80 SCALE 1/8" CHF. S.E.
CH. SECT. APP'D.
J.E. CODE CONTRACT NO. M 7585

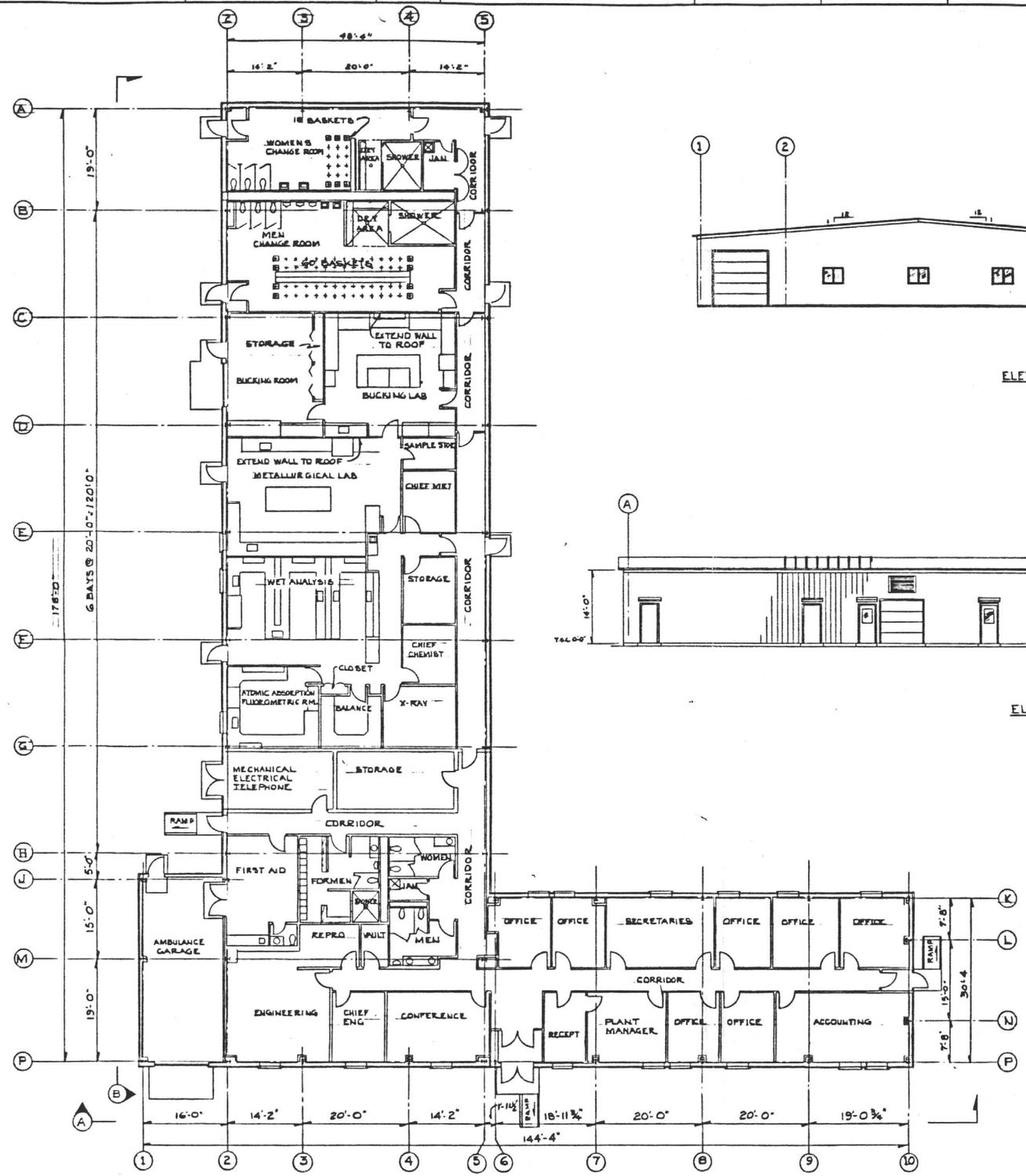
Dravo

DRAWING NO. M04-107

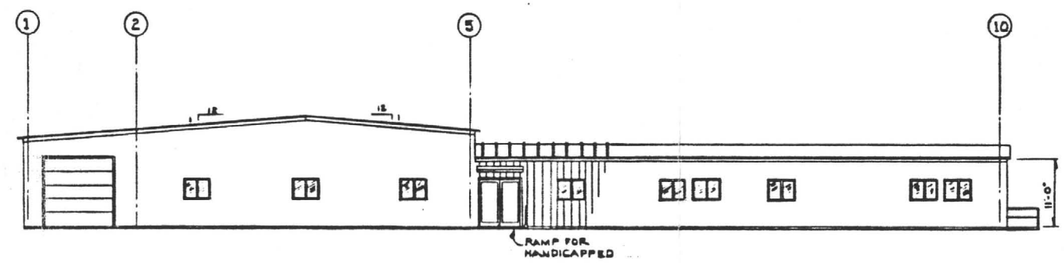
PRELIMINARY NOT APPROVED FOR CONSTRUCTION
ISSUE NO. 1 DATE PRINTED 10-24-80

This drawing, including the information it contains, is the property of Dravo Corporation. It is submitted only in connection with the transaction to which it pertains and shall not be used in any manner detrimental to the interest of Dravo Corporation. This drawing is not to be copied and must be returned upon request.

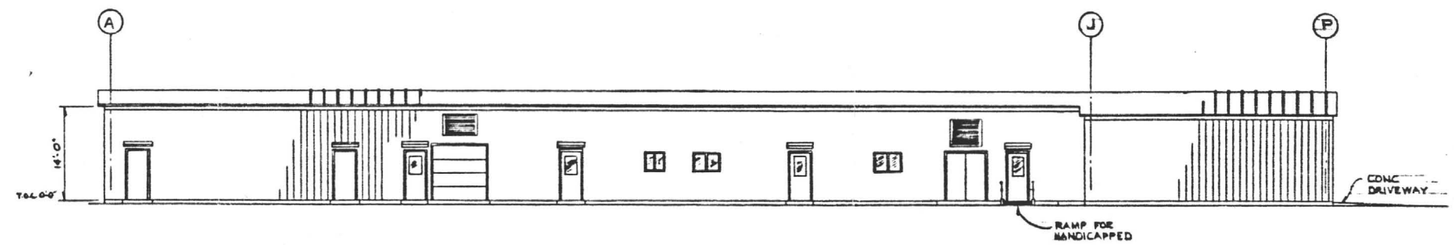
DENVER OPERATIONS OFFICE ORIGINALS & DETAILS ON



FLOOR PLAN



ELEVATION 'A'



ELEVATION 'B'

NO	BY	DESCRIPTION	J.E.	S.E.

REVISIONS

WYOMING MINERAL CORPORATION
DRIPPING SPRINGS PROJECT

ADMINISTRATION - LAB BUILDING
FLOOR PLAN & ELEVATIONS

PRELIMINARY — NOT APPROVED FOR CONSTRUCTION
ISSUE NO. 1 DATE PRINTED 10-24-80

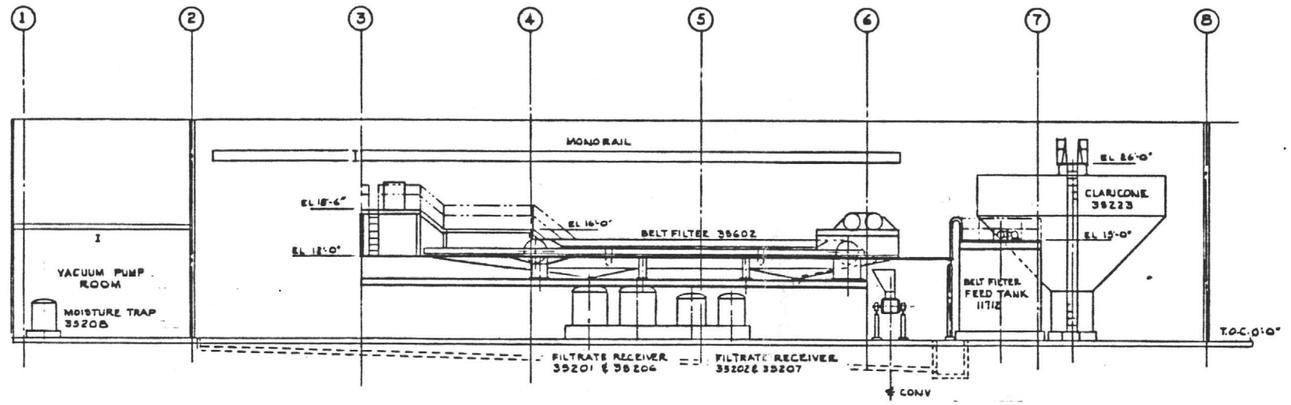
DR. E.V.S. 8-18-80 | SCALE 1/8" | CHF. S.E. ____
CH ____ | SECT. ____ | APP'D ____
J.E. ____ | CODE ____ | CONTRACT NO. M 7585

Dravo

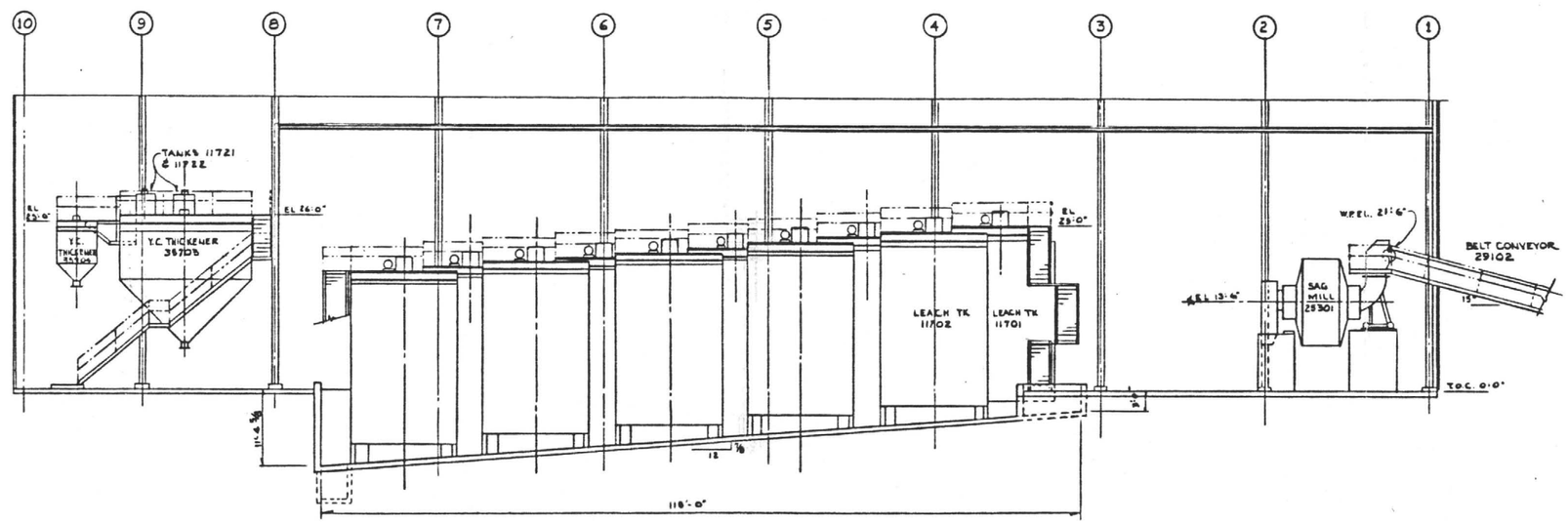
DRAWING NO. M04-108

DENVER OPERATIONS OFFICE | GENERALS & DETAILS DIV.

This drawing, including the information it contains, is the property of Dravo Corporation. It is submitted only in connection with the transaction to which it pertains and must not be used in any Dravo dealings to the interest of Dravo Corporation. This drawing is not to be copied and must be returned upon request.



SECTION D-D



SECTION E-E

NO	BY	DESCRIPTION	J E	S E

REVISIONS

WYOMING MINERAL CORPORATION
DRIPPING SPRINGS PROJECT

GENERAL ARRANGEMENT
MILL BUILDING
SECTIONS D-D AND E-E

PRELIMINARY — NOT APPROVED FOR CONSTRUCTION
ISSUE NO. 1 DATE PRINTED 10-24-80

DR LVB 7-26-79 | SCALE 1/4"=1'-0" | CHF. S. E.
CH | SECT. MECH | APP'D
J. E. | CODE 406 | CONTRACT NO. 7585

Dravo

DRAWING NO. M04-109

This drawing, including any information it contains, is the property of Dravo Corporation. It is submitted only in connection with the transaction to which it pertains and must not be used in any manner detrimental to the interests of Dravo Corporation. This drawing is not to be copied and must be returned upon request.

DENVER OPERATIONS OFFICE | GENERALS & DETAILS DN

IV ENVIRONMENTAL

LICENSING PROGRAMS

1. INTRODUCTION

In today's regulatory climate, for a facility to be constructed and operated efficiently, its licensing program requires the application of the same careful conceptual design, engineering, construction and maintenance efforts that are routinely committed for the physical development of the mine and the mill. Without the completion of a successful license program, neither the mine nor the mill can operate. In recognition of this fact, the design concepts of the licensing program projected for the Dripping Spring Project are described in this Section.

2. SCOPE OF WORK

The scope of work is to describe the licensing program required for the Dripping Spring Project to the extent required to provide convincing justification for the costs and schedules contained in this Section. The licensing program described does not include continuing licensing actions in support of the construction and operation of the facility.

3. DESCRIPTION OF PROGRAM

.1 Governmental Unit Relationships

The licensing of uranium mining and milling operations is mandated by laws enacted by a variety of political entities. The Dripping Spring Project is subject to the requirements of laws and ordnances originated by the Federal government, by the State of Arizona, and by local governmental (county or inter-county commissions) units.

3. DESCRIPTION OF PROGRAM (Continued)

.2 Task Relationships

In contrast to organization by issuing agency, it is also often of value to classify licensing requirements by the type of activity. For the Dripping Spring Project, the principal areas of concern can be divided into:

a. Determination of Environmental Baselines and Issuance of an Environmental Impact Statement favorable to continuing the Project.

b. Design of a Uranium Mill Tailings Disposal Program and Issuance of a Radioactive Materials License to assure the protection of the health and safety of the public in perpetuity.

c. Design of a Radiation Control Program and Issuance of a Radioactive Materials License to assure protection of the health and safety of the employees, the public, and the environment over the life of the operation.

d. Design and approval of an Operating Plan to include the physical and structural characteristics of the Project over its operating life and specifically to describe the physical, environmental and financial aspects of decommissioning the Project and carrying out environmental reclamation of the affected areas.

e. Negotiations required to obtain any water rights necessary to the operation of the Project.

3. DESCRIPTION OF PROGRAM (Continued)

.1 Governmental Unit Relationships (Continued)

In several areas, the precise jurisdictional limits either are overlapping and not clear, or are in a state of flux.

At the present time, the various agencies and their areas of interest are:

a. U.S. Nuclear Regulatory Commission - Licensing of mill tailings (by-product material).

b. U.S. Forest Service - Permitting mining and reclamation activities in a National Forest.

c. U.S. Environmental Protection Agency - Permitting to assure control of pollutant levels in air and water effluents and in solid wastes (where not delegated to the State).

d. Arizona Radiation Regulatory Agency - Licensing the possession of yellow cake (source material) resulting from milling operations.

e. Arizona Department of Health - Permitting to assure control of pollutant levels in air and water effluents and in solid wastes (where not retained by the U.S. EPA or delegated to local authorities).

f. Arizona Water Commission - Establishment of water rights.

g. Pinal - Gila Counties Air Quality Control District - Permitting to assure control of pollutant levels in air (where not otherwise pre-empted by State or Federal Authority).

3. DESCRIPTION OF PROGRAM (Continued)

.2 Task Relationships (Continued)

f. Procurement of all additional required permits, releases, etc., of a local or specialized nature. (Contruction permits, power line rights-of-way, highway excess load permits, etc.)

g. Transmittal of required notifications (other than financial and industrial relations oriented).

In addition, the activities of legal and "public interest" groups have a significant potential to influence the decisions of regulatory bodies. Therefore, it becomes a requirement that the licensing program include both a legal and a public relations aspect to evaluate and (as much as possible) direct that potential.

The activity classifications listed above describe the major tasks required by the licensing program. Permits or approvals of lesser significance that are not included will be obtained within the schedule and cost restraints contained in this Section.

4. SCHEDULE

The schedule for accomplishing the licensing program to the point of initiating construction activities, while achievable, has not been unrestricted. As a result, certain activities have been telescoped to something less than maximum cost efficiency.

The schedule for the major items, calling for a 30-month duration starting January 1, 1981, is shown in Figure A.

5. BASIS OF ESTIMATE

The schedules and cost estimates are based on the current October 1980 situation. The planning assumes such items as continued authority over the disposal of the mill tailings by the U.S. Nuclear Regulatory Commission rather than by the Arizona Radiation Regulatory Agency. The cost estimates are derived from a preliminary study provided by Science Applications, Inc.

.1 Handling of the Environmental Impact Statement

The licensing of the Dripping Spring Project by a Federal agency will constitute a "major" action. The Project will require approvals from the Forest Service (FS) and the Nuclear Regulatory Commission (NRC), and probably by the Environmental Protection Agency (EPA). Under existing rules, one of these agencies should act as a "Lead Agency" in the preparation of the Environmental Impact Statement (EIS) that is required by law to be prepared prior to taking any "major" action.

At this time, it has not been clearly indicated as to which agency will generate the EIS, but such an action is unavoidable. Furthermore, the nature of the other Federal permitting actions is normally such that the review of other license and permit applications can be carried out by any agency independently of, and concurrently with, the generation of the EIS.

Therefore, the schedule has been constructed to show the preparation and issuance of an EIS as an independent function which is the critical path item. The review and approval of specific Federal licenses then can follow reasonably promptly after the publication of the final environmental impact statement.

5. BASIS OF ESTIMATE (Continued)

.2 Permitting the Environmental Baseline Studies

The scope of the baseline studies required to prepare the applicant's environmental report is sufficiently large that prior approval of an overall operating plan may be required by the Forest Service.

.3 Continuing Activities

Many activities performed in support of the licensing program will be of a continuing nature. These activities include preliminary and in process discussions and contacts with regulatory agencies regarding license applications, and the continuing review of pertinent legislative and rule making actions by government bodies. In particular, an effective public relations program should be initiated just as soon as a decision is made to proceed with the project to keep the local people informed regarding the status of the project and to respond quickly and openly to any concerns that might arise.

6. COSTS

The cost estimates for the Dripping Spring licensing program are presented in two forms. Tables A through C are modified Science Applications, Inc., estimates keyed to specific tasks involved in acquiring data, preparing applications, and negotiating with the various agencies to obtain the necessary licenses. The modifications consisted primarily of deleting costs that were considered to be more properly ascribed elsewhere, or to revise estimates to reflect in-house activities by WMC. In addition, certain continuing expenditures not chargeable to specific tasks are shown as part of Table C.

7. COSTS (Continued)

Figure B reflects a breakdown of the same costs by quarter to provide an estimate of the rate of expenditures. This figure better describes the expenditures associated with ongoing activities.

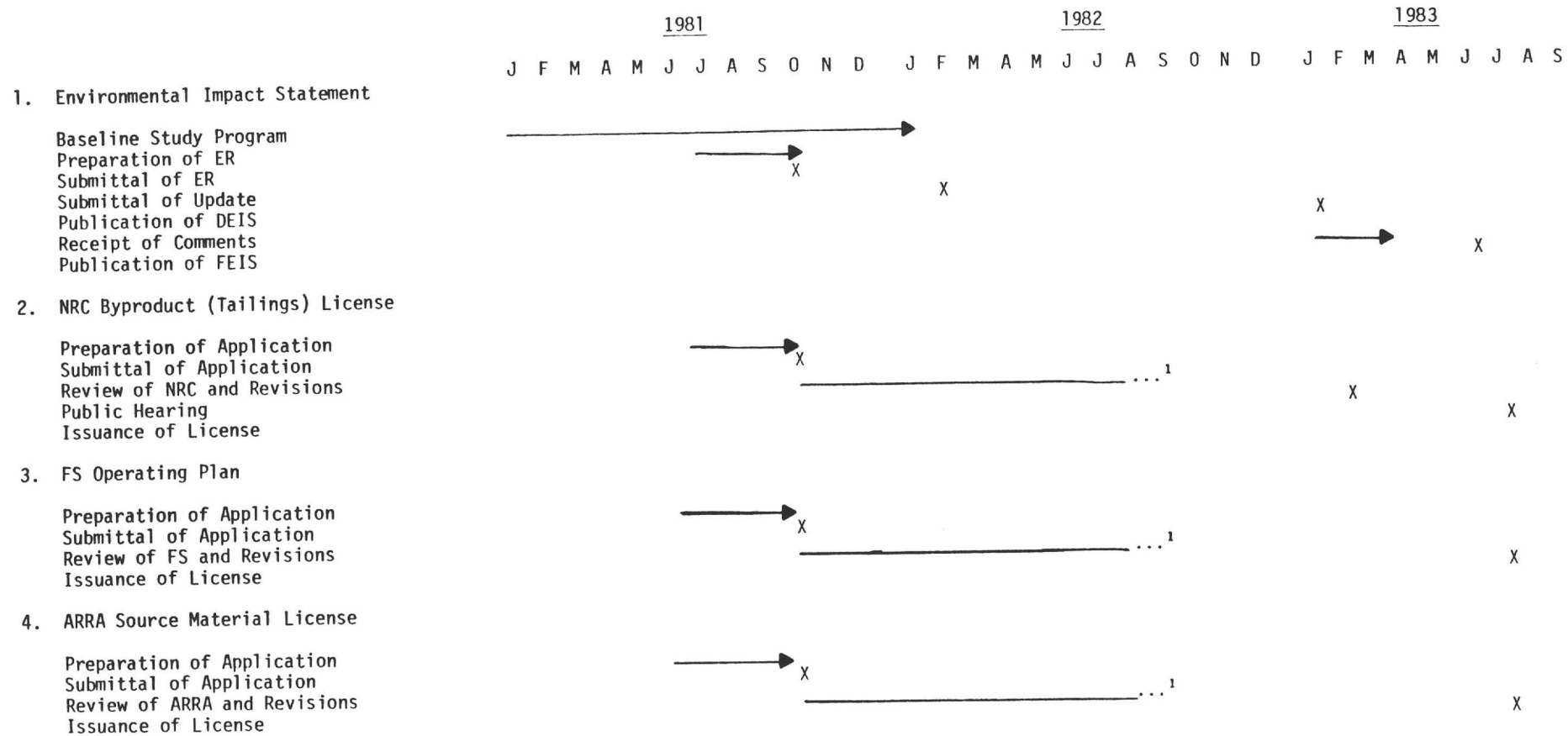
8. ALTERNATIVE COURSES OF ACTION

No alternative to the conduct of a successful licensing program exists other than (1) abandoning the project, or (2) conducting project activities illegally; neither of which is practicable. Due to the monopolistic nature of government, no opportunities are available for dealing with alternate agencies, or even alternate staffs within an agency, who might be more favorably inclined toward granting any given permit.

There is a possibility of extending the licensing time frame to permit the possible elimination of expedited or overlapping baseline studies. However, these studies occur early in the program and by the time any delay in the program may be recognized as acceptable, the opportunity to profit from it may well have passed.

FIGURE A

WMC/DRIPPING SPRING PROJECT LICENSING SCHEDULE



V ESTIMATED COSTS

WYOMING MINERAL CORPORATION
DRIPPING SPRING PROJECT
SUMMARY OF ESTIMATED EXPENDITURES (CASH FLOW)
In Thousands

	Extended prior to 1/1/81	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	TOTAL
MINE																
Capital Cost																
Open Pit				2902	2741	8	1021	572	829	24	16		24			8137
Underground										1440	1272	78	5			2795
Operating Cost																
Open Pit				2970	5368	5368	5458	5686	5685	5514	2650	1724	1465	1295	360	43543
Underground									26	2610	6783	6879	5873	4435	296	26902
MILL & ANCILLIARIES																
Capital Cost				9200	18757											27957
Operations																
Labor					379	1463	1464	1463	1463	1464	1463	1463	1464	1463	1463	15012
Overheads						243	244	243	244	243	244	243	244	243	244	2435
Operating Cost						3913	3913	3913	3913	3914	3913	3913	3913	3913	3914	39132
ENVIRONMENTAL		647	827	353												1827
ROYALTIES (See Letter Dated 10/6/80)	725	231	130	130	130	830	30	30	160	459	874	70	994	1338	508	6639
RECAPTURABLE EXPLORATION	407															407
DEVELOPEMNT COST THRU 8/80	1645															1645
SALES & USE TAX				58	59	312	318	318	318	318	285	215	215	198	186	2800
PERSONAL PROPERTY TAX					585	1005	1011	873	804	732	654	441	329	231	135	6800
TOTAL ESTIMATED EXPENDITURES PER YEAR	2777	878	957	15613	28019	13142	13459	13098	13442	16718	18154	15026	14526	13116	7106	186031
U_3O_8 PRODUCED & MILLED (lbs.) (Overall)																6178
COST PER POUND U_3O_8 PRODUCED & MILLED																30.11

V-2

ESTIMATE _____
ESTIMATOR _____
DATE _____
CHECKER _____

Dravo

SHEET NO. _____

PROJECT WYOMING MINERAL - DRIPPING SPRING M-7585 OPEN PIT MINES

ITEM	DESCRIPTION	Unit Life (yr.)	Ownership $/Hour					M&R $/Hour			Direct Operating $/Hour							Number of Units	Annual Hours Per Unit	Annual Totals (1,000 dollars)				
			Depr.	Tax	Int.	Ins.	Total	Labor	Parts	Total	Labor	Fuel	Lub.	Tires	Elec.	Misc.	Total			Depr.	Other Owner.	M&R	Direct	Total
1	Vert. Blasthole Drill	7							13.74	13.74		4.53	1.77	1.48	-	4.00	11.78	2	2,000			55	47	102
2	Haul Truck 769B	7							2.48	2.48		5.53	.48	4.55			10.56	7 10	3,500			61 87	259 370	320 457
3	Front End Loader 992C	4							6.00	6.00		18.87	.78	27.06			46.71	2	3,000			36	280	316
4	Front End Loader 988	4							4.50	4.50		11.22	.57	9.96			21.75	1	3,000			14	65	79
5	Crawler Tractor D-9H	7							4.46	4.46		12.84	.86	9.00 (undercarriage)			22.70	2	3,000			27	136	163
6	Wheel Tractor	7							2.70	2.70		7.74	.40	4.61			12.75	1	3,000			8	38	46
7	Crawler Tractor D-8K	7							4.62	4.62		9.18	.35	6.75 (undercarriage)			16.28	1	3,000			14	49	63
8	Motor Grader	7							2.00	2.00		2.72	.17	.30			3.19	1	3,000			6	10	16
9	Anfo Truck (Ripco)	7							.70	.70		2.00	.10	.25			2.35	1	1,750			1	4	5
10	Anfo Bin 40-Ton	7																1				.5	.5	1
11	Powder Truck 2-Ton	7							.50	.50		2.00	.10	.20			2.30	1	1,750			1	4	5
12	Lowboy Ford LT-9000	7							.90	.90		3.00	.10	1.25			4.35	1	1,750			2	8	10
13	Truck Scanner								.50	.50					1.10		1.10	1	3,500			2	4	6
14	Pit Pump 3" gas drive	3							.35	.35		1.50					1.50	1	3,500			1	5	6
15	Water Truck (Paramount P-3000)	7							1.30	1.30		6.00	.30	3.00			9.30	1	3,500			5	33	38
16	Fork Lift 10,000 lb.	7							1.80	1.80		6.00	.10	.50			6.60	1	2,000			4	13	17
17	Hyd. Crane 15-Ton	7							1.75	1.75		3.00	.10	1.00			4.10	1	1,500			3	6	9
18	Lube Truck	10							.90	.90		4.00	.10	.50			4.60	1	2,000			2	9	11
19	Tire Truck	10							.90	.90		4.00	.10	.50			4.60	1	1,500			1	7	8
20	Welding Truck	10							.75	.75		3.50	.10	.50			4.60	1	1,500			1	6	7
21	Pickup Truck	3							.25	.25		3.00		.10			3.10	4	2,000			2	25	27
22	Manager Car	3							.20	.20		2.00		.10			2.10	1	1,500			-	3	3
23	Ambulance	10							.20	.20		2.00		.10			2.10	1	500			-	1	1
24	Light Towers	2							.30	.30		.75					.75	3	1,500			1	3	4
25	Telephone System	10							.59	.59								1	8,448			5	-	5
26	Hand Probes	10							.40	.40								3	2,000			2	-	2

FORM NO. 101

	YEAR	1983 1	1984 2	1985 3	1986 4	1987 5	1988 6	1989 7	1990 8	1991 9	1992 10	1993 11	1994 12
No.	Item							No. Und. Devel.	No. Prod. So. Devel.	So. Devel.	So. Prod.		
2	Vert. Blasthole Drill	175,195	175,195										
13	Haul Truck Cat. 769B	993,020	1,241,275		993,020								
4	Front End Loader 992C	548,239	548,239			548,239	548,239						
1	Front End Loader 988		273,249				273,249						
2	Crawler Tractor D-9H	636,000											
1	Wheel Tractor		117,995										
1	Crawler Tractor D-8K	238,000											
1	Motor Grader	93,321											
1	Anfo Truck	36,000											
1	Anfo Bin	11,000											
1	Powder Truck	22,000											
1	Low Boy	60,000											
1	Truck Scanner		50,000										
2	Pit Pump			7,800			7,800						
1	Water Truck		54,000										
1	Forklift		45,000										
1	Hyd. Crane 15-ton		96,000										
1	Lube Truck		30,000										
1	Tire Truck		30,000										
1	Welding Truck		22,000										
14	Pick-up Trucks	16,500	16,500		16,500	16,500		16,500	16,500		16,500		
4	Manager Car	8,000			8,000			8,000			8,000		
1	Ambulance	25,000											
6	Light Towers	3,500	7,000		3,500	7,000							
1	Radio System	12,000											
3	Hand Probes		34,000										
1	Diesel Stor. Tank	6,800											
1	Bridge Culvert 60"x80' (Armco $89/ft)	7,120											
1	Explosive Mag.	10,000											
	TOTAL	2,901,695	2,740,453	7,800	1,021,020	571,739	829,288	24,500	16,500		24,500		

WYOMING MINERAL OPEN PIT OPERATING COST ESTIMATE
(x $1,000)

	YEAR		1	2	3	4	5	6	7	8	9	10	11	12
			1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
UNIT COST	JOB CLASSIFICATION	NO.					ADMINISTRATIVE (Base Salary + .20 x Base (Burden))							
55.4	General Manager	1	55.4	55.4	55.4	55.4	55.4	55.4	55.4	27.7	27.7	27.7	27.7	27.7
51.5	Mine Superintendent	1	51.5	51.5	51.5	51.5	51.5	51.5	51.5	51.5	51.5	51.5	-	-
49.1	Chief Engineer	1	49.1	49.1	49.1	49.1	49.1	49.1	24.6	-	-	-	-	-
42.8	Chief Geologist	1	42.8	42.8	42.8	42.8	42.8	42.8	42.8	-	-	-	-	-
41.7	Environmental Engineer	1	41.7	41.7	41.7	41.7	41.7	41.7	41.7	41.7	41.7	41.7	41.7	41.7
29.3	Mine Engineer	2	58.6	58.6	58.6	58.6	58.6	58.6	29.3	-	-	-	-	-
17.3	Drafter	1	17.3	17.3	17.3	17.3	17.3	17.3	17.3	-	-	-	-	-
26.9	Safety Engineer	1	26.9	26.9	26.9	26.9	26.9	26.9	26.9	13.5	13.5	13.5	13.5	13.5
19.0	Accountant	2	38.0	38.0	38.0	38.0	38.0	38.0	38.0	19.0	19.0	19.0	19.0	19.0
23.8	Purchasing Agent	1	23.8	23.8	23.8	23.8	23.8	23.8	23.8	11.9	11.9	11.9	11.9	11.9
30.1	Personnel Man	1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	15.1	15.1	15.1	15.1	-
41.7	Maintenance Superintendent	1	41.7	41.7	41.7	41.7	41.7	41.7	41.7	20.9	20.9	20.9	20.9	-
32.3	Maintenance Foreman	2	64.6	64.6	64.6	64.6	64.6	64.6	64.6	32.3	32.3	32.3	32.3	32.3
44.3	Mine Foreman	3	132.9	132.9	132.9	132.9	132.9	132.9	132.9	44.3	44.3	-	-	-
17.3	Managers Secretary	1	17.3	17.3	17.3	17.3	17.3	17.3	17.3	8.7	8.7	8.7	8.7	8.7
14.4	Receptionist	1	14.4	14.4	14.4	14.4	14.4	14.4	14.4	-	-	-	-	-
25.9	Warehouse Superintendent	1	25.9	25.9	25.9	25.9	25.9	25.9	25.9	13.0	13.0	13.0	13.0	13.0
24.0	Warehouse Forman	2	48.0	48.0	48.0	48.0	48.0	48.0	48.0	24.0	24.0	24.0	24.0	24.0
18.0	Warehouse Helper	1	18.0	18.0	18.0	18.0	18.0	18.0	18.0	9.0	9.0	9.0	9.0	9.0
	OPEN PIT TOTAL		798.0	798.0	798.0	798.0	798.0	798.0	744.2	332.6	332.6	288.3	236.8	200.8
							OPEN PIT HOURLY MAINTENANCE (Hourly x 1.35 x 2,000)							
30.1	Mechanic	4	120.4	120.4	120.4	120.4	120.4	120.4	60.2	60.2	60.2	60.2	30.1	30.1
28.9	Mechanic Helper	4	115.6	115.6	115.6	115.6	115.6	115.6	57.8	57.8	57.8	57.8	28.9	28.9
30.1	Electrician	1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	-	-
30.1	Lube Man	1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	-
28.9	Fuel Truck Operator	1	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	-
	TOTAL ANNUAL OPEN PIT		325.1	325.1	325.1	325.1	325.1	325.1	207.1	207.1	207.1	207.1	118.0	59.0

WYOMING MINERAL OPERATING COST ESTIMATE

(x $1,000)

UNIT COST	JOB CLASSIFICATION	NO.	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
	YEAR		1	2	3	4	5	6	7	8	9	10	11	12
	OPEN PIT OPERATING LABOR													
30.1	Drill Operator	3	45.2	90.3	90.3	90.3	90.3	90.3	90.3					
28.9	Drill Helper	3	43.4	86.7	86.7	86.7	86.7	86.7	86.7					
32.2	Loader Operator	6	96.6	193.2	193.2	193.2	193.2	193.2	193.2	64.4	64.4			
30.1	Haul Truck Driver	14	210.7	421.4	421.4	210.7								
	Haul Truck Driver	20				301.0	602.0	602.0	602.0	150.5	150.5			
30.1	Bulldozer Operator	6	180.6	180.6	180.6	180.6	180.6	180.6	180.6	180.6	180.6	180.6	180.6	
30.1	R.T. Bulldozer Operator	2	30.1	60.2	60.2	60.2	60.2	60.2	60.2	60.2	60.2	60.2	60.2	
30.1	Grader Operator	2	30.1	60.2	60.2	60.2	60.2	60.2	60.2	60.2	60.2	60.2	60.2	
28.9	Dump Man	2	28.9	57.8	57.8	57.8	57.8	57.8	57.8					
30.1	Scanner Operator	1	15.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1		
28.9	Probe Man	2	57.8	57.8	57.8	57.8	57.8	57.8	57.8					
28.9	Field Maintenance	2	57.8	57.8	57.8	57.8	57.8	57.8	57.8	57.8	57.8	57.8	57.8	
28.1	Blasting Crew	3	42.1	84.3	84.3	84.3	84.3	84.3	84.3					
28.1	Labor Pool	4	56.2	112.4	112.4	112.4	112.4	112.4	112.4					
	ANNUAL TOTALS		894.6	1,492.8	1,492.8	1,583.1	1,673.4	1,673.4	1,673.4	603.8	603.8	388.9	358.9	

WYOMING MINERAL OPEN PIT OPERATING COST ESTIMATE

(x $1,000)

YEAR	1	2	3	4	5	6	7	8	9	10	11	12	Totals
	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	
ITEM					SUMMARY OF OPEN PIT OPERATING COSTS								
Administration	798.0	798.0	798.0	798.0	798.0	798.0	744.2	332.6	332.6	288.3	236.8	200.8	6,923.3
Hourly Maintenance	325.1	325.1	325.1	325.1	325.1	325.1	207.1	207.1	207.1	207.1	118.0	59.0	2,956.0
Operating Labor	894.6	1,492.8	1,492.8	1,583.1	1,673.4	1,673.4	1,673.4	603.8	603.8	388.8	358.8	-	12,438.8
Equipment Operating Cost	902	1,270.0	1,270.0	1,270.0	1,407.0	1,407.0	1,407.0	1,407.0	481.0	481.0	481.0	-	11,783.0
Explosives	-	912.0	912.0	912.0	912.0	912.0	912.0	-	-	-	-	-	5,472.0
Miscellaneous Materials	50	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	1,150.0
Tails Liner	-	470.0	470.0	470.0	470.0	470.0	470.0	-	-	-	-	-	2,820.0
ANNUAL TOTALS	2,969.7	5,367.9	5,367.9	5,458.2	5,685.5	5,685.5	5,513.7	2,650.5	1,724.5	1,465.3	1,294.6	359.8	43,543.1

V-7

ESTIMATE _____
ESTIMATOR _____
DATE _____
CHECKER _____

Dravo

250 days x 2 shifts/day x 6 hrs./shift = 3000 hrs. per unit. Operating spare units not listed

SHEET NO. _____

PROJECT WYOMING MINERAL - SOUTH WORKMAN UNDERGROUND

ITEM	DESCRIPTION	Unit Life (yr.)	Ownership $/Hour					M&R $/Hour			Direct Operating $/Hour							Number of Units	Annual Hours Per Unit	Annual Totals (1,000 dollars)				
			Depr.	Tax	Int.	Ins.	Total	Labor	Parts	Total	Labor	Fuel	Lub.	Tires	Elec.	Misc.	Total			Depr.	Other Owner.	M&R	Direct	Total
																		OPERATING						
	Two-boom Jumbo Drill								2.75			1.15	.38	1.99	--	2.15	5.67	3	3000			25	51	76
	Gardner-Denver 2 Boom Medi-Bore Diesel/Hydraulic																							
	Rubber-tired LHD Elmco 913 3 yd^3 w/Power Shift 81 hp								10.50	10.50		1.86	.83	5.94		(parts) 4.62	13.25	3	3000	Stoping		95	119	214
																		1	3000	Development		32	40	72
	Trucks Elmco 980-T10								2.58	2.58		1.59	1.59	2.76	--	(parts) 2.34	8.28	6	3000	Stoping		46	149	195
																		3	3000	Development		23	75	98
	Jackleg Drills 16 machines oper. 1/3 time								0.27	0.27			.05	--	--	(parts) .18	0.23	16	1000	Stoping only		4	4	8
	Stoper Drills 3 machines oper. 1/6 time								0.21	0.21			0.02	--	--	(parts) .08	0.10	5	500	Stoping only		--	--	--
	Air Compressor 2500 CFM-500 hp								5.87			11.50	1.95	.32		(parts) 2.97	16.74	2	2000			23	67	90
	Longhole Drill								1.82	1.82		.39	.11	--		.43	0.93	1	3000			5	3	8
	Powder and Cap Mags.	--							--	--		--	--	--	--	--	--							
	Shuttle Bus								0.37	0.37		.75	.02	.08	--	--	0.85	2	500			---	1	1
	Ventilation Fans 75 hp 18 hr. per day								0.44	0.44			.05	--		0.29	.34	6	4500	Stoping		12	9	21
																		3	4500	Development		6	5	11
	Pumps and Acces. Equipment 3" gas								0.35	0.35		1.50	--	--	--	--	1.50	1	6000			2	9	11
	Underground Telephone system								0.89	0.89		--	--	--	--	0.09	0.09	1	4000			4	--	4
	Lighting Equipment (Cost Reference Guide)		2-1000 W. Mercury Vapor Lights 3 KW Generator, Trailer						0.30	0.30		.24	.06	.09	--	.13	.52	2	2000			1	2	3

FORM NO. 101

V-8

ESTIMATE _____
ESTIMATOR _____
DATE _____
CHECKER _____

Dravo

SHEET NO. _____

PROJECT WYOMING MINERAL - SOUTH WORKMAN UNDERGROUND - Page 2

ITEM	DESCRIPTION	Unit Life (yr.)	Ownership $/Hour Depr.	Tax	Int.	Ins.	Total	M&R $/Hour Labor	Parts	Total	Direct Operating $/Hour Labor	Fuel	Lub.	Tires	Elec.	Parts	Total	Number of Units	Annual Hours Per Unit	Annual Totals (1,000 dollars) Depr.	Other Owner.	M&R	Direct	Total
	Ventilation Test Equipment								0.08	0.08		---	---	---	---	---	---							1
	Surveying Equipment								0.21	0.21		---	---	---	---	---	---	1	4000			1	---	1
	Ore Scanner								0.50	0.50		---	---	---	---	---	---	1	4000			1	---	1
	Probes - gamma ray								0.40	0.40		---	---	---	---	---	---	4	1500			2	---	2
	Air Tuggers								0.13	0.13		---	.02	---	---	.07	---	3	1000			---	---	---
	Generator 3KW (gas powered)								0.04	0.04		.17	.03	---	---	.02	.22	2	3000			---	1	1
	Ambulance		(See under Open Pit Equipment)																					
	Impact Wrenches 3/4" Square-Ring								0.04	0.04		---	.01	---		.02	.03	2	3000			---	---	---
	Sub Totals from previous pages																		During Stoping			221	415	636
																			During Development			125	254	379
																						TOTAL		
	Ground Support - materials		Total Development				22,225 ft x $17.18 =			381,826												381.8		
			Stoping				1,059,682 x $ 1.82 =			1,928,621												1,928.6		
												2,310,447										2,310.4		
	Explosives		Development				22,225 ft x $10.21 =			202,924												202.9		
			Stoping				1,059,682 x $ 1.18 =			1,250,425												1,250.4		
												1,453,349										1,453.3		
	Hose																							127,825
	Tools and Misc.																							639,119
	Pipe																							240,11
	Ventilation Holes 2477 ft.																							619,25

FORM NO. 101

6-7

ESTIMATE _____
ESTIMATOR _____
DATE _____
CHECKER _____

Dravo

SHEET NO. _____

PROJECT WYOMING MINERAL - SOUTH WORKMAN UNDERGROUND - Page 3

ITEM	DESCRIPTION	Unit Life (yr.)	Ownership $/Hour					M&R $/Hour			Direct Operating $/Hour							Number of Units	Annual Hours Per Unit	Annual Totals (1,000 dollars)				
			Depr.	Tax	Int.	Ins.	Total	Labor	Parts	Total	Labor	Fuel	Lub.	Tires	Elec.	Misc.	Total			Depr.	Other Owner.	M&R	Direct	Total
																								590,580
	Power - based on 18 hrs/day																							
																								125,000
	Reclamation																							

FORM NO. 108

Underground Equipment Purchase Schedule

		1989	1990	1991	1992	1993
	YEARS	7	8	9	10	11
No.	Item	No. Undg. Devel.	No. Prod. So. Devel.	So. Devel.	So. Prod.	So. Prod.
3	Two-Boom Jumbos	282,960	141,480	----	----	----
4	Rubber-Tired Loaders Eimco 913LHD	256,490	256,490	----	----	----
9	Trucks Eimco 980-T10	340,140	425,175	----	----	----
16	Jackleg Drills	----	34,290	20,574	----	----
5	Stoper Drills	----	7,218	10,827	----	----
2	Air Compressors	235,440	235,440	----	----	----
1	Air Compressors	58,333	----	----	----	(standby only)
2	Powder & Cap Magazines	22,566	22,566	----	----	----
2	Bus	24,000	----	----	----	----
6	Ventilation Fans (75hp)	----	32,610	32,610	----	----
3	Pumps & Acces.	1,600	3,200	----	----	----
2	Underground Tele. System	21,600	21,600	----	----	----
2	Lighting Equipment	8,500	8,500	----	----	----
2	Ventilation Test Equip.	7,772	----	----	----	----
1	Surveying Equipment	16,200	----	----	----	----
8	Hand Probes	7,876	7,876	----	----	----
16	Hand Tools (sets)	8,640	4,320	2,160	2,160	----
4	Generators	13,600	13,600	----	----	----
2	Portable Buildings	17,305	17,305	----	----	----
5	Impact Wrenches	4,917	4,917	1,639	1,639	----
2	Fuel Tanks	8,220	8,220	----	----	----
2	Flammable Storage	10,380	----	----	----	----
2	Potable Water Tanks	16,200	----	----	----	----
2	Non Potable Water Tanks	16,200	----	----	----	----
10	Roof Jacks	----	905	----	905	----
4	Air Tuggers	7,744	----	----	----	----
20	Fire Extinguishers 20 lb.	609	609	522	----	----
30	Fire Extinguishers 5 lb.	9,900	9,900	9,900	----	----
1	Safety Equipment	43,200	----	----	----	----
	TOTALS	1,440,392	1,272,421	78,232	4,704	

WYOMING MINERAL UNDERGROUND OPERATING COST ESTIMATE
(x $1,000)

UNIT COST	JOB CLASSIFICATION	NO.	1 1983	2 1984	3 1985	4 1986	5 1987	6 1988	7 1989	8 1990	9 1991	10 1992	11 1993	12 1994	Totals
	ADMINISTRATIVE (Base Salary + .20 x Base (Burden)														
55.4	General Manager	1	-	-	-	-	-	-	-	27.7	27.7	27.7	27.7	27.7	138.5
51.5	Mine Superintendent	1	-	-	-	-	-	25.5	51.5	51.5	51.5	51.5	51.5	51.5	334.8
49.1	Chief Engineer	1	-	-	-	-	-	-	24.5	49.1	49.1	49.1	49.1	-	220.9
42.8	Chief Geologist	1	-	-	-	-	-	-	-	42.8	42.8	42.8	42.8	-	171.2
29.3	Mine Engineer	1	-	-	-	-	-	-	29.3	58.6	58.6	58.6	58.6	-	263.7
17.3	Drafter	1	-	-	-	-	-	-	-	17.3	17.3	17.3	-	-	51.9
26.9	Safety Engineer	1	-	-	-	-	-	-	-	13.4	13.4	13.4	13.4	13.4	67.0
19.0	Accountant	1	-	-	-	-	-	-	-	19.0	19.0	19.0	19.0	19.0	95.0
23.8	Purchasing Agent	1	-	-	-	-	-	-	-	11.9	11.9	11.9	11.9	11.9	59.5
30.1	Personnel Man	1	-	-	-	-	-	-	-	15.0	15.0	15.0	15.0	-	60.0
41.7	Maintenance Superintendent	1	-	-	-	-	-	-	-	20.8	20.8	20.8	20.8	-	83.2
32.3	Maintenance Foreman	1	-	-	-	-	-	-	-	32.3	32.3	32.3	32.3	-	129.2
44.3	Mine Foreman	4	-	-	-	-	-	-	177.2	177.2	177.2	177.2	177.2	-	886.0
17.3	Manager's Secretary	1	-	-	-	-	-	-	-	8.6	8.6	8.6	8.6	8.6	43.0
14.4	Receptionist	1	-	-	-	-	-	-	-	14.4	14.4	14.4	-	-	43.2
25.9	Warehouse Superintendent	1	-	-	-	-	-	-	-	12.9	12.9	12.9	12.9	12.9	64.5
24.0	Warehouse Foreman	1	-	-	-	-	-	-	-	24.0	24.0	24.0	24.0	24.0	120.0
18.0	Warehouse Helper	1	-	-	-	-	-	-	-	9.0	9.0	9.0	9.0	9.0	45.0
	UNDERGROUND TOTAL							25.5	282.5	605.5	605.5	605.5	573.8	178.0	2,876.6
	UNDERGROUND HOURLY MAINTENANCE (Hourly x 1.35 x 2,000)														
30.1	Mechanic	2	-	-	-	-	-	-	60.2	60.2	60.2	60.2	60.2	60.2	361.2
28.9	Mechanic Helper	2	-	-	-	-	-	-	57.8	57.8	57.8	57.8	57.8	57.8	346.8
	UNDERGROUND TOTAL								118.0	118.0	118.0	118.0	118.0	118.0	708.0

WYOMING MINERAL UNDERGROUND OPERATING COST ESTIMATE

(x $1,000)

UNIT COST	JOB CLASSIFICATION	YEAR 1 1983	2 1984	3 1985	4 1986	5 1987	6 1988	7 1989	8 1990	9 1991	10 1992	11 1993	12 1994	Totals
						UNDERGROUND OPERATING LABOR								
27.5	Probeman	-	-	-	-	-	-	110.0	192.5	247.5	165.0	82.5	-	797.5
32.6*	Longhole Drillers	-	-	-	-	-	-	65.2	130.4	97.8	65.2	32.6	-	391.2
23.6	Nipper-Lampman	-	-	-	-	-	-	47.2	94.4	70.8	47.2	23.6	-	283.2
32.6*	Miners (Devel)	-	-	-	-	-	-	326.0	489.0	326.0	-	-	-	1,141.0
28.0*	Miners Helpers (Devel)	-	-	-	-	-	-	140.0	210.0	140.0	-	-	-	490.0
32.6*	Miners (Extract.)	-	-	-	-	-	-	-	1,238.8	1,238.8	1,238.8	619.4	-	4,335.8
28.0*	Miners Helpers (Extract.)	-	-	-	-	-	-	-	672.0	672.0	672.0	336.0	-	2,352.0
27.5	Trammers (Devel.)	-	-	-	-	-	-	165.0	247.5	165.0	-	-	-	577.5
27.5	Trammers (Extract.)	-	-	-	-	-	-	-	165.0	495.0	330.0	165.0	-	1,155.0
23.6	Labor Pool (Devel.)	-	-	-	-	-	-	-	106.2	70.8	-	-	-	177.0
23.6	Labor Pool (Extract.)	-	-	-	-	-	-	-	118.0	236.0	236.0	118.0	-	708.0
	UNDERGROUND TOTAL	-	-	-	-	-	-	853.4	3,663.8	3,759.7	2,754.2	1,377.1	-	12,408.2

*Includes incentive costs

						SUMMARY OF UNDERGROUND OPERATING COST								
	Administration	-	-	-	-	-	25.8	282.5	605.5	605.5	605.5	573.8	178.0	2,876.6
	Hourly Maintenance	-	-	-	-	-	-	118.0	118.0	118.0	118.0	118.0	118.0	708.0
	Operating Labor	-	-	-	-	-	-	853.4	3,663.8	3,759.7	2,754.2	1,377.1	-	12,408.2
	Equipment Operating	-	-	-	-	-	-	379.0	636.0	636.0	636.0	636.0		2,923.0
	Explosives	-	-	-	-	-	-	40.5	353.2	353.2	353.2	353.2		1,453.3
	Miscellaneous Materials (including Ground Support)	-	-	-	-	-	-	663.5	663.5	663.5	663.5	663.5		3,317.5
	Tails Liner	-	-	-	-	-	-	-	470.0	470.0	470.0	470.0	-	1,880.0
	Ventilation Holes	-	-	-	-	-	-	155.0	155.0	155.0	155.0	-	-	620.0
	Power	-	-	-	-	-	-	118.0	118.0	118.0	118.0	118.0	-	590.0
	Reclamation supplies											125.0		125.0
	TOTAL UNDERGROUND OPERATING COST						25.8	2,609.9	6,783.0	6,878.9	5,873.4	4,434.6	296.0	26,901.6

G-414
V.11/62

Dravo
PITTSBURGH, PENNSYLVANIA

ENGINEERING COMPUTATIONS

EST NO. ~~V-13~~
CONT NO.
DIVISION

COMPANY WYOMING MINERAL CORPORATION
LOCATION Dripping Spring
DESCRIPTION Diesel Fuel Consumption

DATE
DR CH
REF

Year	Equipment Oper. Cost x $1,000	Diesel Cost x $1,000*	Gal. of diesel per year x $1,000
1983	902	351	365
1984	1,270	494	515
1985	1,270	494	515
1986	1,270	494	515
1987	1,407	547	570
1988	1,407	547	570
1989	1,407	547	570
1990	1,407	547	570
1991	481	187	195
1992	481	187	195
1993	481	187	195
	11,783	4,582	4,775

* Diesel Cost 38.9% of Equipment Operating Cost x $1,000

SHEET NO.

WYOMING MINERAL CORPORATION
DRIPPING SPRING PROJECT
1000 TPD URANIUM MILL

	In Thousands
DIRECT CONSTRUCTION COST	$ 19,421
INDIRECT CONSTRUCTION COST	2,186
CONTRACTOR'S OVERHEAD AND PROFIT	986
TOTAL DIRECT COST	$ 22,593
FIELD ADMINISTRATION, HOME OFFICE ENGINEERING AND WORKMAN'S COMPENSATION	$ 3,678
SALES AND GROSS INCOME TAX	$ 765
BUILDER'S RISK INSURANCE	128
CONSULTANT'S FEE	793
TOTAL	$ 27,957

WYOMING MINERAL CORPORATION
DRIPPING SPRING PROJECT

1000 TPD URANIUM MILL
(IN THOUDANDS)

	DIRECTS	INDIRECTS	CONT. O.H. & P.	TOTAL
ACCESS ROAD	800	--	39	839
MAIN POWER LINE	500	--	20	520
WAREHOUSE	390	45	20	455
OFFICE	820	110	39	969
TRUCK SHOP	886	130	50	1066
MILL	13,602	1,641	700	15,943
ANCILLIARIES	2,423	260	118	2,801
TOTAL DIRECT COST	19,421	2,186	986	22,593

WYOMING MINERAL CORPORATION
DRIPPING SPRING PROJECT
BASIS OF ESTIMATE FOR
1000 TPD URANIUM MILL

This estimate is based on preliminary drawings and descriptions available at this time. The estimated cost represents a budgetary value which is considered to be in the range of plus or minus twenty-five percent.

Costs For The Estimate Were Derived From The Following:

Mechanical Portion:

Preliminary equipment list utilized to input descriptions and quantities into respective areas. Cost of equipment was acquired by telephone. Each vendor was asked to send written quotations as back-up for the telephone quotes.

Civil, Fluids Handling, Electrical and Instrumentation:

Costs prorated by estimating department. Information from former projects was utilized in this case. Detail take-offs were not made for this portion of the estimate.

Indirects:

Reflects expenditures during construction which would normally be encountered for this type of project. These costs include, but are not limited to; construction equipment rental and operating cost, small tools, expendable materials, temporary electrical, temporary piping, clean-up, start-up labor, and service engineers.

Field Administration:

Includes construction management personnel, field engineers, administration personnel, warehouse and office personnel, expenses for all personnel in this group.

BASIS OF ESTIMATE Continued

Design Engineering:

Represents salaries and expenses to accomplish the engineering tasks by Dravo for this phase (Mill and Acess Road) of the project.

Home Office:

Personnel on the Dravo staff performing functions other than "Design Engineering" are included in this portion of the estimate. Included are project manager, project engineers, purchasers, schedulers, estimators, communication costs and computer costs.

The Following Taxes Have Been Included:

Gross Income Tax:

Contractors are subject to a tax of 4%, a 35% standard deduction is allowed in computing the tax, resulting in a tax of 4% on 65% of the contract price.

Sales and Use Tax:

All tangible personal property purchased or rented that does not become an integral part of the facility will be taxed at the rate of 4%. Any material which becomes incorporated in the facility will be exempt from sales tax.

The Following Have Been Added To The Estimate Due To Their Special Application:

Electrical Power Line:

It is assumed that we will connect to existing power lines owned by Salt River Project. Closest point is approximately eleven miles away requiring a small portion to cross through a "Wilderness Area". It is assumed that a simple tie-in can be made which would not require transformers or a sophisticated sub-station. The cost average would be about $46,000 per mile. Use $50,000 in estimate.

BASIS OF ESTIMATE Continued

Access Road:

Approximately one mile of access road from the mill to State Highway No. 288. This will be a paved road with adequate base to support all equipment required at job site. A route to minimize cuts and fills with minimum rock excavation has been selected. The cost has been included in the estimate at a sub-contract cost of $800,000.

Well Water:

A sub-contract cost of $200,000 has been included in the estimate. As mentioned in the "Exclusions", cost of water rights and permits are not included.

WYOMING MINERAL CORPORATION
DRIPPING SPRING PROJECT
PROCESS MILL
LABOR AND OVERHEADS

			In Thousands		
		Rate	1983/ 1984	1985/ 1994	Total
ADMINISTRATION SALARIES					
Superintendent	1	3750/mo	11	450	461
Metalurgist	1	2750/mo	8	330	338
Maintenance Foreman	1	2400/mo	5	288	293
Chief Chemist	1	2250/mo	5	270	275
Environmental Engineer	1	2150/mo	4	258	262
Chemist	2	1900/mo		456	456
Metalurgical Lab. Tech.	1	1450/mo	4	174	178
Sample Prep. Technician	2	1300/mo	3	312	315
Sampler	2	1150/mo		276	276
Foreman Operations	4	2400/mo	29	1152	1181
Subtotal	16		69	3966	4035
OPERATION PAYROLL (2080 Hrs./Year					
S.A.G./Leach Operator	4	8.50 hr.	18	707	725
Filter Operator	4	8.50 hr.	18	707	725
S.X./Precip/Dry/Pack Opr.	4	8.50 hr.	18	707	725
Ancilliary Operator	4	8.50 hr.	18	707	725
Helper	4	8.00 hr.		666	666
Clean Up	3	8.00 hr.		500	500
Security	4	8.00 hr.	133	666	799
Scale Operator	1	8.50 hr.	4	177	181
Crusher Operator	1	8.50 hr.	4	177	181
Front End Loader Opr.	1	8.50 hr.	4	177	181
Subtotal	30		217	5191	5408
MAINTENANCE PAYROLL (2080 Hrs./Year					
General Mechanic	4	9.50 hr.		790	790
Mechanic Helper	4	8.00 hr.		666	666
Instrument Man	1	8.90 hr.		185	185
Utility Man	1	8.90 hr.		185	185
Rubber Man	1	8.90 hr.		185	185
Subtotal	11			2011	2011

WYOMING MINERAL CORPORATION
DRIPPING SPRING PROJECT
PROCESS MILL
LABOR AND OVERHEADS

	1983/ 1984	1985/ 1994	TOTAL
TOTAL LABOR	286	11168	11454
Cost of Turnover @1%	3	112	115
Total Base Wage	289	11280	11569
Payroll Overheads			
20% on Salaries	14	793	807
35% on Hourly	76	2560	2636
Total Payroll Cost	379	14633	15012
PLANT OVERHEADS			
Relocation Expense		180	180
Travel		50	50
Medical Services		360	360
Casual Labor		180	180
Vehicle Lease Expense		175	175
Vehicle Operating Expense including maintenance		250	250
Office Maintenance		90	90
Office Utilities		55	55
Printing, Stationery, Office Supplies		90	90
Blue Print Supplies		30	30
Maps, Books, Subscriptions		10	10
Medical and Safety Supplies		5	5
Postage and Mailing		35	35
Telephone and Telegraph		450	450
Computer Services		50	50
Furniture and Fixtures		20	20
Main. Office Equipment		20	20
Office Equipment Rental		95	95
Auto Insurance		25	25
Prof. and Corp. Memberships		10	10
Community Relations		25	25
Education and Training		35	35
Business Meetings		30	30
Outside Services		50	50
Contingency		115	115
Total Plant Overheads		2435	2435

WYOMING MINERAL CORPORATION
DRIPPING SPRING PROJECT
PLANT OVERHEADS
BASIS OF ESTIMATE

Relocation expense including Home purchase plan — 1% of payroll cost

Medical services including Preemployment physicals — 2% of payroll cost

Travel — 1.3% of payroll cost of administration

Casual labor — 1 % of payroll cost

Vehicle lease espense — 1-Auto @250/mo = x 120 month — 30,000
4-4x4@300/mo/ea x 120 month — 144,000

Vehicle operating expense - 25000 miles/year @ 20¢ - 5 vehicles

Vehicle maintenance - included in operating expense

Office maintenance - .005 of payroll cost

Office utilities - .003 of payroll cost

Printing, Stationary, office supplies - .005 of payroll cost

Blue Print Supplies - .0015 of payroll cost

Map, Books, Subscriptions - .0005 of payroll cost

Medical and Safety Supplies - $5,000.00 of payroll cost

Postage and Mailing - .002 of payroll cost

Telephone and Telegraph - .025 of payroll cost

Computer service - $5,000.00/year of payroll cost

Furniture and Fixtures - .0011 of payroll cost

Maintain office equipment - .0012 of payroll cost

Office equipment rental - .0052 of payroll cost

Auto insurance - $500/vehicle/year of payroll cost

Professional and Corporate memberships - $5000 each

Education and Training - .002 of payroll cost

Wyoming Mineral Corporation
Dripping Spring Project
Plant Overheads
Basis of Estimate

Community Relations - .0015 of payroll cost

Business meetings -$30,000

Outside services - $50,000

Contengency 5% of overheads

WYOMING MINERAL CORPORATION
DRIPPING SPRING URANIUM PROJECT
PROCESS MILL
OPERATING EXPENSE

	1985/1984
Electric Power	5385
Propane	3250
Deisel	390
Gasoline	180
Potable Water	30
Boiler Water Treatment	20
Mill Water	20
Chemicals (1)	23667
Drums (Product)	340
Transportation (Product)	1355
Safety (Outside)	50
Environmental (Outside)	50
Lakewood Support	1900
Plant Parts, Tools, Consumables	1500
Building and Grounds Maintenance	1680
	39817

(1)

Reflects 25.00/ton H_2SO_4 cost.

WYOMING MINERAL CORPORATION
DRIPPING SPRING PROJECT

REAGENT COST

REAGENTS

SOURCE	REAGENT	USE RATE	COST/UNIT	$/TON ORE	ANNUAL COST
Inspiration Consolidated Copper Co.	H_2SO_4	.350 lbs/ton at	$42.00/ton* 25.00/ton	7.35 4.38	2,572,500 1,533,000
Hooker Chemical	$NaClO_4$	8 lbs/ton	$0.1925/lb	1.54	539,000
Farmers Chemical	NH_3	2.6 lbs/ton	$160/ton	0.21	73,500
Henkel	Amine	.04 lbs/ton	$1.40/lb	0.056	19,600
Union Carbide	/SO Decanol	.04 lbs/ton	$0.50/lb	0.02	7,000
Kerr-McKee	Solvent (Kerosene)	0.106 gal/ton	$1.00/gal	0.106	37,100
Dow Chemical	Flocculants	0.3 lbs/ton	$1.50/lb	0.45	157,500
		Total Annual Total Annual	($42 Acid) ($25 Acid)		3,406,200 2,366,700

*Inspiration Consolidated Copper Company quote as of 1 October 1980. Per Ray Hyppa (WMC) ICCC expects price to be $25.00 per ton in 1985 because of capacity increase. Lower figure (in parentesis) used in subsequent calculations.

WYOMING MINERAL CORPORATION

DRIPPING SPRING PROJECT

POWER COST - MILL

Estimated Power Draw for Mill - 2020 H.P.

2020 H.P. x .85 = 1717 net Draw H.P.

1717 x D.746 = 1281 K.W. x 24 hr. Day x 340 Day/Year = 10,453,000 KWH

10,453,000 KWH x $0.045/KWH = $470,000/Year

470,000 x 10 Years = $4,700,000

WYOMING MINERAL CORPORATION
DRIPPING SPRING PROJECT

Product Drums

4 per day x 340 days/year @ 25.00/drum.

Transportation

750# per Drum @ 21.5¢ per pound

Safety - Outside

Estimated @ $20,000.00 per year

Environmental - Outside

Estimated @ $20,000.00 per year

Lakewood Support

± 0.30 per pound U_3O_8

Plant Parts and Tool Inventory

Estimated $150,000/year

Building and Grounds Maintenance

Roadways - Maintanence and snow removal.

2 graders year-round operated and maintained $7,000/mo. rental.

Labor use ancilliary operators

Building Maintenance

Material 25,000.00 life of project

Labor - included in plant labor

TABLE A

WMC/DRIPPING SPRING PROJECT

BASELINE ENVIRONMENTAL STUDY PROGRAM

	Labor	ODC	Total
Hydrology	$ 5,000	$ 10,000	$ 15,000
Water Quality	15,000	70,000	85,000
Meteorology/Air Quality	110,000	50,000	160,000
Soils	20,000	8,000	28,000
Vegetation	36,000	8,000	44,000
Wildlife	40,000	5,000	45,000
Aquatic Biology	40,000	5,000	45,000
Silviculture	15,000	2,000	17,000
Geology	5,000	1,000	6,000
Archaeology	20,000	5,000	25,000
Land Use	10,000	2,000	12,000
Alluvial Valley	5,000	-	5,000
Tailings	20,000	5,000	25,000
Socioeconomics	22,000	4,000	26,000
Radiometrics	50,000	95,000	145,000
Noise	8,000	3,000	11,000
Aesthetics	4,000	1,000	5,000
Project Management	40,000	15,000	55,000
Sub-total	$465,000	$289,000	$754,000

TABLE B

WMC/DRIPPING SPRING PROJECT

PERMIT APPLICATION PREPARATION ACTIVITIES

	Labor	ODC	Total
EIS	$ 50,000	$ 15,000	$ 65,000
NRC Byproduct License	30,000	30,000	60,000
FS Operating Plan	33,000	10,000	43,000
ARRA Source Mtl. License	25,000	6,000	31,000
Envir. Consolidated Permit	12,000	3,000	15,000
Air Quality Permit	8,000	2,000	10,000
Preapplication Reg. Mtgs.	15,000	8,000	23,000
Project Management	4,000	1,000	5,000
Sub-total	$177,000	$ 75,000	$252,000

TABLE C

WMC/DRIPPING SPRING PROJECT

HEARING AND NEGOTIATING EXPENDITURE

	Labor	ODC	Total
Application Revisions	$ 25,000	$184,000	$209,000
Hearing Expenses	15,000	5,000	20,000
Public Relations	80,000	35,000	115,000
Legal Expenses	200,000	25,000	225,000
Project Management	44,000	7,000	51,000
Sub-total	$364,000	$256,000	$620,000

Engineering Support for Licensing Effort - (outside) $ 200,000

TABLE D

Summary of Permitting Costs

Table "A"	Baseline Environmental Study Program	$ 754,000
Table "B"	Permit Application Preparation Activities	$ 252,000
Table "C"	Hearing and Negotiating Expenditures	$ 620,000
	Engineer Support for Licensing Effort	$ 200,000
	TOTAL PERMITTING COST	$1,826,000

FIGURE B

WMC/DRIPPING SPRING PROJECT LICENSING EXPENDITURE SCHEDULE

	1981				1982				1983	
	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd
1. Baseline Study Program										
Field Studies	-	20,000	30,000	150,000	500,000	9,000				
Project Management	12,000	10,000	10,000	13,000						
2. Permit Application Prep.										
EIS		8,000	35,000	20,000	6,000					
Major RAM Licenses		12,000	50,000	80,000	5,000					
Environmental Licenses			2,000	21,000	6,000					
Project Management					7,000					
3. Hearing & Negotiating Exp.										
Application Revisions						6,000	2,000	8,000	13,000	180,000
Hearing Expenses							8,000			13,000
Public Relations	10,000	15,000	6,000	10,000	6,000	8,000	15,000	10,000	15,000	20,000
Legal Expenses	22,000	22,000	12,000	12,000	22,000	11,000	12,000	22,000	45,000	45,000
Project Management					3,000	10,000	8,000	8,000	11,000	11,000
4. Engineering Support for Licensing Effort	3,000	8,000	11,000	43,000	133,000	2,000				
Totals	47,000	95,000	156,000	349,000	688,000	46,000	45,000	48,000	84,000	269,000

WYOMING MINERAL CORPORATION
DRIPPING SPRING URANIUM PROJECT
SALES AND USE TAX

OPEN PIT MINING		
Capital Cost Items (Exempt)	-0-	
Operating Material	310	
Explosives	235	
Miscellaneous Materials	45	590
UNDERGROUND MINING		
Capital Cost Items (Exempt)	-0-	
Operating Materials	75	
Explosives	185	
Miscellaneous Materials	90	
Tails Liner (Exempt)	-0-	350
PROCESS MILL		
Capital Cost Items (Exempt)	-0-	
Operating Materials	1,800	
Plant Overhead Taxable	60	1860
Total Estimated Sales and Use Tax		2,800

WYOMING MINERAL CORPORATION
DRIPPING SPRING URANIUM PROJECT
PERSONAL PROPERTY TAX

OPEN PIT MINING		
Capital Cost Items	760	
Operating materials	78	
Explosives	60	
Miscellaneous Materials	12	910
UNDERGROUND MINING		
Capital Cost Items	283	
Operating Materials	3	
Explosives	3	
Miscellaneous Materials	1	290
PROCESS MILL		
Capital Cost Items	5200	
Operating and Maintenance Materials	400	5600
		6800

WYOMING MINERAL CORPORATION

TAXES

The following is a summary of the taxes involved in the operation of a uranium processing facility in Arizona:

Transaction Privilege (Sales) and Use Taxes

Tax Rate

The State of Arizona imposes a tax at the rate of four percent. Many areas impose an additional local tax usually at the rate of one percent or two percent. With the exception of four cities, Holbrook, Scottsdale, Snow Flake, and Tempe, the local tax applies only if the material is purchased from a vendor located in one of the cities imposing the local tax. With the exception of the four cities, the local use tax would not be accrued on items purchased from suppliers outside of Arizona or from suppliers in cities in Arizona that do not impose the local transaction tax.

Exempt

1. Machinery and equipment used directly in manufacturing, processing, refining, and metalurgical operations (leaching, milling, precipitation, smelting, and refining).

2. Repair or replacement parts for exempt machinery and equipment used directly in production.

3. Raw materials incorporated into the product being processed for sale.

4. Drums and containers, if used for shipping the product to the customer.

5. Gasoline on which Arizona Motor Fuel Tax is paid.

Taxable

1. Expendable supplies including chemicals, lubricants, cleaning agents, grinding balls, and drill bits.

2. Janitor's equipment and hand tools.

3. Office equipment, furniture and supplies.

4. Tangible personal property used in selling or distribution activities.

5. Tangible personal property used in research.

6. Motor vehicles.

7. ~~Ships~~, buildings, ~~docks~~, ~~and~~ ~~depots~~.

8. Electricity, gas, bottled gas, and water.

Property Taxes

Real and personal property is assessed as of the first Monday in January of each year. The tax would apply to land, buildings, and improvements to real estate; as well as personal property such as office furniture, machinery and equipment, supplies, and other equipment that may be leased or rented. Commercial or industrial property is assessed at 27 percent of the estimated value of the property. For estimating purposes, we would use $125 per $1,000 of assessed valuation.

Gasoline Refund

There is a provision for obtaining a refund of the Arizona Motor Fuel Tax paid on gasoline used in non-highway equipment. The requirements are rather complicated and it may not be worth considering unless the volume of gasoline used would be very significant.

DRIPPING SPRING PROJECT
ANALYSIS OF EXPLORATION AND DEVELOPMENT COST
PROJECT TO DATE THROUGH 8/80

	RECAPTURABLE EXPLORATION COST	DEVELOPMENT COST
Nichols Claims		
Big Joe	10,958	
Little Joe	156,209	
Workman	36,230	
Hope	6,175	
Total Aggregation	209,572	1,119,822
Cox Claims		
Wyminco	9,606	
Lucky Stop	153,802	
Rhonda	33,530	
Total Aggregation	196,938	525,146

MANPOWER SCHEDULE

DRAVO ENGINEERS AND CONSTRUCTORS - DENVER DIVISION

CONTRACT NO. 7585 BY N. Snyder DATE 10-28-80 REV.

CUSTOMER WYOMING MINERAL CORPORATION JOB DRIPPING SPRING, ARIZONA OPERATION SHEET NO. 1 OF 2 SHEETS

E.A.C.102-02 Rev. 0

DESCRIPTION OF WORK	Percent Complete	1 1983	2 1984	3 1985	4 1986	5 1987	6 1988	7 1989	8 1990	9 1991	10 1992	11 1993	12 1994
OPEN PIT MINE													
DRILL OPERATOR	3	1.5	3	3	3	3	3	3					
DRILL HELPER	3	1.5	3	3	3	3	3	3					
LOADER HELPER	6	3	6	6	6	6	6	6	2	2			
HAUL TRUCK DRIVER	14	7	14	14	7								
HAUL TRUCK DRIVER	20				10	20	20	20	5	5			
BULLDOZER OPERATOR	6												
R. T. BULLDOZER OPERATOR	2	1	2	2	2	2	2	2	2	2	2	2	
GRADER OPERATOR	2	1	2	2	2	2	2	2	2	2	2	2	
DUMP MAN	2	1	2	2	2	2	2	2					
SCANNER OPERATOR	1												
PROBE MAN	2												
FIELD MAINTENANCE	2												
BLASTING CREW	3	1.5	3	3	3	3	3	3					
LABOR POOL	4	2	4	4	4	4	4	4					
UNDERGROUND													
PROBE MAN	10							4	10	9	6	6	
LONG HOLE DRILLERS	4							2	4	3	2	2	
NIPPER	4							2	4	3	2	2	
MINERS AND HELPERS - DEVELOP	22							15	23.5	10			
MINE	105							3	62	105	62	62	
TRAMMERS - DEVELOP	12							6	13	6			
MINE	18							12	13	12	12		
LABOR POOL DEVELOP	4							3	4.5	3			
MINE	15								10	15	10	10	

MANPOWER SCHEDULE

DRAVO ENGINEERS AND CONSTRUCTORS - DENVER DIVISION

CONTRACT NO. 7585

CUSTOMER WYOMING MINERAL CORPORATION

JOB DRIPPING SPRING, ARIZONA

OPERATION

BY N. Snyder DATE 10/28/80 REV.

SHEET NO. 2 OF 2 SHEETS

EAC 102-02 Rev. 0

	DESCRIPTION OF WORK		1 1983	2 1984	3 1985	4 1986	5 1987	6 1988	7 1989	8 1990	9 1991	10 1992	11 1993	12 1994
	MILL													
	FOREMEN	4												
	S.A.G.& LEACH OPERATOR	4												
	FILTER OPERATOR	4												
	SX/ PRECIP/ DRY/ PACK OPERATOR	4												
	ANCILLIARY OPERATOR	4												
	HELPER	4												
	CLEANUP	3												
Note 1	SECURITY	4												
	SCALE OPERATOR	1												
	CRUSHER OPERATOR	1												
	FRONT END LOADER OPERATOR	1												

NOTE 1 : Functional includes Open Pit, Underground and Mill

V-39

MANPOWER SCHEDULE
DRAVO ENGINEERS AND CONSTRUCTORS - DENVER DIVISION

CONTRACT NO. 7585

BY N. Snyder DATE 10/28/80 REV.

CUSTOMER WYOMING MINERAL CORPORATION JOB DRIPPING SPRING, ARIZONA MAINTENANCE SHEET NO. 1 OF 2 SHEETS

EAC 102-02 Rev. 0

DESCRIPTION OF WORK		1 1983	2 1984	3 1985	4 1986	5 1987	6 1988	7 1989	8 1990	9 1991	10 1992	11 1993	12 1994
MAINTENANCE SUPERINTENDENT													
OPEN PIT													
UNDERGROUND													
MAINTENANCE FOREMEN													
OPEN PIT	2												
UNDERGROUND													
MILL													
MECHANIC													
MINE	4	4	4	4	4	4	4	4	4	4	4	3	3
MILL	4												
MECHANIC HELPER													
MINE	4	4	4	4	4	4	4	4	4	4	4	3	3
MILL	4												
ELECTRICIAN													
MINE													
INSTRUMENT MAN													
MILL													
LUBE MAN													
MINE													

MANPOWER SCHEDULE

DRAVO ENGINEERS AND CONSTRUCTORS - DENVER DIVISION

CONTRACT NO. 7585

CUSTOMER WYOMING MINERAL CORPORATION

JOB DRIPPING SPRING, ARIZONA

MAINTENANCE

BY N. Snyder DATE 10/28/80 REV.

SHEET NO. 2 OF 2 SHEETS

E & C 102-02 Rev. 0

DESCRIPTION OF WORK	1 1983	2 1984	3 1985	4 1986	5 1987	6 1988	7 1989	8 1990	9 1991	10 1992	11 1993	12 1994
FUEL TRUCK OPERATOR												
MINE												
RUBBER MAN												
MILL												
UTILITY MAN												
MILL												

V-41

MANPOWER SCHEDULE
DRAVO ENGINEERS AND CONSTRUCTORS - DENVER DIVISION

CONTRACT NO. 7585 BY Nevin Snyder DATE 10/28/80 REV.

CUSTOMER WYOMING MINERAL CORPORATION JOB DRIPPING SPRING, ARIZONA MANAGEMENT AND ADMINISTRATION SHEET NO. 1 OF 3 SHEETS

Note 1

EAC 102-02 Rev. 0

DESCRIPTION OF WORK		1 1983	2 1984	3 1985	4 1986	5 1987	6 1988	7 1989	8 1990	9 1991	10 1992	11 1193	12 1994
GENERAL MANAGER													
SUPERINTENDENT													
OPEN PIT MINE													
UNDERGROUND MINE													
MILL													
CHIEF ENGINEER													
OPEN PIT													
UNDERGROUND													
CHIEF GEOLOGIST													
OPEN PIT													
UNDERGROUND													
MINE ENGINEER													
OPEN PIT	2												
UNDERGROUND	2												
ENVIRONMENTAL ENGINEER													
MINE													
MINE MILL													
DRAFTER													
OPEN PIT													
UNDERGROUND													

MANPOWER SCHEDULE
DRAVO ENGINEERS AND CONSTRUCTORS - DENVER DIVISION

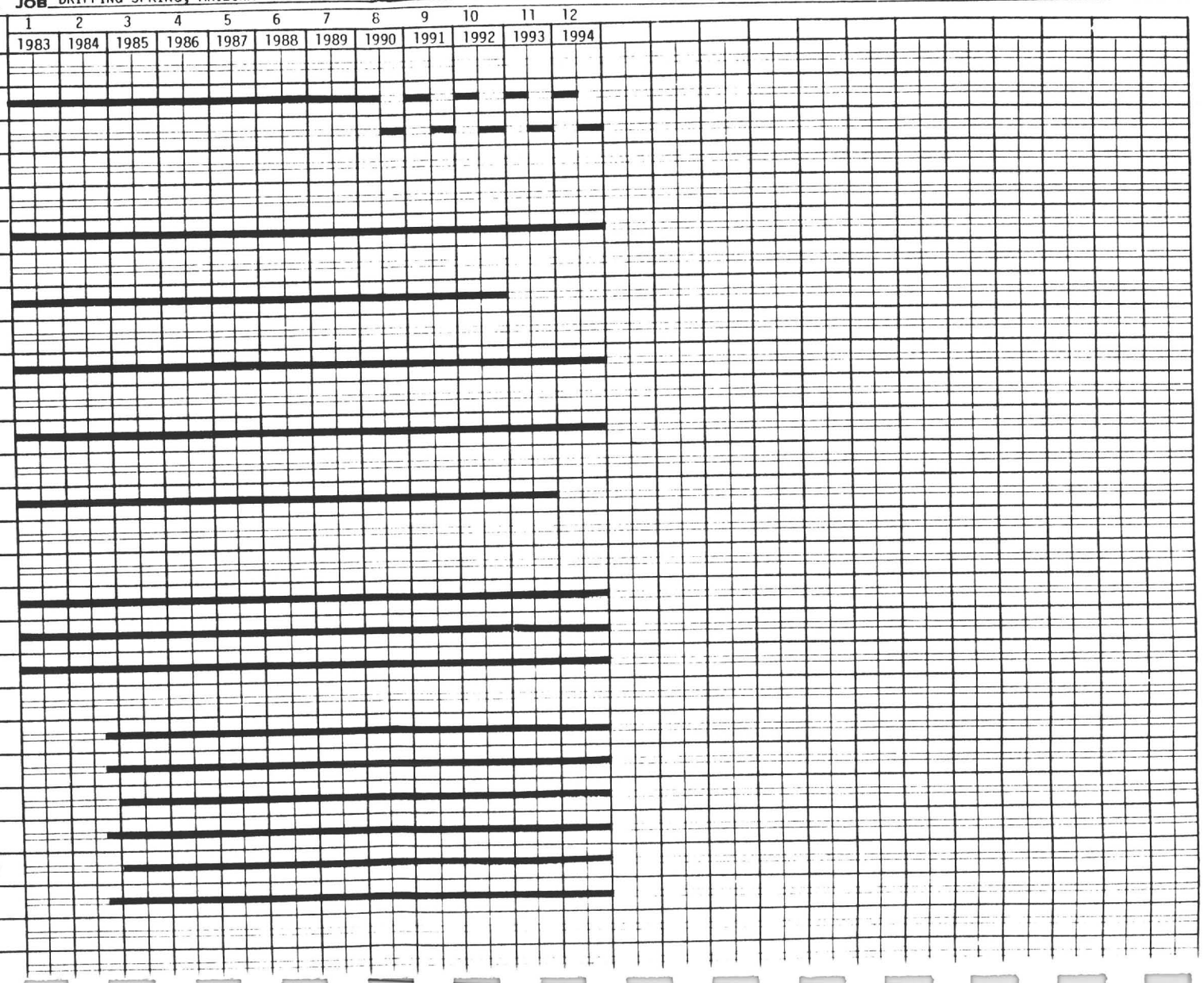
BY N. Snyder DATE 10/28/80 REV

CONTRACT NO. 7585

CUSTOMER WYOMING MINERAL CORPORATION JOB DRIPPING SPRING, ARIZONA MANAGEMENT AND ADMINISTRATION SHEET NO. 2 OF 3 SHEETS

E.A.C. 102-02 Rev. 0

	DESCRIPTION OF WORK		
	SAFETY ENGINEER		
	OPEN PIT		
	UNDERGROUND		
Note 1	MANAGERS SECRETARY		
Note 1	RECEPTIONIST		
Note 1	ACCOUNTANT	2	
Note 1	PURCHASING AGENT		
Note 1	PERSONNEL		
	WAREHOUSE		
Note 1	SUPERINTENDENT		
Note 1	FOREMAN	2	
Note 1	HELPER		
	METALURGIST	MILL	
	CHIEF CHEMIST	MILL	
	CHEMIST	MILL	2
	SAMPLE PREP. TECH.	MILL	2
	SAMPLER	MILL	2
	SAFETY ENGINEER	MILL	
	NOTE 1: Function includes open		



MANPOWER SCHEDULE

DRAVO ENGINEERS AND CONSTRUCTORS - DENVER DIVISION

CONTRACT NO. 7585

CUSTOMER WYOMING MINERAL CORPORATION

JOB DRIPPING SPRING, ARIZONA

MANAGEMENT AND ADMINISTRATION

BY N. Snyder DATE 10-28-80 REV

SHEET NO. 3 OF 3 SHEETS

DESCRIPTION OF WORK		1 1983	2 1984	3 1985	4 1986	5 1987	6 1988	7 1989	8 1990	9 1991	10 1992	11 1993	12 1994
MINE FOREMAN													
OPEN PIT	3												
UNDERGROUND	4												
MILL FOREMAN	4												