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DIVISION OF
OIL, GAS & MINING

CO-OP MINING COMPANY

BEAR CREEK CANYON MINE

MINING AND RECLAMATION PLAN

CHAPTER I

INTRODUCTION AND SUMMARY OF PERMIT APPLICATION

INTRODUCTION

The purpose of this volume is to consolidate the material from the original version of the Co-op Mining Company Bear Canyon permanent regulation MRP that was submitted March 23, 1981 and subsequent submittals that were made in response to Apparent and Technical Completeness Reviews made by the Division. Also to update and upgrade the information presented in the written material and maps, and to improve the format to better conform to the Division guidelines. Should the reviewer encounter any disparity in information presented herein as compared to previous submittals, this is to be considered the correct version.

The information contained herein is true and correct to the best of my knowledge.

Wendell Owen

Leona Stowell, Notary Public
Residing in Salt Lake, Utah

10-26-83

Commission expires
12-11-86

CHAPTER I

Table of Contents

1.1 Scope of Operation

1.2 Summary of Environmental Impacts

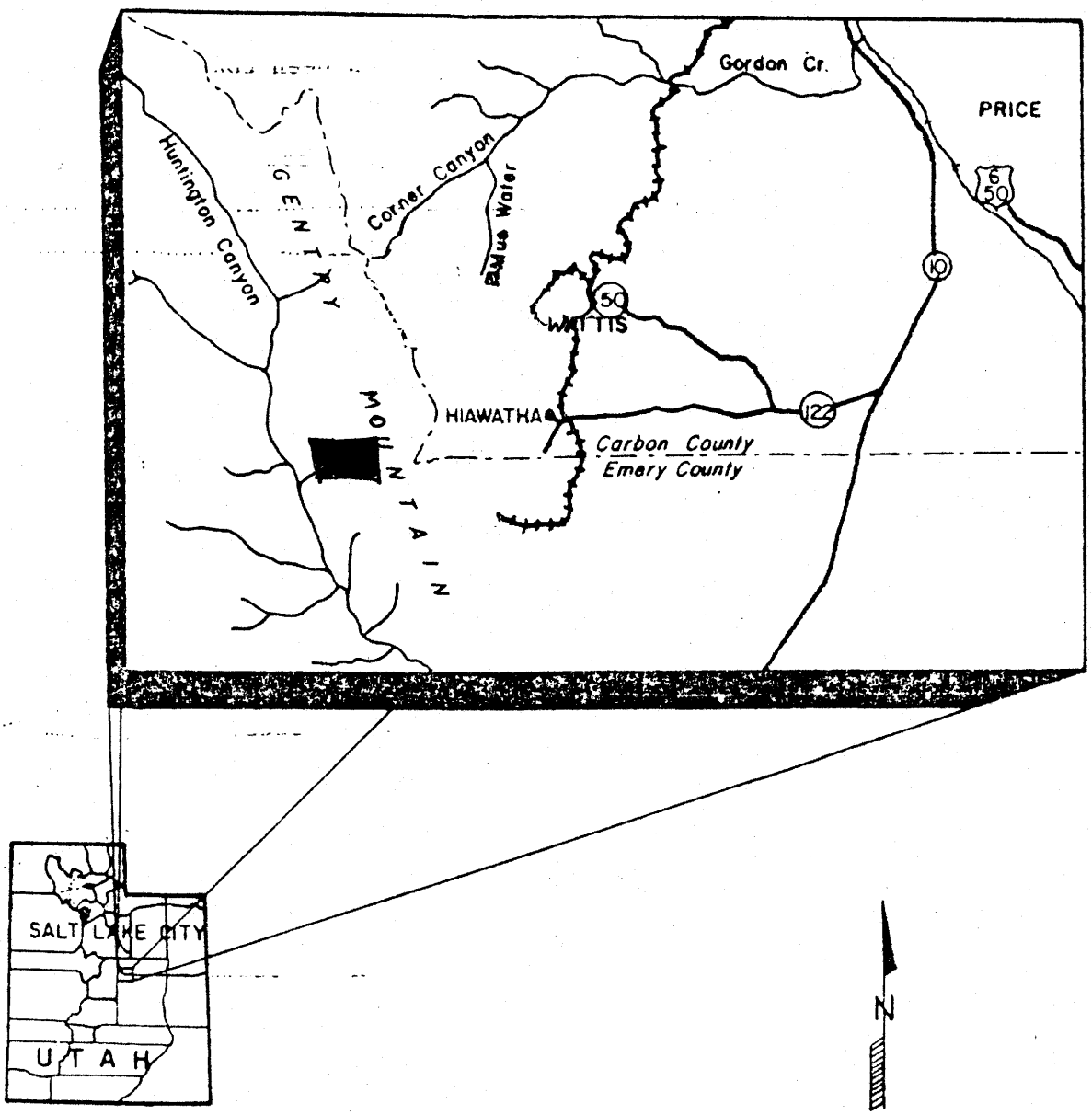
1.3 Introduction to Document Organization and Reviewers Checklist

The following material constitutes a Mining and Reclamation Plan to obtain an underground coal mining permit for the Bear Canyon Mine operated by Co-op Mining Company.

This Amendment is submitted under the Utah Regulations of Coal Mining and Reclamation Operations Act (Title 40, Chapter 10, Utah Code Annotated 1953, as amended), the Surface Mining Control and Reclamation Act of 1977 (P.L. 95-87), the Cooperative Agreement between the State of Utah and the United States Department of the Interior, the Federal Land Policy and Management Act of 1976, regulations of the U.S. Geological Survey, the Permanent Regulatory Program regulations of the Surface Mining Reclamation and Enforcement, and the regulations fo the State of Utah Department of Oil, Gas, and Mining.

1.1 SCOPE OF OPERATION

This section describes, in general terms, the scope of operations conducted by Co-op Mining Company at the Bear Canyon Mine. This general treatment orients the reader to the mine operation and provides an overall framework for understanding the specific details presented in the subsequent chapters of this application.



0 4 8
Scale in Miles
(ENLARGED VIEW)

FIGURE 1-1

LOCATION MAP

CO-OP MINING COMPANY

EMERY COUNTY

Mining Plans

Co-op Mining Company controls 1,115 acres in Emery County Utah, (900 acres in Bear Canyon, 215 acres in Trail Canyon; see Figure 1-1). Mining has been conducted on this site from 1938 to the present time and 20 million tons of new, minable coal are estimated to remain in the Blackrock Bed within the permit application area. Production during the first five-year period will total 1 million to 1.5 million tons, with an average full capacity production of 200,000 ton/year reached by the fourth year. The exact figure will depend on market conditions, of course, (all figures are for raw tons).

Access to the reserves on the property is made through 3 portal. The middle seam portal (referred to as Portal 1) and the original Bear Canyon seam portal (Portal 2) are used primarily to recover coal from previously worked areas.

Since the mining in many areas involves working in the proximity of the old mine, main entry pillars will be columnized to provide vertical support and prevent "punching" by the pillars, which would produce unsafe working conditions and cause the loss of recoverable coal.

All portals will be sealed when workings cease. Surface breakouts from the seam for ventilation will be made in Bear Canyon and may be made in Trail Canyon. Mining conditions in the future may warrant additional ventilation.

The current mining system employs room and pillar mining with continuous miners. Pillars are removed wherever possible. In the virgin coal areas, development will allow use of either room and pillar or Longwall methods or a combination of both, with room and pillar preferred wherever feasible.

As the mine develops, main entries will be driven in two sets of either four, five, or six, with barrier pillars separating each set. These main entries will run East to West, to the property boundary. Submain entries will run at right angles from the main entries to the limits of the property.

Overall, an advance-retreat mining system is projected for this mine with retreat mining employed prior to abandonment of each section.

Barrier Pillars

Barrier pillars will be left to protect entries within

the permit area. The subsidence wave caused by maximum coal recovery will cause only minor and easily repairable damage above the coal outcrops. Mining will usually be stopped a minimum of 200 feet from the surface to maintain stability of the surface in the places where coal outcrops occur. Barrier pillars will be left in place to protect the steep escarpments.

Conservation of Coal Reserves

Mining of this area provides for maximum recovery of the coal reserves, about 60 percent overall. This high recovery is due both to known mining conditions and Co-op Mining Company's engineering and production practices. The main entry system will allow access to the reserves West of the permit area. Reserves to the North can be entered through outcrops.

Equipment

The equipment used to mine the permit area is listed in Section 3.4.5. Additional equipment will be acquired as needed.

Mine Safety

The Bear Canyon Mine will comply with all federal, state, and local regulations for safety, security, and fire control in matters pertaining to signs, fences, hazardous and flammable materials, explosives, fire protection, monitoring of coal and refuse piles, routine and accident reports, corrective actions, good housekeeping, and mine maps and records.

Operations Schedule

Annual production is scheduled to increase from 200,000 tons in 1983 to 300,000 tons by 1987. The mine operates three shifts per day for 240 days per year and employs 30 to 40 salaried and hourly workers. If production rises to 500,000 ton/year, employment will increase by a maximum of 10.

Permit Area

The permit area comprises lands owned by COP Development Company. At present, there is no land leased by the company from the state and federal governments.

1.2 SUMMARY OF ENVIRONMENTAL IMPACTS

Impacts on Current and Future Land Use

Hydrology - Soil disturbance during the life of the mine will increase erosion, but required sediment control measures will reduce impact on lowlands. There will be minimal dischare of ground water from the mine.

Vegetation, Range Management, and Soils - Temporary disturbances will remove vegetation and increase erosion, but revegetation will return desired vegetation, decrease erosion, and increase forage production.

Minerals - There is oil and gas potential in the area; however, there should be no conflict between coal mining and development of this resource.

Archaeology - No sites warranting preservation are located within the permit boundaries.

Timber, Fire, and Transportation - No merchantable timber exists within the permit area. Some

shrubs will be removed during operation, but it will be replaced by revegetation growth and yield. Access roads will provide for easier fire control and will allow removal of any fire hazards.

Recreation and Scenic Resources - In the short term the mine will reduce the recreational values of the permit area. Recontouring and grading of disturbed areas wherever possible will restore scenic values and revegetation will improve wildlife habitats.

Human Values

No public parks nor historical sites lie within the permit area. There are no historical, archeological or paleontological resources either.

Hydrologic Balance

The Bear Canyon Mine will have no impact on the guantity of ground water. Subsidence caused by the mine will have no effect on springs; the mine will intercept only miniscule quantities of water destined for the Huntington Creek drainage; the mine will not affect water supply for vegetation or creek flow.

Sediments and other impurities will be removed from surface water before discharge. Acid drainage will not occur because of the low sulfur content of the coal. Ground water discharged from the mine is not anticipated, due to the mines utilization of all water, once the mine is in full operation. Suspended sediments will increase in streams adjacent to construction areas, but this effect will be mitigated by required sediment control.

Soil Resources

Because the mine lies underground, the impact on soils is minimal overall. Surface operations and mining facilities will cover soil; disturbed soil in construction areas add to erosion because of removal begetation and reduce forage and livestock capacity. These impacts will be mitigated by the reclamation plan. Before disturbance on virgin areas the topsoil will be removed, stockpiled and stabilized temporarily. Disturbed surface areas will be backfilled, compancted and graded to return them to as near their original contour as possible. Topsoil will be redistributed and stabilized. Revegetation will control erosion and increase forage and wildlife capacity.

Vegetative Resources

Impacts on vegetative resources will not be major since the Bear Canyon Mine is underground. Vegetation will be removed from areas of construction, erosion will increase and plant species will be reduced. These impacts will be mitigated by revegetation of disturbed areas with a suitable, permanent and diverse vegetative cover.

Fish and Wildlife

Since the mine will impact such a small area, the future impact of continued mining operations is expected to be minimal.

Impact on large game species will be minimized by the location and timing of surface activities. Impact on small burrowing mammals in areas of subsidence will be locally great but only temporary. All species are of adequate density, and any losses will be made up by contiguous breeding populations.

Impact on nesting birds will be minimal and local. No endangered species nest in the area.

No impact on amphibians and reptiles is expected because of the species' widespread distribution.

Huntington Creek is the only quality stream in the area and it is unlikely to be affected by sediment or subsidence. Thus, no adverse impact on aquatic wildlife is expected.

Air Quality

The only potential air pollutant produced by the mine will be particulates.

Total annual controlled emissions should be less than the 250 ton/year, controlled emission PSD cutoff. Therefore the mine does not qualify as a "major source" under the Prevention of Significant Deterioration (PSD) requirements.

Dust from road use will be reduced by water or chemical treatment of roads, vehicle use restrictions, speed limits, soil stabilization and periodic grading where appropriate. Coal dust will be controlled by spray, compaction and non-toxic dust suppressing chemicals.

Subsidence

Maximum removal of the coal resource could result in surface subsidence over the long term.

No damage will occur to manmade structures due to the topography of the area and its inaccessibility-precluding the existence of any structures. No damage is expected to result to power lines that exist within the permit area. If damage should prove to be greater than expected, such facilities could be moved to more stable sites. Subsidence effects in th unmined eastern portion of the permit area will have to be anticipated on a site-specific basis; however, the 1,000 foot of overburden in the area should minimize surface impacts. Monitoring of ground and surface impacts. Monitoring of ground and surface water will be conducted and mitigating measures employed if any significant impact occurs.

Waste Disposal

There is no refuse disposal in the mine plan area.

1.3 INTRODUCTION TO DOCUMENT ORGANIZATION AND REVIEWER'S CHECKLIST

This Mining and Reclamation Plan follows the "General Guideline for Organizational Format and Content- -Permit Applications" revised November 3, 1980 by the Division of Oil, Gas, and Mining of the State of Utah. This organization is pursuant to U.C.A. 40-10-10(2) and UMC 771.23(a.). The table of contents for the overall mine plan, located at the front of this first volume, lists the chapters and appendices. A detailed chapter outline precedes each chapter and lists the chapter headings, plates, figures, tables and appendixes and attachments.

Tables appear with the chapter text following the reference to them. Tables are double-numbered; thus, Table 2-1 is the first table in Chapter 2, Table 2-2 the second, and so forth. Figures, which are normal-sized (8-1/2 x 11 or 11 x 17) illustrations, are double-numbered (Figure 2-1, 2-2, etc.) and also appear on following pages. Plates are oversized illustrations. Numbered with the same system as tables and figures, they are folded and enclosed in sleeves at the end of the chapter in sequential order.

References within the text are made by author's last name and the date of publication. References are listed alphabetically by author in the bibliography at the end of the chapter.

CHAPTER 2

OWNERSHIP AND CONTROL

CHAPTER 2

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2.10 Location of public office for filing

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2.1 SCOPE

This chapter provides all relevant and required information about the ownership and control of persons operating the Bear Canyon Mine, ownership and control of lands in the permit area, compliance status and history of the mines and their owners and operators, insurance and performance bonds, applicable licences and status of permits and fillings and public notices of this application. Also a portfolio of comments received to this date. (Appendix 2-1)

2.2 IDENTIFICATON OF INTERESTS (UMC 782.13)

Permit Applicant

CO-OP MINING CO.

53 West Angelo Ave.
Salt Lake City, Utah 84115
Tele. 801-486-5047

2.2.1 Owners of Record of Surface Area and Coal Rights

Land and Coal owner

C O P Coal Development Co.
3140 South Main St.
Salt Lake City, Utah 84115

Plate 2-1 shows the property within and contiguous to the permit boundaries. The initials COP on this

plate stand for COP Development Company. Authorization to mine is represented by the initials "ATM" Table 2-1 lists the fee owners of the surface and mineral property rights.

Table 2-1 Property Ownership

Parcel	Surface	Coal	Minerals	Grazing	Oil & Gas
A	COP Devel.	"	"	"	"
B	Northwest Carbon	"	"	"	"
C	U.S. Forest Service	"	"	"	"

2.2.2 Holders of Leasehold Interest in Surface Area and Coal Rights

The names and addresses of holders of record in Leasehold Interest are listed below:

Coal mining lease by and between Co-op Mining Co. and Peabody Coal Co., executed Dec. 1st, 1975.

See Plate IV-1 area T16s, R7e, S L M
Sec. 14 SW¼
" 23 E½, E½ NW¼, E ½ SW ¼, SW ¼, SW¼
" 24 all West of N-S fault
" 25 all West of N-S fault

The right to mine and remove from, and use for purposes incident to mining, including access roads, camp facilities, surface operations, storage of coal, and other activities. Also unrestricted use of all access roads leading to and from property. Lease is binding on the successors to the parties of the lease.

plate stand for COP Development Company. Authorization to mine is represented by the initials "ATM" Table 2-1 lists the fee owners of the surface and mineral property rights.

Table 2-1 Property Ownership

Parcel	Surface	Coal	Minerals	Grazing	Oil & Gas
A	COP Devel.	"	"	"	"
B	Nevada Power	"	"	"	"
C	U.S. Forest Service	"	"	"	"

(See Table 2-2)

2.2.2 Holders of Leasehold Interest in Surface Area and Coal Rights

The names and addresses of holders of record in Leasehold Interest are listed below:

Coal mining lease by and between Co-op Mining Co. and Peabody Coal Co., executed Dec. 1st, 1975.

See Plate IV-1 area T16s, R7e, S L M
Sec. 14 SW¼
" 23 E½, E½ NW¼, E ½ SW ¼, SW ¼, SW¼
" 24 all West of N-S fault
" 25 all West of N-S fault

The right to mine and remove from, and use for purposes incident to mining, including access roads, camp facilities, surface operations, storage of coal, and other activities. Also unrestricted use of all access roads leading to and from property. Lease is binding on the successors to the parties of the lease.

2.2.3 Purchase of Record Under a Real Estate Contract for Surface Area Coal

See Appendix 2-B Title Insurance Policy

2.2.4 Operator, if Different from Applicant

Same as above.

2.2.5 Resident Agent of the Applicant

Wendell Owen
P.O. Box 300
Huntington, Utah 84528
(801) 748-5238

2.2.6 Business Designation (partnership)

Officers and Directors of the Applicant

Ellery Kingston
140 East 30 South
Sandy, Utah 84070

Earl W. Stoddard
P.O. Box 300
Huntington, Utah 84528

Elden Kingston
991 East 3825 South
Salt Lake City, Utah 84106

John Gustafson
1815 South 1100 West
Woods Cross, Utah 84087

2.2.7 Current, Pending or Previous Coal Mining Permits in the U.S. held by Applicant and Principal Shareholder Subsequent to 1970

Act/015/021 Oil, Gas, and Mining Div.
Act/015/025 Oil, Gas, and Mining Div.

2.2.3 Purchase of Record Under a Real Estate Contract for Surface Area Coal

See Appendix 2-B Title Insurance Policy

2.2.4 Operator, if Different from Applicant

Same as above.

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991 East 3825 South
Salt Lake City, Utah 84106

John Gustafson
1815 South 1100 West
Woods Cross, Utah 84087

2.2.7 Current, Pending or Previous Coal Mining Permits in the U.S. held by Applicant and Principal Shareholder Subsequent to 1970

Act/015/021 Oil, Gas, and Mining Div.
Act/015/025 Oil, Gas, and Mining Div.

2.2.8. Owners of Record of Surface and Subsurface Areas Contiguous to the Preposed Permit Area

Plate 2-1 displays the parcels of land contiguous to the permit boundaries. The parcels are designated with lower case letters.

The names and addresses of the owners of record are listed below:

The same as the General Partners.

2.2.9 Mine Name and M.S.H.A. Identification

The name of the mining operation for which this application is submitted is:

Bear Canyon Mine-Co-op Mining Company

The M.S.H.A. Identification Number is:

MSHA #42-00081-0

2.2.10 Applicant's Interest in Areas Contiguous to Proposed Permit Area

2.3 COMPLIANCE INFORMATION (UMC 782.14)

See Appendix A.

2.4 RIGHT OF ENTRY AND OPERATION INFORMATION(UMC 782.15)

The applicant's right to enter the lands and

to conduct operations in the permit area is based on the documents listed in Section 2.4.1 It should be noted that the applicants right is not subject to any pending litigation.

2.4.1 Document Description

The following documents support Co-op Mining Company's right of Entry and Operation. (see Appendix 2-B)

A - - Title or Title Insurance Policy

B - - Deed or Trust Deed

C - - Utah Business Licence

D - - County Business License

E - - Tax Commission License

F - - Coal Leases

G - - Etc.

2.4.2 Identification and Explanation of Legal Rights or Agreements for Lands to be Affected by Mining Activities

Not Applicable

2.4.3 Map Showing Legal Boundaries

Legal boundaries of the permit area and contiguous areas are shown on Plates 2-1 and 2-2.

2.5 RELATIONSHIP TO AREAS DESIGNATED UNSUITABLE TO MINING

2.5.1 Information on Area Suitability for Surface and Underground Disturbance

No portion of the area to be permitted is within an area designated as unsuitable for mining under the provision of 30 CFR 764 and 765. To the best of the applicant's knowledge, no portion of the area to be permitted is under study of designation as unsuitable for mining in an administratative proceeding under 30 CFR 764 and 765.

In preparing this application, Co-op Mining Co. has conducted the most comprehensive study known to date of the suitability of the permit area. That study makes up the following chapters of this report.

State and federal regulations allow an area to be unsuitable for the mining of coal if:

- Reclamation is not economically or technologically feasible.

  Reclamation at the Bear Canyon Mine is

economically and technologically feasible. Reclamation plans are detailed in Section 3.6.

- Coal mining is incompatible with state and local land use.

  Coal mining is compatible with present and future land use of the permit area. Section 4.4 describes land use in detail.

- Mining would affect fragile or historical lands and significantly damage historical, cultural, scientific, or esthetic values of natural systems.

  The permit area is neither historically significant nor fragile. There are only ten archeological sites, primarily contiguous to the permit area, none warranting nomination to the National Register (see Section 5.5.1) Damage to natural systems will be minimal and will be mitigated (see Section 3.5). The area contains no endangered animal or plant species (see Section

3.5.5 and 3.5.6 and Chapters 9 and 10).

- Mining would affect renewable-resource lands and result in substantial losses of food, fiber, or water supply.

  The permit area contains no prime farmland (see Section 4.4.2.4) or merchantable timber (Section 4.4.2.1). The mine will have only minor impact, some of it beneficial, on water resources (see Sections 3.5.3, 7.15, and 7.2.5).

- Mining would affect natural-hazard lands and thereby endanger life and property.

  The permit lands are not natural-hazard lands.

In addition, the permit area includes no cemetaries, no national trails, no wild and scenic rivers, no wilderness study areas, and no significant harvestable forest cover.

2.5.2 Waiver Under UMC 786.19(d)(2)

Not Applicable

2.5.3 Waiver of Owners of Nearby Occupied Dwellings

Applicant does not propose to conduct or locate surface facilities within 300 feet of an occupied dwelling.

2.6 PERMIT TERM INFORMATION - ANTICIPATED FOR EACH PHASE

2.6.1 Starting Date

Starting dates anticipated for each phase of mining are dependent on permit approvals, how, ever, it is hoped that work could commence by early spring 1981 and the mine could theoretically be in production by mid summer that same year.

2.6.2 Termination Dates

Termination dates anticipated for each phase of mining are nebulous at this time although a detailed estimate of production and reserves are included in the Geology Section and a projection of 50-years appears realistic.

The final termination date for the mining operation is expected to be 2030.

2.6.3 Numbers of Surface Acres Affected

The anticipated disturbance by the Bear Canyon Mine totals about 10 acres. Plate 2-2 shows potential property expansion and future facilities of the mine.

2.64 Horizontal Extent of Underground Working for Each Phase

Section 3.4.8.3 tabulates the horizontal extent of underground working.

2.6.5 Vertical Extent for Each Phase

Plate 2-3 showsthe mine development plan by seam during each of the next five years, then for each five-year period thereafter for the life of the mine.

Between 1983 and 1988, all production will be from the Middle Seam (see Section 3.4.1, Mining Plans).

In 1983 ----1988 recovery of the Middle Seam will occur on the Co-op fee land (see Plate 2-3)

2.6.6 Mining in Excess of Five Years

The amount of reserves within the permit area is not minable in five years. The Co-op Coal Company anticipates continuing operations at the Bear Canyon Mine at least through the remainder of the twentieth century. Investments have accordingly been made and will continue to be made in facilities, equipment, property, and mineral and mining leases. Investment in much of the equipment and facilities will not have been recovered within five years. Furthermore, associated reclamation costs for disturbed areas will be substantial. For these reasons a permit term of 20 years is requested.

The information included in this application deals with the effects of the entire 20-year period of proposed mining (see Plate 2-3) New and updated information will be supplied as required.

2.7 PERSONAL INJURY AND PROPERTY DAMAGE INFORMATION

Co-op Coal Company carries public liability and

property damage insurance in due force. In response to OSM's completeness statement, this policy has been increased to comply with the requirements of 30 CFR 806.14 and UMC 806.14. The policy bears a rider requiring the insurer to notify OSM and DOGM if the policy is cancelled. A copy of the certificate of insurance and rider is supplied to the Utah Division of Oil, Gas, and Mining. (see Appendix 2-C)

2.8 PROPOSED PERFORMANCE BOND

As required by UMC 800.11 and 30 CFR 800.11, the applicant has filed copies of a Performance Bond conforming to 30 CFR 805 and 806 and UMC 805 and 806. Reclamation costs relevant to this bond are detailed in Section 3.6.7.

2.9 OTHER LICENSES AND PERMITS

Section 2.2.8 lists coal mining permits applied for by the applicant and principal shareholder. The other permits and licenses dealing with land use, air and water quality, water rights and health and safety laws and regulations are listed in Table 2-4.

2.10 LOCATION OF PUBLIC OFFICE FOR FILING APPLICATION

The applicant has simultaneously filed complete copies of this application with the following agencies:

State of Utah Division of Oil, Gas, and Mining 1588 West North Temple Salt Lake City, UT 84116	7 copies
Emery County Clerk Emery County Courthouse Castle Dale, UT 84513	1 copy

2.11 NEWSPAPER ADVERTISEMENT/PROOF OF PUBLIUCATION

On the date of the filing of this application with Division of Oil, Gas, and Mining, the applicant has filed and advertisement with the Emery County Progress and Sun Advocate, local newspapers with circulation in Emery & Carbon counties sufficient to cover the locality of the applicant's operations. This advertisement follows the format required under 30 CFR 786.11 9a0 and UMC 786.11 (a). A copy of the publication is attached in Appendix 2D. Proof of publication has been submitted with the copy in Appendix 2D.

TABLE 2-2

A. C.O.P. Development Co.
3140 South Main St.
Salt Lake City, Utah 84115

B. Nevada Power Company
P.O. Box 230
6226 West Sahara Avenue
Las Vegas, Nevada 89151

C. U.S. Forest Service
599 W. Price River Dr.
Price, Utah 84501

Table 2-4

APPARENT COMPLETENESS REVIEW
ATTACHMENT
OTHER PERMITS AND LICENSES

BEAR CREEK CANYON MINE

Agency	Permit/License	Reference	Identification #	Date of Application	Date of Approval
Utah Division of Oil, Gas and Mining	Surface Mining Control and Reclamation Permit	Interim Permit	ACT/015/021	May 16, 1978	March 7, 1
U. S. Environmental Protection Agency	National Pollution Discharge Elimination System (NPDES	Federal Water Pollution Control Act	UT-0023612	Apr 15, 1979	July 8, 19
	Spill Prevention Control & Counter Measure Plan	Federal Water Pollution Control Act		Pending	
	Prevention of Significant Deterioration Permit (PSD)	Clean Air Act Amendments of 1977	Potential emissions less than 100 tons per year. PSD not required.		
Utah Division of Water Rights	Approval Order Small Structures	Section 73-5-5 of Utah Water Code		none	
Dam Safety	Dam Design Review	Section 73-5-5 of Utah Water Code		none	
Utah Division of Environmental Health	Approval Order Air Quality	Utah Air Conservation Act		May 5, 1980	June 17, 1
	Approval Order-Culinary Water Wastewater & Solid Waste Disposal Site Facilities	Utah State Water Pollution Control Act	Pending Solid waste not required. See exibit 'a'.		
	Construction Permit for Sedimentation Ponds		Construction is complete at present.		
	Driveway Permit for Each Location Where a Private Road Enters a County or State Road	Emery County	Have valid existing rights. (UMC 761.5 (b)(		

Agency	Permit/License	Reference	Identification #	Date of Application	Date of Approval
Utah Division of Water Rights	Water Rights Appropriation of Record of Diversion			none	
Mine Safety & Health Administration	Mine Permit	Mine Safety & Health Act	42-00081-0 42-0697	Dec 10, 1978 Sept 24, 1980	Dec 22, 1 Sept 27, 1
Industrial Commission of Utah	Notice of Intent to Mine Coal	General Safety Orders Utah Coal Mines			
Bureau of Land Management	Right-of-Ways/ Special Use Permits	Federal Land Policy & Management Act of 1976		Permit area on Fee land.	
Utah Division of State Lands	Right-of-Ways/ Special Use Permits			Permit area on Fee land.	
U. S. Forest Service, etc.	Right-of-Ways/ Special Use Permits			Permit area on Fee land.	
County Zoning Commission		Zoning approval		Jan 30, 1980	Apr 7, 19

Appendix 2-1

No comments have been received as of this date.

VIOLATION LIST NUMBER (1)

Violation Number	Violation	Reg. No.	Location	Status
N78-V-1-1-1-A 11/9/78	Opening & developing a site for surface coal mining operations without a State permit. Violation 30-USC-502(a)	USC 502 (a)	Entire Operation	Abated, Assessments made and paid
1-B	All surface drainage from disturbed areas is not passing through a sedimentation pond. No surface runoff collection system on sedimentation ponds exists at this site.	717.17	All portions of surface disturbance at the minesite.	
1-C	Failure to post mine permit identification signs.	30 CFR 712.12	All public access points to the minesite, namely public access to minesite from St. Highway 31.	
1-D	Failure to monitor ground water.	30 CFR 717.17	Entire Operation	
1-E	Failure to develop and implement a surface water monitoring program.	30 CFR 717.17	Entire Operation	
1-F	Failure to treat or bury and compact combustible material	PL 95.87 Sec 515 (b) 914 + 30 CFR 717.14	1. Waste Pile area under conveyor belt that leads to the coal stockpile area from the tipple site. 2. Area that borders the coal stockpile site about 100 ft. downstream from the stream crossing that enters the stockpile area over Trail Creek.	Abated, Asessments made and paid

VIOLATION LIST NUMBER (1)

Violation Number	Violation	Reg. No.	Location	Status
1-G	All access roads at this mine are not constructed so as to prevent additional contribution of suspended solids to streamflow.	717.17	Notice applies to all access roads used at this minesite in Trail Creek Canyon.	Abated, Asse ments made a paid

VIOLATION LIST NUMBER (1)

Violation Number	Violation	Reg. No.	Location	Status
2 of 4	Failure to pass surface drainage from a disturbed area through a sediment control structure.	MC 717.17 (a) Title 40-10-17 (i) (ii) (a)	Reclaimed area between haul road and Huntington Canyon Highway.	
3 of 4	Failure to maintain ditches, culverts, and other structures serving to drain access and haul road.	MC 717.17 (i) (3) (ii) Title 40-10-17 (q)	1. Culverts of upper access road to portal area. 2. Upper culvert of mainstream drainage. 3. Diversion ditch between lower shop area and stockpile. 4. Diversion ditch between coal stockpile & sed. pond.	
4 of 4	Failure to segregate stockpile and protect topsoil from wind and water erosion or contaminants.	MC 717.20 (a) Title 40-10-17 (e)	Refuse extension area above sediment pond diversion channel.	
N80-1-15-2 1 of 2 12/4/80	Failure to mine in accordance with approved plan. Failure to monitor ground water as required by the Regulatory Authority.	MC 715.11 (a) MC 717.11 (a) MC 717.17 (h) (2)	Groundwater monitoring plan.	Abated, Asessments made and paid

VIOLATION LIST NUMBER (1)

Violation Number	Violation	Reg. No.	Location	Status
N79-5-5-27-2 9/18/79 1 of 2	Failure to dispose of waste within an area not approved by the Regulatory Authority	30 CFR 715.15 of the rules and regulations PL 95-87 Sec. 516	Head of hollow behind Mr. Owens trailer adjacent to supply road to the portal.	Abated, Asessments made and paid
N79-5-5-27 9/18/79 2 of 2	Failure to have a copy of all current permits licenses, approved plans, or other authorizations to operate the mine shall be available for inspection at or near the minesite.	30 CFR 717 11b of the rules and regulations PL 95-87, Sec. 517 (b) (1).	Entire operation	
11/27/79	Cessation Order			
5/6/80	Failure to maintain diversion so as to permit additional contribution of suspended solids to overland flow.	MC 717.17 (c)		
N80-1-14-4 1 of 4	Operating without a permit	40-10-9-(1) Utah code Annotated 1953	Recent development of truck turnaround area above scalehouse.	Abated, Asessments made and paid

VIOLATION LIST NUMBER (1)

Violation Number	Violation	Reg. No.	Location	Status
N81-2-8-2 2 of 2 8/6/81	Failure to place and store noncoal waste in a controlled manner in a designated portion of the permit area.	UMC 817.89(a)	Entire Operation	
N81-3-16-1 1 of 1 8/16/81	Failure to submit surface and ground water data according to interim surface and groundwater monitoring plans as required by the Division in 3/5/81 certified letter.	UMC 771.19	Entire Operation	Abated, Assessments made and paid
N81-2-13-4 1 of 4 10/14/81	Failure to notify Division of structural weakness in sediment pond. Failure to comply with terms and conditions of permit. Failure to comply with Federal and State water quality standards, and effluent limitations.	UMC 817.41(c) UMC 771.19 UMC 817.46(t)	Sediment pond discharge due to breach in embankment.	
N81-2-13-4 2 of 4 10/14/81	Failure to pass disturbed area drainage through a desimentation pond or treatment facility before leaving the permit area to prevent additional contaminations of sediment to streamflow or to runoff outside the permit area. Failure to place waste in a controlled manner to ensure that leachate & runoff do not degrade surface or groundwater. Failure to identify toxicity of waste.	UMC 817.42 (c)(1) UMC 817.45 UMC 817.71 (c)(1) UMC 817.48(a) 40-10-18(2)(D) Utah Code Annotated 1953	Reclaimed site across the stream from sediment pond used for disposal of sediment waste from sediment pond.	

VIOLATION LIST NUMBER (1)

Violation Number	Violation	Reg. No.	Location	Status
N80-1-15-2 2 of 2	Failure to mine in accordance with approved plan. Failure to monitor surface water as required by the Regulatory Authority	MC 715-11 (a) MC 717-11 (a) MC-717(b)(1)(v)	Surface water monitoring plan	
N81-3-5-1 2/4/81	Failure to clearly mark stockpiled soil.	UMC 817.11(g)	Trail Canyon topsoil stockpile adjacent to newly constructed refuse disposal extension. Bear Creek - topsoil stockpile at intersection of upper pad access road and lower pad.	
N81-3-1-1	Failure to maintain ditches, culverts and other structures serving access and haul road.	MC 717.17 (j) (3)(ii) revised UMC 817.165(a)(b) Title 40-10-17(q)		Abated, Assessments made and paid
N81-2-8-2 1 of 2 8/6/81	Failure to maintain designed sediment control measures so as to prevent additional contributions of sediment to streamflow or to runoff outside the permit area.	UMC 817.45 UMC 817-165 40-10-18(2)(i) Utah code Annotated 1953	Entire operation	

VIOLATION LIST

Violation Number	Violation	Reg. No.	Location	Status
82-1-2-10 4 of 10	Failure to remove topsoil	UCA-40-10-17(e)	West 3rd Main Access Road	Terminated
82-5-2-10 4 of 10	Failure to mark permit mine identification sign	UCA-40-10-19(4) UMC 817.11(d) UMC 817.11(c-1,2,3)	Entire Operation Area	Terminated
82-5-2-10 2 of 10	Operating without a permit	UCA 40-10-9(1)	¼ mile south scalehouse	Vacated
82-5-2-10	Failure to place noncoal waste permitted area	UCA 40-1--9(1) UMC771.19 UMC817.89 UCA-40-10-20(5) UCA 40-10-22(2) (a)(i)	Uppermost Pad	Terminated
82-1-5-1	Failure to operate in accordance of approved plan	UMC 771.19 817.43 B,C,F 817.45 817.100 817.170-176	Power Pole Line	Terminated
82-1-3-1	Failure to store noncoal waste in approved manner	UCA 40-10-22(1)(c) UMC 817.89 a,b,c,	Permit Area	Terminated
Cessation Order 82-1-3-1	Same as above failure to abate			Vacated

VIOLATION LIST

Violation number	Violation	Reg. no.	Location	Status
82-5-2-10 10 of 10	Failure to construct sediment control measures	UCA-40-10-18, 2 i (ii) UMC 817.41 UMC 817.42(a)(1)(6) UMC 817.43 c UMC 817.45(1)	Sed. pond west side of Bear Creek	Terminated
82-5-2-10 9 of 10	Failure to construct diversions	UCA-40-10-15 (2)(i)(ii) 817.43c 817.42 a(1) 817.41	Access haul road	Terminated
82-6-2-10 8 of 10	Failure to conduct coal mining to safeguard hydrology	UCA 40-10-18 2 (i) UMC817.41(a) UMC817.46(a)(1)	Access haul road ¼ mile south P-A	Vacated
82-5-2-10 6 of 10	Failure to maintain sediment control-erosion.	UMC 817.45 (iiie)	Downslope Bear Canyon Mine Area	Terminated
82-5-2-10 6 of 10	Failure to conduct coal mining to safeguard hydrology	UCA 40-10-18 (2)(i) UMC 817.41 (a) UMC 817.44 UMC 817.45	Bear Creek Stream Channel	Terminated
82-5-2-10 5 of 10	Failure to protect topsoil	UCA-40-10-17 (e)UMC 817.23	Sed. Pond Topsoil Pile	Terminated

VIOLATION LIST NUMBER (1)

Violation no.	Violation	Reg. no.	Location	Status
N81-2-13-4 3 of 4 10/14/81	Failure to place underground development waste in a designated disposal area within the permit area as authorized in the approved permit conducting surface operations without a permit.	UMC 817.71 40-10-9(1) Utah Code Annotated 1953	Reclaimed site across the stream from the sediment pond.	Abated, Assessments made and paid
N81-2-13-4 4 of 4 10/14/81	Failure to maintain sediment pond to prevent short circuiting. Failure to maintain sediment control measures to prevent additional contribution of sediment to streamflow and to runoff outside the permit area	UMC 817.45 UMC 817.46(e) 40-10-18-2 (1)(ii) Utah Code Annotated 1953	Breach in sediment pond.	

VIOLATION LIST NUMBER (2)

Violation Number	Violation	Reg. No.	Location	Status
82-1-3-4 1 of 4	Failure to pass runoff from disturbed area through a sediment control structure.	817.42(a)(1)	Main access and haul road.Upper end of main stockpile pad.	Terminated
82-1-3-4 2 of 4	Failure to divert runoff away from disturbed area	817.45(i) 817.45(d)	Diversion ditch adjacent to main access and haul road.	Terminated
82-1-3-4 3 of 4	Failure to store non-coal waste in an approved manner	817.89(a)(b)(c)	Entire operation	Terminated
82-1-3-4 4 of 4	Failure to eliminate fire hazards and otherwise eliminate conditions which constitute a hazard to the health and safety of the public.	40-10-18(2)(h)	Coal fires on downslope below crusher facility	Terminated

VIOLATION LIST

Violation Number	Violation	Reg. No.	Location	Status
83-5-3-1	Failure to control runoff-diversions & sediment	UCA 40-10-18(i)(ii) UMC 817.41 UMC 817.42(a)(1) UMC 817.43(c)	Trail Canyon along access road	Terminated
83-5-1-4 1 of 4	Operating without a permit	UCA 40-10-9(1)	Out of permit area	Vacated
2 of 4	Failure to remove topsoil	UCA 40-10-17(e) UMC 817.21-23	Failure to abate 82-5-10	Terminated
3 of 4	Failure to maintain sediment control-erosion	UMC 817.45(iii)(e)	Failure to abate 83-5-2-10 7 of 10	Vacated
4 of 4	Failure to protect hydrologic balance	UCA 40-10-18(2)(i) UMC 817.41 (a) UMC 817.42 (a)(1)	Failure to abate 83-5-2-10 8 of 10	Vacated
83-5-9-1	Conduct reclamation activities without a permit	UMC 771.19 UMC 817.11	Upper Switchback Trail Canyon	Vacated
83-5-7-1	Operating without a permit	UCA 40-10-9 UCA 40-10-22(i)(c)	Bear Canyon Scale Area	Terminated
83-5-6-1	Failure to control runoff	UCA 40-10-18(2)(i)(ii) UMC 817.41 UMC 817.42(a)(1) UMC 817.43(e)	Upperroad Trail Canyon	Terminated

VIOLATION LIST

Violation Number	Violation	Reg. No.	Location	Status
83-1-2-3 1 of 3	Mining Activity-danger to public public	UCA 40-10-22(1)(6) UCA 40-10-1(2)	Haul Road Bear Canyon Mine	Terminated
2 of 3	Operating without a permit	UCA-40-10-9	Haul Road Bear Canyon Mine	Terminated
3 of 3	Class I haul road and failure to opperate	UMC 771.19 UMC 771.13 (b)(3) UMC 817.150-155	Haul Road Bear Canyon Mine	Terminated
83-1-2-1	Failure to design and maintain diversions; failure to abate 83-5-2-2	UCA 40-10-9(1) UMC 817.43 a,b,c, UMC 817.45(i)	See 85-5-2-2	Terminated
83-5-2-2 1 of 2	Failure to operate under approved permit	UCA-40-10-18(i) UMC 771.11 UMC 771.19	Bear Canyon Scale Septic Tank	Terminated
2 of 2	Failure to construct diversion	UCA 40-10-18(i) UMC 817.43(a)(b)(c) UMC 817.45(i)	Bear Canyon Fan and Crusher	Terminated
83-5-8-3	Failure to operate under approved plan.	UMC 771.13 UMC 771.14	New Truck Loadout Bear Canyon	Pending -DOGM approval
2 of 3	Failure to construct sed. pond as approved	UMC 817.46-47	Sediment Pond Bear canyon	Pending
3 of 3	Failure to control runoff-diversions	UCA-40-10-18 (2)(i) UMC 817.43 UMC 817.43	Drainage area-Fan	Terminated

VIOLATION LIST

Violation Number	Violation	Reg. No.	Location	Status
83-5-5-3 1 of 3	Failure to adequately protect topsoil	UCA 40-10-17(e)	Entire operation	Terminated
2 of 3	Failure to construct sediment control	UCA 40-10-18(2)(i)(ii) UMC 817.45 & 46	Catch basin Scalehouse	Terminated
3 of 3	Failure to conduct mining to protect hydrologic balance	UCA 40-10-18(2)(i)(ii) UMC 817.41 UMC 817.45	Bear Creek	Terminated

VIOLATION LIST

Violation Number	Violation	Reg. No.	Location	Status
83-5-5-3 1 of 3	Failure to adequately protect topsoil	UCA 40-10-17(e)	Entire operation	Terminated
2 of 3	Failure to construct sediment control	UCA 40-10-18(2)(i)(ii) UMC 817.45 & 46	Catch basin Scalehouse	Terminated
3 of 3	Failure to conduct mining to protect hydrologic balance	UCA 40-10-18(2)(i)(ii) UMC 817.41 UMC 817.45	Bear Creek	Terminated
83-1-3-1	Reclamation activities without an approved permit	UMC 771.19 817.111	Trail Canyon	Terminated
84-7-1-1	Failure to operate with an approved mine plan	UMC 771.19	Bear Canyon	Terminated
84-4-15-1	Failure to construct emergency spillway	UMC 817.46J	Trail Canyon sed pond Trail Canyon	Terminated

Form No. [illegible]
ALTA Owner's Policy
Form B - 1962
(Amended 10-17-70)
(Standard Coverage)

OWNER'S POLICY

POLICY OF TITLE INSURANCE

ISSUED THROUGH THE OFFICE OF

SOUTHEASTERN UTAH TITLE COMPANY

SEAL

[illegible] BUILDING • PRICE, UTAH 84501
(801) 637-1245

SUBJECT TO THE EXCLUSIONS FROM COVERAGE, THE EXCEPTIONS CONTAINED IN SCHEDULE B AND THE PROVISIONS OF THE CONDITIONS AND STIPULATIONS HEREOF, FIRST AMERICAN TITLE INSURANCE COMPANY, a California corporation, herein called the Company, insures, as of Date of Policy shown in Schedule A, against loss or damage, not exceeding the amount of insurance stated in Schedule A, and costs, attorneys' fees and expenses which the Company may become obligated to pay hereunder, sustained or incurred by the insured by reason of

1. title to the estate or interest described in Schedule A being vested otherwise than as stated therein,
2. any defect in or lien or encumbrance on such title,
3. lack of a right of access to and from the land, or
4. unmarketability of such title.

IN WITNESS WHEREOF, First American Title Insurance Company has caused this policy to be signed and sealed by its duly authorized officers as of Date of Policy shown in Schedule A.

First American Title Insurance Company

FIRST AMERICAN TITLE INSURANCE COMPANY
INCORPORATED
SEPTEMBER 24
1968
CALIFORNIA

BY [signature] PRESIDENT

ATTEST [signature] SECRETARY

COUNTERSIGNED

[signature] ASSISTANT SECRETARY

SCHEDULE A

Total Fee for Title Search, Examination
and Title Insurance [redacted]
Order No. 3593-E

Amount of Insurance: [redacted]

Policy No. [illegible]

Date of Policy: September 25, [illegible] at 3:10 p.m.

1. Name of Insured:

C.O.P. COAL DEVELOPMENT COMPANY,
a Utah corporation.

2. The estate or interest referred to herein is at Date of Policy vested in:

C.O.P. COAL DEVELOPMENT COMPANY,
a Utah corporation.

3. The estate or interest in the land described in Schedule C and which is covered by this policy is

FEE SIMPLE

SCHEDULE C

The land referred to in this policy is situated in the County of Emery, State of Utah, and is described as follows:

T16S, R7E, SLBM

Section 26: E½NW¼ and all that part of SE¼NE¼ and the SE¼ lying West of a Northeast-Southwest fault line.

EXCEPTING THEREFROM all coal.

14: S½
22: E½NE¼, NW¼SE¼, NE¼SE¼
23: All
24: NW¼NW¼ and all that part of the SW¼NW¼ and the W½SW¼ lying West of a Northeast-Southwest fault line.

25: All that part of the NW¼NW¼ lying West of a Northeast-Southwest fault line.
26: W½NE¼, NW¼NW¼, and all that part of the NE¼NE¼ lying West of a Northeast-Southwest fault line.

* * *

AGREEMENT

This agreement made and entered into this 3rd day of August 1983, by and between Emery County, a body corporate and politic (County), and Co-Op Mining Company, a Utah general partnership (Co-Op),

WHEREAS, there is an existing road in Emery County known as Bear Creek Road, and

WHEREAS, Co-Op requires extensive use of said road, and

WHEREAS, due to said extensive use, said road should be relocated for the health, safety and welfare of the citizens of County as well as others who may have occasion to use said road,

NOW, THEREFORE, be it agreed as follows:

1. The parties hereto agree and acknowledge that the southern 0.65 miles of the road known as Bear Creek Road is a County road. Said County road runs from State Road 31 in a northerly direction for approximately 0.65 miles to a presently existing gate. Thereafter the road is a private road.

2. That Co-Op will relocate the Bear Creek Road according to the plans and specifications prepared by the Emery County Engineer and described on the document entitled Bear Canyon County Road Relocation dated October 12, 1982.

3. Co-Op will relocate the Road according to the plans and specifications referred to above at their expense. Co-Op will reimburse County for engineering costs incurred by County concerning the preparation of said plans and specifications and site inspections up to One Thousand ($1,000.00) Dollars.

4. Co-Op will indemnify and defend County for any damage caused, or loss incurred to or claim made by any public or private individual, firm, group, association, partnership or corporation as a result of the construction conducted to relocate Bear Creek Road. Said indemnification will continue until such time as County approves the completed roadway and accepts the construction thereof.

5. Co-Op acknowledges and accepts the easements of North Emery Water Users and Huntington City which exist in, along and across the relocate Bear Creek Road. Said easements are in existence on the ground. Co-Op's acknowledgment thereof herein recognizes and preserves said easements.

6. Co-Op agrees to encase water lines of North Emery Water Users and Huntington City in nestable corrugated pipe pursuant to plans and specifications prepared by the Emery County Engineer.

7. Co-Op agrees to allow access to other property served by the relocated Bear Creek Road. Said access shall be allowed to the owner of the property, their successor in interest or any other individual, firm, group, association, partnership or corporation who requires access due to their association with the owner or because the owner has granted permission to the individual, firm, group, association, partnership or corporation to go upon his property. Co-Op will not withhold access due to the type of activity which the then owner or his agents, employees or invitees intend or in fact conduct.

8. Co-Op will provide a completion and performance bond to Emery County upon the execution hereof in the amount of Twenty-Five Thousand ($25,000.00) Dollars which will remain in force and effect for twelve (12) months after the date said road is accepted by County as indicated in paragraph 4 above.

9. Co-Op will provide liability insurance in an amount not less than Five Hundred Thousand ($500,000.00) Dollars to be in force during the construction of said road. Said policy will name County as an insured.

10. Co-Op agrees to complete said road in a timely manner not to exceed eighteen (18) months from the date of this agreement. County may make demand upon the bonding company under the bond provided pursuant to paragraph 8 above and secure completion of the relocation in the event construction is not completed within the agreed upon eighteen (18) months.

11. It is further understood that any additional improvements of the relocated Bear Creek Road will be at the expense of all primary users.

12. The Co-Op agrees to reclaim that portion of the old Bear Creek Road according to the specifications and requirements of the Bureau of Land Manager (BLM).

13. That the Co-Op agrees to provide Emery County with the necessary easement agreements with the Utah Department of Transportation.

14. Co-Op acknowleges and agrees to comply with standard number 6.3.8 "Protection Zone" of the Utah State Health Drinking Water Standards as it applies to supplies of drinking water in Bear Canyon.

15. County agrees to inspect the relocated Bear Creek Road within ten (10) days after notification by Co-Op of the completion thereof. County must within five (5) working days of said inspection accept the road or notify Co-Op of any deficiencies which must be then corrected by Co-Op within the time period outlined in paragraph 10 above. Should County fail to notify Co-Op of any deficiencies within five (5) working days, the road is deemed accepted by County and the twelve (12) month period indicated in pargaraph 8 above begins to run from the sixth (6th) day after inspection.

IN WITNESS WHEREOF, this agreement is executed the day and year above first written, at Castle Dale, Utah, pursuant to a resolution of the Emery County Board of Commissioners at a regularly scheduled meeting of the Board.

EMERY COUNTY, a body politic and corporate,

ATTEST

County Clerk

By _____
Chairman of the Emery County Board of Commissioners

IN WITNESS WHEREOF this agreement is executed at Huntington, Utah.
DATED this 3rd day of August, 1983.

CO-OP MINING COMPANY, a Utah general partnership

By _____
a General Partner

R-226 (Rev. 1/77)
HIGHWAY RIGHT-OF-WAY
ENCROACHMENT

PERMIT

10844

District No. 4 Date October 1, 1982 Application of Co-op Mining Company, By Vondell Owen, Title Manager

Address P.O. Box 1245, Huntington, Utah Phone 748-5238, in Emery County is hereby granted, subject to the Regulations for the Control and Protection of State Highway Rights-of-Way, Standard Specifications for Road and Bridge Construction, Specifications for Excavation on State Highways, General Safety Orders of the Industrial Commission, Safety Manual for Road and Bridge Construction, Instructions to Flagmen, the approved plans, and any special limitations set forth herein, permission for the purpose of excavate to construct an approach 30' wide for a coal haul road.

within right-of-way limits of Highway No. 31, State Maintenance Section No. 08-31-01, Milepost No. 32, in the following location:
about 12 miles northwest of the jct. of SR-10 & SR-31 on the east side of the highway.

Receipt of $5.00 permit fee is hereby acknowledged (delete where not applicable). The work permitted herewith shall commence October 2, 1982 and shall diligently be prosecuted to completion. The work shall be completed and all disturbed surfaces or objects restored on or before October 30, 1982. In the event work is commenced under this permit, the applicant agrees to prosecute the same to completion by the date herein above specified. In the event the applicant fails or refuses to complete the work the Utah Department of Transportation may, at its election, fill in or otherwise correct any existing impediments at the expense of and subject to immediate payment by the applicant.

Applicant shall execute a bond in the minimum amount of $1000, increased by multiples thereof as determined by the District Director, to insure faithful performance of the permittee's obligation. The bond shall remain in force for three years after completion of the work.

Before work permitted herewith is commenced, the applicant shall notify: John Cox at Huntington 687-9969 and commencement of said work is understood to indicate that the applicant will comply with all instructions and regulations of the Utah Department of Transportation with respect to performance of said work, and that he will properly safeguard said work to prevent accident and shall indemnify and hold harmless the Utah Department of Transportation from all damages arising out of any and all operations performed under this Permit.

Permittee shall not perform any work on State Highway right-of-way beyond those areas or operations stipulated on the permit.

If applicant fails to comply with Utah Department of Transportation regulations, specifications, or instructions pertinent to this permit, the District Director or his duly authorized representative may by verbal order suspend the work until the violation is corrected. If the applicant fails or refuses to comply promptly, the District Director or his authorized representative may issue a written order stopping all or any part of the work. When satisfactory corrective action is taken, an order permitting resumption of work may be issued.

Special Limitations: Per agreement with the B.L.M. & attached map.

(Signature of Applicant)

Approved by: [illegible]
For District Director

THIS COPY MUST BE CONSPICUOUSLY POSTED AT THE ENCROACHMENT SITE DURING THE ENTIRE ENCROACHMENT PERIOD

United States Department of the Interior

BUREAU OF LAND MANAGEMENT

Moab District
San Rafael Resource Area
P. O. Drawer AB
Price, Utah 84501

IN REPLY
REFER TO:

9230
UT-060-6434
UT-060-6438
(U-067)

SEP 19 1983

Mr. Wendell Owen
CO-OP Mining Company
P. O. Box 1245
Huntington, Utah 84528

Dear Mr. Owen:

Right-of-way U-52411 was issued to Emery County on September 15, 1983, for the Bear Canyon Road. A copy of the agreement between your company and the County has been received. We are therefore closing Trespasses UT-060-6434 and UT-060-6438.

Sincerely yours,

Area Manager

cc: Joe Helfrich, Utah Div. of Oil, Gas and Mining
4241 State Office Building, SLC, UT 84114

PLOT PLAN

BIG BEAR CANYON
OVERLAY ZONE

MAJOR UNDERGROUND FACILITY

CONDITIONAL USE PERMIT

JOHANSEN & TUTTLE ENGINEERING INC.

CASTLE DALE, UTAH

DATE: FEB 1982 DRWN: KAS

SCALE 1" = 100'

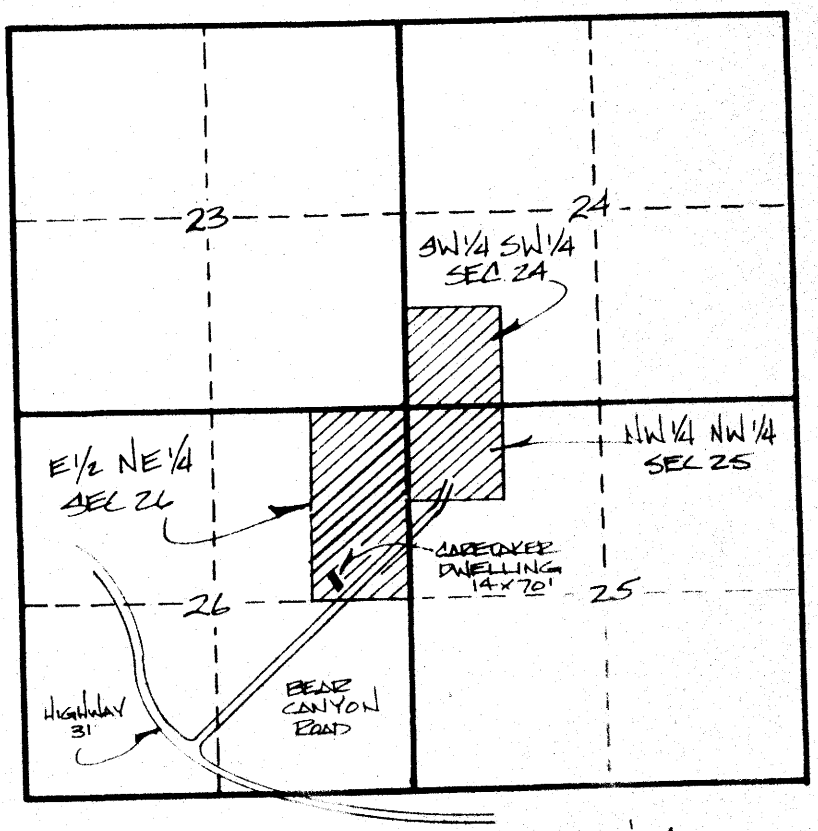
PROPERTY DESCRIPTION

THE SW1/4 OF THE SW1/4, SECTION 24,
T. 16 S., R. 7 E., SLB&M.

THE NW1/4 OF THE NW1/4, SECTION 25,
T. 16 S., R. 7 E., SLB&M.

THE EAST 1/2 OF THE NE1/4, SECTION 26,
T. 16 S., R. 7 E., SLB&M

CONTAINING 160 ACRES TOTAL



T. 16 S., R. 7 E., SLB&M

KEY MAP

SET TAB STOPS AT ARROWS

Certificate of Insurance

acord

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES LISTED BELOW.

NAME AND ADDRESS OF AGENCY

Insurance Agencies, Inc.
404 East 4500 South #B-14
SLC, Utah 84107

NAME AND ADDRESS OF INSURED

Co-op Mines, Ensign Corporation
53 West Angelo Ave.
SLC, Utah 84115

COMPANIES AFFORDING COVERAGES

COMPANY LETTER	
A	Agna - Centaur Ins. Co.
B	
C	
D	
E	

This is to certify that policies of insurance listed below have been issued to the insured named above and are in force at this time. Notwithstanding any requirement, term or condition of any contract or other document with respect to which this certificate may be issued or may pertain, the insurance afforded by the policies described herein is subject to all the terms, exclusions and conditions of such policies.

COMPANY LETTER	TYPE OF INSURANCE	POLICY NUMBER	POLICY EXPIRATION DATE	Limits of Liability in Thousands (000)	EACH OCCURRENCE	AGGREGATE
	GENERAL LIABILITY		4/28/83 thru	BODILY INJURY	$	$
	☐ COMPREHENSIVE FORM ☐ PREMISES-OPERATIONS ☐ EXPLOSION AND COLLAPSE HAZARD ☐ UNDERGROUND HAZARD ☒ PRODUCTS-COMPLETED OPERATIONS HAZARD ☐ CONTRACTUAL INSURANCE ☐ BROAD FORM PROPERTY DAMAGE ☐ INDEPENDENT CONTRACTORS ☐ PERSONAL INJURY	GL1001179	4/28/84	PROPERTY DAMAGE	$	$
				BODILY INJURY AND PROPERTY DAMAGE COMBINED	$ 1 mill	$
	M & C	subject to $250.00 Deductible		PERSONAL INJURY		$
	AUTOMOBILE LIABILITY			BODILY INJURY (EACH PERSON)	$	
	☐ COMPREHENSIVE FORM ☐ OWNED ☐ HIRED ☐ NON-OWNED			BODILY INJURY (EACH ACCIDENT)	$	
				PROPERTY DAMAGE	$	
				BODILY INJURY AND PROPERTY DAMAGE COMBINED	$	
	EXCESS LIABILITY			BODILY INJURY AND PROPERTY DAMAGE COMBINED	$	$
	☐ UMBRELLA FORM ☐ OTHER THAN UMBRELLA FORM					
	WORKERS' COMPENSATION and EMPLOYERS' LIABILITY			STATUTORY		
	OTHER					
	Water Wells					

DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES

Coal loading & unloading at railhead
Coal mining, colad dock operations by means of mechanical apparatus

Cancellation. Should any of the above described policies be cancelled before the expiration date thereof, the issuing company will endeavor to mail 30 days written notice to the below named certificate holder, but failure to mail such notice shall impose no obligation or liability of any kind upon the company.

NAME AND ADDRESS OF CERTIFICATE HOLDER

STATE OF UTAH &

HUNTINGTON CITY

DATE ISSUED Sept. 1, 1983

AUTHORIZED REPRESENTATIVE

UMC 782.21 Newspaper Advertisement and Proof of Publication

AFFIDAVIT OF PUBLICATION

STATE OF UTAH
County of Emery, } ss.

I, Robert L. Finney, on oath, say that I am the Publisher of The Emery County Progress, a weekly newspaper of general circulation, published at Castle Dale, State and County aforesaid, and that a certain notice, a true copy which is hereto attached, was published in the full issue of such newspaper for Four (4) consecutive issues, and that the first publication was on the 1st day of April, 19 81, and that the last publication of such notice was in the issue of such newspaper dated the 22nd day of April, 19 81

Robert L. Finney

Subscribed and sworn to before me this 7th day of May, 19 82

Isabelle Finney
Notary Public,

My Commission expires My Commission Expires October 28, 1983, 19

Residing at Price, Utah

Publication fee, $ 41.60

NOTICE OF FILING APPLICATION FOR COAL MINING AND RECLAMATION PERMIT

Co-op Mining Company, Box 300, Huntington, Utah, hereby announces its intent to file application for a coal mining permit for the Bear Canyon mine with the Division of Oil, Gas, and Mining under the laws of the State of Utah. A copy of the complete application is available for public inspection at the Emery County Recorder's Office, Emery County Court House, Castle Dale, Utah 84513. Written comment on the application should be submitted to the State of Utah Oil, Gas, and Mining Division, 1588 West North Temple, Salt Lake City, Utah 84116.

The area to be mined can be found on the USGS Hiawatha quadrangle map. The approximately 820 acres of the permit area are on private property (fee coal area) described as follows:

Area 16 South; Range 7 East SLM

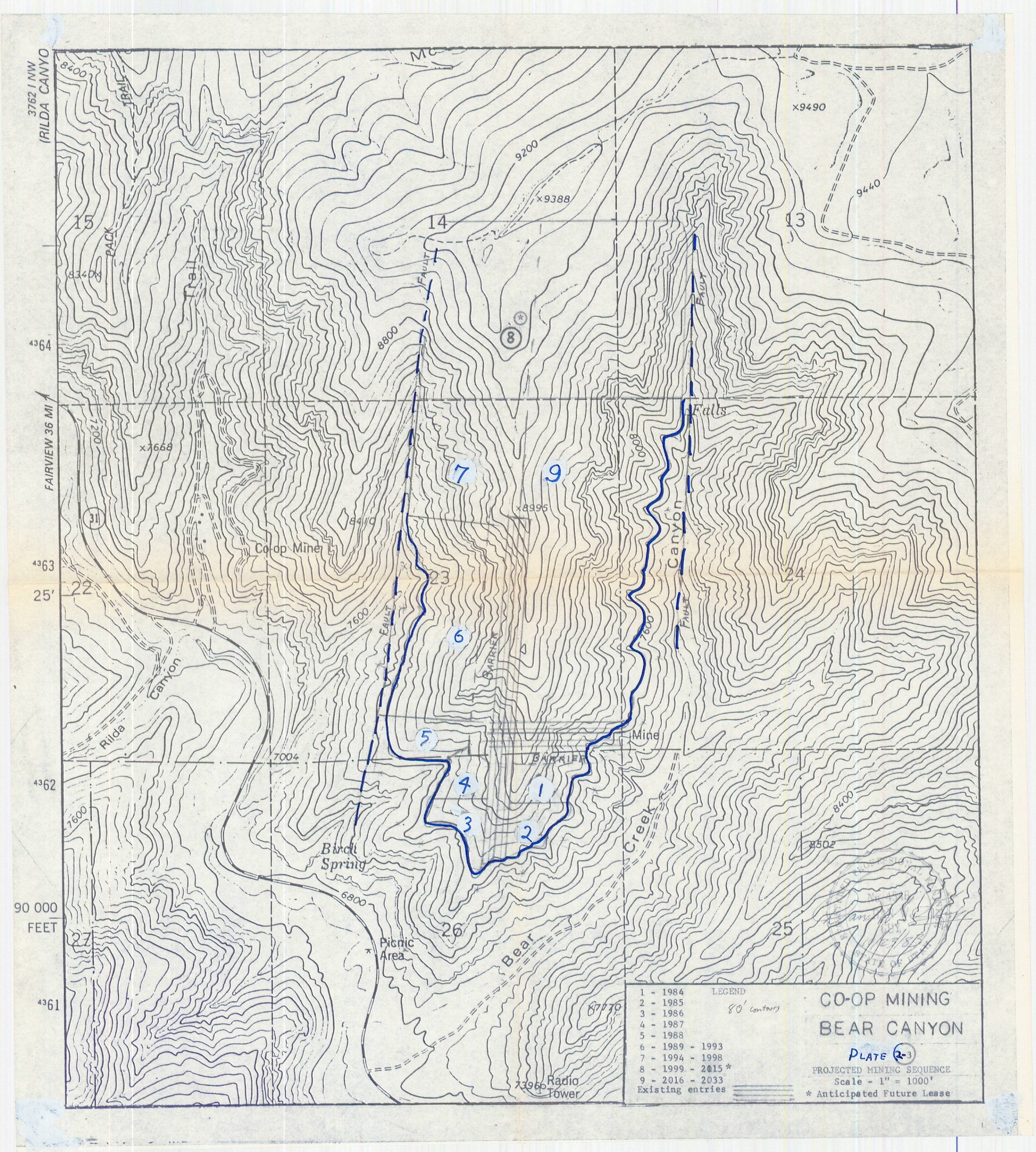
Sec. 14; SW ¼

Sec. 23; E ½; E ½ NW ¼, E ½ SW ¼; SW ¼ SW ¼

Sec. 24; All West of the N-S fault

Sec. 25; All West of the N-S fault

Published in the Emery County Progress April 1, 8, 15 and 22, 1981.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(RILDA CANYO
FAIRVIEW 36 MI
90 000
FEET
Co-op Mine
Rilda Canyon
Birch Spring
Picnic Area
Bear Canyon Creek
Falls
Mine
Radio Tower
BARRIER
FAULT
PACK TRAIL
9200
9388
9490
9440
8800
8400
7600
7004
6800
7200
7668
8995
8410
8502
7396
8770
1 - 1984
2 - 1985
3 - 1986
4 - 1987
5 - 1988
6 - 1989 - 1993
7 - 1994 - 1998
8 - 1999 - 2015 *
9 - 2016 - 2033
Existing entries
LEGEND
80' contours
CO-OP MINING
BEAR CANYON
PLATE 2-3
PROJECTED MINING SEQUENCE
Scale - 1" = 1000'
* Anticipated Future Lease

CHAPTER 3

OPERATION AND RECLAMATION PLAN

CHAPTER 3

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BEAR CANYON MRP

4/30/84

This material replaces corresponding chapters
and pages in Co-Op Mining Company's MRP Submittal of 10/26/83

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3.1 SCOPE

This part describes the actions and procedures of Co-op Mining Company to satisty the requirements for underground mining operations and reclamation.

3.2 SURFACE FACILITIES - EXISTING

The mine which existed at the proposed site has been abandoned for over 30 years and subsequently there is no evidence of long existing facilities.

3.3 SURFACE FACILITIES - NEW

Subsection 3.3.1 and 3.3.2 deal exclusively with proposed new facilities.

3.3.1 Site Selection and Preparation of Proposed Facilities

Plate 2-2 is an overlay of the new location of all surface facilities. In addition an accurate determination of where each facility is in relationship to the existing topographic as well as structual fixtures such as highways.

3.3.2 Portals

3.3.3 Surface Buildings and Structures

The present plan calls for the following structures:

Surface structures will consist of; a single building complex containing shops, parts warehouse, bath house, and mine offices; truck scales, weighman office, caretaker dwelling, mine run coal receiver bin, crushing and sizing structure, truck load out bins, stockpile towers, and conveyors to carry coal to storage and load out sites, etc.. A complete list is included on page 3-126 and shown on Plate 2-2. Detailed plans for each structure are attached in Addendum 3.3.4-A Plans.

3.3.4 Coal Handling, Storage and Loading

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Coal carried from the mine by conveyor belt to a receiver bin, conveyed to the sizing and crushing plant, the lump removed and diverted to the lump bin, the rest of the oversized crushed, and the coal sized to meet the

various requirements of the different customers, then conveyed to the truck load out bins, or the stockpile area.

3.3.5 Power System, Transmission Lines and Substations

Power will be delivered by U.P. & L. transmission lines at 12,500 V. direct to a substation (See Plate 2-2), reduced to 480 V. for tipple use, and to 240 V. for shop and other use.

Surface power systems, transmission lines and substations will be removed and the areas reclaimed as prior when they are no longer required.

3.3.6 Water Supply System

A water right transfer has been applied for; if this is approved, a cistern system would be utilized. (See Appendix 3.3.6-A)

The system, which carries water from the Mine or Cistern to the loadout area, wash plant,

bathhouses and offices, consists of a 2-inch pipeline and water storage tanks, will be removed. The area will be topsoiled and revegetated. Plans and permit applications are attached in Appendix 3.3.6-A.

3.3.8 Water Diversion Structures

Water diversion structures will be maintained until revegetatated areas are well established and stable. Unless an accepted and approved use for these is established after mining, they will be removed as above; graded and revegetated.

3.3.9 Sedimentation Control and Water Treatment Facilities

This facility will be maintained as long as it is required to meet the effluent limitations of applicable federal or state laws for runoff or drainage. When their usefulness is ended, they will be removed and the sites reclaimed as described previously.

3.3.10 Storage, Waste and Refuse Areas

Not Applicable

bathhouses and offices, consists of a 2-inch pipeline and water storage tanks, will be removed. The area will be topsoiled and revegetated. Plans and permit applications are attached in Appendix 3.3.6-A.

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3.3.10 Storage, Waste and Refuse Areas

Co-Op will not generate coal refuse. Non-coal waste is addressed under"Surface Facilities."

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3.3.10 Storage, Waste and Refuse Areas

Co-Op disposes of underground development waste in abandoned areas underground in line with UMC 817.71-74 and MSHA regulations.

3.3.11 Transportation, Roads and Parking Areas

Roads and parking areas will be treated in the same manner as other working areas. Any asphalt or treated surfaces will be removed prior to reclamation. Approximately 1.2 miles of access road will be rehabilitated upon completion of mining. See Plate 3-1 and road agreement under Appendix 3.3.11.-A.

The Bear Canyon Road is approximately 1800' long from the gate to the scale house as shown on Plate 3-5. This road is constructed 30' wide and is surfaced with 6" of -3/4" gravel, crowned in the middle as shown on the cross-section. Drainage will be provided along the road by ditches with a minimum depth of 1.8 feet. Erosion protection, such as straw bales at 100' intervals or 6" median diameter rip-rap on a bed of -1" gravel 6" thick, shall be provided in all areas where velocities are expected to exceed 5 ft. per sec.. Culverts are installed as shown on the drawings; in addition, the two proposed 30" CMP culverts are now in place as indicated on the map. Culvert inlets will be protected by rock-lining or concrete headwalls. In areas where culverts are placed, at least 30" of headwater depth is available to allow for a variance to allow the 18" culverts to pass the 10 year-24 hour storm event. The culvert on the submitted drawing is to scale, and was installed with a trash

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rack to prevent plugging, a rock headwall at the inlet, and rip-rap at the outlet to prevent erosion.

This road will be maintained in such a manner that the performance standards will be met throughout the life of the entire transportation facility, including maintainance of the surface, shoulders, parking and side areas, and erosion control structures for safe and efficient utilization of the road.

Upon completion of the operation and reclamation of the mine site disturbed area, it is anticipated that this portion of the Bear Canyon Road will also be reclaimed. This will occur at approximately the same time as the final removal of the sedimentation pond and diversions on the mine site. The road surfacing material will be removed and either salvaged or disposed of within the pond site and buried. The reclamation will then be accomplished by ripping up the remaining base, spreading the material across the (roadway) disturbed area, and planting the area with the approved seed mix. During this time, all culverts shall be removed and either salvaged or disposed of in an approved landfill, and the natural drainage patterns shall be restored

The mine area and portal access road is approximately 2,112' long. A cross-section and profile of this road is

shown on Plate 3-5. Culvert locations and ditches are also shown on this drawing, as well as on Plate 3-1. This road is primarily used for access to the mine portals and other facilities. The road was originally constructed for access to the old Bear Mine, and has since been widened and fitted with proper drainage controls to protect the environment. The road is designed, used and maintained to meet the requirements of UMC 817.151 - 817.156, and to control or minimize erosion and siltation, air and water pollution, and damage to public or private property.

The road is located along the canyon floor above the stream, and along the stable slope leading to the portals. The overall grade of the road does not exceed 1:v:10h (10%) and the maximum pitch grade does not exceed 1v:6.5h (15%). The horizontal alignment is consistent with the existing topography and with the volume, speed, and weight of anticipated traffic.

As mentioned earlier, the initial road was constructed under pre-law conditions, using the cut/fill side-cast method. A stability analyses was performed on the road by Dames and Moore in 1981 (Appendix 3-F). Their conclusion was that the Bear Canyon Portal Access Road has a stability factor of safety of a minimum of 1.43, and ranges upward to 2.15.

Ditches and culverts have been added to the road to control run-off and safely pass the run-off from a 10 year-24 hour precipitation event. (See Plates 3-1 and 3-5). Ditches shall be maintained at a minimum depth of 1.8 feet, and at least 30" of headwater depth will be maintained at the inlet of the 18" culverts. Culverts are fitted with trash racks to prevent plugging, and buried and compacted a minimum of 30" to prevent crushing. In areas where velocities of run-off exceed 5 fps, erosion protection such as straw bales at 100' intervals or 6" median diameter rip-rap on a bed of 2" gravel/sand 6" thick shall be maintained. Culvert spacing conforms with the requirements of UMC 817.153(c)(z)(i Rock or concrete headwalls shall be provided at the inlet to all culverts, and rip-rap or other erosion protection shall be provided at the outlet.

The road is surfaced with 4" of -3/4 gravel, and is maintained in such a manner that the approved design standards are met throughout the life of the facility. Damage to the road from use or weather events shall be promptly repaired.

This road shall be removed upon completion of the mining operation. The timing and procedure of removal and reclamation is discussed in detail under the Backfilling and Grading Plan in Sec. 3.6.4. A detailed description of each road is included in Appendix 3-G.

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All roads, conveyors and other facilities shall be maintained in such a manner to prevent damage to fish, wildlife, and related environmental values. This is accomplished by:

1. Maintaining hydrologic controls, such as ditches, culverts, diversions and sedimentation ponds to assure that disturbed drainage is conveyed away from undisturbed drainages and either held or cleaned before releases.
2. Watering of roads as necessary to reduce fugitive dust.
3. Protection of wildlife within the permit area and reporting of sightings of threatened and endangered species.
4. Contemporaneous reclamation.
5. Advocating good-housekeeping practices to reduce the possibility of contamination of surface waters in the area.
6. Co-Op is committed that all support facilities will be restored to prevent damage to fish, wildlife and related environmental values and the possibility of additional contributions of suspended solids to streamflow or runoff outside the permit area will be minimal.

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3.3.12 Topsoil Storage Piles

Topsoil storage piles are located as shown in Plate 2-2. This material will be stockpiled, protected and seeded to prevent erosion. It will be recovered as needed to carry out the reclamation plan described herein.

3.3.13 Explosives Storage and Handling

Co-Op does not have an explosives storage facility within the permit area, and Co-Op does not anticipate the use of explosives in their normal mining operation. However, in the unlikely event the need arises, the following procedures will be adhered to:

Use of Explosives

There are no surface blasting activities incident to this under ground operation. There is a possibility os the need to use exlosives in the underground operation to advance through faults, dikes, or other rock strata too hard for cutting by the continuous miner. Any use of explosives in the underground operation will be in compliance with all applicable state and federal laws, and will be conducted by persons trained, examined and certified as provided by 30 CFR 850 and the Utah State Industrial Commission.

Blasting material will be stored in fire proof bullet proof magazines and clearly designated as an (Explosives Storage Area", as required by state and federal laws.

3.3.11 Transportation, Roads and Parking Areas

Roads and parking areas will be treated in the same manner as other working areas. Any asphalt or treated surfaces will be removed prior to reclamation. Approximately 1.2 miles of access road will be rehabilitated upon completion of mining. See Plate 3-1 and road agreement under Appendix 3.3.11.-A.

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3.3.13 Explosives Storage and Handling

Co-op does not anticipate the use of explosives in their normal mining operation. However, in the unlikely event the need arises, the following procedures will be adhered to:

Co-op will adhere to all State and Federal requirements, regulations and mandates applicable to the prescribed use and quantity. Including, but not limited to:

A federally approved storage facility.

An individual trained and certified in the use of explosives.

All forms, notifications and reporting procedures.

3.3.14 Relocation or Use of Public Roads

There are no public roads within the permit area.

3.3.14.1 Protective Measures

Access roads will be posted with "Authorized Personnel Only", speed and road information signs upon entrance to the property; use of these roads is restricted to authorized personnel. Security is maintained by adequate security personnel.

3.3.14.2 Maps

Plate 3-1 shows the location of all roads in the permit area.

3.3.14.3 Cross-Sections

Plans and cross-sections of the new access road to the portal area are show on Plate 3-1 and Section D-D ; Mine Access Road - Construction and Reclamation Plan.

3.3.15 Total Area for Surface Disturbance During Permit Term

Total area or surface disturbance during the permit term is approximately 10 acres. Individual areas are shown on Plate 3-2 .

3.3.16 Additional Area for Surface Disturbance for Life of Mine

Surface disturbance in addition to what has already

been disturbed is not anticipated.

3.3.17 Detailed Construction Schedule

Construction of coal handling and processing facilities to begin on or about April 1, 1981, scheduled for completion by Aug. 1, 1984. Construction of truck scale and caretaker dwelling to begin on or about Sept. 1, 1982, scheduled for completion by Sept. 1, 1984. Construction of shop complex to begin on or about Aug. 15, 1983, scheduled for completion on or about Aug. 1, 1984.

3.4 OPERATION PLAN

We are entering the first coal seam through an existing mine. The underground mining plans, (roof control, ventilation, barrier pillar, and etc.) are included as Appendix 3-B .

3.4.1 Mining Plans

There are three seams in the Bear Canyon property, the Upper Bear, (upper), the Bear or Blind canyon seam (middle), and the Hiawatha (lower). The old existing mine is in the middle seam. Our projected plan is to

begin mining in the existing mine.

3.4.1.1 Portals, Shafts and Slopes

See Plate 3-1.

3.4.1.2 Mining Methods

Room & Pillar Methods will be employed.

3.4.1.3 Projected Mine Development

See Plate 2-3.

3.4.1.4 Retreat Mining

Underground coal mining procedures follow two basic approaches to the recovery of involved reserves. These are advancing and retreating. Sometimes considerable advantage can be obtained if the entire reserve can be developed and then mined from the most remote area back to the portal. However, this is not generally possible. As a result, development work and

mining are usually accomplished simultaneously as the workings advance into the property. Depending upon the mine layout, this can be an advancing system until development reaches the property boundary, after which it can become retreating and mine back to the portal. Thus, we have an advance-retreat situation for the entire property.

This concept can be applied to various parts of the mine as well - for instance, the main entries, submain entries and even panels. If mining advances along both sides of any set of entries from their starting point to their termination, the system is advancing; if mining is not started until the entries reach their limit and then begins at the termination point on both sides, the system is retreating. If mining begins at the initiating point of the entries on one side and advances to the end, then moves to the other side and works out to the starting point, it becomes an advance-retreat system.

Frequently this method is attractive, as it permits high production work to proceed in combination with development, creates favorable strata control conditions and, if done properly, facilitates ventilation and enhances safety of the operation. An overall advance-retreat system is projected for this mine. However, where longwall mining is used, the faces will retreat along the panel entries.

Advance-retreat is not to be confused with first and second mining, which applies primarily to room and pillar work. First mining refers to the excavation of rooms and entries, leaving the intervening pillars of coal in place. Second mining can accompany first mining as it advances into a solid block of coal, in which case it is advancing; or it can retreat through an area which has been first-mined. The former is probably the safer and preferred method. It will be used where second mining is applicable in the Bear Canyon Mine.

3.4.1.5 Roof Control, Ventilation, Water Systems, Dust Suppression, Dewatering and Electrical

a. Roof Control

Roof control is described in the approved roof control plan (Appendix 3B). Basically, mine roofs are bolted on 5-foot centers with either expansion shield or resin grouted bolts not less that 48 inches long. Roof bold plates and, if desired, wooden cap pieces are used. Wooden posts and cap pieces can also be installed as needed.

Generally, roof strata are not expected to create major difficulties. The roof of the coal seams are predominatly sandstone; it provides good anchorage for roof bolts.

Floor strata throughout appear to be adequate and should create few problems. Some minor floor heaving may occur.

b. Ventilation

A fan with a combined capacity of 850,000 ft.

Table 3-1

Coal Reserves - Bear Canyon Mine

Coal Seam	Surface Acres of Seam	Avg. Thickness of Coal	Coal Reserves In Place	Coal Reserves Recoverable
Bear Canyon Seam	750	10'	13,065,500	6,532,500
Hiawatha Seam	800	5'	6,968,000	3,484,000
		TOTAL	20,033,000	10,016,500

3/min. supply air to the underground mining units.

Intake air is carried in the entries on one side of a set, while return air is carried through the entries on the other side. Air is directed through the mine by stoppings, doors, overcasts, regulators and brattice cloth. After sweeping the working faces of each section the air is directed into the return aircourses and out of the mine. Little or no methane gas is generated in any of the Blackhawk seams.

c. Dewatering, Water Systems and Dust Suppression

Water generated in the mine is collected in sumps and used at the mine. Some water from the roof is collected and pumped directly outside for use in the bathhouses and as drinking water in the offices. Tests for potability are made bi-monthly. Water also serves for sprays on the machines at the working faces,

on the coal at belt heads and transfer points and for storage in the 5,000 gal. underground reservoir for the wash plant. Presently water generated is used or contained at the mine; there is no discharge to surface waters. However, a National Pollution Discharge Elimination System (NPDES) permit has been obtained in case increased volumes are encountered.

d. Electrical

Electric power is currently purchased from a public utility at 12,500 V. and distributed over the surface of the property through company-owned overhead and buried transmission lines. At the mine portals, company substations convert the power to 13,200 V. for underground distribution and 440/220/120 V. for use on the surface.

Underground distribution voltages are transformed to 440/220/120 V. at a power center for use by the machines. All circuits are isolated by switches and protected by adequate circuit breakers and overload devices as required by law.

3.4.2 Barrier Pillars

Pillars of coal generally are left underground to protect a surface or underground feature which must be maintained and protected for the life of the mine (main entries) or permanently (oil or gas wells). The size of some is specified by law; others are designed by the operator to provide the protection needed. Those along the outside property boundary will be 100 feet wide. Shaft pillars will be large enough to prevent damage by subsidence, outcrops will be protected by a minimum of 200' barrier pillars.

3.4.2.1 Protection of Oil, Gas and Water Wells

There are no active or abandoned oil or gas wells within the permit boundary.

3.4.2.2 Protection of Manmade Features (Surface & Subsurface)

Manmade features and structures do not exist on the mineable portion of the permit area. There are some forest trails but they are all located beyond the coal outcrops. Maxi-

mum coal recovery in the controlled uniform manner planned for this mine should result in even surface subsidence with minimum disturbance.

3.4.2.3 Protection of Natural Surface Structures & Streams

Co-Op is committed to maintain a minimum of a 200' barrier pillar to the outcrop to minimize detrimental impacts to nesting raptor in the event of an escrapment failure. The stream channels will be safeguarded through protective berms and sediment controls on all disturbed waters.

3.4.2.4 Property Boundaries

Area boundaries of individual leases and fee property are shown in Plate 2-1. Total area covered by this permit is that enclosed by the heavy outside line. Protection of these lines and property adjacent to the permit area is provided by continuous barrier pillars 100 feet wide or wide enough to prevent subsidence across the boundary resulting from angle of draw.

3.4.2.4.1 Buildings Within 1,000 Feet of Permit Area

No buildings lie within 1,000 feet of the permit area.

3.4.2.4.2 Existing Public Roads

The main access road to the property is a public road. It provides access from Huntington Canyon to the mine. Access beyond the gate entrance to the mine is controlled by the company and the road is posted with no trespassing, speed control and general traffic control signs. When mining has been completed, the road would be reclaimed.

3.4.2.5 Outcrop Protection

In most areas, the coal outcrops are buried. That is, they are not visible from the surface, either because they are covered to some depth with overburden or because, in many areas, the coal has been burned for some distance from the surface. Where neither of these situations exist, routine tests of the coal may show that it has been "weathered" or "oxidized" and mining would be stopped within 200 feet of the outcrop.

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The main access road to the property is a public road. It provides access from Huntington Canyon to the mine. Access beyond the gate entrance to the mine is controlled by the company and the road is posted with no trespassing, speed control and general traffic control signs. When mining has been completed, the road would be reclaimed.

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3.4.3 Conservation of Coal Resource

Maximum recovery of this reserve will be practiced from the time Co-op Mine begins mining on this property. In addition, mining plans have established mine layouts to reach all areas of the property and, at the same time, by the adoption of pillar recovery techniques in room and pillar work, raise the percentage of recovery of reserves in the mining area to the maximum. Whereas room and pillar methods without pillar mining recover approximately 50% of the coal, the above procedures show recovery of 80% to 90% in the mining area or close to 60% overall.

Seams will be mined to a minimum thickness of 5 feet which is the lower limit for operation of the equipment that must also mine to full seam heights of 10 feet or more.

Barrier pillars to protect main and submain entries have been made large enough (200 feet or greater) to assure preservation of the entries for their useful life. When the area

they service is mined out, the entry pillars will be recovered on the way out.

3.4.3.1 Recovery Factors

Various factors and combinations of factors affect the amount of coal recovered from any given area of a reserve. Natural conditions such as incompetent roof strata, soft floor strata, water, depth of overburden and residual tectonic forces in the strata influence operating procedures and their effectiveness. Manmade conditions including mine layout, mining sequences and operating procedures can significantly influence the amount of overall recovery.

Present indications of natural conditions within the permit area are encouraging. Roof and floor conditions are generally satisfactory with the exception of some faulting, which may create difficulties.

Burned areas of coal along the outcrops also are not definitely delineated. This will affect the total in-place reserve estimate if

such burning has penetrated the seam to a greater distance than anticipated.

Co-op Coal Company's engineers have assured recovery of the highest percentage of in-place reserves by adoption of sound engineering principles in design and strict observance of these principles in operation.

3.4.3.2 Projected Maximum Recovery and Rate

The mining systems adopted by Bear Canyon Mine for use on this property will assure maximum recovery of the reserve with thorough application of the most advanced current mining technology and equipment. Pillar recovery in room and pillar work follows procedures that assure thorough and uniform removal of the coal to maintain effective roof control over the working and adjacent areas.

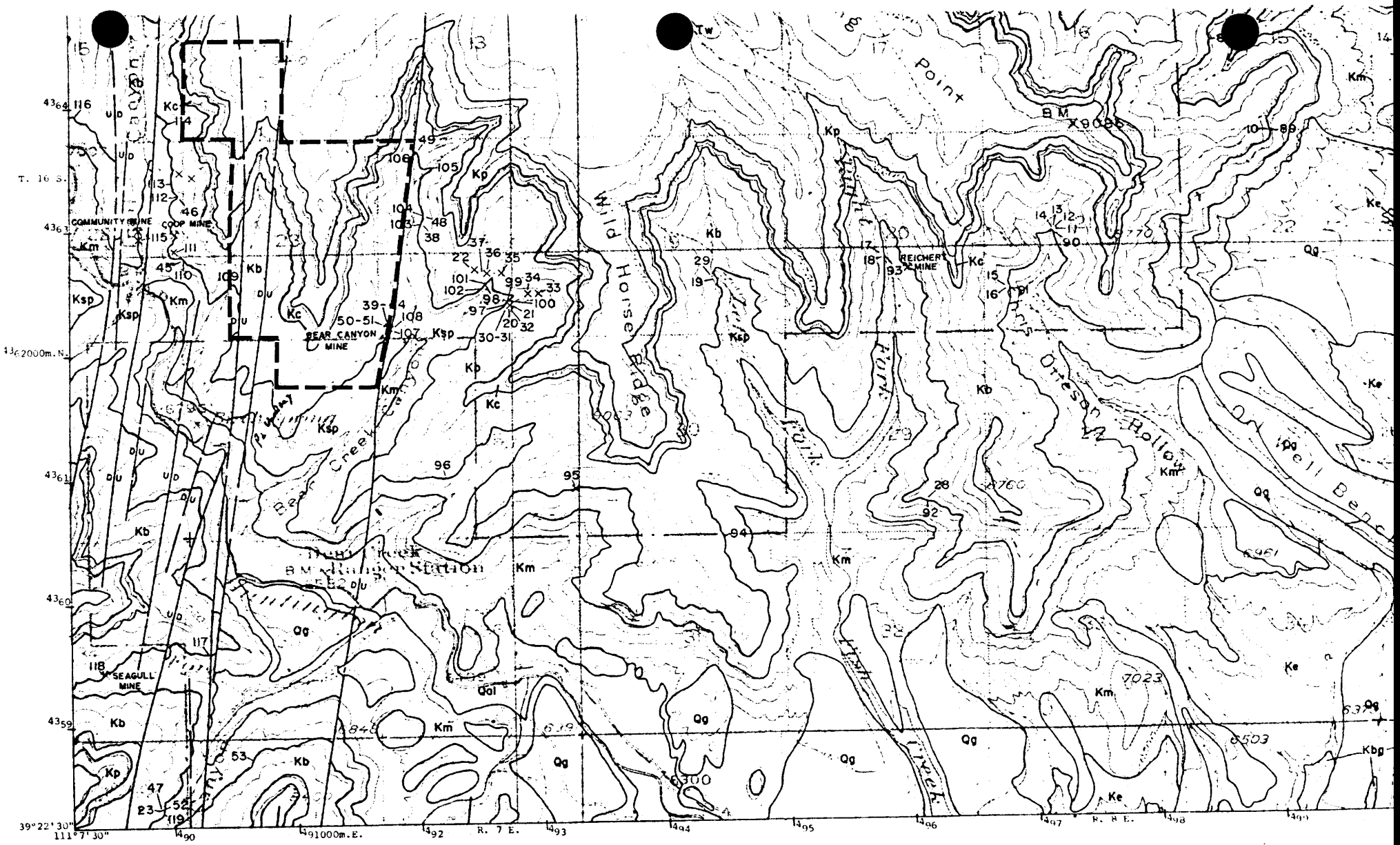
3.4.3.2.1 Recoverable Reserves in the Permit Area

Table 3-1 in Section 3.4.1 shows the reserves in each seam determined from our most recent data.

Co-Op Coal Company plans to extract all coal reserves, to the extent allowed by economics, safety conditions and prudent mining practice, from the lands it controls.

The "upper seam" in this area is the Upper Bear Canyon Bed, which is probably just a split off the main Bear Canyon Seam in which the mine is located. This seam lies only 15' to 20' above the Bear Canyon Seam at the minesite, and is evidenced only by a ledge and some burning. Speiker and Doelling have both referred to a probable upper split of the Bear Canyon Seam in this area, likely with a small lateral extent and little, if any, mining potential. An additional seam outcrops about 200' above the mine portals; however, this is one of the "upper beds" listed on Table 1, page 6-15, and apain, is not considered to have any economic potential due to limited lateral extent and extreme burning of seams in this horizon (Doelling p. 6-14).

Due to the burning, questionable lateral extent and inability to trace these upper seams (or splits), and due to the close proximity of the Upper Bear Canyon split to the main bed



TOPOGRAPHY BY
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SCALE 1:42240

Geology and coal data by
E. M. Spieker, 1931, USGS

PERMIT AREA

Coal and geology map, Hiawatha NE quadrangle

FIGURE 3.4-1

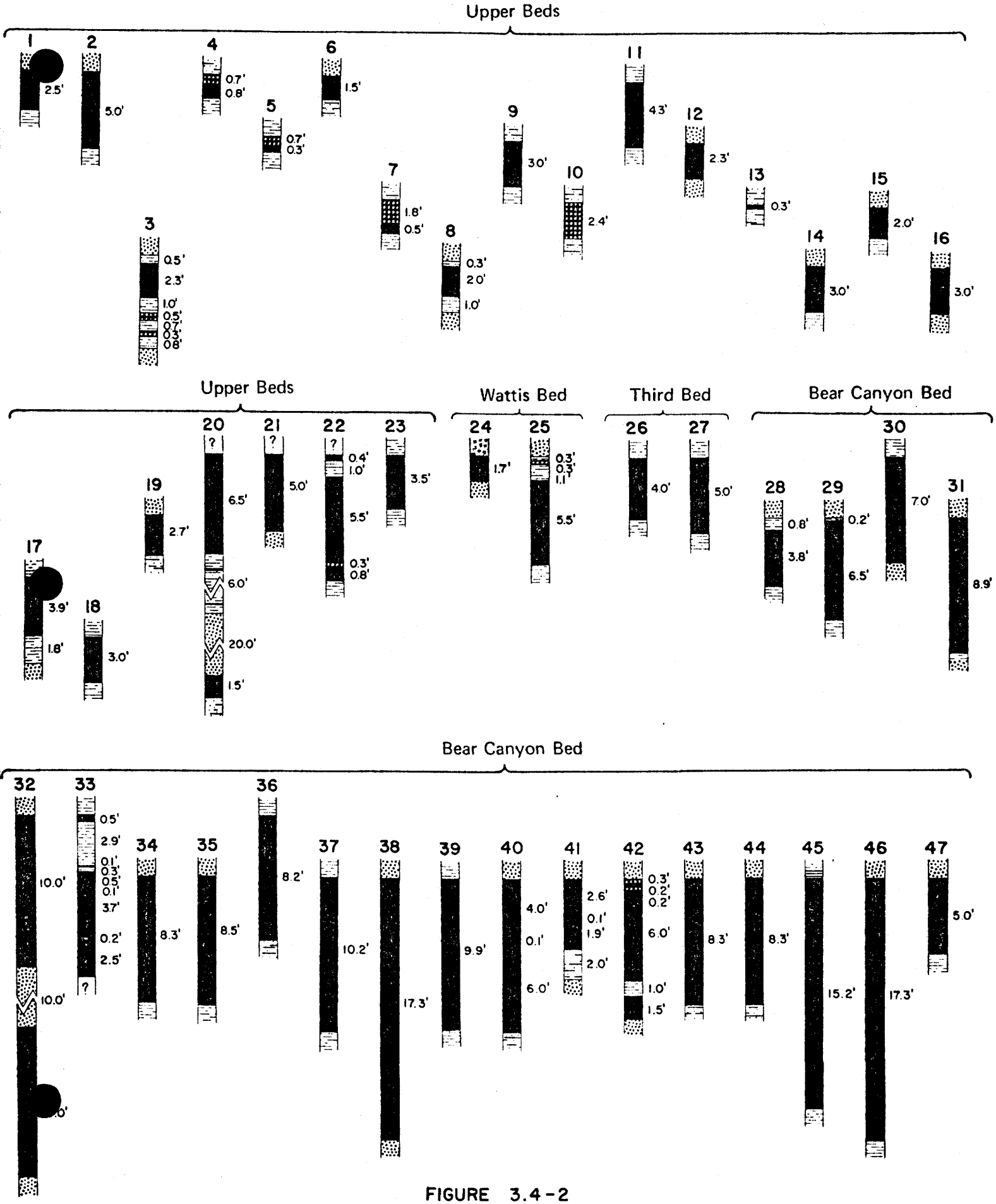

Upper Beds
1
2.5'
2
5.0'
4
0.7'
0.8'
5
0.7'
0.3'
6
1.5'
7
1.8'
0.5'
8
0.3'
2.0'
1.0'
9
3.0'
10
2.4'
11
4.3'
12
2.3'
13
0.3'
14
3.0'
15
2.0'
16
3.0'
3
0.5'
2.3'
1.0'
0.5'
0.7'
0.3'
0.8'
Upper Beds
Wattis Bed
Third Bed
Bear Canyon Bed
17
3.9'
1.8'
18
3.0'
19
2.7'
20
?
6.5'
6.0'
20.0'
1.5'
21
?
5.0'
22
?
0.4'
1.0'
5.5'
0.3'
0.8'
23
3.5'
24
1.7'
25
0.3'
0.3'
1.1'
5.5'
26
4.0'
27
5.0'
28
0.8'
3.8'
29
0.2'
6.5'
30
7.0'
31
8.9'
Bear Canyon Bed
32
10.0'
10.0'
33
0.5'
2.9'
0.1'
0.3'
0.5'
0.1'
3.7'
0.2'
2.5'
?
34
8.3'
35
8.5'
36
8.2'
37
10.2'
38
17.3'
39
9.9'
40
4.0'
0.1'
6.0'
41
2.6'
0.1'
1.9'
2.0'
42
0.3'
0.2'
0.2'
6.0'
1.0'
1.5'
43
8.3'
44
8.3'
45
15.2'
46
17.3'
47
5.0'

FIGURE 3.4-2

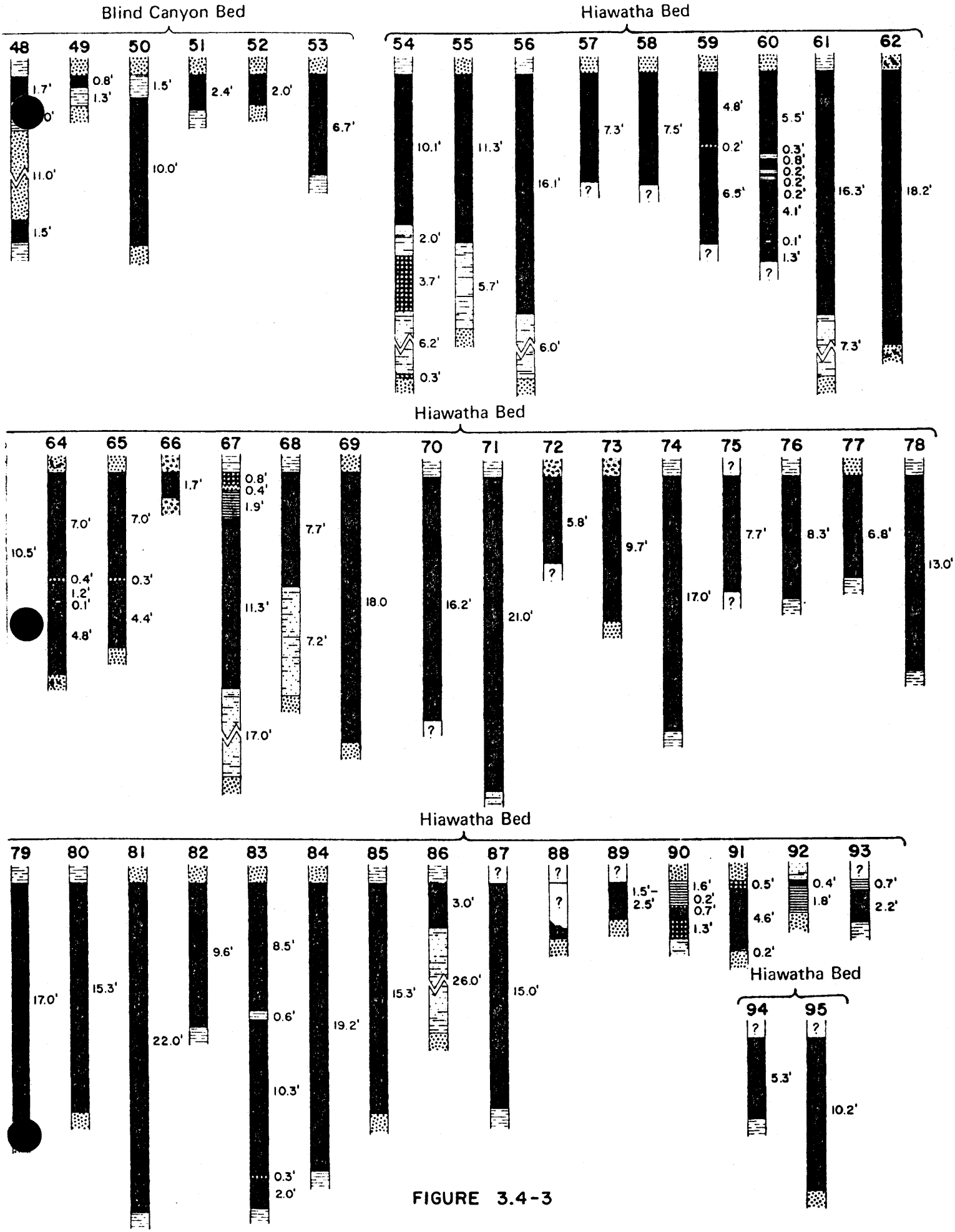

Blind Canyon Bed
48
1.7'
0'
11.0'
1.5'
49
0.8'
1.3'
50
1.5'
10.0'
51
2.4'
52
2.0'
53
6.7'
Hiawatha Bed
54
10.1'
2.0'
3.7'
6.2'
0.3'
55
11.3'
5.7'
56
16.1'
6.0'
57
7.3'
?
58
7.5'
?
59
4.8'
0.2'
6.5'
?
60
5.5'
0.3'
0.8'
0.2'
0.2'
0.2'
4.1'
0.1'
1.3'
?
61
16.3'
7.3'
62
18.2'
Hiawatha Bed
64
10.5'
7.0'
0.4'
1.2'
0.1'
4.8'
65
7.0'
0.3'
4.4'
66
1.7'
67
0.8'
0.4'
1.9'
11.3'
17.0'
68
7.7'
7.2'
69
18.0
70
16.2'
?
71
21.0'
72
5.8'
?
73
9.7'
74
17.0'
75
?
7.7'
?
76
8.3'
77
6.8'
78
13.0'
Hiawatha Bed
79
17.0'
80
15.3'
81
22.0'
82
9.6'
83
8.5'
0.6'
10.3'
0.3'
2.0'
84
19.2'
85
15.3'
86
3.0'
26.0'
87
?
15.0'
88
?
?
89
?
1.5'-
2.5'
90
1.6'
0.2'
0.7'
1.3'
91
0.5'
4.6'
0.2'
92
0.4'
1.8'
93
?
0.7'
2.2'
Hiawatha Bed
94
?
5.3'
95
?
10.2'

FIGURE 3.4-3

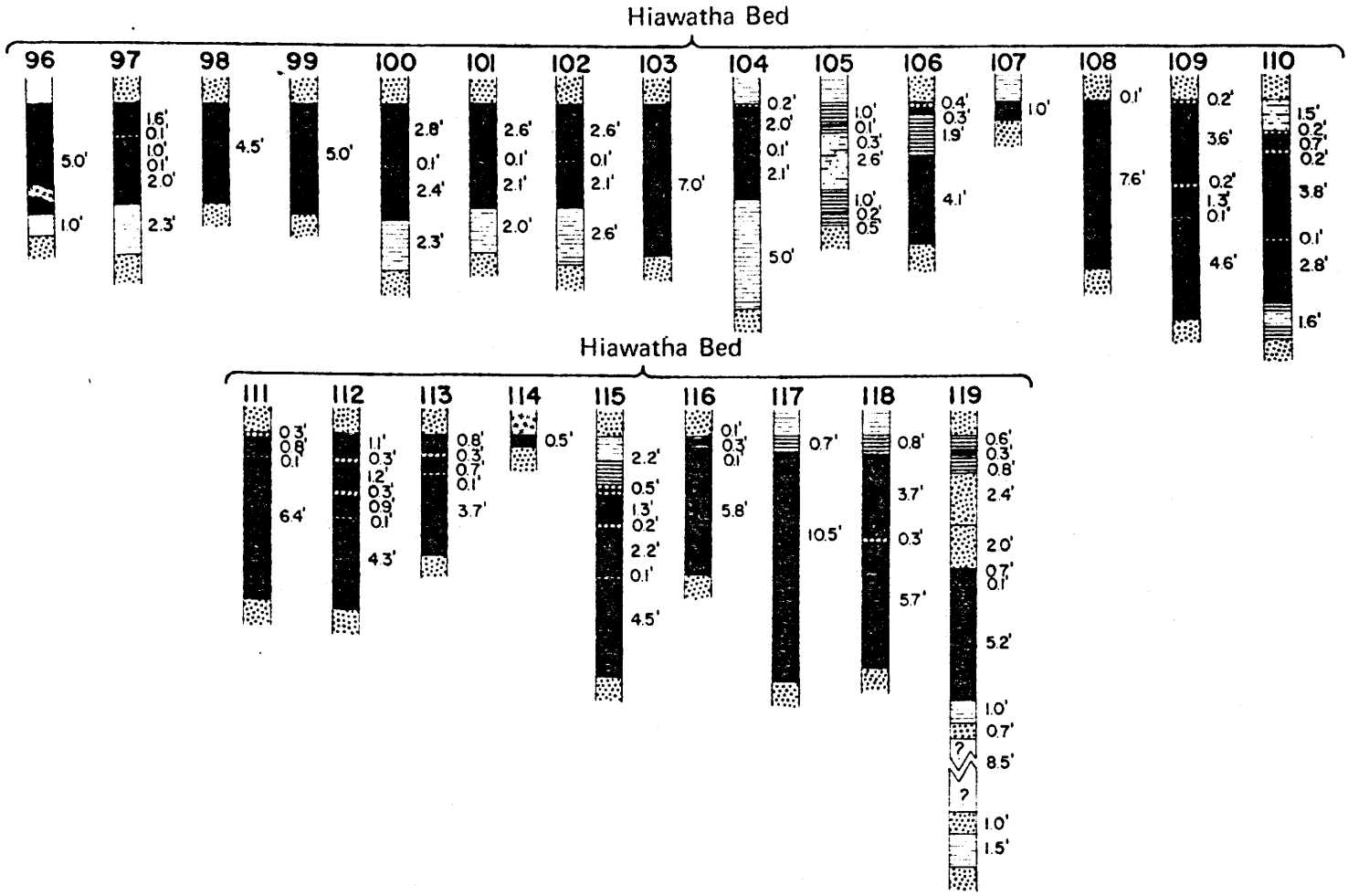

Hiawatha Bed
96
5.0'
1.0'
97
1.6'
0.1'
1.0'
0.1'
2.0'
2.3'
98
4.5'
99
5.0'
100
2.8'
0.1'
2.4'
2.3'
101
2.6'
0.1'
2.1'
2.0'
102
2.6'
0.1'
2.1'
2.6'
103
7.0'
104
0.2'
2.0'
0.1'
2.1'
5.0'
105
1.0'
0.1'
0.3'
2.6'
1.0'
0.2'
0.5
106
0.4'
0.3'
1.9'
4.1'
107
1.0'
108
0.1'
7.6'
109
0.2'
3.6'
0.2'
1.3'
0.1'
4.6'
110
1.5'
0.2'
0.7'
0.2'
3.8'
0.1'
2.8'
1.6'
Hiawatha Bed
111
0.3'
0.8'
0.1'
6.4'
112
1.1'
0.3'
1.2'
0.3'
0.9'
0.1'
4.3'
113
0.8'
0.3'
0.7'
0.1'
3.7'
114
0.5'
115
2.2'
0.5'
1.3'
0.2'
2.2'
0.1'
4.5'
116
0.1'
0.3'
0.1'
5.8'
117
0.7'
10.5'
118
0.8'
3.7'
0.3'
5.7'
119
0.6'
0.3'
0.8'
2.4'
2.0'
0.7'
0.1'
5.2'
1.0'
0.7'
?
8.5'
?
1.0'
1.5'

FIGURE 3.4-4

each seam. The recoverable coal reserves was then estimated by multiplying the in-place reserve by a recovery factor of 50%. A 60% recovery factor could be used based on actual recovery experience by Co-Op Mining Company in the seams in this area; however, the 50% factor was used to assure the reserve estimate is conservative.

Co-Op plans to enter the Hiawatha Seam at a later date, although , at this time it is not known precisely when that will occur, or at what location. It is possible that access to the lower Hiawatha Seam may prove to be most economic through new portals in the outcrop; however, as mining progresses, and fault locations and displacements are better delineated, it may become even more feasible and less environmentally destructive to enter the lower seam through rock tunnels. In any event, Co-Op will commit to provide the Division with complete plans for entering the lower seam prior to taking such action. These plans will be submitted as a modification to this MRP and will be submitted in a timely manner to allow for review and approval prior to com-

mencing work on entering the Hiawatha Seam.

3.4.3.2.2 Recovery Rate

Mining recovery of the above reserves is projected to be 50% of the total inplace raw coal tonnage.

The operation will produce 200,000 tons of raw coal per year with at least 3 miner sections working 240 days. This is 833 tons per day with 2 production shifts operating.

This rate of production (considering a lower rate during the initial buildup years plus the tonnage still to be mined in the area of old workings) will make the projected mine life 50 years.

3.4.3.2.3 Justification for Mining Engineering Techniques

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Co-op Coal Company plans to extract all coal reserves, to the extent allowed by economics, safety conditions and prudent mining practice, from the lands it controls.

3.4.3.2.2 Recovery Rate

Mining recovery of the above reserves is projected to be 60% of the total in-place raw coal tonnage.

The operation will produce 200,000 tons of raw coal per year with at least 3 miner sections working 240 days. This is 833 tons per day with 2 production shifts operating.

This rate of production (considering a lower rate during the initial buildup years plus the tonnage still to be mined in the area of old workings) will make the projected mine life 50 years.

3.4.3.2.3 Justification for Mining Engineering Techniques

Mining techniques and operating procedures adopted by Co-op for this property are based upon current engineering principles and modern equipment in relation to existing knowledge of the property, natural conditions and production desired. Approaches are not those of the Co-op staff alone; they are the result of consultation with reputable consulting mining engineers of this country as well, all of whom are familiar with western U.S. coal conditions.

Mine layout has considered the seam condition and minable areas so that all recoverable coal can be reached. Main entries are designed for maximum protection throughout their life with adequate capacity to supply ventilating air to working areas as well as trouble-free haulage systems for coal, men and materials.

3.4.3.2.4 Justification for Non-Recovery

Only that coal required by law to be left in place and that which is economically or physically unrecoverable because of adverse natural conditions or safety considerations will not be recovered.

Mine layout assures that all areas of coal within the permit boundaries are accessible to mining.

Even in the suspected area of faulting, plans have been made to locate panels between and parallel to the faults for maximum recovery.

3.4.3.2.5 Access to Future Reserves

Not Applicable

3.4.4 Economic Validity of Operation

Economic information provided in this application is in compliance with OSM and DOGM regulations 782.16 (b) AND (784.13(b)(6). Reclamation costs are discussed in Section 3.6.7.

3.4.5 Equipment Selection

Co-op Mining Company will utilize the equipment described in the following list for its mining operation and will acquire any additional equipment as required to maintain a sound mining operation.

3.4.5.1 Surface Equipment

Vibrating screens
crushers
conveyors
Front end loaders
road grader
crawler tractor
fork lift

3.4.5.2 Underground Equipment

continuous miner
electric shuttle cars
belt lie with feeder-breaker
roof bolter
scoop
service vehicle
personel carrier
boss buggy
rock dusters
water pumps
supply tractor
stopper
power center

3.4.6 Mine Safety, Fire Protection and Security

The mine complies with all federal, state and local

regulations on safety, fire control and security in underground and surface areas, as discussed below.

3.4.6.1 Signs

Signs used on the property are constructed of suitable material, employ uniform and standard designs and conform to local ordinances and codes. They will be maintained during the conduct of all activities to which they pertain. The gate at the main entrance will be posted with a sign containing the company name, address, telephone number and identification number. Table 3.4.6.1 lists signs and duration of maintenance and placement. Surface blasting is not planned at this underground mine. If such blasting becomes necessary for some reason, "Blasting Area" signs will be posted on access roads and on public roads within 200 feet. In addition, the blasting area will be conspicuously flagged in the vicinity of charged holes. All other requirements of the Utah DOGM mining regulation pertaining to surface blasting will also be satisfied.

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In the event that surface blasting becomes

Table 3.4.6.1

Sign Maintainance

Stream Buffer Zone Signs	Until Bond Release
*Perimeter Markers	Until Bond Release
Vegetation Reference Area	Until Bond Release
Mine Identification Signs	Until Bond Release
Top Soil Signs	Until soil is redistributed
Blasting & Warning Signs	Until all hazardous activity is concluded
Road & Caution Signs	Until Bond Release
Flammable Materials Signs	Until all such material is removed
Hazardous Material Sign	Until all such material is removed

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*Perimeter Markers- The permimeter of the mine disturbance area is marked with steel rods approximately 4' in length (roof bolts) and are painted a flourescent orange on top. The rods are placed in such a manner that a person can site from one rod to the next and the line can be clearly determined.

regulations on safety, fire control and security in underground and surface areas, as discussed below.

3.4.6.1 Signs

Signs used on the property are constructed of suitable material, employ uniform and standard designs and conform to local ordinances and codes. They will be maintained during the conduct of all activities to which they pertain. The gate at the main entrance will be posted with a sign containing the company name, address, telephone number and identification number.

Surface blasting is not planned at this underground mine. If such blasting becomes necessary for some reason, "Blasting Area" signs will be posted on access roads and on public roads within 200 feet. In addition, the blasting area will be conspicuously flagged in the vicinity of charged holes. All other requirements of the Utah DOGM mining regulation pertaining to surface blasting will also be satisfied.

In the event that surface blasting becomes

Combustible non-coal materials such as paper, used oil and wood will be collected routinely, transported to an approved sanitary land fill and disposed of.

Diesal fuel and gasoline are stored in tanks with capacities of 1,000 and 5,000 gallons. The tanks are located and positioned so as not to affect any slope or shaft opening. The storage tanks will be protected from corrosion by cathodic coat protection or other effective methods considered most compatible with existing soil conditions. The tanks will be inspected to ensure no leakage into the surrounding soil. All surface tanks will have protective berm constructed within 90 days of permit approval; Also, the tanks are located so as any major spillage runs directly to the sediment pond. (See Plate 2-2). Loose coal and the coal faces are sprayed with water prior to and during cutting by the water sprays on the machines. In addition, routine periodic (20-minutes) inspection and tests are made for methane gas during this operation.

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Buildings and structures are protected against fire by the location of adequate numbers, sizes and types of fire extinguishers in compliance with regulations. Water is available from the surface water distributing system.

3.4.6.3.3.1 Facilities

Discussed above under Section 3.4.6.3.3

3.4.6.3.3.2 Coal Stockpiles

Monitored daily.

Refuse Piles

Co-Op does no produce processed coal and does not produce coal refuse.

3.4.6.3.4 Explosives

This is an underground mine using continuous mining methods which does not necessitate the need for blasting. In the event blasting would be necessary it would be in accordance with existing federal and state laws.

All surface work, such as site preparation is completed at this time. No surface blasting is anticipated in the permit term.

3.4.6.4 Compliance with Regulations

Co-Op Mining Company will comply with all federal and state regulations pertaining to the operation of this mine within the permit area.

3.4.6.4.1 Routine Reports

All routine reports pertaining to the operation will be submitted to the proper governmental agencies, in particular those required under CFR 30 Chapter 75.1800-1808.

3.4.6.4.2 Reporting of Accidents

All accidents will be reported to MSHA in accordance with CFR 30 Chapter 1 Subpart B par. 80.1080.12; Subpart C par.

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80.20-80.24; and Subpart D par. 80.30-80.33. Such reporting will also include the Utah DOGM.

3.4.6.4.3 Corrective Action Accidents

Immediately after an accident, an on-site investigation will be initiated by company safety personnel accompanied by federal and state officials if required. The investigation and report will determine the cause of the accident, contributing factors and methods for prevention. Corrective action will be taken immediately. All data will be reviewed with mine personnel at their regular safety meetings and pertinent data will be incorporated into safety training classes.

Federal, state and other appropriate officials will be notified of all accidents in accordance with current regulations.

3.4.6.4.4 Good Housekeeping

The company believes that neat, clean

working areas are conducive to greater safety, pride and productivity. Its practice will be therefore, to require that supplies and materials be stored neatly in designated areas, that trash be cleaned up daily and transported to control areas for disposal and that spillage of coal or other materials be reduced to a minimum. Inadvertent spillages will be removed as soon as possible.

3.4.6.4.5. Mine Maps

Maps of underground section working will be updated by Section Foremen using their own measurements of face advance and width. Sections will be regularly and accurately surveyed by the Salaried Personel and all mine maps will be kept up to date and filed. These records will be reported to the appropriate agencies as required by current regulations.

3.4.6.4.6 Mine Records

Mine operating records will be maintained daily to show progress, production, work-force, conditions, ets. These records will be maintained in the mine files and will be accessible to authorized personnell when necessary.

3.4.7 Operations Schedule

The mine operating schedule as outlined is, of course, subject to change from a variety of causes, i.e., strikes, changes in market, underground mining conditions, surface transportation, etc. However, the following data show the projected performances.

3.4.7.1 Annual Production for Permit Time

If the market conditions warrant, annual production could reach 200,000 tons, and increase to 400,000 tons, (projection) by the year 1995. Prior to the 200,000 ton, an approval from the Executive Secretary in accordance with Sec. 3.1 UAR will be gained.

3.4.7.2 Operating Schedule

The mine will operate 240 days per year, 5 days per week to produce the above ton-

3.4.6.4.6 Mine Records

Mine operating records will be maintained daily to show progress, production, workforce, conditions, etc. These records will be maintained in the mine files and will be accessible to authorized personnel when necessary.

3.4.7 Operations Schedule

The mine operating schedule as outlined is, of course, subject to change from a variety of causes, i.e., strikes, changes in market, underground mining conditions, surface transportation, etc. However, the following data show the projected performances.

3.4.7.1 Annual Production for Permit Time

Annual production; 200,000 Tons, increased to 400,000 Tons, (projection).

3.4.7.2 Operating Schedule

The mine will operate 240 days per year, 5 days per week to produce the above ton-

ages. It will use a total of 30 + miners working 3 shifts per day and producing 400 + ton per shift per unit.

3.4.7.3 Employment

Total personnel will be 35, 5 of whom will be salaried and 30 hourly employees.

3.4.8 Mine Permit Area

3.4.8.1 Acreage and Delineation

The permit area comprises approximately 900 acres located and outlined as shown on Plate 2-1.

The permit area is made up of properties owned in fee by COP Development Company.

3.4.8.2 Mining Sequences

Plate 2-3 show the mining sequence on the property each year for the first five years and each five years thereafter for the life of the mine.

3.4.8.3 Acreage in Each Scheduled Sequence of Underground Activity (Not Surface Disturbance)

YEAR	ACREAGE
1984	11
1985	11
1986	11
1987	11
1988	13
1989-1993	65
1994-1998	65
1999-2003	65

3.4.9 Mine Plan Area

The "mine plan area" is defined for the purposes of this section to consist of the permit area.

The permit area has been discussed previously (Section 3.4.8).

The tentative acreages to be disturbed for each activity described above are as follows:

3.4.8.3 Acreage in Each Scheduled Sequence

YEAR	ACREAGE
1984	11
1985	11
1986	11
1987	11
1988	13
1989-1993	65
1994-1998	65
1999-2003	65

3.4.9 Mine Plan Area

The "mine plan area" is defined for the purposes of this section to consist of the permit area.

The permit area has been discussed previously (Section 3.4.8).

The tentative acreages to be disturbed for each activity described above are as follows:

Mine Shop Area		.175 acres
Mine Access Road	3.7	2.15 acres
Portal and Pad Areas	3.26	~~5.1~~ acres
Sediment Treatment Area		.5 acres
Scales Area	1.56	1.42 acres
		9.72 Ac

3.5 ENVIRONMENTAL PROTECTION

3.5.1 Preservation of Land Use

COP Development Company, which is the legal owner of affected surface operations, anticipates that the postmining land uses of the affected areas will remain the same as the premining land uses. These uses are identified in Chapter 4. State or local governments have not proposed any changes in land use following reclamation.

Once operations in an area have ceased, the disturbed area will be scarified, sloped and seeded before the next growing season. The site will be reseeded with a mixture of seed such as mountain varities of wheatgrass, hard fescue, or species

transmission facilities will be constructed to be raptor protected. See Appendix 10-C.

Co-Op is further committed to report the presence of any Golden eagles observed on the property to the Division.

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specified by the Division of Oil, Gas, and Mining. Grass will be maintained by fertilization or reseeding until stable up to five years. (See Interim Reclamation Plans - Appendix 3-C.

The proposed mine access roads to the mine portal will be reclaimed and revegetated. This will accomplish a dual purpose of controlling runoff and revegetating the hillsides with vegetation comparable to existing growth.

Co-op Coal Company will cooperate with all state and local land use plans and programs.

Emery County zoning ordinances classify the Bear Canyon Mine plan area as Industrial Mining.

3.5.1.1 Projected Impacts of Mining on Current and Future Land Use

The management objectives and the impacts from the Bear Canyon Mine per-

taining to these objectives are described in detail in Chapter 4.

Impacts

Approximately 10 acres of soil will be disturbed within the permit area. This includes loadout areas, offices, shops and substations, roads, portal areas and the topsoil storage area.

The reduction in desirable plant species will temporarily reduce forage production and wildlife capacities.

The short-term negative impact of vegetation removal would be outweighted by the positive impacts of revegetation and improved fire protection and prevention.

Wildlife in the area will adapt to the operation in a relative short time as witnessed by existing coal operations. Proposed construction may temporarily disrupt wildlife if human disturbance is not kept to a minimum. These

topics are discussed in detail in the Wildlife Report, Chapter 10.

3.5.1.2 Control Measures to Mitigate Impacts

Reclamation activities in the permit area will be directed toward minimizing the overall impact of coal mining. This can be accomplished by careful planning of the disturbed areas that must be later reclaimed.

The mine surface operation facilities proposed, will be returned to a wildlife/grazing habitat at the conclusion of the mining operation. The premining and proposed postmining uses are therefore identical for all areas. (Chapter 4)

The initial step in the reclamation plan is to seal all large diameter openings. This will be accomplished by backfilling these openings with non-combustible material. The seals will be designed so that

mine drainage, if any, will not enter surface water bodies. For a more detailed description of the sealing of openings see Section 3.6.3.1, Sealing of Mine Openings, Drill Holes, Wells, etc.

The next step in reclamation would be the removal of all surface structures, equipment and road blacktop. Next, all solid waste generated in abandonment opperation will be collected and removed from the reclaiming areas. Additional information concerning this aspect of the reclamation plan is presented in Section 3.6.3.2., Removal of Surface Structures.

Backfilling of the subterranean portion of the silos, holes and depressions will be the next reclamation activity. Once backfilling is completed, drainages will be returned and disturbed areas will be graded and recontoured. A detailed description of this reclamation phase is

found in Section 3.6.4, Backfilling and Grading Plans.

A suitably permanent and diverse vegetative cover, as required by the appropriate land management agency, will be established on all affected land. (See Sec. 9.5 and 10.5 for details).

Land reclamation will take place as soon as possible after surface disturbance. All cut and fill slopes resulting from construction of the access road will be stabilized and revegetated at the first seasonal opportunity. Areas occupied by support facilities such as roads, office buildings, shops and coal handling structures will not be reclaimed until conclusion of the mining operation.

3.5.2 Protection of Human Values

There are no public parks nor historical sites worthy of preservation in the permit area.

3.5.2.1 Projected Impact of Mining on Human Values, Historical and Cultural

The projected impact of mining on cultural resources can be direct or indirect. Direct impacts are a direct consequence of project development and operation, such as earthmoving. Indirect impacts arise from activities that are not strictly part of the project developement and operation, such as changes in local populaton.

3.5.2.2 Control Measures to Mitigate Impacts

Co-Op is committed to take all necessary steps to remedy any adverse impacts from slides and to notify the Division by the fastest available means to safeguard human and environmental values.

3.5.3 Protection of Hydrologic Balance

Co-op Mining Company will conduct all mine site operations in such a way as to minimize potential impact to surface and ground water quality.

Water originating in or flowing through disturbed areas will be collected by a drainage control system and the additional suspended material allowed to settle in a sediment treatment facility before discharge into the natural

drainage system. No permanent changes to the natural drainage channels are anticipated. Postmining land use will be similar to premining use, and the hydrological aspects of the reclamation effort have been planned accordingly.

Present mine portals are designed to ensure that water will not be discharged from the mine, once the water right issue is resolved and the present discharge will be utilized.

In compliance with 30 CFR 75.1711-2, seals will be installed in all entries as soon as mining is completed and the mine is to be abandoned. The seals will be located at least 25 feet inside the portal mouth entry.

Culinary water usage at the mine site will qualify as a public water supply and will meet State of Utah primary and secondary water standards.

3.5.3.1 Projected Impacts of Mining on the Ground Water Hydrologic Balance

Geology largely controls the occurrence and quality of water in any region. Since the region surrounding the mine plan area consists of the same geologic formation, the effects of mining on hydrologic balance should be the same throughout the area. Further, it can be assumed that the impacts from future mining will be the same as the minor impacts that have resulted from the mining of the past 50 years.

The existing hydrologic balance will be discussed in detail in Chapter 7, Hydrology.

3.5.3.2 Control Measures to Mitigate Impacts

No significant impacts to the ground water system are expected from the mining operation. The ground water monitoring plan, discussed in Section 3.5.3.3, will provide

a means to follow the possible effect of the mining activities on the ground water system. No surface or ground water will be discharge into the mine under any circumstances. If mine water is encountered at the working face, which on an areawide basis generally yields less than 10 gal./min. per active face, it will be collected in the face area and pumped to impoundments located within the mine. The impoundments will be designed to allow sufficient time for suspended solids to settle. If necessary, mechanical devices will be installed to remove grease and oil that might be present in the water before it is used for dust suppression.

The construction of proposed surface facilities will result in increases of the suspended solids concentration increases, however are expected to be temporary because of compliance with the regulatory requirements that sediment control features be provided for all areas of surface disturbance.

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Water quantity will remain generally unaffected due to the geological conditions in the mine area. Therefore, there will be little or no impact, adverse or otherwise, on the hydrologic system.

State and federal regulations (30 CFR 817.54 and UMC 817.54) require that an alternate water supply be provided to replace any water supplies in the area, Co-op Mining Company will provide this alternate supply if needed. Several alternate sources of supply exist:

1) Water from springs could be piped to the affected site.

2) Water rights could be purchased for springs damaged by Co-op Mining Company, or, alternate water shares could be substituted. (See App. 3.3.6., Proof of Ownership).

3) A well could be drilled at the affected site to provide an alternate supply (since artesian conditions do not exist).

4) Water produced in the mine could be piped to the affected site.

5) Water shares presently owned could be transferred.

Alternative 4 may mean treating of poorer quality water and pumping to overcome elevation differences.

In the unlikely event that mining adversely affects a water source, the Co-op Mining Company will select an alternative after considering all possibilities of each site-specific circumstance.

3.5.3.3 Ground Water Monitoring Plan

An ongoing ground water monitoring program will be conducted.

3.5.3.4 Projected Impacts of Mining on the Surface Water Hydrologic Balance

The occurrence and quality of water in any region is highly controlled by geology. The majority of the mine plan area is strong structurally and consists of the same geologic formations. It is presumed that mining activities will have little adverse impact on the area hydrologic system.

3.5.3.5 Control Measures to Mitigate Impacts - Surface Water

Runoff from all disturbed areas will be passed through sediment treatment facilities. Any discharge from facilities will be monitored in accordance with NPDES permit standards and state and federal regulations.

The effects of the mining operation on the surface water system will be analyzed through the surface water monitoring plan described in the next section. In the unlikely event that monitoring shows that the surface water system is being adversely

TABLE 3-6

COMPREHENSIVE WATER QUALITY ANALYTICAL SCHEDULE

FIELD MEASUREMENTS	LABORATORY MEASUREMENTS
Discharge	Iron, total
pH	Magnesium, total
Temperature, Air	Total Dissolved Solids
Temperature, Water	Total Suspended solids*

*Surface waters only

affected by mining activities, additional steps will be taken to rectify the situation in consultation with state and federal regulatory agencies.

3.5.3.6 Surface Water Monitoring Plan

An ongoing hydrologic monitoring program will be conducted.

As required, water quality data collected from surface water monitoring stations will be submitted within 60 days of the end of each quarter, depending upon the speed of the laboratory analyses.

3.5.4 Preservation of Soil Resources

Co-op Mining Company is prepared to meet the requirements specified by 30 CFR 784.15. Backfilling, soil stabilization, compacting, grading and any other necessary operations will be performed when necessary with the best technology available, as approved by the regulatory agency. Section 3.6, Reclamation Plan, provides a detailed discussion

affected by mining activities, additional steps will be taken to rectify the situation in consultation with state and federal regulatory agencies.

3.5.3.6 Surface Water Monitoring Plan

An ongoing hydrologic monitoring program will be conducted if in the event they are deemed necessary.

As required, water quality data collected from surface water monitoring stations will be submitted within 60 days of the end of each quarter, depending upon the speed of the laboratory analyses.

3.5.4 Preservation of Soil Resources

Co-op Mining Company is prepared to meet the requirements specified by 30 CFR 784.15. Backfilling, soil stabilization, compacting, grading and any other necessary operations will be performed when necessary with the best technology available, as approved by the regulatory agency. Section 3.6, Reclamation Plan, provides a detailed discussion

of the reclamation effort.

3.5.4.1 Projected Impacts of Mining on Soil Resources

Since the Bear Canyon Mine is an underground mine at the site of an old works, the overall impact of mining on soils will be minor. The impacts of surface operations and mining facilities on soil resources consist of coverage of soil by facilities, disturbance of soils during construction activities, erosion created by removing vegetation, reduced forage growth due to nutrient degradation, reduced wildlife capacity and particulate emissions to the air. However, the abandoned mine had large accumulations of debris which has now been cleaned up, which to a large degree constitutes enhancement.

3.5.4.2 Control Measures to Mitigate Impacts

The objective of the proposed backfilling,

soil stabilizing, compacting, contouring and grading process is to create a reclaimed surface that provides a variety of topographic features to enhance postmining land use.

Section 4.5.1, Postmining Land Use, and Section 3.6, Reclamation earthwork activities to be conducted. This section summarizes the steps to be taken in the backfill, soil stabilization, compaction, contouring and grading program.

Topsoil Removal and Protection

Before any new construction or mining activity that will disturb the surface of native undisturbed areas, topsoil will be removed from the affected area after vegetation has been removed. The topsoil will be segregated from any other material removed and stockpiled separately in a stable site within the permit area protected from erosion, compaction, or contamination. The stockpile will be stabilized by seeding.

As soon as operations are concluded in each disturbed area, the removed topsoil will be redistributed on the site in the manner required. Methods and techniques are detailed in Section 3.6.4.4, Soil Redistribution and Stabilization. (See Appendix 3-D Approved topsoil handling plan)

Backfill, Compaction and Grading

To the maximum extent practicable, disturbed surface areas will be backfilled, compacted and graded according to the approved time schedule. The purpose of these operations is to return disturbed areas to approximate original makeup and contour. Wherever possible, backfilling will return the various soil horizons to their original site and make them compatible with surrounding areas. Compaction will help the returned soils remain in place. Grading will restore the contour to as near the original state as possible; however, because of local conditions, large-scale backfilling, compaction and grading will not be possible in many areas.

STATE OF UTAH
NATURAL RESOURCES
Oil, Gas & Mining

Scott M. Matheson, Governor
Temple A. Reynolds, Executive Director
Dr. G. A. (Jim) Shirazi, Division Director

4241 State Office Building • Salt Lake City, UT 84114 • 801-533-5771

August 17, 1983

Mr. Wendell J. Owen
Co-op Mining Company
P. O. Box 1245
Huntington, Utah 84528

RE: Approval for Consolidation of
Topsoil Stockpiles
Bear Creek Canyon Mine
ACT/015/025, Folder Nos. 4 & 7
Emery County, Utah

Dear Mr. Owen:

Following is the approval of the proposed plan for consolidation of the several topsoil stockpiles located at Bear Canyon. The approval lists the deadlines for completing the work and a change in the recommended seed mix.

Please be aware that failure to meet these deadlines will subject Co-op to a violation for failure to operate in accordance with an approved plan.

Division approval is hereby granted to consolidate the topsoil piles in Bear Creek Canyon and provide accurate topsoil volume calculations by August 31, 1983 as proposed in Co-op Mining Company's June 24, 1983 submittal. Approval to implement protection measures of topsoil stockpiles is granted with the exception of utilizing the seed mix proposed. The use of the seed mix listed in Attachment 2-A is not recommended for topsoil pile protection as the shrubs included, given 20-40 years of growth, would in all likelihood cause problems in the topsoil redistribution process. It is suggested that Co-op utilize an appropriate seed mix for topsoil protection which does not contain shrubs.

Since fall seeding would produce the most optimal success in germination and establishment of a vegetative cover, seeding my occur as late as October 14, 1983.

Since this mine produces no acid-forming or toxic-forming materials, backfilling required to cover such materials will be unnecessary. (See Laboratory test Appendix 3E)

Physical and Chemical Soil Stabilization

Soils will be stabilized by physical and chemical methods before planting. This may include placement of crushed heavy material at the toe of roadfill slopes, for example. Other approved and proven methods will be employed as necessary. Chemical stabilization may include the addition of neutralizing chemicals to soils shown to be excessively acidic or basic. Nutrients and soil amendments will be added in the amounts indicated by soil tests to assure that the surface soil layer can sustain the approved postmining land use.

Biological Soil Stabilization

Returned soils will be stabilized bio-

logically by revegetation of disturbed areas. This stabilization effect will be accomplished by the holding capacity of the root systems of the new vegetative cover, particularly small shrubs and trees. This aspect of soil stabilization will begin as soon as topsoil is redistributed. Section 3.6.5, Revegetation Plan, provides specific detail on this aspect of the reclamation plant.

3.5.5 Protection of Vegetative Resources

Co-op Mining Company has maintained a commitment to reclaim the unused disturbed areas to to the extent of the cover of the natural vegetation on the mine plan area. Chapter 9, Vegetative Resources, provides a preliminary report on the vegetative resources of the area.

3.5.5.1 Projected Impacts of Mining on Vegetative Resources

Since the Bear Canyon Mine is an under-

ground mine, the overall impact on surface vegetation is minor. The effects of surface operations on vegetative resources consist of removal of vegetation from new construction areas, on-site erosion and reduction of desirable plant species, which will reduce forage production and wildlife capacity.

3.5.5.2 Mitigating Measures to be Employed to Reduce Impacts on Vegetative Resources

All disturbed areas will be planted and revegetated during the first appropriate season following grading and redistribution of topsoil. This program will include any necessary addition of remedial treatments to the soil. A suitable, permanent and diverse vegetative cover selected on the basis of appropriate land management agency requirements will be established on all reclaimed areas. The schedule of the program is presented in

Section 3.6.6 What follows is an outline of the major aspects of the revegetation plan. The specific measures involved will be addressed on a site specific basis.

Seeding and Planting

All plants used to revegetate the disturbed. areas will be native or compatible species selected specifically for the vegetative community, as detailed in Section 9.3.2. The choice of dominant species will be determined by suitability for post-mine land use. Seed types will include wheatgrass, salina wildrye, sagebrush, pinyon and juniper. Wherever possible, seed will be drilled or disced into the ground. In steep slope areas, where such techniques are difficult or impossible, hydro-seedings or cyclone spreader seeding will be done.

Native shrubs will be used for shrub replanting. These will be potted seedlings, if available. Bare-root trees will be

used to tome extent.

Mulching and Moisture Retention

As required, all regraded and retopsoiled areas will be mulched or otherwise treated to promote germination of seeds and to retain moisture. Various moisture-retention products are available.

Maintenance

Should such procedures prove necessary to the success of the revegetation plan, protection of replanted areas from animals may be carried out. Such procedures, however, are unlikely to be needed because the species to be selected should not require continuous or considerable maintenance beyond replanting.

3.5.5.3 Monitoring Procedures

All revegetated areas will be monitored closely for at least 5 years after revegetation. Any maintenance indicated by the results of these inspections will be

carried out promptly.

Vegetation will be measured yearly on all revegetated plots for at least the first 5 years. If success is achieved, further measurements will be made at 5-year intervals. Any area not achieving success will be re-evaluated and revegetated again in light of the most recent findings.

3.5.6 Protection of Fish and Wildlife

Wildlife is present in the mine plan permit area. Due to the size of the total disturbance impacts on the various mammal, amphibian and reptile species should be minimal. In addition, Co-op Mining Company is commited to mitigating as much as possible the adverse effects of all new construction and maintaining the natural abundance and diversity of the area.

3.5.6.1 Projected Impacts of Mining on Fish and Wildlife

Mammals

The Bear Canyon Mine plan area is inhabited by 84 species of mammals, of which 25 species are considered of high interest and 14 of these are protected by state or federal law (see Table 10-1).

Elk that are thought by the Utah Division of Wildlife Resources (UDWR) to be stable and productive use portions of the mine plan area at various times of the year for such necessary activities as wintering and feeding. This use, however, is marginal and not crucial. The minimal disturbance caused by planned surface facilities will have no significant impact on the herd.

Mule deer utilize the whole permit area, taking advantage of various habitat at different times of the year. Browse in the wintering range within the permit area is in good shape and should facili-

Mammals

The Bear Canyon Mine plan area is inhabited by 53 species of mammals, of which 19 species are considered of high interest and 14 of these are protected by state or federal law (see Table 10-1).

Elk that are thought by the Utah Division of Wildlife Resources (UDWR) to be stable and productive use portions of the mine plan area at various times of the year for such necessary activities as wintering and feeding. This use, however, is marginal and not crucial. The minimal disturbance caused by planned surface facilities will have no significant impact on the herd.

Mule deer utilize the whole permit area, taking advantage of various habitat at different times of the year. Browse in the wintering range within the permit area is in good shape and should facili-

tate over-wintering of the herd. Projected impact from proposed surface operations is expected to be minimal. The range of cougars in the permit area is determined by the migration patterns of mule deer and by human disturbance. Since the cougar population is low and since their range is far greater than the areas of proposed construction, mining activities will have little impact on the species.

Black bear may inhabit the permit area but the area is small compared to the overall habitat area. Black bears are not numerous, nor are they likely to be disturbed during the most sensitive times of their annual cycle. Impact will be minor at most.

Cottontail rabbits are likely to be affected only by subsidence, which will be limited to relatively small areas thus causing little negative impact. Disturbance to vegetation resulting in

seral succession will actually improve the reproduction potential of the rabbits.

Impact on snowshoe hares will be minor since the species's habitat in conifer-aspen stands is limited in the permit area.

Furbearers using underground burrows may be affected by subsidence within limited portions of the permit area. However, such effects will be temporary and the species are widespread and adaptable to human activity. Long-term impact will be minimal.

Mining activity will have little effect on the habitat of small mammals. Subsidence damage to burrows could increase mortality and reduce reproductive success temporarily, but the effect would be temporary because of the continued survival of the breeding population in

contiguous areas and to the high densities of these species.

Birds

The list of bird species found in the mine permit area are listed in Tables 10-10 and 10-11.

Only two species found in the mine permit area are on the endangered species list: the bald eagle and the peregrine falcon. The bald eagle is a winter resident only and the peregrine falcon is not known to nest within the permit area.

Potential impact on bird species would be limited to the proposed new construction areas. Impacts, however, should be minor since the areas involved are small and since equivalent habitat is readily available close by. (See Raptor Survey UDWR - Appendix 10-A

Amphibians

The three amphibians occurring in the permit area (see Table 10-4) occupy similar habitats throughout the region and are unlikely to be affected in any major way by planned activities.

Reptiles

Reptiles found in the permit area are located in many other similar habitats and their populations will not be seriously impacted by planned activities. UDWR personnel will be notified if any denning sites are discovered during mining or construction.

Aquatic Wildlife

Since there are no perennial streams in the surface operation areas, little impact to aquatic wildlife is expected. Huntington Creek, the closest perennial stream to the permit boundary, is located a considerable distance from the surface operation, 1.5 miles. This high quality fishery is protected through Co-Op's Sediment Control Structures (see Chapter 7).

3.5.6.2 Mitigating Measures to be Employed To Protect Fish and Wildlife

To minimize habitat disturbance and loss, surface activity at the breakout and the ventilation shaft will be minimal. The proposed site is located at the mine portal at Trail Canyon, so no new disturbance will result. Construction will be scheduled to minimize conflict with deer and elk use periods.

The disturbed areas will be reseeded within the next growing season and the resulting seral succession will actually benefit deer and elk. Habitat loss due to construction is limited to the size of the disturbed area and will be small. All water in the permit area is ephemeral channels. Any water sources necessary to wildlife will be protected or an alternative source will be provided. In addition, riparian habitat will be enhanced. (See Section 10-D).

Structures that pose a barrier or hazard will be provided with passageways, buffers, fences, or other necessary protection, as directed by UDWR.

Co-Op is committed to reclaim all disturbed land and remove all support facilities upon completion of mining to prevent damage to fish, wildlife, and related environmental values.

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The applicant will inform employees of the vulnerability of local wildlife and will admonish them to avoid all harassment or unnecessary activity. In addition the training film offered by the UDWR "Coal Mining and Wildlife" will be shown annually to all employees.

Any discovered wildlife impact not described here will be mitigated by Co-op Mining Company with methods agreed upon by UDWR.

Since no impacts are expected to the ephemeral waters of mine area in the near future, no special mitigation plan concerning Bear Creek is presented here.

3.5.6.3 Monitoring Procedures

Bear Creek does not warrant a biological or habitat monitoring effort in the area of the mine lands.

determined by consultation with UDWR.

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3.5.6.3 Monitoring Procedures

Bear Creek does not warrant a biological or habitat monitoring effort in the area of the mine lands.

3.5.7 Protection of Air Quality

Co-op Mining Company will use the best mining technology available to maintain maximum utilization and conservation of coal while preserving environmental integrity. The operator will employ the best management practices for fugitive dust control. The National Ambient Air Quality Standard (NAAQS) will be well maintained.

3.5.7.1 Projected Impacts of Mining Operation on Air Quality

Particulates are the only pollutant which might impact air quality at the mine area. Increase in concentrations of other pollutants such as sulfur dioxide, nitrogen oxide, carbon monoxide and photochemical oxidants would be neglible. The main source of total suspended particulates (TSP) would be coal particles, which would settle out within short distances (1 mile or less) downwind. The mining operation would not be a "major source" under the Prevention of Significant

Deterioration (PSD) regulations because total annual controlled emissions of particulate matter are expected to be less than 250 ton/year.

The level of estimated impacts can be put in perspective by comparing the calculated pollutant ground-level concentration with the NAAQS established for protection of human health and welfare. The worst case analysis of impacts (Aero-Vironment, 1977) shows that the total ground-level concentration includeing an average background of 20 Hg/m^3 would be well under the federal secondary standard of 150 Hg/m^3.

During typical meteorological conditions, impacts in the region would be lower than quantities derived from the worst case analysis resulting from increased dispersion during the 24-hour period. The increased dispersion would be brought on by more normal wind speeds and more meander in the wind direction than considered in the worst case analysis.

The annual TSP concentrations (including background) would be 25 Hg/m^3, which is less than the NAAQS of 60 Hg/m^3. The greatest impact would be near Huntington Canyon and it would be caused by human activity.

The impacts of TSP concentrations from one sub-air basin to adjoining ones would be low because of mixing and fallout over the distances involved.

3.5.7.2 Mitigating Measures to be Employed to Control Air Pollutants

The main source of air pollutants would be dust from autos and trucks traveling on unpaved roads and from coal loading sites. Unpaved roads used in conjunction with the mining activities will be treated with water and/or non-toxic chemical dust suppressants.

Vehicular traffic will be restricted to authorized personnel and maximum vehicle speed will be limited to 20 miles per hour.

The speed restriction signs will be posted along the roads.

3.5.7.3 Air Quality Monitoring Plan

The mining operation would not be a "major" source" under the PSD regulations because total annual controlled emissions of particulate matter are expected to be less and 250 ton/year. Therefore, the requirement for air quality monitoring is not anticipated. (See Chapter 11, U. Health Approval letter).

3.5.8 Subsidence Control Plan

Co-op Mining Company will use the room and pillar method of mining. This method is outlined in detail in Section 3.4.1

Maximum extraction could result in surface subsidence over a long term. Subsidence will depend on the amount of cover over the coal seam, the amoumt of coal removed under the methods of mining and the stratigraphy of the formations above the coal seams. Partial extraction leaving the pillars in place

The speed restriction signs will be posted along the roads.

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3.5.8 Subsidence Control Plan

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Maximum extraction could result in surface subsidence over a long term. Subsidence will depend on the amount of cover over the coal seam, the amoumt of coal removed under the methods of mining and the stratigraphy of the formations above the coal seams. Partial extraction leaving the pillars in place

will reduce or eliminate subsidence, but is less desirable from a standpoint of maximum economic resource recovery.

There are no known anticipated effects from subsidence due to the amount of overburden and the strata above the coal seam. Surface fractures on the permit area have been minimal.

Necessary support pillars will be left in place to assure entries for the continuation of mining as per mine plan.

Barrier pillars will be left to protect the escarpments from mass failures. Rock formations are all sedimentary. They are composed of stratified layers of friable sandstone and soft silt and clay shales. The jointed, weathered nature of the rock, combined with the interlayering of the sandstone and shale contribute to frequent rockfalls and minor slope failures along the steep escarpment slopes.

Subsidence will have no effect on the surface facilities since no such structures are located over mined-out areas.

3.5.8.1 Projected Impacts of Subsidence

The surface of the area to be mined that might be impacted by subsidence is used primarily for cattle grazing and wildlife habitat. No known aquifer exists above the immediate coal zone. Buildings, conveyors, etc. for the mining operation are all located East of the coal field. In general the area is rugged with limited access and not readily accessible to the public. Subsidence is not expected to be significant at the depths involved in the new areas.

3.5.8.2 Control Measures to Mitigate Impacts

The impact of the observed subsidence will be evaluated and used as a guide in determining the need for control of subsidence and for mitigation. The need for subsidence control and for a specific mitigating measure will need to be site specific. The surface water supply will need to be protected or mitigating measures utilized if adverse impacts occur.

Subsidence control can be accomplished by several methods as needed, such as:

1) Not pulling pillars in selected sensitive areas (i.e. near outcrops).

2) Uniform extraction to minimize impacts.

Mitigating measures are limited in this relatively inaccessible area. Damage to any surface structures including fences and roads can be repaired. The mitigation of flow reductions or drying up of a water source must be site specific Flow from springs can be diverted or conveyed over a crack that might disrupt flow. Water can be supplied to the area if a critical need exists.

3.5.8.3 Subsidence Monitoring

A base map has been prepared showing contours and surface features that might be impacted by subsidence, such as surface structures and springs (Plate 3-3). The extent of

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mining is shown on Plate 3-4 and the area where pillars will be removed is indicated. This base map will be updated annually. Co-Op will notify adjacent porperty owners concerning subsidence potential prior to approaching their boundaries. Co-Op will conduct an annual survey to identify all evidence of subsidence. An annual field survey will be made to identify observable subsidence. Details are attached under Appendix 3-5-8A.

When subsidence is observed to adversely impact a surface structure or resource, the extent of the impact will be evaluated.

As pillars are pulled under the western portion of the mine plan area, impacts will be anticipated and hazards assessed on a site-specific basis. An overburden of approximately 1,000 feet or more in the western portion of the mine plan area should minimize surface impacts. Sandstone formations overlaying the Blackhawk coal bed should better distribute stresses and reduce the tendency for surface cracks and subsidence at the surface.

3.5.9 Waste Disposal Plans (Spoils, Coal Processing Wastes, Mine Development Wastes, Non-Coal Wastes, Removal, Handling and Storage.

Co-Op does not anticipate the handling of development waste

rock in its mining operation although a contingency plan has been developed if the need were to become critical in the effort to maximize coal removel. It is for the above purpose that Co-Op has designated a waste rock storage site in Trail Canyon. This area was used historically in this capacity and has the necessary hydrolic safeguards presently implemented. The waste would be handled in the same manner as coal and truck hauled to this area. This area would be addressed as a permit modification of New Permit Application. Co-Op will submit plans for the underground waste disposal site at least 90 days prior to anticipated need and will not use the site until such area is approved.

UMC 817.89 DISPOSAL OF NON-COAL WASTE

The Co-Op is presently undertaking a massive clean-up operation wherein large quantities of scrap have already been removed from the permit area. Once the operation is complete (September 1, 1983) the balance of the salvageable equipment will be stored in the designated area.

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A plan for this type of storage yard was discussed with a number of the technical staff in July of 1983 and was generated and submitted to the Division for their review prior to implementation. It is discussed in Appendix 3.3.4.A Sec. 8 pages 3 through 125.

In the interim, the equipment which is not scrapped out will be temporarily stored on the disturbed sites in both Bear and Trail Canyon. These sites will be situated in such a manner to insure that whatever runoff results from the area will pass through designated sediment facilities. The non-coal waste (other than rock refuse) generated in the operation of the mine will be placed in metal dumpsters which are strategically located on the property. A local trash collector is contracted to replace these bins when they are approximately 80% full.

3.5.9.1 Projected Impacts of Disposal Areas and Methods on the Environment

Not Applicable

3.6 RECLAMATION PLAN

Co-op Mining Company, upon completion of mining on this permit area, will reclaim all disturbed surface areas as diligently and rapidly as possible, to restore the property to a variety of alternative uses.

The postmining land uses could be grazing, recreation, wildlife and mineral. Portals will be closed and concrete foundations will be buried with fill material.

Where physically possible, disturbed areas will be scarified, sloped, topsoiled and seeded or planted before the next growing season. The site will be revegetated with a mixture of grasses, forbs, brush and trees as agreed upon with the appropriate land management agencies. Reclaimed areas will be maintained until stable up to five years. Seed will be planted with the best techniques available at that time. (Seed List Attached under 3-F)

Proposed access roads, to the mine portals, will be reclaimed and revegetated. This will accomplish a dual purpose of controlling runoff and revegetating the hillsides with vegetation comparable to existing growth.

The initial step in the reclamation plan is to seal all large-diameter openings by backfilling these openings with non-combustible material. The seals

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Proposed access roads, to the mine portals, will be reclaimed and revegetated. This will accomplish a dual purpose of controlling runoff and revegetating the hillsides with vegetation comparable to existing growth.

The initial step in the reclamation plan is to seal all large-diameter openings by backfilling these openings with non-combustible material. The seals

will be designed such that mine drainage, if any, will not enter surface water bodies. For a more detailed description of the sealing of openings, see Section 3.6.3.1, Sealing of Mine Openings, Drill Holes, Wells, etc.

The next step in reclamation would be the removal of all surface structures, equipment and road blacktop. Once this has been accomplished, all solid waste generated in the abandonment operation will be collected and removed from the reclaiming areas. Additional information concerning this aspect of the reclamation plan is present in Section 3.6.3.2, Removal of Surface Structures.

Backfilling of the subterranean portion of the silos, holes and depressions will be the next reclamation activity. Once the backfilling is completed, the disturbed areas will be graded and recontoured. A detailed description of this reclamation phase is found in Section 3.6.4, Backfilling and Grading.

Reclamation Timetable

A suitably permanent and diverse vegetative cover

to benefit wildlife will be established on all affected areas of land.

Land reclamation will take place as soon as possible after surface disturbance. All cut and fill slopes resulting from construction of access roads and railroads will be stabilized and revegetated at the first seasonal opportunity. Areas occupied by support facilities such as roads, office buildings, shops, coal handling structures and conveyors will not be reclaimed until conclusion of the mining operations. Demolition and removal of structures should commence in March, April, 2033. Portal seals and grading should commence in June and be completed by September, 2033. Drill and hydroseeding and stream enhancement work should be completed by October 30th. The area should be monitored during July, 2034, and again during July, 2035. At this point shrub and tree density, as a result of planting, can be determined. When the vegetation standard is achieved, the sediment control structures will be removed.

3.6.1 Contemporaneous Reclamation

Interim reclamation (during operations) will occur in areas that are no longer needed or that

to benefit wildlife will be established on all affected areas of land.

Land reclamation will take place as soon as possible after surface disturbance. All cut and fill slopes resulting from construction of access roads and coal yards will be stabilized and revegetated at the first seasonal opportunity. Areas occupied by support facilities such as roads, office buildings, shops, coal handling structures and conveyors will not be reclaimed until conclusion of the mining operations. Demolition and removal of structures should commence in March, April, 2033. Portal seals and grading should commence in June and be completed by September, 2033. Drill and hydroseeding and stream enhancement work should be completed by October 30th. The area should be monitored during July, 2034, and again during July, 2035. At this point shrub and tree density, as a result of planting, can be determined. When the vegetation standard is achieved, the sediment control structures will be removed.

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3.6.1 Contemporaneous Reclamation

Interim reclamation (during operations) will occur in areas that are no longer needed or that

require short-term stabilization. These areas will be seeded and mulched. Other areas may be reclaimed at different times during the operation as specific activities are concluded. (Appendix 3-C). This same procedure will apply to any area which becomes available during the life of the mine, and will be implemented upon the first available favorable season.

3.6.2 Soil Removal and Storage

To prevent suitable topsoil from being wasted or contaminated by spoil or other waste materials topsoil will be removed from any new construction areas as a separate operation. The topsoil will be stockpiled and protected from wind and water erosion and contamination which might lessen its capability to support vegetation. The following subsections deal specifically with the various phases of the topsoil and subsoil handling plan. There is approximately 2,600 cu. yds. of topsoil on site in Bear Canyon. The balance of 5,500 cu. yds. has been purchased from RACO Company and was tested to insure its compatibility. Sec. 8.6 pages 8-16 through 8-16D detail storage. (See Appendix 3-D).

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require short-term stabilization. These areas will be seeded and mulched. Other areas may be reclaimed at different times during the operation as specific activities are concluded. (Appendix 3 - C)

3.6.2 Soil Removal and Storage

To prevent suitable topsoil from being wasted or contaminated by spoil or other waste materials topsoil will be removed from any new construction areas as a separate operation. The topsoil will be stockpiled and protected from wind and water erosion and contamination which might lessen its capability to support vegetation. The following subsections deal specifically with the various phases of the topsoil and subsoil handling plan. There is approximately 2,600 cu. yds. of topsoil on site in Bear Canyon. The balance of 2,500 cu. yds. has been optioned from RACO Company and is presently being tested to insure its compatability. If this material is satisfactory, it will be purchased stockpiled and revegetated at its present location (adjacent to CV Spur - Carbon County, Utah. (See Appendix 3-D)

Topsoil Removal

At the start of any construction phase, topsoil has been collected from the area where useable soil existed. Existing vegetation has been removed and the topsoil collected prior to excavation or other surface disturbance operations within the affected areas.

The depth of topsoil removal in each case depends on the amount of A and B horizon material as defined in OSM Regulation 30 CFR 783.21 and 783.22.

The topsoil removed in these areas consists of A horizon quality material and B horizon quality material. The C horizon material was not removed since it is not sufficiently capable of supporting diverse vegetation. Chapter 8 presents additional soil information.

The equipment used for topsoil removal consisted of bulldozers, front-end loaders and dump trucks. The use of bulldozers require pushing of the topsoil to a collection point for loading into

dump trucks or other means of transportation to the designated stockpile. Adequate supervisory personnel were present at the time of topsoil removal to instruct the equipment operators in the proper techniques of topsoil removal and to ensure that required horizons were removed and stored.

Topsoil Stockpile

During any stockpiling operation, unnecessary compaction was prevented by limiting the equipment traffic over the stockpile.
Plans involving topsoil storage can be labeled as "short term" or "long term" depending on completion of activities in each area and the reclamation schedule presented in Section 3.6.6.

o Short-Term Topsoil Storage Areas

Short-term stockpiles of topsoil will be for areas to be reclaimed almost immeadiately upon cutting and at final grade. Topsoil will be redistributed promptly to minimize natural degradation processes. (such as pipeline trenches, etc.)

Long-term Topsoil Storage Areas

During any new construction of areas that will be used for the duration of the mining operation within the permit area, topsoil will be collected and and stockpiled. The topsoil will be used later for postmining reclamation of the abandonment areas. Other long-term stockpiles will be established at the proposed loadout site.

Topsoil Protection

The short-term topsoil stockpile will be sprayed with water or temporarily vegetated to retard erosion. The long-term topsoil stockpile will be protected by the following operational steps:

- A stable surface will be provided in an area outside the influence of active operation.

- As a stockpile is completed, it will be left in a rough condition to minimize erosion.

- Stockpiles will be situated and protected to prevent water erosion and sprayed with a tacifying agent.

- Storage piles will be vegetated with quick-growing soil-stabilizing plants.

- Signs will be posted to protect the stockpiles from accidental use as fill or from other inadvertent material contamination.

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- The establishment of noxious plant series will be prevented.

The stockpiled topsoil will not be removed or otherwise disturbed until required for the redistribution operation on a prepared, regraded disturbed area.

Topsoil Redistribution

Prior to topsoil redistribution, regraded land will be scarified by a ripper-equipped tractor. The ground surface will be ripped to a depth of 14" in order to reduce surface compaction, provide a

roughened surface to assure topsoil adherence and promote root penetration.

Within a ten day period prior to seeding, topsoil will be distributed on all areas to be reclaimed. During this time the topsoil will be allowed to settle and attain equilibrium with its natural environment. This procedure will be followed for all areas in which facilities such as roadbed, mine pads and building sites are to be abandoned.

Topsoil redistribution procedures will ensure approximate uniform thickness of 6" consistant with the proposed reclamation plan. Topsoil will be redistributed at a time of the year suitable for ? establishment of permanent vegetation.

To minimize compaction of the topsoil following redistribution, travel on reclaimed areas will be limited. After topsoil has been applied, surface compaction will be reduced by using a dryland chisel ? plow running at a suitable depth. This operation will also help prepare a proper seed bed and protect the redistributed topsoil from wind and water

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erosion. Co-op Mining Company will exercise care to guard aganist erosion during and after application of topsoil and will employ the necessary measure outlined in Chapter 8, to ensure the stability of topsoil on graded slopes.

3.6.3 Final Abandonment

Co-op Mining Company anticipates that the postmining land uses of the permit area will be the same as the premining. State and local governments have not proposed any land use changes for the postminig period. This section delineates the abandonment and reclamation steps to be taken which will allow a return to the original land use once mining operations are complete. In general, disturbed portions of the mine plan area will be returned to their original wildlife/grazing habitat.

Method of Achieving and Supporting Postmining Land Uses

The following presents the abandonment steps and revegetation/reclamation activities which represent the method of achieving and supporting postmining land uses. The activities are organized in the ap-

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proximate order of execution. These listed activities are also discussed in Chapter 4.

3.6.3.1 Sealing of Mine Openings, Drill Holes, Wells, etc.

Exploratory Holes, Bore Holes, and Wells

Upon abandonment of drilling operations, all drill holes are to be cemented with an approved slurry. The slurry mixture will consist of 5.2 - 5.5 gall. of water per bag of cement. Co-Op is committed to plugging all drill holes with 5 feet of cement as required by rule M3(5) UMLR Act of 1975.

Shafts

The shafts will be filled from bottom to collar with non-combustible material. A cap consisting of a 6 inch thick reinforced concrete slab will be used as a seal.

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The cap will be equipped with a 2 inch diameter vent pipe and will extend for a distance of 15 feet below the surface of the shaft collar.

Mine Entries - UMC 817.13-15

Seals will be installed in all entries as soon as mining is completed and the mine is to be abandoned. The seals will be located at least 25 feet inside the portal mouth entry. Prior to installation, all loose material within 3 feet of the seal area will be removed from the roof, rib and floor. The mine entry seals will be made of solid concrete blocks (average minimum compressive strength of 1,800 lfb/in^2 tested in accordance with ASTM C140-70) and mortar (1 part cement, 3 parts sand and no more than 7 gallons of water per sack of cement) to form a wall two blocks thick.

Seals will be installed in the following manner: The seal will be recessed at least 16 inches deep into the rib and 12 inches deep into the floor. No recess will be made into the roof. The blocks will be at least 6 inches high, except in the top course and 8 inches wide. The

The blocks will be laid and mortared in a transverse pattern. In the bottom course, each block will be laid with its long axis parallel to the rib. The long axis in succeeding courses will be perpenducular to the long axis block in the preceding course. An interlaced pilaster will be constructed in the center. The seals will have a total thickness of 16 inches. Where conditions permit, the portal seals will be graded to conform with existing surface contours and planted. In those instances where sizable highwalls established in preparing the portal site cannot be returned to original contours, the opening in front of the wall will be filled with non-combustible material as above and the portal and entire exposed seam on the highwall will be covered with 6 to 8 feet of non-combustible material, graded, covered with suitable material and seeded. For illustration of a typical seal, see Fig. 3-1 .

3.6.3.2 Removal of Surface Structures

Co-op Mining Company will restore disturbed land-surface areas to their approximate premining conditions, to the extent technologically and economically feasible.

The blocks will be laid and mortared in a transverse pattern. In the bottom course, each block will be laid with its long axis parallel to the rib. The long axis in succeeding courses will be perpendicular to the long axis block in the preceding course. An interlaced pilaster will be constructed in the center. The seals will have a total thickness of 16 inches. Where conditions permit, the portal seals will be graded to conform with existing surface contours and seeded. In those instances where sizable highwalls established in preparing the portal site cannot be returned to original contours, the opening in front of the wall will be filled with non-combustible material as above and the portal and entire exposed seam on the highwall will be covered with 6 to 8 feet of non-combustible material, graded, covered with suitable material and seeded. For illustration of a typical seal, see Fig. 3-1. Temporary seals are discussed in Appendix 3-F.

3.6.3.2 Removal of Surface Structures

Co-Op Mining Company will restore disturbed land-surface areas to their approximate premining conditions, to the extent technologically and economically feasible. All surface facilities including support facilities will be removed and restored to prevent damage to fish, wildlife, and associated environmental values.

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Building Removal

Office, shop, storage, scale, buildings and bath house:

- Each structure will be removed.
- Foundations will be removed if they are close to the surface. Deeper foundations will be fractured and covered with at least 3 feet of dirt.

Road Abandonment

The access road and small support roads will be reclaimed. Culverts and blacktop surfacing material will be removed. Reclamation would then include recontouring, ripping, adding cross drains, water bars, topsoil and seed. See Appendix 3-G, Detailed Plan.

Mine Operational System Removal

Systems such as domestic water will be phased out and removed or buried.

Area Cleanup

Building Removal

Office, shop, storage, scale, buildings and bath house:

- Each structure will be removed.
- Foundations will be removed if they are close to the surface. Deeper foundations will be fractured and covered with at least 3 feet of dirt.

Road Abandonment

The access road and small support roads will be reclaimed. Culverts and blacktop surfacing material will be removed. Reclamation would then include recontouring, ripping, adding cross drains, water bars, topsoil and seed.

Mine Operational System Removal

Systems such as domestic water will be phased out and removed or buried.

Area Cleanup

Solid waste generated in the abandonment operation will be collected and removed.

3.6.3.3 Disposition of Dams, Ponds and Diversions

After the disturbed areas are stabilized and runoff is comparable to the area's premining conditions without detention time, the site drainage system will be removed. The site drainage system areas will be backfilled and revegetated. All ponds will be drained and allowed to dry; thereafter they will be backfilled and revegetated.

Natural drainage patterns will be returned to a horizontal drainage pattern similar to the original.

3.6.4 Backfilling and Grading Plans

The objective of the proposed backfilling, soil stabilizing, compacting, contouring and grading process is to achieve a reclaimed surface which will

provide a variety of topographic features enhancing postmining land use.

Reclamation earthwork activities will be conducted as oulined in Section 4.5, Postmining Land Use and Section 3.6.6, Schedule of Reclamation. The steps to be taken in the backfill, soil stabilization, compaction, contouring and grading problems are described in the following subsections. Stability annalyses of backfilled areas are discussed in Appendix 3- F.

Backfilling operations, utilizing equipment such as rubber-tired srapers, front-end loaders and dump trucks, will be conducted in the portal and treatment facility areas. Holes or depressions will be filled when the mining operation is concluded. Compaction operations utilizing equipment such as sheeps-foot tampers, will be conducted to stabilize all filled holes and depressions. The portal fill material will be put in place with an LHD (load, haul, dump) unit to ensure proper backfilling.

In general, the backfilling and grading operation will take place in the following manner:

1. All mining portals will be sealed and backfilled as previously described.

2. Solid waste generated in the facilities removal will be collected and removed to an approved landfill.

3. A backhoe and dozer will work in conjunction to remove the outer edge of the operational benches and compact it against the highwall. This will be accomplished by the backhoe reaching over the edge of the bank approximately 20' pulling the material back. The dozer will then push and compact this material from the highwall outward to reach a bench slope of approximately IV:0.33h for drainage purposes.

4. This operation will start on the upper bench and work accross the banch to the upper access road.

5. The backhoe and dozer will work in the same manner to eliminate the access road, working down to the lower pad. A typical cross-section of the reclaimed road cut is shown in Fig. 3.6.4-A.

6. The above procedure will continue on down the canyon reshaping the mine yard and disturbed area to the configuration shown on Plate 3-2, Postmining Topography.

7. As backfilling and grading is completed, operational areas will be scarified by ripping to a depth of 14" with a dozer where possible. Steep slopes will receive special ripping to create ledges, crevices, pockets and screes. This will reduce compaction and prevent topsoil slippage, and improve soil retention and vegetation establishment

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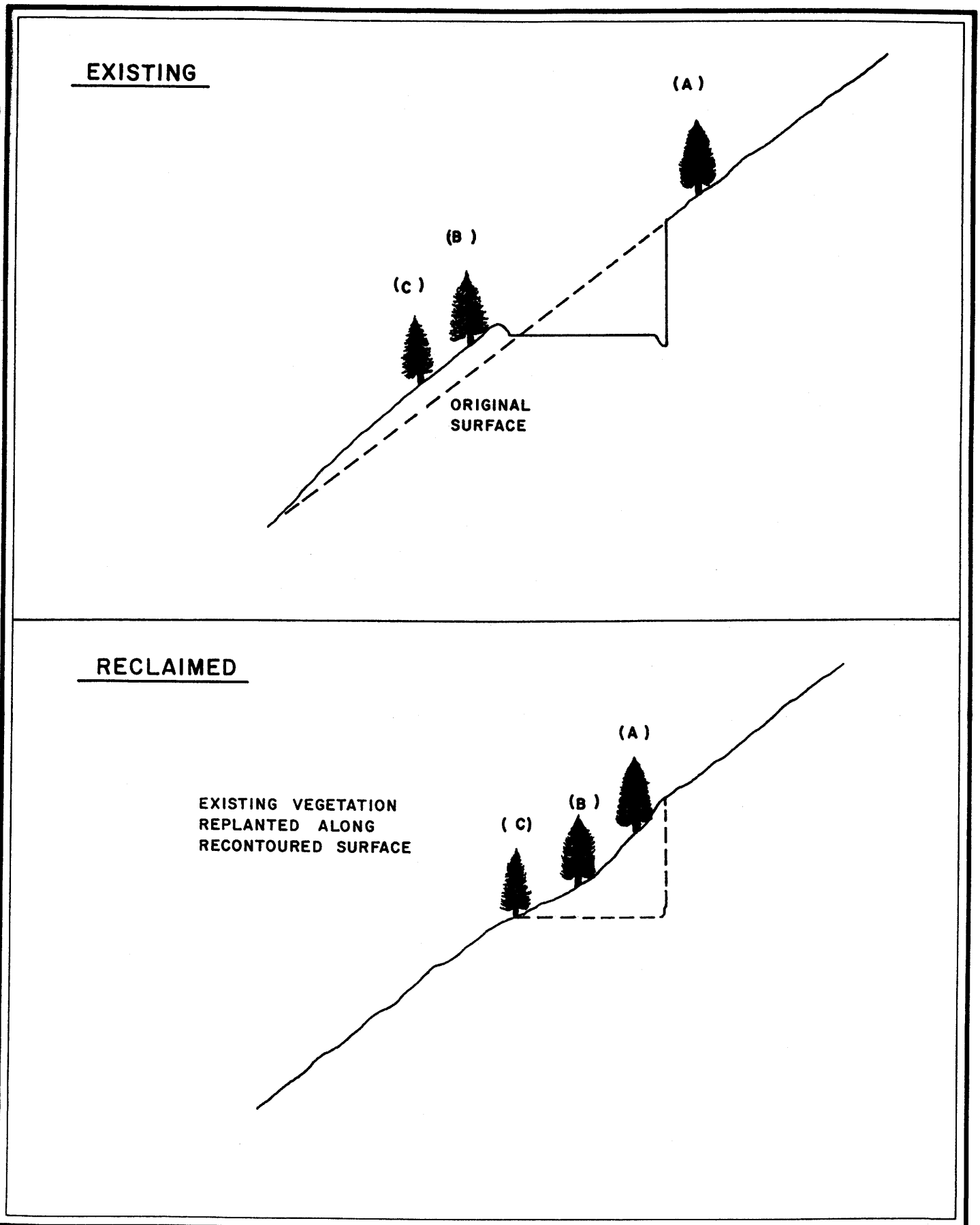

TYPICAL SLOPE RECLAMATION	ATTACHMENT 2	FIGURE NO. 3.6.4.-A

8. Topsoil will be spread over the disturbed areas after the grading and ripping is complete.

9. Upon completion of the above, the area will be reseeded as per the plan.

10. Material used for the recontouring will be taken from side slopes or other existing embankments within the disturbed area. In general, material to be compacted or used for fill will be taken from a side slope or embankment close enough to allow for pushing into place by a dozer, rather than loading and hauling by truck.

3.6.4.1 Recontouring

The cut slopes will be constructed in a manner which will achieve the necessary physical stability. This design will prevent slides and other related erosional damage. Upon abandonment, slopes will only be reduced to the amount physically possible. This amount will be limited to the reach of a back hoe, approximately 20'. Steep slopes and highwalls are inaccessible to conventional equipment, and thus, cannot be reduced or flattened qppreciably during reclamation. Stability analyses on these areas have confirmed that they have a factor of safety greater than 1.3 as they presently exist.

Stability and the designated post-mining land use can be achieved without extensive backfilling and return to the approximate original contour.

In February 1981, a slope stability analysis was performed by Dames & Moore on the Bear Canyon Mine access road. The purpose of this study was to analyze the static safety factor of the side-cast cut and fill slopes along this road. The conclusion of this study was that the slope stability had a safety factor ranging from a minimum of 1.43 to 2.15. This study was performed on the soil characteristics of the down-cast material which was not compacted. This is the same material that will be partially pulled back and compacted against the highwalls, increasing both the cohesion and unit weight of material and increasing the safety factor above the minimum of 1.43. This will result in a factor of safety well above the required 1.3. (Copies of the Dames & Moore report along with an earlier report are included in Appendix 3-F.)

3.6.4.2 Removal or Reduction of Highwall

Highwalls will be reduced to the extent practiceable to develope a static safety factor of at least 1.3.

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Only those highwalls that can be lessened by reaching with a backhoe will be reduced. Highwalls greater than 20' in height will be left as shown on Plate 3-2, Postmining Topography; however, these highwalls are shown to have a stability safety of greater than 1.3 by the following analyses:

A 1981 slope stability study of the Bear Creek Mine Access Road by Dames and Moore indicated a static safety factor of 1.43 to 2.15. (Appendix 3-F). This study was performed to analyze the static safety factor of the side-cast cut and fill slopes along the Bear Creek Portal Access Road. The maximum static safety factor of 2.15 was achieved in the trial arc which included the highwall area. (Shown on Plate 2 of their report). As a furthur note on page 5 of their Feb. 20, 1981 report, they indicate, "It should be noted that the factor of safety of the trial arc which cuts deep into the slope does not consider the presence of bedrock, increasing strength of the natural soils with depth, or the effect of the calcium carbonate cementation in the soil. If the above were incorporated

into the analysis, the factor of safety would be significantly higher." Since the highwalls are commonly made up of varying layers of bedrock material, it is reasonable to assume their strength and stability will increase accordingly.

As a further check on the highwall stability, a separate analysis was performed using a different method. This analysis uses the Hock method, and is based on rock parameters typical of those contained in the Blackhawk Formation of the Wasatch Plateau. The safety factor is calculated using the following parameters:

Maximum Slope Height	100'
Slope Angle	80
Rock Mass Cohesion	65 psi
Rock Mass Friction Angle	31
Rock Mass Bulk Density	155 lbs/ft^3

Based on these parameters, and utilizing the Hock charts, included as Fig. 3.6.4.2.A and Fig. 3.6.4.2.B, the highwalls have a safety factor of 2.61 for dry conditions and 2.40 for saturated conditions.

Figure 3.6.4.2.A

(DRY CONDITIONS)

CIRCULAR FAILURE CHART NUMBER 1

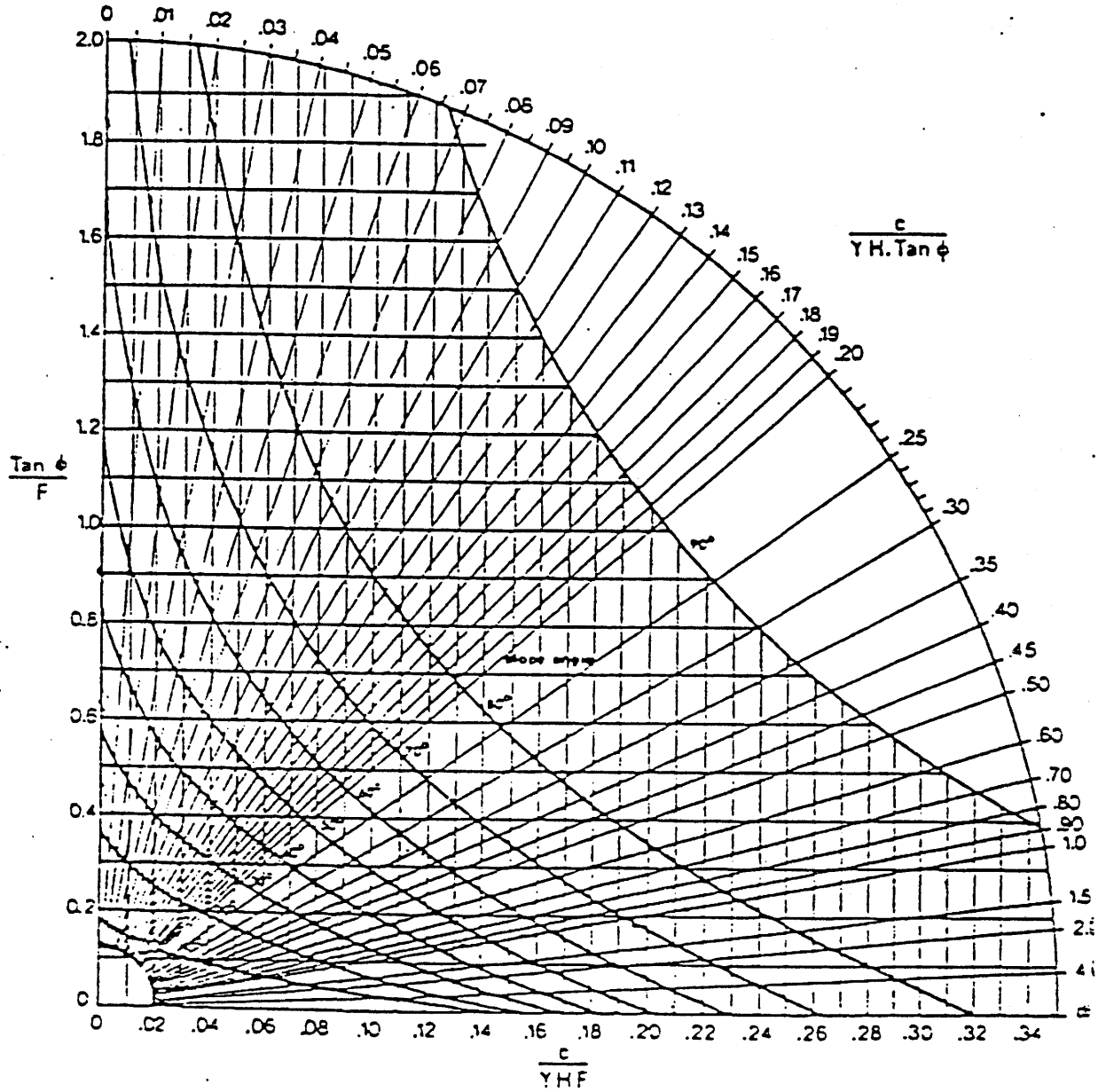

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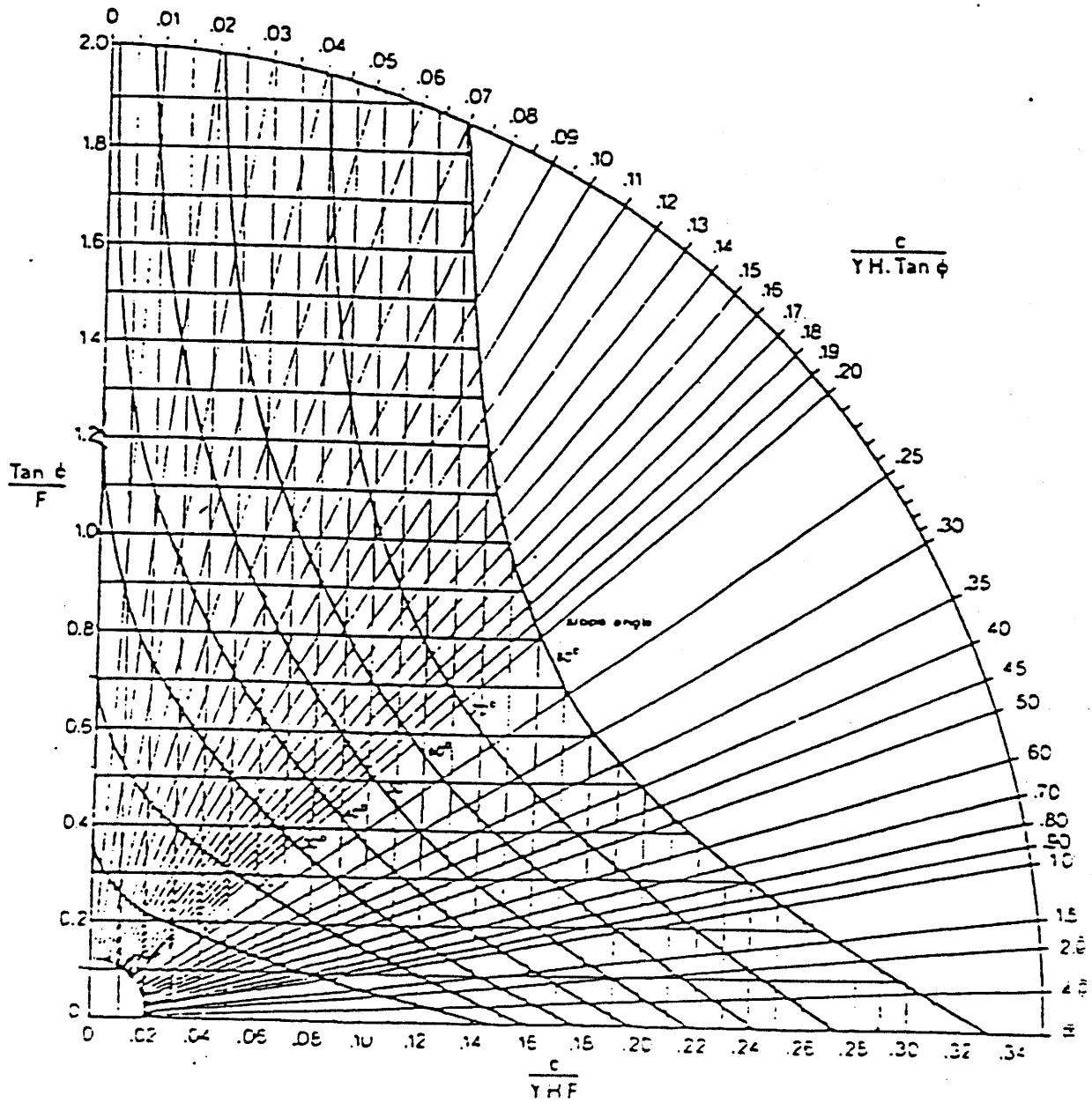
Figure 3.6.4.2.B

(SATURATED CONDITIONS)

CIRCULAR FAILURE CHART NUMBER 5



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This agrees with the projections made in the Danes and Moore report, and furthur substantiates that the highwalls proposed to be left in place will have a static safety factor of greater than 1.3.

Retention of highwalls is therefore proposed based on the following:

1. The retained highwalls will not be significantly greater in height or length than the dimensions of existing cliffs in the surrounding area. Extensive, high cliffs are common in the Wasatch Plateau.

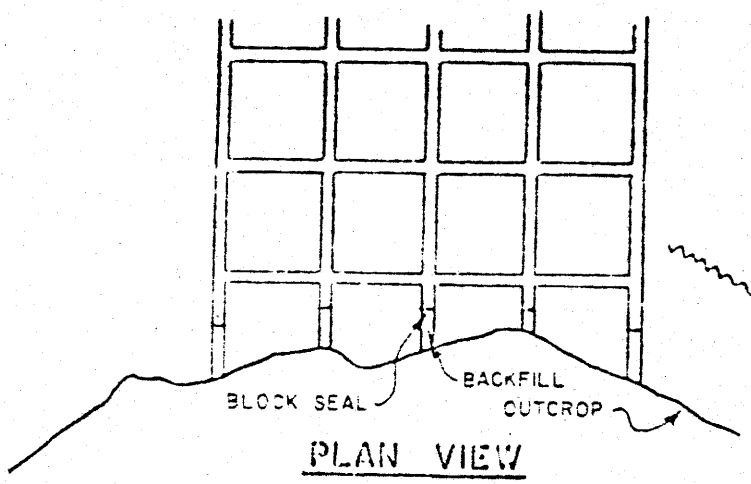
2. The residual highwall is similar in structural composition to the pre-existing cliffs in the surrounding area, and will be compatible with the visual attributes of the area. Highwalls are composed primarily of sandstones and sandy shales which are common in the natural cliffs of the area.

3. The residual highwall will have a static safety factor of greater than 1.3 and will be compatible with the geomorphic processes of the area. The rock types common in the highwall are very similar to those in surrounding vertical cliffs; therefore, the highwalls will react similarly to the geomorphic processes in this area.

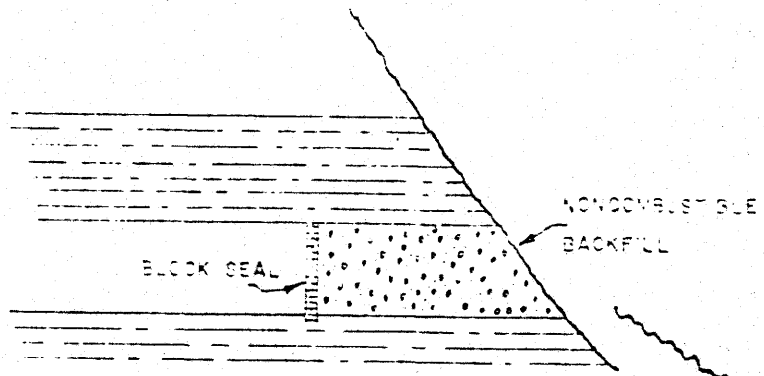
3.6.4.3 Terracing and Erosion Control

The need to terrace some of the steeper slopes within the mine plan area currently is not anticipated.

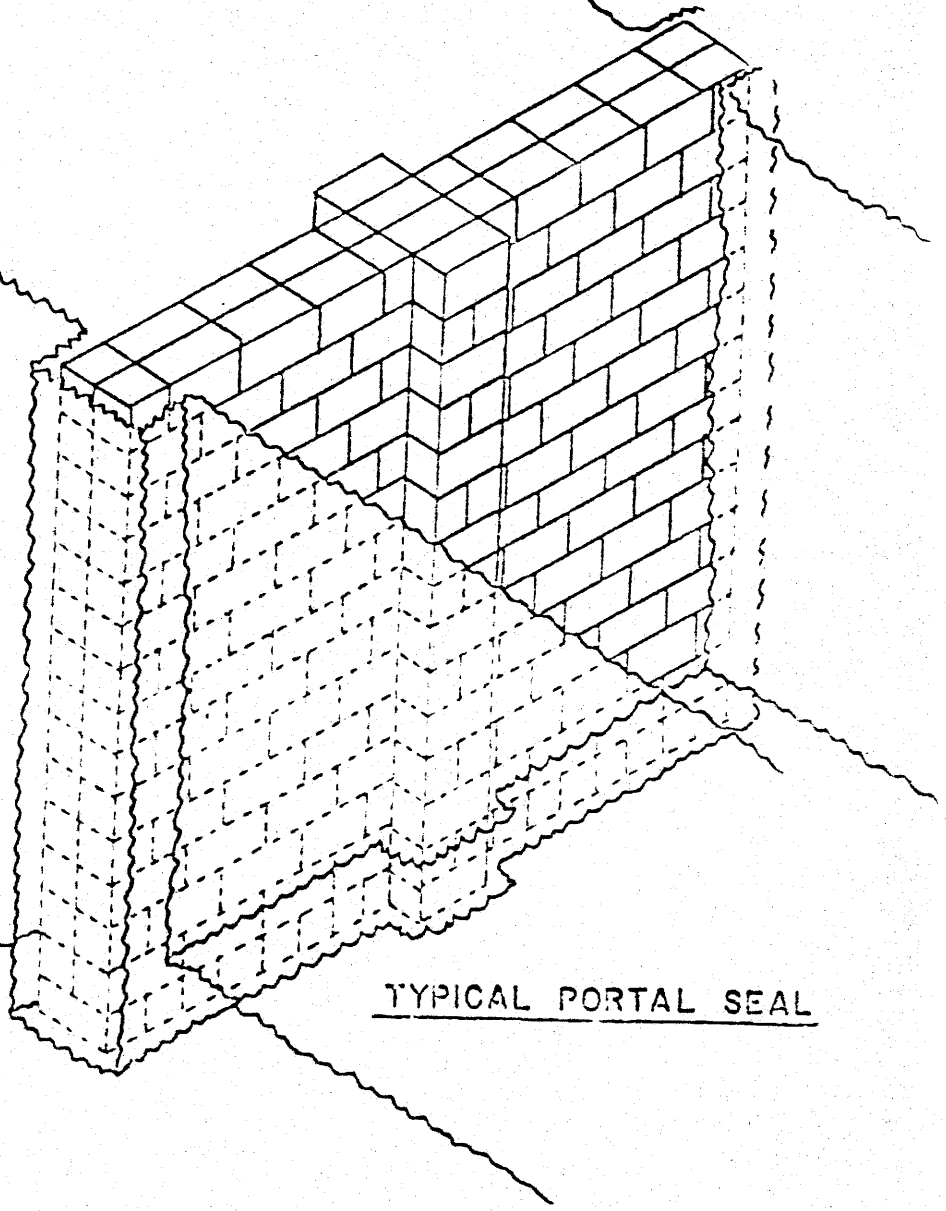
Erosion control measures which will be employed are specific to each situation. Mulching to reduce and limit rainfall impact will be a widely used erosion control practice.



PLAN VIEW



SECTION VIEW



TYPICAL PORTAL SEAL

PORTAL SEALS

Fig 3-1

3.6.4.4 Soil Redistribution and Stabilization

Prior to redistribution, the regraded land will be scarified by a ripper-equipped tractor. The ground will be ripped to a depth of 14" to reduce surface compaction, provide a roughened surface to assure topsoil adherence and promote vegetational root penetration.

Within a 10 days period prior to seeding, topsoil will be distributed on all areas to be reclaimed. During this time, the topsoil will be allowed to settle and attain equilibrium with its natural environment. This procedure will be followed for all areas in which facilities such as roadbeds, mine pads and building sites are to be abandoned.

Topsoil redistribution procedures will ensure an approximate 6" thickness consistent with the proposed reclamation plan. Topsoil will be redistributed in the fall of the year suitable for establishing permanent vegetation.

To minimize compaction of the redistributed topsoil, travel on reclaimed areas will be limited. After topsoil has been applied, surface compaction will be reduced with suitable equipment. This operation

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will also help prepare a proper seedbed and protect the redistributed topsoil from wind and water erosion. Co-Op Mining Company will exercise care to guard against erosion during and after application of topsoil and will employ the necessary measures to ensure the stability of topsoil on graded slopes as outlined in Chapter 8 page 23.

In addition to the vegetative stabilization discussed in Section 3.6.5 Revegetation Plan, physical stabilization of the soil is also planned. The specific methods to be implemented are defined in Chapter 8 page 23. An example of the soil stabilization methodology that will be used includes the placement of

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crushed and heavier material at the toe of road-fill slopes.

3.6.5 Revegetation Plan

All disturbed areas will be planted and revegetated during the first appropriate season following grading and topsoil redistribution procedures and will include, as necessary, the addition of remedial soil treatments. A suitable, permanent, diverse vegetative cover, selected on the basis of UDWR recommendations, will be established on all reclaimed areas. The proposed reclamation schedule is presented in Section 3.6.6, Schedule of Reclamation. The following subsections describe the major aspects of the proposed revegetation plan.

3.6.5.1 Soil Preparation

Scarifying Areas

Operational areas will be scarified to reduce compaction and to prevent topsoil slippage. Steep slope areas which must remain after abandonment will receive special ripping to create ledges, crevices, pickets and screes. This will allow better soil retention and

and vegetation establishment.

Fertilization and Neutralization - UMC 817.25

The topsoil will be tested before it is seeded to determine the type and amount of fertilizer or neutralizer required. Soil analyses will measure the following components:

- Micronutrients
- Potassium, calcium, magnesium
- Phosphorus
- Nitrogen
- Soil pH and salinity
- Soil texture

Chemical analyses for micronutrients may be conducted by testing soil extracts with DTPA solution and measured by use of an atomic absorption analyzer. Ammonium acetate may be used to extract potassium, calcium and magnesium for atomic absorption analysis. Phosphorus may be determined with sodium bicarbonate extraction and colorimteric analysis. The Kjeldahl method may be used for determination of total nitrogen. Soil texture may be determined by a Bouyoucus hydrometer method (solium herametaphosphate dis-

persing agent). Soil pH may be determined on a 1:1 soil/water mixture tested with an electrode pH meter. Salinity may be analyzed by using a Wheatstone conductivity cell on an extract of each soil sample.

All necessary fertilization or neutralization, as determined by soil testing will be done.

3.6.5.2 Seeding and Transplanting

Steep slopes will be seeded with a hydro-seeder. Gently sloping and flat areas will be seeded with a drill seeder. Many shrubs and all trees will be planted by hand setting to ensure a permanent plant cover.

3.6.5.2.1 Species and Amounts/Acre - Shrubs, Trees, Grasses and Forbs - Different Plans for Different Areas

With UDWR recommendations and the 1981 vegetation field study as a basis, a suitable permanent, effective and di-

verse vegetative cover of species native to the permit area, or appropriate substitutes, will be established on all affected areas.

Plants used to revegetate the disturbed sites will be selected specifically for the vegetative community to be established in the given area.

The dominant species used for each vegetative type will be chosen on the basis of premine diversity values (see Section 9.3.6), available seed source and enhancement of postming land use. Some of the native plants to be used for revegetation will be wheatgrass, salina wildrye, sagebrugh, pinyon and juniper.

The species ultimately selected for use and the numbers or amounts per acre will depend also on the steepness and exposure of the slopes to be revegetated. For south-facing and sunny slopes, a mixture of big sagebrush, rubber rabbitbrush, Saskatoon service-berry, pinyon pine and Utah juniper may be planted by hand-set-

ting or seeding on an appropriate schedule to produce the equivalent of 1-m (3.25 foot) intervals.

Further recommended species and seeding protocol can be found in Appendix 9C and 9D.

3.6.5.2.2 Methods Including Quantity and Spacing

Methods, quantity and spacing of seeding are covered above in Section 3.6.5.2 and 3.6.5.2.1

3.6.5.3 Mulching

On all reclaimed areas a wood fiber mulch will be used to enhance the moisture retention required for seed germination. Mulch will have tackifier to adhere to the soil. The steeper slopes will require a hydromulch of a more permanent nature and/or the addition of burlap or soil-retaining matting. Mulch with tacifying agent may be used on steep banks.

3.6.5.4 Irrigation

Since the species used for reclamation are known for their survival characteristics, it is felt that artificial application of additional water will not be required. Should lower than average precipitation or irregularities in distribution of precipitation occur following the initiation of reclamation procedures, irrigation may be used on a short-term basis. Otherwise, irrigation may be primarily used if initial revegetation attempts fail and if such irrigation is considered to be a major factor in achieving revegetation.

3.6.5.5 Management

Deer and rodent use of areas planted with tree and shrub species will be observed yearily. If heavy use of the planted trees and shrubs by deer appears probable, appropriate protection measures will be taken. Also, should significant rodent damage become likely, a control program may be developed in conjunction with UDWR and appropriate land management

3.6.5.4 Irrigation

Since the species used for reclamation are known for their survival characteristics, it is felt that artificial application of additional water will not be required. Should lower than average precipitation or irregularities in distribution of precipitation occur following the initiation of reclamation procedures which temporarily precludes vegetation establishment, a preferred course of action would be to replant problem areas.

3.6.5.5 Management

Deer and rodent use of areas planted with tree and shrub species will be observed yearily. If heavy use of the planted trees and shrubs by deer appears probable, appropriate protection measures will be taken. Also, should significant rodent damage become likely, a control program may be developed in conjunction with UDWR and appropriate land management

agencies.

3.6.5.6 Vegetative Monitoring, Revegetation Success, Assessment and Test Plots on Interum Revegetation

All interum seeded areas will be inspected at the end of each growing season to determine the success of the seeding program for a period of at least five years (reclamation years 1-5). Where success is apparent, as represented by achievement of 80% original cover during the 5-year period, monitoring will be immediately investigated to determine the possible failure cause(s), so that positive steps can be taken to establish the desired interum vegetation during the next seasonal opportunity. Planting and/or seeding will be implemented on a contemporaneous basis as soon as backfilling or grading are complete. This effort will ensure a temporary cover of small grains, grasses or legumes until a permanent cover can be established.

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Standard methods, as outlined in Chapter 9, Vegetative Resources, will be applied to determine the degree of success for revegetation attempts.

3.6.5.7 Soil Testing Plan

The soil testing plan is discussed above in Section 3.6.5.1.

3.6.6 Schedule of Reclamation

The general timetable for completing the major steps in reclamation is:

2033-	Landfills and solid wastes will be regraded and seeded as they are completed.
2033-	Underground mine openings will be closed and sealed as they are abandoned.
2033-	Surface facilities will be removed as they become unnecessary.
2033-2034-	The completion of surface reclamation will be in as short a time as possible after operations cease.

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3.6.6.1 Detailed Timetable for Completion of Each Major Step in Reclamation

The specific timetable for completing each major step or phase in reclamation is not applicable for all. Reclamation will commence upon abandonment (year 2033).

3.6.6.2 Reclamation Monitoring

Upon completion, the reclaimed area will be monitored to determine when bond release parameters are achieved. If the monitoring indicates inadequacies, and rills and/or gullies develope on reclaimed areas, the damage will be addressed in such a manner to allow re-application of seed and mulch and tack the next available growing season. Earth work will constitute; (1) the diversion of water concentrations away from eroded areas with small hand-made berms, (2) distribution of additional soil if necessary to fill gullies, (3) recontouring with equipment as warranted and, (4) re-application of seed, tack, mulch and fertilizer in the approved manner as outlined in Chapter 9.

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If gullies constitute an overall change in drainage

pattern, a plan to stabilize and modify drainage pattern will be submitted to the Division for approval prior to implementation.

The monitoring procedures will be the same sampling methodologies which were incorporated in establishment of the reference areas. Starting in year 3 after reclamation, years 1 and 2 will be ocular estimates with the intent of identifying problem areas.

The success of the reclamation effort will be evaluated by detailed sampling of cover and production on reclaimed areas. The data from the reclaimed areas and the reference area will be collected during the same growing season. If there is no significant difference in cover and production between the reclaimed areas and the reference areas when tested at the 95 percent significance level using a one-tailed t-test, then the areas will be judged to be adequatly reclaimed relative to cover and production. Woody plant density will be determined by sampling each reference area prior to planting in order to establish a standard for each vegetation type.

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Cover and production on reclaimed and reference areas will be measured using the same methods employed during the baseline studies. Cover will be estimated in randomly located 1.0 square meter quadrats. Production will be measured using a SCS methodology. Shrub density will be evaluated based on the procedure described above.

One of the greatest challenges of revegetation is to create reclaimed areas which have a large number of desireable species. Species diversity on the reclaimed areas will be encouraged by including a

variety of grasses, forbs, and shrubs in seeding and planting mixes. Species diversity will be judged adequate when the relative cover and percent distribution of biomass for the major life form groups approximates that which occurs in the reference areas. That is, if the relative cover by perennial grasses is 50 percent in the reference areas, then the relative cover by perennial grasses on the reclaimed areas should also be approximately 50 percent. This same relationship should also hold true for productivity. If most of the cover and production were being provided by annual forbs on the reclaimed areas and by perennial grasses on the reference areas, then the reclamation would be judged unsuccessful.

The purpose of the above procedures is to demonstrate that based on cover, production, woody plant density, and species diversity, the disturbed areas have been returned to stable plant communities capable of withstanding the intended post-mining land use.

3.6.7 Schedule of Reclamation for Co-Op Bear Canyon Mine

3.6.7.1 Detailed Timetable for Completion of Major Reclamation Processes

The following schedule of reclamation is proposed to be initiated within 90 days (weather permitting) of final abandonment of the mining operation:

		Acc. Time
1.	Seal Portal - 1 week	1 week
2.	Remove Structures - 2 weeks	3 weeks
3.	Soil Placement (backfilling & grading)	
	a. Upper Pad - 1 week (Including Road)	4 weeks
	b. Channel Restoration - 1 week	5 weeks
	c. Lower Pad & Diversion - 1 week (Including Road)	6 weeks
4.	Seedbed Material & Hindling - 1 week	7 weeks
5.	Reseeding & Fertilizing - .5 week	7.5 weeks
6.	Mulching - .5 week	8 weeks
7.	Protective Fencing - 2 weeks (concurrently)	
		8 weeks

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The above reclamation tasks are therefore proposed to be completed within 8 weeks following the start of reclamation activities.

Equipment	Cost Per hour
1. Loader - 950B ($2\frac{1}{2}$ cy bucket)	$ 113.20
Operator	29.25
	$ 142.45
2. Crane - Groves RT-580 20T	78.80
Operator	29.90
	$ 108.70
3. Truck and Operator	$ 79.30
4. Cat D-7G	$ 152.55
Operator	29.90
	$ 182.40
5. Backhoe (Cat 235)	$ 211.90
Operator	29.90
	$ 241.80

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Backhoe (BH) Cycle Time Estimates - 235 Backhoe

Average	
Load Bucket	6.5 sec.
Swing Bucket	6.0 sec.
Dump Bucket	2.5 sec.
Swing Empty Bucket	5.0 sec.
Total Average	**20 sec. - 2.12 yds^3**

Medium to hard digging (hard packed soil with up to 50% rock content) depth to 70% of machine's capability.

3 cy/min X 2.12 yds X 60 = production/hr. = 381.60 cu.yd/hr

Cut and fill yardages (Same Number - 1 cycle)

Crawler Tractor (D7G) Cycle Time Estimates

D7G Cut Material - 200 yd.run

Average Blade Load of 15 cu. yd.

Cycle time	7.6 min	Loaded Average
	4.0 min	Return
	11.6 min	Cycle

Efficiency 50 min/hr.

50 min/11.6 min cycle X 15 yds/cycle = 64.65 yds/hr.

950B Loader Cycle Time		.50 min.
1.	Pile (10" material and smaller	+.01 min.
2.	Common ownership of trucks	-.04 min.
3.	3/4" to 6"	.00 min.
	113 cu yds./hr.	.53 min.
	196 cu. yds/hr. Topsoil	

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3.6.7.2 Summary of Reclamation Cost Estimate

A.	Seal Portal	$ 2,994.00
B.	Removal Structures	22,205.00
C.	Cleanup	2,353.00
D.	Soil Placement (Backfilling & Grading)	37,081.00
E.	Channel Restoration	7,953.00
F.	Reseeding and Fertilizer	13,750.00
G.	Mulching	3,500.00
H.	Protective Fencing	6,000.00
I.	Overhead and Contingency	11,760.00
J.	Maintenance and Monitoring	2,500.00
	1985 Dollars	$ 110,096.00

3.6.7.3 Reclamation Cost Estimate for Co-Op Mine

A. Seal Portal

Labor - 2 men X 179.20/man day X 5 days	1,794.00
Materials - 200 blocks/seal X 5 seals X 1.00/block	1,000.00
Mortar, sand, etc.	200.00
Subtotal	$ 2,994.00
Subtotal A	$ 2,994.00

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B. Removal Structures

Fan

Labor - 2 men X 179.20/day X 2 days	717.00
Equipment (hauling) - 1 truck + operator X 4 hours X 79.35/hour	317.00
20 T crane X 2 hrs X 78.80/hour	158.00
2 hours X Crane Operator X 29.90/hr	60.00
Subtotal	$ 1,252.00

Structures and Conveyor (Principle)

Labor - 3 men X 179.20/day X 2 days	1,075.00
Equipment (hauling) - 1 truck + Operator X 16 hrs X 79.35/hr.	1,270.00
1 loader + operator X 16 hrs X 142.45 (950 B - $2\frac{1}{2}$ cv vd bucket)	2,279.00
Subtotal	4,624.00

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Substation Power Transformer

Labor - 2 men X 179.20/day X 2 days	717.00
Hauling - 1 truck + operator X 16 hrs X 79.35	1,270.00
Loader - 4 hrs X 142.45/hr (+operator)	570.00
Subtotal	$ 2,557.00

Bathhouses, Shop, Warehouse, I Mine Offices

Labor - 2 men X 179.20/day X 3 days	$ 1,075.00
Equipment (Hauling) - 1 truck + operator X 12 hrs X 79.35/hr	952.00
Loader - 4 hrs X 142.25/hr + oper.	569.00
Subtotal	$ 2,596.00

Water System

Labor - 2 men X 179.20/day X 1 day	358.00
Hauling- 1 truck + operator X 4 hrs X 79.35/hr	317.00
Loader - 2 hrs X 142.25/hr + oper.	285.00
Subtotal	$ 960.00

Fuel Storage Tank and System

Labor - 2 men X 179.20/day X 2 days	717.00
Hauling - 1 truck + operator X 16 hrs X 79.35/hr.	1,270.00
Loader - 8 hrs @ 142.25/hr + oper.	1,138.00
Subtotal	$ 3,125.00

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Truck Loadout

Labor - 2 men X 179.20 X 2 days	717.00
Lowboy truck + oper. @ 79.35/hr X 4 hr.	317.00
1 20 ton crane 1 hr X 78.80	79.00
Operator @ 29.90 X 1	30.00
Subtotal	$ 1,143.00

Stacking Facility

Labor - 4 men X 179.20 X 1 day	717.00
Truck & operator 79.35 X 4 hrs	317.00
1 20 ton Crane 2 hrs. X 78.80	316.00
1 950B Loader 118.55/hr X 4 hrs	474.00
1 Crane operator 29.90 X 2 hrs.	60.00
Subtotal	$ 1,884.00

Crusher Facility

Labor - 2 men @ 179.20/day X 4 days	1,434.00
1 20 T Crane 6 hrs X 78.80	473.00
1 Truck + operator 8 hr X 79.35	635.00
6 hrs Crane Operator X 29.90	180.00
Subtotal	$ 2,088.00

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Oil Slack Load Out

Labor - 2 men @ 179.20/day X 2 days	717.00
1 20 T. Crane 2 hrs X 78.80	159.00
1 Truck + operator 4 hrs X 79.35	317.00
2 hrs Crane operator 29.90	60.00
Subtotal	$ 1,253.00

Watchman Facility

2 men X 1 day X 179.20	358.00
D7G Crawler 2 hrs X 182.40	365.00
Subtotal	$ 723.00

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SOIL PLACEMENT - (Reference Area Post-Mining Contour Map)

Areas	Earth Moved	Cu. Yds.	Cost/Hr.D7G	Cost/Hr.BH-235	Time	Cost
Scale Area	cut	889	182.40		64.65 hr.	2,508.00
Sed. Pond B	fill	450		241.80	1.17 hr.	282.90
Sed. Pond A	fill	1333		241.80	3.49 hr.	843.88
Ditch to Pond A	fill	377	182.40		5.83 hr.	1,063.39
Bath House Area	cut	1111	182.40		17.18 hr.	3,133.39
Load Out	cut fill	3352 3352		241.80	8.78 hr.	2,123.00
Road Coal Prep.	cut fill	2222 2222		241.80	5.82	1,407.00
Lower Rd.to Swith-Back	cut fill	3377 3377		241.80	8.84	2,137.50
Up Rd. to Portal	cut fill	6622 6622		241.80	17.35	4,195.23
Portal Fan Area	cut fill	4444 4444		241.80	11.64	2,814.55
Total	**cut** **fill**	**21,820** **21,777**			**19 days**	**20,510.00**

8,000 cu. yds. topsoil - transport .65 miles = 950B Loader 41 hrs. 142.45 5,840.00

dump and regrade - 2 trucks & operator = 41 hrs @ 79.35 3,253.00

Spreading and ripping - D7G = 41 hrs. @ 182.40 7,478.00

Temporary Scale House reclaimed 10/1/85

Hiawatha Seam Portal reclaimed 6/30/85

C. Cleanup

Labor - 2 men X 179.20/day X 4 days	1,434.00
Hauling - 1 truck + operator X 8 hrs X 79.35/hr	635.00
Loader (+operator) - 2 hrs X 142.45	285.00
Subtotal	$ 2,353.00
B & C Subtotal	$ 24,558.00

D. Soil Placement (Backfilling and Grading)

See Table D-1 p. 108E

D Subtotal	$ 37,081.00

E. Channel Restoration

Backhoe + operator X 241.80 X 24 hrs.	5,803.00
Labor - 4 men X 179.20/day X 3 days	2,150.00
Subtotal	$ 7,953.00

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F. Reseeding & Fertilization (10 acres)

Hydroseeder, operator and driver	
seed = $ 1,275.00	
Crew = $ 100/acre	13,750.00
Subtotal	$ 13,750.00

G. Mulching (10 acres)

Hydromulcher, operator and driver

$350/acre X 10 acres	3,500.00
Subtotal	3,500.00

H. Protective Fencing (10 acres)

6 foot high X 3,000 linear feet X

$2.00/foot installed	$ 6,000.00
Subtotal	6,000.00

I. Overhead and Contingency

1. Baseball park seeding	2,400.00
2. Retaining wall removed	300.00
3. Borehole plugging	700.00
4. Contemporaneous reclamation	6,000.00
5. Administration	2,360.00
Subtotal	$ 11,760.00

J. Maintenance and Monitoring

5 years @ $500.00/year	2,500.00
Subtotal	2,500.00
Total	$ 110,096.00

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Note all costs estimates are based on 1985 dollars

Co-Op will deposit with the Division of Oil, Gas & Mining, an irrevocable bank letter of credit upon the approval of bond amount.

3.6.8 Alluvial Valley Floor Determination UMC 785.19

Co-Op contends there are no alluvial valley floors within the permit area. This opinion is based on the following evidence:

1. The soils are of such a nature that both the water holding capacity and the rocky nature preclude any but the sparsest of vegetation cover (See Chapter 8 Soils).

makes no difference

2. The area receives less than 14" annual precipitation and has no evidence of subterrainian irrigation.

3. Water quality of the intermittant Bear Creek is marginal and the flows are tied to precipitation event rather than ground water interation.

4. The area has no history of agriculture attempts and the terrain is such as to preclude any but the minimum of level areas of small size to facilitate USC.

Co-Op Mine requests the Division to evaluate the site-specific conditions and render a judgement in this regard.

3.6.9. Temporary Cessation

In the event of a temporary cessation of operation, Co-Op will notify the Division within 48 hours of pending shut down and will submit all information regarding exact number of surface acres and the horizontal and vertical extent of sub-surface strata in the permit area prior to cessation or abandonment, extent and kind of surface reclamation, and identification of backfilling, regrading, revegetation, environmental monitoring, underground opening closures and water treatment activities that will continue during temporary cessation.

3.6.9.1 Temporary Portal Seals

Co-Op will seal portals which are not to be utilized for mine inspection or access during temporary cessations of operation. These seals will be constructed of woven wire and securely attached to the portal entry so as to make tresspass by men or animals prohibitive. All portals which are to be utilized will be posted with "No Tresspassing" and " Keep Out" notices. Where doors exist such as fan entries, this will also be locked and signed accordingly.

Each mine entry which is temporarily inactive, but has a further projected useful service under the approved permit application, shall be protected by barricades or other covering devices, fenced, and posted with signs, to prevent access into the entry and to identify the hazardous nature of the opening. These devices shall be periodically inspected and maintained in good operating condition by the person who conducts the underground coal mining activities.

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Co-Op is committed to sealing all portals in the prescribed manner which are temporarily inactive in course of normal mining activities.

INCORPORATED UNDER
THE LAWS OF THE STATE OF UTAH

NUMBER

SHARES

Huntington-Cleveland Irrigation Company

Capital $150,000 150,000 Shares

This Certifies that C. W. Kingston is the owner of

*****Three Hundred Thirty Three and 77/100**** Shares of the Capital Stock of

Huntington-Cleveland Irrigation Company

transferable only on the books of the Corporation by the holder hereof in person or by Attorney upon surrender of this Certificate properly endorsed.

IN WITNESS WHEREOF, the said Corporation has caused this Certificate to be signed by its duly authorized officers and its Corporate Seal to be hereunto affixed this 16 day of February A.D. 19 62

Secretary

President

SHARES 100 PAR

©GDES 154

3-115

RECLAMATION PLAN

MINE PORTAL ROAD

The following procedures are designed to revegetate and control erosion. They will satisfy the commitments made by Co-Op Mining Co. in their permit application and all applicable portions under CFR 784.13. The area in question will be along and adjacent to the main mine access. The reclamation will be of a permanent nature. (See Plate 3-1). The actual ground involved comprises approximately 3 acres of disturbance.

METHODOLOGY

The actual implementation of abandonment and ultimate reclamation can be broken down into four major catagories and classification of types of work needed:

(1). Earth moving: redistribution of top soil and redistribution of road cut material to approximate original contour of surface.

(2). Clump planting of adjacent vegetation on recontoured surface.

(3). Seeding and mulching to re-establish interum species and reduce erosion until climax vegetation can be established.

(4). Intermittant stream channel restoration and reconstruction of permanent drainage.

PHASE # 1 EARTH MOVING

The road system can be brought back to a reasonable configuration by implementation of a large backhoe unit. The actual method will involve the pulling of surface material from the road surface and berm and placing it against the opposing high wall. This material will then be covered with approximately 1 foot of top soil by pulling material from about 10 feet below the road cut up onto the road surface and spreading and compacting this material with the front bucket, at the same time pulling the leading edge of the high wall down to alleviate the degree and angle of the high wall. All work done both above and below the road will take into consideration existing vegetation and all effort will be made to minimize disturbance and utilize existing vegetation. When there is no alternative other than disturbance, an effort will be made to relocate earth and maintain existing vegetation in place, attempting to relocate the vegetation in the proximity of the road disturbance. (See attachment # 2).

PHASES # 2 AND 3 REVEGETATION

This procedure involves a two phase program: (1). To clump plant existing vegetation in small basins along the recontoured road, and, (2). To hydromulch the entire area to supplement revegetation and control run-off until stabilization is complete and to prepare a site which will be stable enough for a period of time to allow vegetation

Stream Buffer Zones UMC 817.57

Co-Op has attempted to protect Bear Creek in all areas where existing structure and disturbance preclude the establishment of a buffer zone. This has been accomplished by earthen berms along roads adjacent to the stream, culverting in the area of the scale house, silt fences, and straw filters on all tributaries which pass distubed runoff from haul roads. In addition, all disturbed area runoff other than haul roads pass through a sediment pond prior to discharge into Bear Creek. The buffer zone that does exist will be properly posted and signed.

No additional disturbance is anticipated in the Bear Canyon drainage however, if in the future, expansion is required, Co-Op is committed in taking all necessary safeguards to ensure the integrity of Bear Creek and establishing an adequate buffer zone.

PHASE #4 DRAINAGE CHANNEL STABILIZATION AND RECONSTRUCTION

In conjunction with the recontouring, all drainage areas will re-establish to approximate original configuration. In order to minimize the loss of soil, all drainages will be lined with hygronomy blankets for approximately 10 feet above and below the areas of disturbance. In addition, where conditions warrant, rock rip rap may also be utilized to add yet another parameter of stability.

CONCLUSIONS AND RECOMMENDATIONS

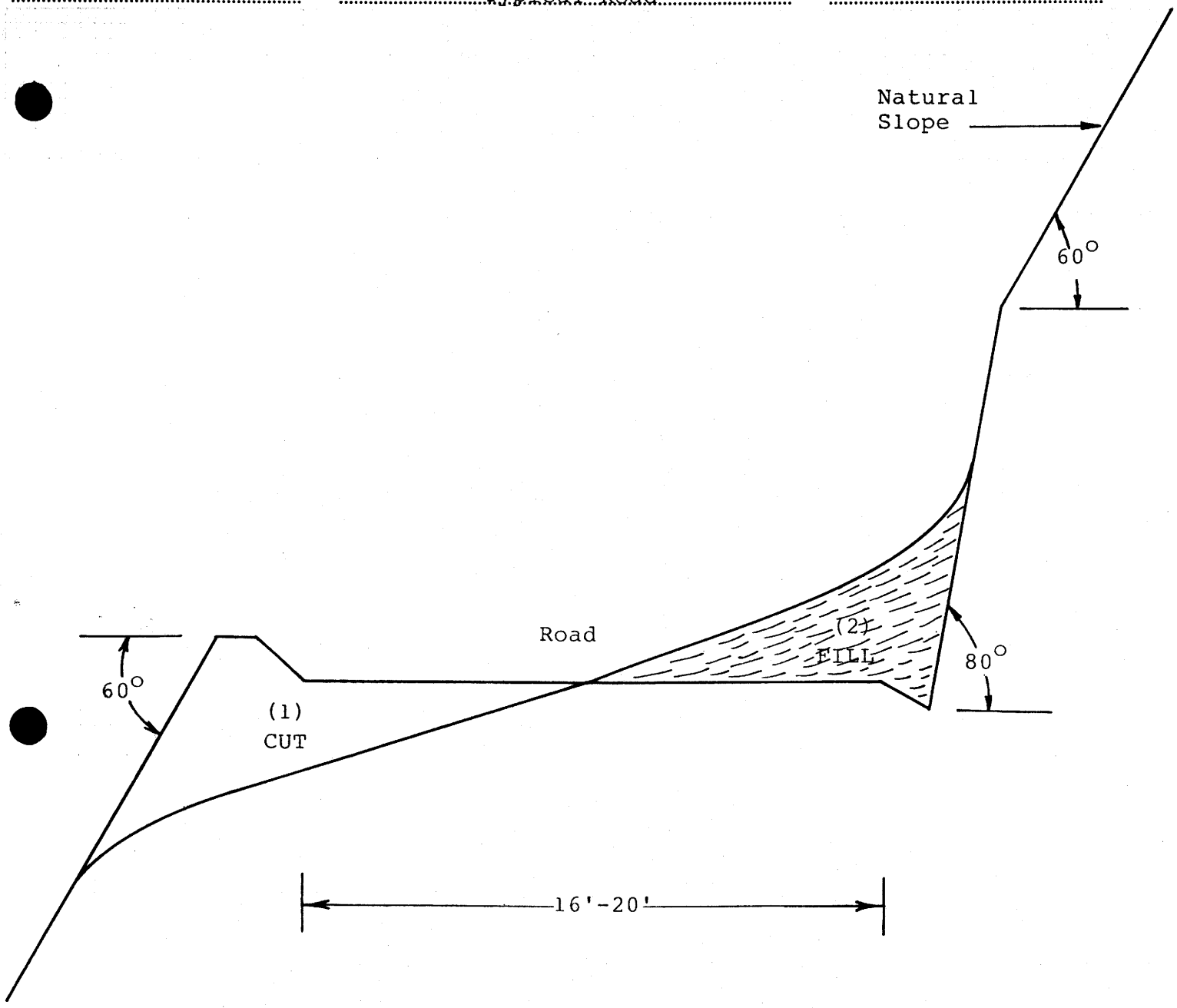
The advantages of this recommended procedure are as follows:

1. By utilizing a backhoe, associated disturbance will be kept minimal.
2. The clump planting procedure accomplishes all of the below:
   a. Immediate ground cover.
   b. Aesthetically pleasing upon completion.
   c. Maximize potential for native species to establish.
   d. Innoculation of soil with indigenous mycorrhiza.
   e. Modify and enhance the micro-environment surrounding each clump.
3. The hydroseeding, mulching, fertilization, and tackifying will virtually assure rapid establishment, thus minimizing wind and water erosion.
4. The channel liners are a proven method to eliminate erosion at the same time allowing for stabilization through revegetation.
5. A cost effective methodology to address a common problem associated with pre-law disturbance.

BY D. Guy DATE 5/11/85 SUBJECT Recontouring of Typical Road SHEET NO. 1 OF 1

CHKD. BY DATE JOB NO.

Scale: 1" = 5'



Note: Area (1) is placed in Area (2).

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EXISTING AND PROPOSED STRUCTURES

The Bear Canyon Mine has the following surface facilities:

- Temporary Scale House
- Truck Loadout
- Coal Storage Area and Stacking Facility
- Crusher Facility
- Principle Conveyor Structure
- Fuel Storage Tanks
- Oil Slack Loadout
- Shop
- Non-coal Storage Yard
- Power Transformer
- Caretaker Dwelling
- Single building complex containing shops, parts warehouse, bathhouse and mine offices
- Mine run coal Receiver bin

Work commenced on all structures June of 1982 with the exception of the proposed bathhouse, phase 2 loadout, and stacking tube. (A detailed plan of these proposed structures will be provided to the Division upon final drafting.)

The location of each of the listed structures is shown on Plate 2-2 Surface Facilities. Co-Op has sought interum approval for each structure in the course of construction, the hydrologic safegards have been implemented, top soil removed and stored, interum revegetation completed where earthwork is at final grade, and health and safety standards implemented as per MSHA standards.

All of the structures are to be reclaimed in the year 2033 and are detailed in Section 3.6.6. and 3.6.7 Bear Canyon MRP 4/30/84 submittal. In order to consolidate all previous plan submittals, current photographs were taken on 4/26/84 and are attached herein in a brief description of each facility is attached under "Facility Description" and is correlated to the representational photo. Also, Table 3.3.4.-1 lists each structure and the dates of construction, present state, etc.

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FACILITY DESCRIPTIONS

(1) Temporary Scale House

This structure consists of a 12' x 50' trailor which has temporarily been utilized as a scale office. It is to be removed and replaced by a more permanent structure in 1984. At present, all environmental safeguards are in place on an interum basis and permanent structures will be implemented upon completion. See Scale House Approval letter MRP Chapter 11 (approvals). Photo (1) see schematic "A" replacement structure.

(2) Fuel Storage Tank

There are 3 10,000 gal. fuel storage tanks installed at the downslope of the shop area. These tanks are contained within a natural berm of the slope with the only access by way of the disturbed drainage ditch leading directly to the sediment pond. The pond is designed to contain any spillage which could foreseeably occur. The area will be posted " No Smoking" and fire extinguishers are in place, all MSAH safety standards will be adhered to. See photo 2.

(3) Truck Loadout Facility

The truck loadout is a conveyor system designed to load tractor-trailor trucks from any of the storage areas. It is electrically manipulated so as to minimize spillage. As each unit is loaded, the area is cleaned of spilled coal on a daily basis, and all runoff is contained. See photo 3.

(4) Shop

The shop building is for servicing of both underground and surface equipment. Major and minor repairs are implemented and it is used to inventory parts to be utilized on a continual roll over basis. The

building is heated with a coal furnace and is equipped with standard heavy equipment handling implements such as wenches, welders, etc. See photo 4.

(5) Oil Slack Loadout

The oil slack loadout is designed to handle oiled stoker coal, primarily for non-commercial clients. It maintains a 20,000 ton storage bin with an electrical controlled auger to load small tonnages. The bin is fed via of a hopper and conveyor which is loaded by way of an end loader. See photo 5.

(6) Coal Storage and Stacking Tubes

The coal storage yard (phase 1) is equipped with a system of conveyors wherein coal can be segragated according to size and is of a short term nature where the piles are constantly being consumed and replenished. The area also contains two 6000 gallon oil storage tanks which are used to store oil for stoker coal. All run-off is controlled, and passes through the primary sediment pond. See photo 6.

(7) Crusher Facility

This facility is primarily a coal segragation site where the various sizes of coal can be separated and then stacked in the designed locations. This area is controlled run-off and is passed through the sediment pond. See photo 7.

(8) Non-Coal Storage Yard

This area is utilized for all material which is in storage on the property with projected use and or salvage value. A schematic is attached as Figure 3.8.1. Historically, the site has been utilized for this purpose and is designed with hydrologic safeguards to protect the watershed. Additional work is anticipated to upgrade the hydrolo-

logic measure upon Division approval. See photo 8.

(9) Transformer Substation

This facility is the concern of the mine's power supplier, Utah Power & Light. However, Co-Op does maintain the fence, and enforces health and environmental safeguards. Th structure is pictured on photo 9.

(10) Conveyor Structure

This conveyor is the route by which the coal exits the mine. Photo 10 pictures the conveyor in the lower tight corner, and shows the progression of coal through the various structures to the truck load-out. It is also a good overview of the property showing relative locations of each structure 1 - 8. Pictured in this photo, center top, is Co-Op's topsoil stockpile, not listed as a structure but in evidence on the surface.

(11) Single Building Complex (New Scale House) Containing small shop, parts warehouse, formans bathhouse, and mine offices.

A schematic of this structure of attached construction, is underway with an anticipated completion date of fall 1986.

(12) Caretakers Residence

This is a single-wide 14X50 house trailor. A number of small pens and sheds attached for storage and housing a collection of domesticated fowl.

(13) Mine run Coal Receiver Bin

As the name implies, is approximately 50' X 100' bin where coal fall from the conveyor shute prior to traveling to the crusher is pictured in photo #7.

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Co-Op is committed that all support facilities, mine disturbance or associated disturbance of any kind will be restored so as to prevent damage to fish, wildlife and related environmental values; and, minimize the possibility of additional contributions of suspended solids to streamflow or runoff outside the permit area.

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Table 3.3.4.-1

Existing Structure	Construction Dates Beginning	Construction Dates Completion	Photo #	Reclamation Time Frame
Temporary Scale House	10/1982	11/1983	1	replace in 1985
Fuel Storage Tanks	10/1983	6/1984	2	2033
Truck Loadout	9/1982	4/1983	3	2033
Shop	10/1983	9/1984	4	2033
Oil Slack Loadout	4/1983	7/1983	5	2033
Coal Storage & Stacking	6/1980	4/1983	6	2033
Crusher Facility	4/1980	12/1985	7	2033
Non-coal Storage Yd.	3/1980	9/1984	8	2033
Transformer Substation	4/1980	6/1980	9	2033
Conveyor Structure	3/1980	6/1980	10	2033
New Scale House (Modification approved) See Chapter 11	6/1984	10/1986		2033
Caretakers Dwelling	6/1980	7/1981		2033
Bath House	8/1984	11/1985		2033
Stacking Tube & Load-out (2nd Phase)	4/1985	10/1985		2033

RECEIVED
MAY 17 1985
DIVISION OF OIL GAS & MINING

Scott M. Matheson
Governor

James O. Mason, M.D., Dr.P.H.
Executive Director
801-533-6111

DIVISIONS

Community Health Services
Environmental Health
Family Health Services
Health Care Financing

OFFICES

Administrative Services
Community Health Nursing
Management Planning
Medical Examiner
State Health Laboratory

STATE OF UTAH
DEPARTMENT OF HEALTH
DIVISION OF ENVIRONMENTAL HEALTH

150 West North Temple, P.O. Box 2500, Salt Lake City, Utah 84110-2500

Kenneth Lee Alkema, Director
Room 474 801-533-6121

December 20, 1983
533-6108

Wendell Owen
Co-Op Mining Company
P. O. Box 300
Huntington, Utah 84528

RE: Approval Order for Modifications to Air Pollution Control at Coal Mine, Emery County

Dear Mr. Owen:

On October 28, 1983, the Executive Secretary published a notice of intent to approve the modifications to the air pollution control equipment for the surface operations at your coal mine in Emery County. The 30 day public comment period has expired, and no comments were received.

This air quality approval order authorizes the modifications as proposed in your notice of intent dated October 14, 1983, with the following operating conditions:

1. All emission control equipment shall be properly installed, maintained, and operated as proposed in the notice of intent dated May 5, 1980, and subsequent information dated October 14, 1983.

2. No visible emissions from any point shall exceed 20% opacity as measured by EPA test Method 9.

3. Annual production of coal shall not exceed 200,000 tons without prior approval from the Executive Secretary in accordance with Section 3.1, UACR.

4. Crushers, screens, conveyors, and all transfer points shall be controlled by water sprays to minimize fugitive emissions. The water sprays shall operate whenever the mine is operating.

5. The haul roads and access roads shall be water sprayed to minimize fugitive dusts at least twice per eight hour shift unless daily precipitation exceeds 0.05 inches for that day.

An Equal Opportunity Employer

6. The stockpile and loadout areas shall be sprayed (water or other suppressant) as dry conditions warrant or as determined necessary by the Executive Secretary.

7. A compliance inspection shall be performed within 30 days of the date of this approval order.

The fee for issuing this modified approval order is $179.17. (See enclosures for breakdown of costs.) The amount is payable to the Utah Department of Health, sent to the Executive Secretary of the Utah Air Conservation Committee, and is due within 30 days after the approval order date.

Sincerely,

Brent C. Bradford
Executive Secretary
Utah Air Conservation Committee

MRK/ads
cc: EPA Region VIII (J. Philbrook)
Southeastern District Health Dept.
Enclosures (2)

4367

ITEMIZED COSTS FOR NOTICE OF INTENT

The following are final costs incurred by the Bureau of Air Quality to review your modification and issue an approval order.

Filing Fee	$ 50.00
Engineering Review	77.40
Administrative	51.77
Total	$ 179.17

CHARGEABLE FEES - BUREAU OF AIR QUALITY

Source CO-OP Mining Major _____ Minor X

Date Started _____ Non-Attainment _____ PSD X

Date Approved _____

NOTICE OF INTENT REVIEW

1. Pre-Design Date: 0

Filing Date: 10/14/83

1. Engineer/Hours _____
Engineer/Hours 0

2. $ 50.00

Engineering Review: Engineer/Date/Hours

Site Survey Date: 10-21 4 HR

Calculations:

Hours/Engineer $ _____

Hours/Engineer $ _____

TOTALS: 4 HRS @ 15/HR = 60 Hours with 29% fringe $ 77.40

2. Modeling:

Calculations:

TOTALS: Hours/Modeler 0 —

Computer $ 0 —

Analysis $ 0 —

3. Administrative Costs:

Survey Travel $ 0

Notice to Paper $ 46.35

Hearing Travel $ 0

Overhead @ 7% $ 5.42 (.07 x 77.40)

SUBTOTALS $ 51.77

FINAL TOTALS 4 HOURS $ 179.17 (50.00+77.40+51.

MRK:wml

ADDENDUM TO: SEWAGE WASTE DISPOSAL AND HANDLING FACILITY

BEAR CANYON SCALE HOUSE - BEAR CANYON MINE

RE: letter 09/08/83 received Co-op 09/29/83 State of Utah, Department of Health

2. More detail must be provided on the proposed lift station:

   a. Details of the lift station construction must be provided, ie., height, materials of construction, construction details etc., of the lift station wet well.

Co-op Reply:

The wet well will be constructed of 60 inch concrete culvert, 135 emulsion will be applied on both the inside and outside of the cylinder to an approximate thickness of 1/8th inch. The six ft. section of culvert will be set 4 inches into a 52" x 10" concrete pad (see Figure 2). The culvert will then be backfilled with sand to a depth of 5'6" leaving approximately 6" of the culvert end extending above the surface. A 4"

metal line from the 2,500 gal. septic tank will be welded into the 36" culvert at this point, a 3" metal line will be sealed at the same elevation on the opposing side (See figure 2). A 6" x 6' x 6' concrete pad will then be poured around the top of the culvert. A 2" depression to accomodate a conventional 60" manhole cover will be formed in place. See consturction diagram (Figure 3).

b. Details of the switches which will be used to activate pump and warning light must be provided.

Co-op Reply:

(See Figure 4)

c. The proximity of the lift station to the stream should be provided./Also provisions which would prevent waste water (if the lift station should flood) from entering the stream should be shown.

Co-op Reply

The wet well will be approximately 15 feet horizontal distance from the existing stream channel. However, Co-op is presently permitting a 200' 60" culvert that will seal this stretch of stream off for a minimum of 50' below the area of the well. In ad-

dition, the drainage from the entire pad area is designed to drain to the catch basin which will further ensure the intergrity of the stream.

d. Details of the screen over the lift station discharge line should be presented.

Co-op Reply:

A standard 100 mesh screen is provided on the intake portion of the pump unit. This, in combination with the 3 screen inlet pipe to the well, should maintain a relatively clear debris-free fluid in the well as well as the pump.

e. Details of the cover for the lift station should be provided.

Co-op Reply:

The cover is simply a standard 36" man-hole cover as provided by W. R. White Pipe Company of Price, UT.

f. Details of the lift station pump should be provided to ensure it is of adequate capacity and suitable for this application.

Co-op Reply:

If anything, a 200 gpm trash pump is oversized to accomodate a 300 gal. wet well, however, Co-op has contacted 3 pump manufacturers with the request for specifications and pricing. When a decision is reached, a set of specifications for the pump will be supplied to the Dept. of Health for the review and approval prior to purchase and/or installation.

3. The details of the 3 inch diameter sewer pipe crossing Bear Creek should be provided. These details should include relative elevation of the crossing pipe to the creek bottom, what type of pipe will be used, will the pipe be encased and if so what type of pipe will be used etc.

Co-op Reply:

3" PVC schedual 240# pipe will be installed at a depth of 40" - 48" at 10" from intersecting the 60" concrete culverted creek. This pipe will be run through a 6" PVC pipe for a distance of 40' which will by-pass the 60" culverted creek by a minimum of 10'.

STATE OF UTAH
NATURAL RESOURCES & ENERGY
Water Rights

Scott M. Matheson, Governor
Temple A. Reynolds, Executive Director
Dee C. Hansen, State Engineer

74 West Main Street • P.O. Box 718 • Price, UT 84501 • 801-637-1303

September 30, 1983

Division of Oil, Gas and Mining
Attn: Joseph C. Helfrich
4241 State Office Building
Salt Lake City, Utah 84114

Dear Mr. Helfrich:

At the request of Mr. Melvin Coonrod, consultant for Co-op Mining Company, please be advised that the above mentioned company has filed Change Application No. a-12921 (93-1067), of which a copy is enclosed, requesting the right to withdraw up to 0.25 sec.-ft. of water from a mine tunnel in Bear Canyon located at a point: N. 79 ft. & E. 75 ft. from the SW Cor. Sec. 26, T16S, R7E, SLB&M. It is proposed to use the water for mining and irrigation purposes within the SE¼, NE¼, T16S, R7E, SLB&M.

The change application was filed with this office on September 2, 1983. Normal processing time for such a request is 90-120 days, provided that there are no protests filed.

I trust that this brief explanation will help clarify their present water rights status. If I can assist further in any way please feel free to call on me.

Sincerely,

Mark P. Page

Mark P. Page
Area Engineer

cc: Melvin Coonrod
Co-op Mining Company

Enclosure

Form 114
25M 4-63

IN THE ....SEVENTH.... JUDICIAL DISTRICT COURT, IN AND FOR THE COUNTY OF .....EMERY..... STATE OF UTAH

IN THE MATTER OF THE GENERAL DETERMINATION OF RIGHTS TO THE USE OF ALL WATER BOTH SURFACE AND UNDERGROUND WITHIN THE DRAINAGE AREA OF THE SAN RAFAEL RIVER IN SANPETE AND EMERY COUNTIES IN UTAH.

STATEMENT OF WATER USER'S CLAIM
CODE NO. 93 SERIAL NO. 1067
MAP NO. 21

NOTE: This blank is sent to you in accordance with Utah Law. The information called for herein will be used in connection with the adjudication of water rights on the above mentioned drainage area. All questions applicable to your claim must be answered fully, and one copy of this form must be filed with the Clerk of the District Court at .....Castle Dale....., Utah, within sixty (60) days from date of service of the attached Notice. A copy shall be filed with the State Engineer, State Capitol, Salt Lake City. Failure to file the attached Statement of the Water User's Claim with the Clerk of the District Court within the time stated will forever bar and estop you from asserting any right to the use of water from said drainage area.

1. Name of Claimant Charles W. Kingston
2. Address 862 East Garfield Avenue Salt Lake City, Utah 484110 Interest Claimed Full
3. Name of particular spring, spring area, stream, well, tunnel or drain from which water is diverted is Underground Water (Mine Tunnel) in Emery County.
4. Priority date claimed January 20, 1964 Date when water was first used .....
   Date when work on diverting system was first begun ..... Date when diverting system was completed ..... Nature of work .....
5. Class of Right (Indicate by X):
   (a) ..... Right to surface water initiated by beneficial use before 1903 Claim No. .....
   (b) ..... Right to underground water initiated before 1935 Claim No. .....
   (c) ..... Right decreed by court, cite title of case .....
   (d) X Application filed, State Engineer's Office No. 35836 Cert. of App. No. Election Chng. a-6330
   (e) ..... Right acquired by adverse use prior to 1939
6. Nature (Indicate by X), Amount, and Annual Period of Use (by month & day):

(a) X	Irrigation	Sec. Ft. Inc.	from April 1	to October 31	(both dates incl.)
(b)	Stockwatering	Sec. Ft.	from	to	(both dates incl.)
(c)	Domestic	Sec. Ft.	from	to	(both dates incl.)
(d)	Municipal	Sec. Ft.	from	to	(both dates incl.)
(e) X	Mining	Sec. Ft. 0.25	from January 1	to December 31	(both dates incl.)

7. Direct Flow Appropriation (must be described with reference to U. S. Government Survey Corner)
   (a) Point of diversion from ~~[illegible]~~ tunnel ~~[illegible]~~ N. 210 ft. & W. 320 ft. from E¼ Cor. Sec. 22, T16S, R7E, SLB&M.
   (b) Description of spring area .....
   (c) Point of rediversion or point of return to natural channel .....
   (d) If flow is intermittently diverted, list by number or description, all rights involved .....
8. Where water is used for irrigation purposes:
   (a) Area irrigated in legal subdivisions of land by 40-acre tract. (All sources of water for same land or lands must be described in each instance by name or claim number) CLAIMS USED FOR PURPOSE DESCRIBED: 93-1067 on: 0.5 acre in SE¼NE¼ Sec. 22, T16S, R7E, SLB&M.

.....

.....

.....

.....

.....

.....

.....

(b) Do you get water under a ditch owned by several users..... If so, give names of all users and divisions of interest .....

9. Where water is used for Stockwatering:

(a) Number of each kind of stock watered .....

(b) All sources of water for same stock. (Describe by name or claim number) .....

.....

.....

10. Where water is used for Domestic: .....

(a) Number of families or their equivalent ..... All sources of water for same use. (Describe by name or claim number) .....

FORM 108

Exchange Application No. _____

APPLICATION FOR THE RIGHT OF EXCHANGE OF WATER STATE OF UTAH

For the purpose of obtaining permission to make an exchange of water, application is hereby made to State Engineer, based upon the following showing of facts submitted in accordance with the requirements of Sec. 73-3-20, Utah Code Annotated, 1953.

1. The name of the applicant is Mrs. Charles W.(Lavenda) Kingston
2. The post office address of the applicant is 862 E.Garfield Ave.SLC, Ut. 84110
3. The right to be exchanged was acquired by Application No. 35836 (93-1067)
   (Give application No., certificate No., Decree, stock purchase, or other identification.)
4. The quantity of water is 0.25 second-feet, or _____ acre-feet.
5. The period of use from January 1 *(Month)* *(Day)* to December 31 *(Month)* *(Day)*, inc.
6. The period of storage from _____ *(Month)* *(Day)* to _____ *(Month)* *(Day)*, inc.
7. The direct source of supply is Tunnel tributary to _____ in Emery county.
8. The point of diversion is* N 210' & W 320' from E¼ Cor. Sec. 22, T16S, R7E, SLM
9. The water is, or was, to be used for the following purposes:
   Irrigation SE¼ ne¼ Sec. 22, T16S, R7E, SLM
   Mining
   _____, Total 10 acres.
   (Give place of use by legal subdivision of land)

THE FOLLOWING EXCHANGE IS PROPOSED

10. 0.25 second-feet or _____ acre-feet of water represented by the foregoing right will be delivered from January 1 *(Month)* *(Day)* to December 31 *(Month)* *(Day)* incl. of each year, to satisfy other rights, into _____ at a point* N79' & E75' from the SW cor. Sec. 24 T16 R7E SLM
11. In exchange for the water delivered and described in par. 10, there will be _____ second-feet or _____ acre-feet diverted from _____ *(Month)* *(Day)* to

_____ incl., of each year from a well _____
(Month) *(Day)* *(diameter and depth)*

or stream _____, at a point* _____

_____

_____

12. The water will be used for _____

Irrigation

Mining, Total 10 acres.

NOTE: *The point of diversion, point of return or point of delivery must be located by course and distance or by rectangular distances with reference to some United States land survey corner.*

AGREEMENT

This agreement made and entered into this 3rd day of August 1983, by and between Emery County, a body corporate and politic (County), and Co-Op Mining Company, a Utah general partnership (Co-Op),

WHEREAS, there is an existing road in Emery County known as Bear Creek Road, and

WHEREAS, Co-Op requires extensive use of said road, and

WHEREAS, due to said extensive use, said road should be relocated for the health, safety and welfare of the citizens of County as well as others who may have occasion to use said road,

NOW, THEREFORE, be it agreed as follows:

1. The parties hereto agree and acknowledge that the southern 0.65 miles of the road known as Bear Creek Road is a County road. Said County road runs from State Road 31 in a northerly direction for approximately 0.65 miles to a presently existing gate. Thereafter the road is a private road.

2. That Co-Op will relocate the Bear Creek Road according to the plans and specifications prepared by the Emery County Engineer and described on the document entitled Bear Canyon County Road Relocation dated October 12, 1982.

3. Co-Op will relocate the Road according to the plans and specifications referred to above at their expense. Co-Op will reimburse County for engineering costs incurred by County concerning the preparation of said plans and specifications and site inspections up to One Thousand ($1,000.00) Dollars.

4. Co-Op will indemnify and defend County for any damage caused, or loss incurred to or claim made by any public or private individual, firm, group, association, partnership or corporation as a result of the construction conducted to relocate Bear Creek Road. Said indemnification will continue until such time as County approves the completed roadway and accepts the construction thereof.

5. Co-Op acknowledges and accepts the easements of North Emery Water Users and Huntington City which exist in, along and across the relocate Bear Creek Road. Said easements are in existence on the ground. Co-Op's acknowledgment thereof herein recognizes and preserves said easements.

6. Co-Op agrees to encase water lines of North Emery Water Users and Huntington City in nestable corrugated pipe pursuant to plans and specifications prepared by the Emery County Engineer.

7. Co-Op agrees to allow access to other property served by the relocated Bear Creek Road. Said access shall be allowed to the owner of the property, their successor in interest or any other individual, firm, group, association, partnership or corporation who requires access due to their association with the owner or because the owner has granted permission to the individual, firm, group, association, partnership or corporation to go upon his property. Co-Op will not withhold access due to the type of activity which the then owner or his agents, employees or invitees intend or in fact conduct.

8. Co-Op will provide a completion and performance bond to Emery County upon the execution hereof in the amount of Twenty-Five Thousand ($25,000.00) Dollars which will remain in force and effect for twelve (12) months after the date said road is accepted by County as indicated in paragraph 4 above.

9. Co-Op will provide liability insurance in an amount not less than Five Hundred Thousand ($500,000.00) Dollars to be in force during the construction of said road. Said policy will name County as an insured.

10. Co-Op agrees to complete said road in a timely manner not to exceed eighteen (18) months from the date of this agreement. County may make demand upon the bonding company under the bond provided pursuant to paragraph 8 above and secure completion of the relocation in the event construction is not completed within the agreed upon eighteen (18) months.

11. It is further understood that any additional improvements of the relocated Bear Creek Road will be at the expense of all primary users.

12. The Co-Op agrees to reclaim that portion of the old Bear Creek Road according to the specifications and requirements of the Bureau of Land Manager (BLM).

13. That the Co-Op agrees to provide Emery County with the necessary easement agreements with the Utah Department of Transportation.

14. Co-Op acknowleges and agrees to comply with standard number 6.3.8 "Protection Zone" of the Utah State Health Drinking Water Standards as it applies to supplies of drinking water in Bear Canyon.

15. County agrees to inspect the relocated Bear Creek Road within ten (10) days after notification by Co-Op of the completion thereof. County must within five (5) working days of said inspection accept the road or notify Co-Op of any deficiencies which must be then corrected by Co-Op within the time period outlined in paragraph 10 above. Should County fail to notify Co-Op of any deficiencies within five (5) working days, the road is deemed accepted by County and the twelve (12) month period indicated in pargaraph 8 above begins to run from the sixth (6th) day after inspection.

IN WITNESS WHEREOF, this agreement is executed the day and year above first written, at Castle Dale, Utah, pursuant to a resolution of the Emery County Board of Commissioners at a regularly scheduled meeting of the Board.

EMERY COUNTY, a body politic and corporate,

ATTEST

County Clerk

By _____
Chairman of the Emery County Board of Commissioners

IN WITNESS WHEREOF this agreement is executed at Huntington, Utah.
DATED this 3rd day of August, 1983.

CO-OP MINING COMPANY, a Utah general partnership

By _____
a General Partner

CO-OP MINING CO.
BOX 1245
HUNTINGTON, UTAH 84528

Aug. 8, 1983

S U B M I T T A L

RECEIVED
AUG 08 1983
DIVISION OF
OIL GAS & MINING

TO:

DIVISION OF OIL GAS AND MINING
4241 STATE OFFICE BUILDING
SALT LAKE CITY, UTAH 84114

Co-op Mining Co. submits the following plans for that portion of the haul road in the Bear Creek Canyon designated as a private road in the enclosed copy of the aggreement between Emery County and Co-op Mining Co. The road coincides with the existing Bear Canyon road, which follows the original contour of the land, minimizing additional disturbance or adverse effects on the environment. There will be no cut or fill sections, and no material side-cast. If any new area is disturbed, any suitable topsoil will first be removed and stockpiled as described in the topsoil plan previously submitted. At the time of final reclamation, the road will be reclaimed as outlined in the previously submitted reclamation plan, unless it is determined to be necessary for post mining land use. Hydrology for the drainage controls has been calculated by Horrocks Engineers (See appendage A). Culverts will be galvanized corrigated type.

Please see enclosed map, profile, and cross-section for construction detail. (Plate 3-5)

CO-OP MINING COMPANY

Wendell Owen

WENDELL OWEN

Coal Mine Safety and Health
District 9

March 1, 1983

Mr. B. W. Stoddard
General Superintendent
Co-op Mining Company
P. O. Box 300
Huntington, UT 84528

Re: Bear Canyon Mine
I. D. No. 42-01697
Roof Control Plan

Dear Mr. Stoddard:

The roof control plan dated January 7, 1983, has been reviewed by MSHA personnel and is approved. As required by 30 CFR, 75.200, the plan shall be reviewed by MSHA every six months.

Sincerely,

John W. Barton
District Manager

JWB:J.S.Miller:mh

cc: Price
Orangeville
DTSC
State

ROOF CONTROL PLAN
General Information

Date 1-7-83 Mine I.D. No. 42-01697

A. Company Co-op Mining Co.

Address P.O. Box 15309 Salt Lake City, Utah 84115
city state

B. Mine Bear Canyon #1

Mine Location

Huntington (city) Emery (county) Utah (state)

C. Location (reference to nearest highway route, direction, and distance)

2 Miles East Off Route No. 31

D. Type(s) of plan Spot Bolting Plan

E. Area(s) of mine covered by the plan Development of entries, rooms and crosscuts

F. Maximum cover: 1700 Feet

Main Roof — — — — Sandstone — — Up to 80 ft. thick

Immediate Roof	Coal - 2 to 4 feet
Coalbed	About 9 feet
Bottom	Coal - 5 to 7 feet
	Clay - 1 to 3 feet

Sandstone —— —— Up to 60 feet

G. BH Stoddard Mgr Supt. 1-7-83
Company Official's Signature Title Date

Roof Control Investigator

The Roof Control Plan approved this date hereby supersedes all previously approved plans

Approved by _____ _____
Date

Title _____

ROOF SUPPORT MATERIALS FOR RESIN GROUTED RODS

RODS

Manufacturer's

Manufacturer Bermingham OR EQUIVELANT Designation 6 or 7 x 72

Minimum Length 72" Diameter 3/4 or 7/8

Type Steel #40 rebar Type Head square

Minimum Yield 40,000 lbs.

Dimensions of Rod: Head 1 1/8" Flange 1 7/8"

BEARING PLATES

Dimensions Generally ¼ x 6" x 6"

Shape Embossed or dished Center Hole Size approx. 7/8"

RESIN

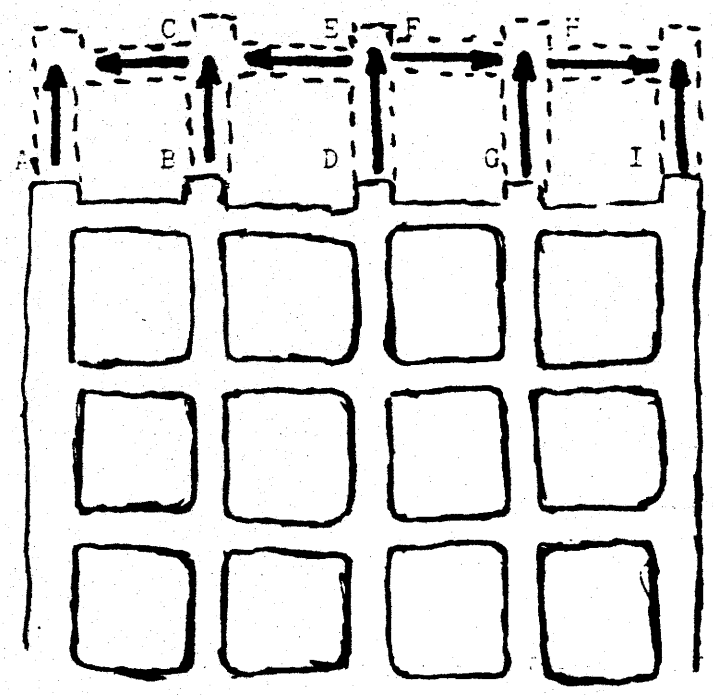
Manufacturer's

Manufacturer Celtite or equivelant Designation roof bolt cartridge

Type IV Size of Finishing Bit 1" +030

Prior approval shall be obtained before making any changes in the materials listed.

Sketch #1



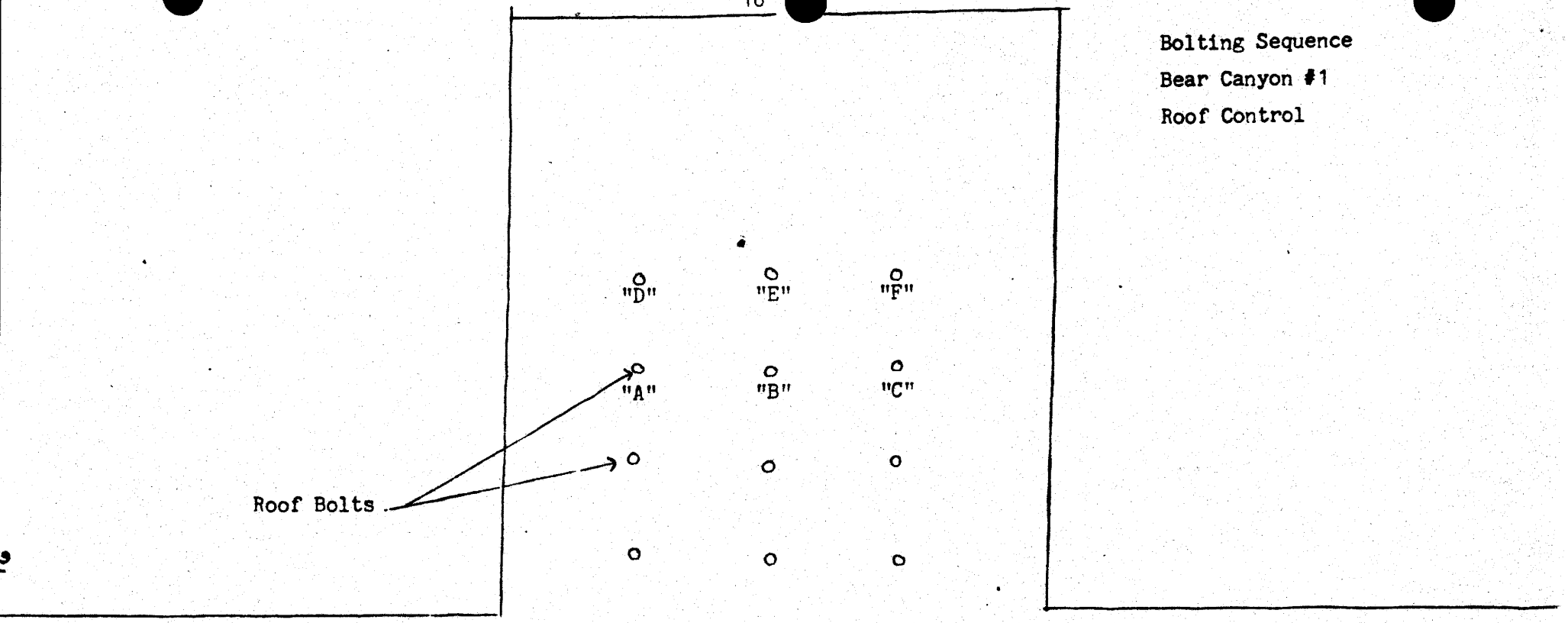
Sequence of Mining
Bear Canyon #1
Roof Control

Typical Section Mining Sequence

Starting on the far right (A) the entry or room is advanced the designated distance. Then the miner pulls back to (B) and this entry or room is advanced same as "A". Then a crosscut (C) is made to join A and B. The miner then pulls back to (D) and this entry or room is advanced same as "B" at this time a crosscut (E) is turned to the left to to join B and D then one is turned to the right (F). The miner pulls back to (G) and this entry or room then advances to crosscut (F), then a crosscut (H) is turned to the right. The miner is then moved to (I) and this entry or room is advanced to crosscut (H). This sequence is then repeated.

RECEIVED
JAN 14 1983

Bolting Sequence
Bear Canyon #1
Roof Control



Typical Sequence of Installing Bolts

Botls are installed on 5 foot centers. Bolts are installed from left to right. Starting from "A" to "B" to "C", then the sequence follow as in "D", "E" and "F".

RECEIVED
JAN 14 1983
DISTRICT 9
Denver, Co.

SAFETY PRECAUTIONS FOR A SPOT BOLTING PLAN

1. For the purpose of this plan, where the roof is strong and competent, as determined by a responsible person of higher authority than the section foreman, an entry may be advanced a maximum of 120 feet prior to roof bolting. Adjoining crosscuts may be run in addition to entries prior to roof bolting. A written record that defines the approved area and is dated and signed by the responsible official shall be kept in a book that is available for examination by interested persons.

2. In the absence of properly recorded approval as described above, an area is to be fully supported. All active faces in a section in an approved area shall automatically revert to a full overhead support if: (a) a roof fall occurs in or inby the last open crosscut in an active section; (b) roof bolts (or crossbars) are installed or needed for a distance in excess of 16 linear feet within such area; or (c) roof bolts (or crossbars) are installed or needed frequently in the general area, regardless of the distance supported in each instance. The official immediately responsible for the area shall report such change to the mine foreman; and the mine foreman shall record the loss of approval for the area in the aforesaid record book. The area may be re-approved per preceding paragraph.

U. S. Department of Labor

Mine Safety and Health Administration
P O Box 25367
Denver, Colorado 80225
Coal Mine Safety & Health
District 9

September 19, 1983

Mr. B. W. Stoddard
Operator
Co-op Mining Company
P.O. Box 300
Huntington, UT 84528

Re: Bear Canyon No. 1 Mine, I.D. No. 42-01697
Six Month Review of Roof Control Plan with
Pillar Extraction Addendum

Dear Mr. Stoddard:

In regard to your requested addendum, dated September 11, 1983, pursuant to your pillar extraction plan, it has been reviewed by MSHA personnel and is approved.

Your currently approved roof control plan with the pillar extraction addendum has been reviewed by this office and appears to be satisfactory and is approved. This plan supercedes all previously approved roof control plans. As required by 30 CFR, 75.200, the approved plan will remain in effect for another six months. If future conditions warrant, the plan may have to be changed.

Sincerely,

for John W. Barton
District Manager

Enclosure

M. Ile ✓

Co-op Mining Company
Bear Canyon No. 1
P.O. Box 300
Huntinton, Utah 84528

U.S. Department of Labor
Mine Safety and Health Administration
Coal Mine Safety and Health
P.O. Box 25367
Denver, Colorado 80225
District 9

9-11-83

Dear Sir;

Please find enclosed a plan and sketches for roof control during pillar extraction. This is the same system we used in the old Co-op Mine I.D. No. 42-00081. Although pillar extraction conditions were far worse in the Co-op Mine we had real good results in safety and clean caves while using this system. Because of these reasons we feel this a safe plan to use in Bear Canyon No. 1.

This plan is an addition to the Roof Control Plan already in effect at the Bear Canyon No.1 Mine I.D. No.. 42-01697.

If there are any questions please contact Bill Stoddard At 801-748-2777.

Thank You;
Operator
BW Stoddard
B.W. Stoddard

9.14.83
HG

TYPICAL ROOF CONTROL FOR PILLAR EXTRACTION

The following roof control plan is formulated for roof control during pillar recovery and is an addition to the roof control plan already in effect at the Bear Canyon #1 Mine I.D. No. 42-01697.

A. The plan now in effect is a minimum roof control plan and was formulated for normal roof conditions. Normal roof conditions means leaving 2 ft. to 4 ft. of top coal as the immidiate roof. Because the immidiate roof is coal, under normal conditions no roof support need be used while developing rooms.

B. This is a typical pillar extraction plan and is a general outline to follow. Any variation from this plan would be no less safe than the one given here.

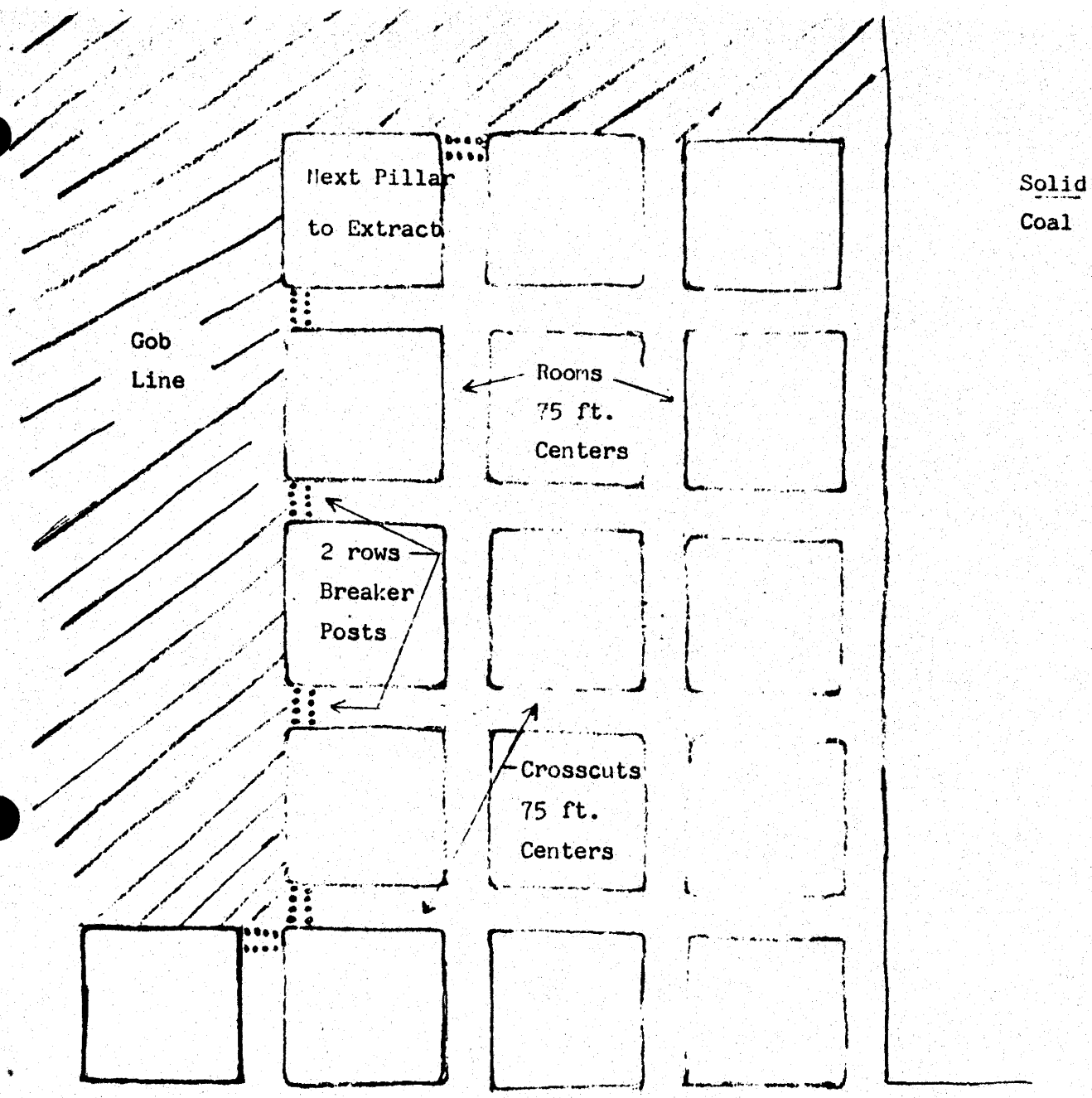
1. Rooms are run on 75 ft. centers and are 18 ft. to 20 ft. wide. crosscuts are run on 75 ft. centers and are run 18 ft. to 20 ft. wide. The total coal seam is about 19 ft. high. Rooms and crosscuts are developed about 9 ft. high. Four ft. of top coal is left for safe roof. About 6 ft. of bottom coal is left and this coal will be extracted with the pillars.

2. Two rows of breaker posts are set on 4 ft. centers across each opening leading into pillared areas. Such posts are installed near the breakline between the split being started and the gob. See sketch #1.

3. A row of turn posts set on 5 ft. centers will be installed leading into each pillar split. When this split is through the pillar 2 rows of breaker posts are installed next to the gob. Another set of turn posts is installed and the fender is split. A row of breaker posts is

set at the end of this split and the far stump is reduced in size enough to allow a cave. The close stump is then reduced enough to allow a cave. The remaining fender is mined from the crosscut in the same manner. It should be noted that if additional posts are needed they will be used. See sketch No's 2,3,4, and 5 for explanation of extracting a pillar.

4. The size of the posts being used will be not less than 6 inches in diameter. All posts shall be topped with a wooden cap piece. These cap pieces will not be less than 3" x 6" x 24" in size. Posts will be installed tight and on solid footing. Not more than two wooden wedges should be used to install a post.



ROOF CONTROL WHILE EXTRACTING PILLARS

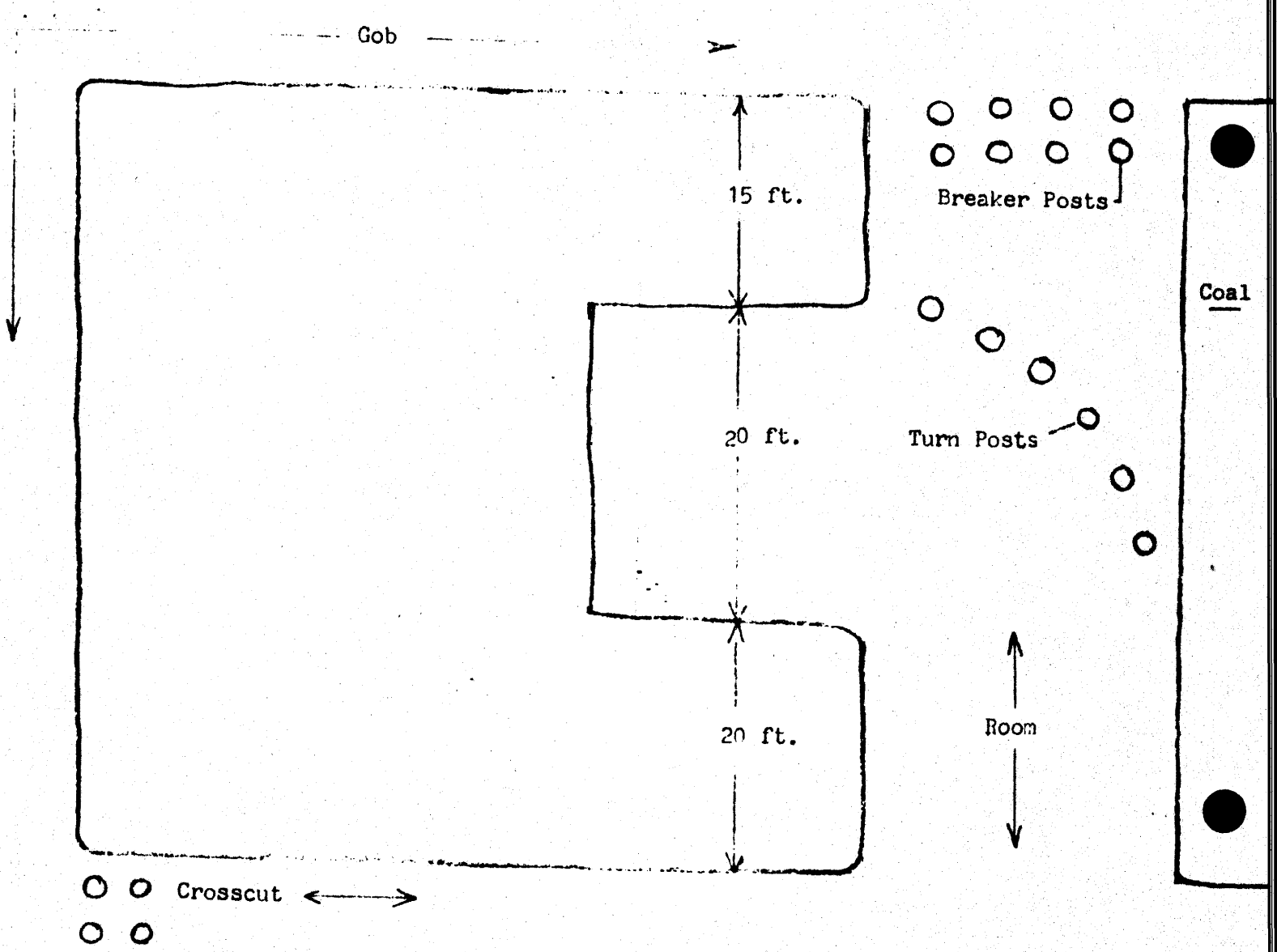
Two rows of breaker posts are set on 4 ft. centers across each opening leading into pillard areas. Such posts are installed near the break-line between the split being started and the gob.

Sketch No. 1

Bear Canyon No. 1

Mine I.D. No. 42-01697

Co-op Mining Co.



ROOF CONTROL WHILE EXTRACTING PILLARS

Starting Pillar Splits

Two rows of breaker posts are set on 4 ft. centers next to the gob line in both the room and crosscut. A row of turn posts is set on 5 ft. centers near the split being started. Pillars are approximatly 55 feet square. The split is about 20 ft. wide leaving about a 15 ft. fender next to the gob and 20 ft. next to the crosscut.

Sketch No. 2

Bear Canyon No. 1

Mine I.D. No. 42-01697

Co-op Mining Co.

Appendix 3-C

APPROVED INTERIM RECLAMATION PLAN

Scope

The following procedures are designed to revegetate and control erosion. They will to a large degree satisfy the commitments made by the Co-op Mining Company in their permit while also satisfying OSM regulations as pertaining to wildlife concerns and interim reclamation for those areas which will be utilized during mining operations.

The areas in question are along and adjacent to the coal stockpile and the topsoil storage pile and are of a contemporaneous nature.

The actual ground involved comprises approximately 1.6 acres of disturbed land primarily deck slope disturbance and the topsoil pile. (See Plate 3-2) Map). The actual procedures involve a two phase program: (1) Earthwork to prepare a site which will be stable enough for a period of time to allow vegetation to become established, (2) Hydroseed and

mulch the entire area to supplement revegetation and control runoff until stabilization is complete.

METHODOLOGY

Phase 1 - Earth Moving

The pad down slopes will be brought back to a reasonable configuration by implementation of a crawler tractor. The actual method will involve smooth contouring of the existing soil and walking the crawler up and down the slope attempting to minimize compaction while at the same time creating small indentations by the grouser on the track. This methodology creates an enhanced micro-climate for the establishment of seed and guarantees sufficient compaction as to assure integrity and stability of enbankment and prohibit failure.

Phase 2 - Seeding and Mulching

The entire area of disturbance will be hydroseeded during October, 1983. The seed mix and rate of application is attached. Hydro-seeding and mulching will be carried out in conjunction with the earth work of Phase 1. Recommendations for the hydroseeding and mulching operation are as follows:

This methodology involves the use of a hydro-seeder to apply the seed and tac to all disturbed areas and then to overspray the seeding with a wood-fiber mulch (approximately 2,000 lbs. per acre, long fiber) in combination with fertilizer and additional tacifying agents.

Co-op will follow the above recommendations.

The following rates of material should be utilized:

(Rates of tac were developed with respect to velocity and erosive power of water which is proportional to the square root of the slope). An emperical factor was determined from laboratory and field studies to arrive at the minimum tac to fiber ratio. Thus, 60 pounds of tac per ton of fiber is about minimum for slopes up to 20% and the emperical factor is determined as 60 ÷ 25% = 12. A 25% slope is about maximum for the minimum amount of tac. For a 100% slope (1 : 1 or 45) the ratio of tac to fiber is calculated as:

SUGGESTED RATIOS OF TAC TO FIBER FOR HYDRO-SEEDING AND HYDRO-MULCHING TO SERVE AS MULCH OR SOIL BINDER

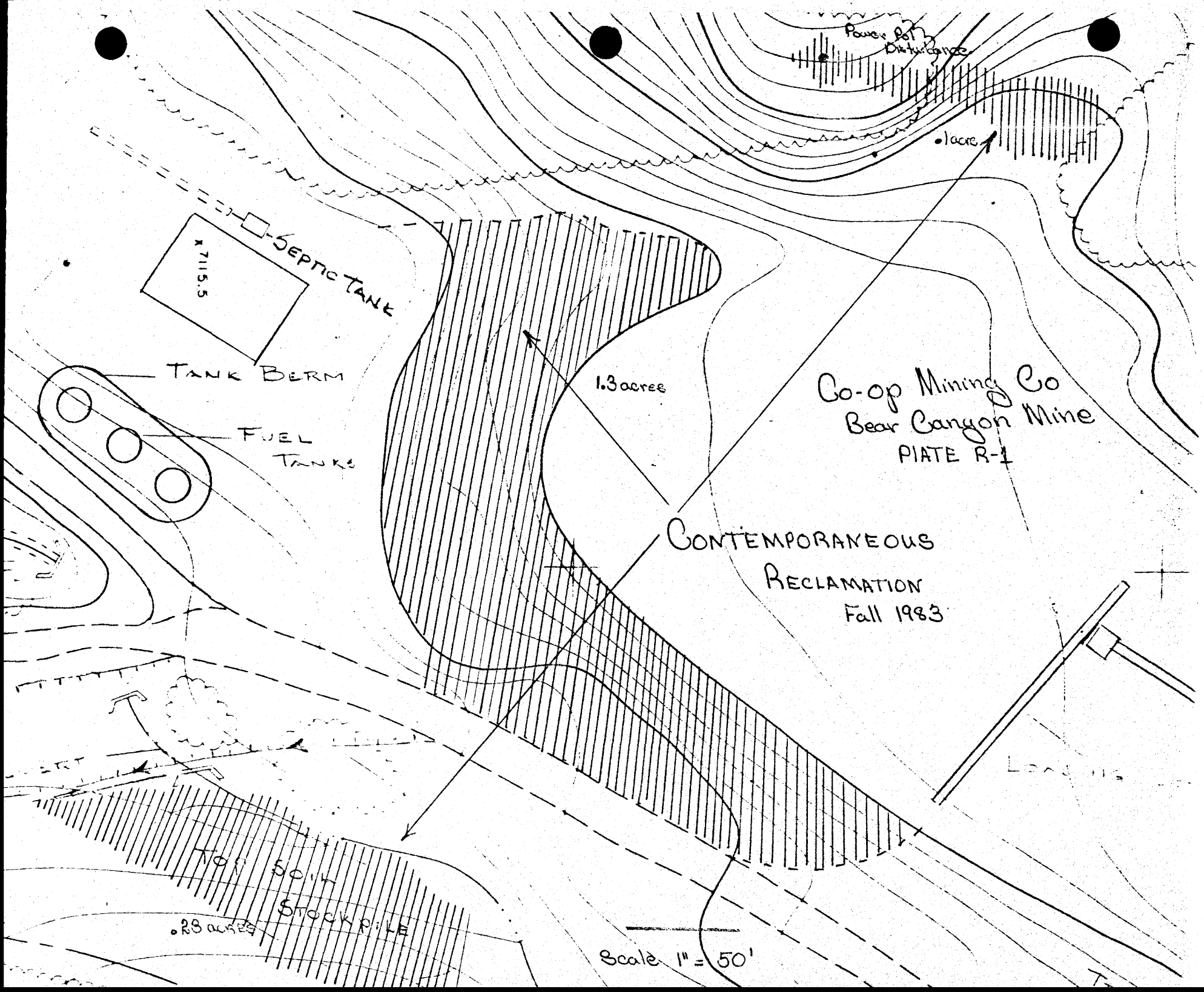
SLOPE ANGLE	SLOPE RATIO Rise:Run	PERCENT SLOPE	LBS. TAC Per Ton FIBER	RATIO TAC TO FIBER
14°	1 : 4	25%	60 (min.)	1 : 30
26°	1 : 2	50%	80	1 : 25
33°	1 : 1½	66%	100	1 : 20
45°	1 : 1	100%	120	1 : 16
57°	1½ : 1	150%	140	1 : 14
64°	2 : 1	200%	160 (min.)	1 : 12

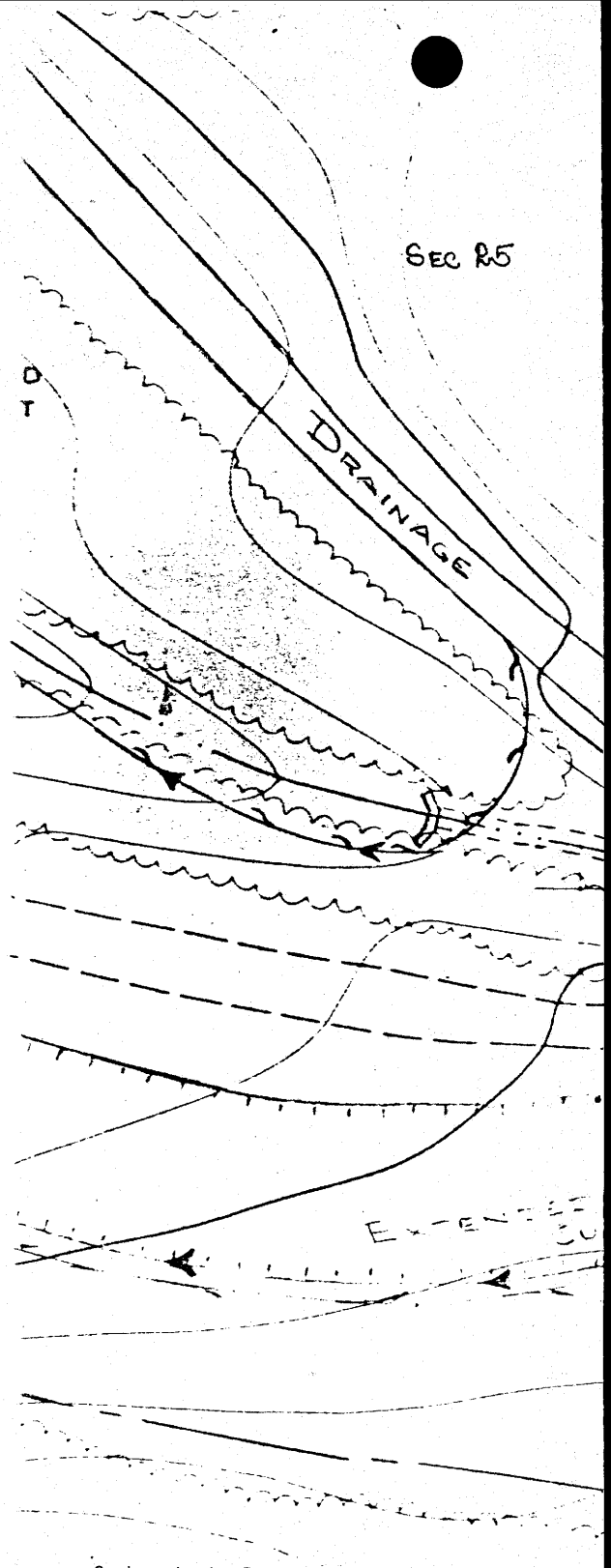
RECOMMENDED SEED MIX FOR INTERIM RECLAMATION

BEAR CANYON MINE

CO-OP MINING COMPANY

SPECIES	RATE PER ACRE HYDROSEED
GRASSES	
Agropyron dasystachyum Thickspike Wheatgrass	6
A. spicatum Bluebunch Wheatgrass	8
Elymus Salina Salina Wildrye	1.5
Oryzopsis hymenoides Indian Ricegrass	3
Poa secunda Sandberg Bluegrass	2
FORBS	
Ladak Alfalfa	2
Yellow Sweet Clover	2
COVER CROP	
Oats	20


Power Pol
Disturbance
.1 acre
Septic Tank
7115.5
Tank Berm
Fuel Tanks
1.3 acres
Co-op Mining Co
Bear Canyon Mine
PLATE R-1
Contemporaneous
Reclamation
Fall 1983
Top Soil
Stockpile
.28 acres
Scale 1" = 50'


SEC R5
DRAINAGE

CO-OP MINING CO.

P.O. Box 15809
Salt Lake City, Utah 84115
Phone (801) 467-4003

June 24, 1983

TOPSOIL STOCKPILE CONSOLIDATION

Bear Canyon Mine

The following plan for handling of topsoil and consolidation of piles to one storage area has been prepared for Co-op Mining Company by Mel Coonrod. Please refer to the request made by Co-op Mining Company on June 1, 1983 and the subsequent visit to the minesite by Ev Hooper and John Whitehead to discuss possible storage sites.

Co-op Mining Company

Wendell Owen

Wendell Owen

SOILS, PHYSICAL AND CHEMICAL PROPERTIES OF SOILS; RESULTS OF ANALYSIS, TESTS, TRIALS AND INTERIM RECLAMATION PLAN.

The 1982 Co-op field investigations provided information on the physical and chemical properties of soils in the permit area. A Soils Legend will be included for each soil in a map unit [Attachment 3A]. A rating for topsoil is included on this form, as are some chemical properties. In studies during the 1982 field season an onsite sampling was analyzed for the required chemical properties in all horizons [see Attachment 1-A].

SOIL SUBSTITUTE OR SUPPLEMENT

Not applicable.

SOIL REMOVAL, HANDLING, STORAGE, AND PROTECTION PLANS

To prevent suitable topsoil from being wasted or contaminated by waste materials, topsoil was removed from all new construction areas as a separate operation. The topsoil was stockpiled and will be consolidated and protected from wind and water erosion and contamination which might lessen its capability to support vegetation. The following subsections deal specifically with the various phases of the topsoil and subsoil handling plan.

Topsoil Removal

At the start of the construction phase, topsoil was collected from the area. Existing vegetation was removed and topsoil was collected prior to excavation or other surface disturbance operations within the affected areas.

The depth of topsoil removal in each case depends on the amount of A and B horizon material as defined in OSM Regulation 30 CFR 783.21 and 783.22. The topsoil removed in these areas consists of A horizon quality material

and B horizon quality material with vertually no distinctive difference. The C horizon material was not removed since it was not sufficiently capable of supporting diverse vegetation do to the excessive rock.

The equipment used for topsoil removal consisted of bulldozers, front-end loaders, and dump trucks. The use of bulldozers requires pushing of the topsoil to a collection point for loading into dump trucks or other means of transportation to the designated stockpile. Adequate supervisory personnel were present at the time of topsoil removal to instruct the equipment operators in the proper techniques of topsoil removal and to ensure that required horizons were removed and stored.

Topsoil Stockpile

Topesoil is presently being stored within areas of the permit boundary [see Map 1]. It is the Co-op intent to consolidate Piles #3 with Pile #4; to utilize Pile #2 which is principally rock and unsuitable as a growth media as rip-rap where ever the need arises; and to relocate Pile #1 which is primarily rock to the site of Pile #4 to be used as a top dressing upon final reclamation.

Plans involving topsoil storage can be labeled as "short term" or "long term" depending on completion of activities in each area and the reclamation schedule presented. These piles should be considered "long term".

Short-Term Topsoil Storage Areas

Short-term stockpiles of topsoil will be for areas to be reclaimed almost immediately upon cutting and at final grade. Topsoil will be redistributed promptly to minimize natural degradation processes.

Long-Term Topsoil Storage Areas

During any new construction of areas that will be used for the duration

of the mining operation within the permit area, topsoil will be collected and stockpiled. The topsoil will be used later for post-mining reclamation of the abandonment areas.

Topsoil Protection

The short-term topsoil stockpile will be sprayed with water or temporarily vegetated to retard erosion. The long-term topsoil stockpile will be protected by the following operational steps:

A stable surface will be provided in an area outside the influence of active operations.

As a stockpile is completed, it will be left in a rough condition to minimize erosion.

Stockpiles will be situated out of drainages to prevent water erosion.

Storage piles will be vegetated with quick-growing, soil-stabilizing plants. Revegetation will involve the immediate seeding of stockpiles topsoil during the next planting season with the seed mixture recommended in a report on vegetation and plant community analysis [see Attachment 2A Seed List] in compliance with the requirements of the appropriate land management agency.

Signs will be posted to protect the stockpiles from accidental use as fill or from other inadvertent material contamination.

The establishment of noxious plant species will be prevented.

The stockpiled topsoil will not be removed or otherwise disturbed until required for the redistribution operation on a prepared, regraded disturbed area.

PLANS FOR REDISTRIBUTION OF SOILS

Prior to topsoil redistribution, regraded land will be scarified by a ripper-equipped tractor. The ground surface will be ripped to a suitable depth in order to reduce surface compaction, provide a roughened surface assuring topsoil adherence, and promote root penetration. Steep slope areas which must remain after abandonment will receive special ripping to create ledges, crevices, pockets, and screes. This will allow better soil retention and vegetation establishment.

Within a suitable time period prior to seeding, topsoil will be distributed on areas to be reclaimed. During this time, the topsoil will be allowed to settle and attain equilibrium with its natural environment. This procedure will be followed for areas in which facilities such as roadbeds, mine pads, and building sites are to be abandoned.

Topsoil redistribution procedures will ensure an approximate uniform thickness consistent with the proposed reclamation plan. Topsoil will be redistributed at a time of the year suitable for establishment of permanent vegetation.

To minimize compaction of the topsoil following redistribution, travel on reclaimed areas will be limited. After topsoil has been applied, surface compaction will be reduced by using appropriate equipment running at a suitable depth. This operation will also help prepare a proper seed bed and protect the redistributed topsoil from wind and water erosion.

Co-op Mining will exercise care to guard against erosion during and after application toptopsoil and will employ the necessary measures to ensure the stability of topsoil on graded slopes. The specific methods to be implemented will be defined in the attached Interim Plan. An example of the soil stabilization methodology that might be used includes the placement of crushed and heavier material at the toe of fill slopes, and the random placement of large rocks and boulders on the surface. This procedure will

enhance the microclimate as well as make the reclaimed area more asthetically compatible with the undisturbed surroundings.

Phosphorus
Nitrogen
Soil pH and salinity
Soil texture

Chemical analysis for micronutrients will be conducted by testing soil extracts from the redistributed material. All necessary fertilization or neutralization, as determined by soil testing, will be done according to the final Reclamation Plan.

EFFECTS OF MINING OPERATIONS ON TOPSOILS, NUTRIENTS, AND SOIL AMENDMENTS

Since the Co-op Mine is an underground mine, the impact of mining on soils will be minor overall. The impacts of surface operations and mining facilities on soil resources consist of coverage of soil by landfills and refuse, disturbance of soils during construction activities, erosion created by removing vegetation, reduced forage growth due to nutrient degradation, reduced livestock capacity, and particulate emissions to the air.

The areas in which soil has been disturbed to date within the permit area, includes the loadout area, future offices, shops and substations, roads, portal areas, and the topsoil storage areas. Additional acreage may be disturbed in the future if Co-op elects to proceed with certain projects it is considering.

MITIGATION AND CONTROL PLANS: SOILS TESTING PLAN

Detailed Interim Reclamation Plans [Appendix 3-C] are attached and will be part of the Bear Canyon Mine Reclamation Plan in regard to stockpiling and long and short term plans and goals for final reclamation.

SOIL TEST REPORT

NO. 7406.0

AGRICULTURAL CONSULTANTS, INC.
P.O. DRAWER 507 — 240 S. FIRST AVENUE
BRIGHTON, COLORADO 80601
303/659-2313

DATE RCVD 11-12-82

REPORTED 11-23-82

REPORT TO: CO-OP MINING COMPANY ATTN: MR. OWEN

BILL TO: SAME

GROWER: SAME

SAMPLE ID: SCALES BEAR

TEXTURE s=silt, sily l=sand, sandy o=loam, loamy c=clay	pH		CEC Meq /100g	SALT Mmhos /cm	Na Meq /100g	Lime %	OM %	Org N Lbs	AVAILABLE NUTRIENTS ppm (1)										
	H_2O	Buf							NO_3	P(2)	K(2)	Ca	Mg	S(2)	B	Zn	Fe	Mn	Cu
LO	8.3	7.0	11.1	1.0	0.2	8.6	1.3	45.5	8	3	99	3400	210	31	0.6	0.6	3.8	2.0	0.3

CROP	YIELD GOAL	CROP RESIDUE T/A	MNR T/A	RECOMMENDATIONS POUNDS PER ACRE											
				N	P_2O_5	K_2O	Elem Sulfer	Lime	Mg	SO_4-S	Boron	Zinc	Iron	Mn	Cu
DL Native Grasses	Average	-	0	40	50	50	0	0	0	0	0	0	0	0	0

1.ppm=parts per million or lbs element per million lbs soil. ppm x 2 = lbs/acre 6-7" depth. ppm x 3.5 = lbs/acre feet. 2. P x 2.3 = P_2O_5 K x 1.2 = K_2O S x 3 =

Values reported but without specific remarks are considered to be within growth range of intended crop.

If poor moisture conditions reduce fertilization accordingly.

Supervised by Dian Lansing

ATTACHMENT 1-A

ATTACHMENT #2-A

RECOMMENDED SEED MIX
BEAR CREEK MINE
CO-OP MINING COMPANY

SPECIES	RATE* PER ACRE	APPROXIMATE NO. SEEDS/FT^2
GRASSES		
Agropyron dasystachyum	3	12
Thickspike wheatgrass		
A. spicatum	8	22
Bluebunch wheatgrass		
Elymus Salina	1.5	15
Salina wildrye		
Oryzopsis hymenoides	3	12
Indian ricegrass		
Poa secunda	1	21
Sandberg bluegrass		
FORBS		
Achillea millifolium	.15	10
Western yarrow		
Aster chilensis	.15	9
Pacific aster		
Hedysarum boreale	9	7
Northern sweetvetch		
Lupinus sericeus	20	6
Silky sweetvetch		
Penstemon Palmeri		
Palmer penstemon		
or		
P. Strictus	.5	7
Rocky Mountain Penstemon		

Attachment #2-A

SHRUBS

Amelanchier Utahensis Utah serviceberry	4	4
Artemisia tridentata ssp. vaseyana Big sagebrush	.15	9
Cercocarpus ledifolius Curlleaf Mountain mahogany	6	7
Chrysothamnus nauseosus var. albicaulus Whitestem rubber rabbitbrush	.5	5
Sambucus cerulea Blue elderberry	.8	4
For hydroseeding	59.75	159
1/2 application for drill seeded areas	30.00	

* Rate is pure live seed to be broadcast and lightly covered.

ATTACHMENT 3-A

SOIL LEGEND

SOIL SYMBOL	SOIL MAPPING UNIT NAME
D2E	Datino bouldery fine sandy loam, 5 to 20 percent slopes
D1G	Datino very stony fine sandy loam, 55 to 70 percent slopes

DESCRIPTION OF THE SOILS

D2E Datino bouldery fine sandy loam, 5 to 20 percent slopes

This Datino soil is very deep and well drained. It occurs on moderately steep alluvial fans and some sloping flood plains at elevations of 7,100 to 7,140 feet [2,165 to 2,177 meters]. This soil formed in alluvium and colluvium derived mainly from sandstone and shale. The average annual percipitation is 14 to 16 inches [36 to 41 centimeters]. Mean annual air temperature is 42 to 45 degrees F. [5 to 7 degrees C.], mean annual soil temperature is 44 to 47 degrees F. [6 to 8 degrees C.], and the average greeze-free season is about 80 to 110 days.

Slopes are 5 to 20 percent and mostly East facing. They are short and concave-convex.

Vegetation is dominatly pinyon, Utah juniper, salina wildrye, squirreltail, big sagebrush, Douglas-fir, and Rocky Mountain juniper.

Included in mapping are small areas of a similar soil except with 20 percent gravel and cobbles in the surface layer.

In a typical profile the surface layer is brown, bouldery fine sandy loam and cobbly loam about 10 inches [25 centimeters] thick. The subsoil is light brown very stony loam about 28 inches [71 centimeters] thick. The substratum is light reddish brown cobbly fine sandy loam to a depth of 60 inches [1.5 meters] or more.

Permeability is moderate. Available water capacity is 6 inches [15 centimeters] to a depth of 60 inches [1.5 meters]. Organic matter content in the surface layer is 4 percent. Effective rooting depth is about 60 inches [1.5 meters]. Surface runoff is medium and erosion hazard is moderate under potential native vegetation and high if vegetation is removed and the soil is left bare. Erodibility is low. This soil is used for range, wildlife habitat and mining operations.

Taxonomic classification is loamy-skeletal, mixed Typic Haploboralls.

A typical pedon of Datino bouldery fine sandy loam, 5 to 20 percent was described on the cut about 200 feet East and 1,100 feet South of the NW corner of Section 25, T16S, R7E.

A11 - - 0 to 2 inches [0 to 5 centimeters] brown [10YR 5/3] bouldery fine sandy loam, dark brown [10YR 3/3] when moist; moderate fine granular structure; loose, very friable, slightly sticky, non-plastic; common very fine to medium, few coarse roots; 10 percent boulders, 10 percent stones, 5 percent cobbles, 10 percent gravel; slightly calcareous; moderately alkaline [8.0]; abrupt smooth boundary.

A12 - - 2 to 10 inches [5 to 25 centimeters]; brown [10YR 5/3] cobbly loam, dark brown [10YR 3/3 when moist; moderate medium granular structure; soft, friable, slightly sticky, slightly plastic; common very fine to medium, few coarse roots; 10 percent cobble and 10 percent gravel; moderately calcareous; moderately alkaline [ph 8.2]; clear smooth boundary.

B2 - - 10 to 38 inches [25 to 96 centimeters]; light brown 7.5YR 6/4] very stony loam, brown [7.5YR 4/4] when moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine to medium roots; 1 percent boulders, 30 percent stone, 10 percent cobbles, 20 percent gravel; moderately calcareous; strongly alkaline [ph 8.5]; abrupt wavy boundary.

C1 - - 38 to 60 inches [96 to 152 centimeters] light reddish brown [5YR 6/4] cobbly fine sandy loam, reddish brown [5YR 4/4] when moist; massive; soft, very friable, slightly sticky, non-plastic; few very fine and fine roots; 10 percent cobbles, 5 percent gravel; strongly calcareous; strongly alkaline [ph 8.6].

D1G <u>Datino - Rock Outcrop Complex, 55 to 70 percent slopes</u>

This map unit is on very steep canyon sideslopes. Slopes are short and concave-convex. Elevation is 7,140 to 7,600 feet [2,177 to 2,318 meters]. The average annual precipitation is 14 to 16 inches [36 to 41 centimeters]. Mean annual air temperature is 42 to 44 degrees F. [6 to 7 degree C.] and the average frost-freeze season is 80 to 110 degrees.

This unit is 75 percent Datino very stony fine sandy loam, 55 to 70 percent slopes in single and concave areas and 15 percent rock outcrop on ridges.

Included in this unit is about 10 percent of a shallow soil that is about 6 to 15 inches in depth, associated with the rock outcrop.

The Datino soil is very deep and well drained. This soil formed in colluvium derived mainly from sandstone and shale. Slopes are 55 to 70 percent and East facing. They are short and concave-convex. Vegetation is dominantly pinyon, Utah juniper, Rocky Mountain juniper, salina wildrye, Douglas-fir, curlleaf mountain mahogany.

In a typical profile the surface layer is brown or yellowish brown, very stony fine sandy loam about 16 inches [41 centimeters] thick. The subsoil is very pale brown, very stony sandy clay loam about 20 inches [51 centimeters] thick. The substratum is very pale brown, very stony silty clay loam to a depth of more than 60 inches [152 centimeters].

Permeability is moderate to 36 inches [91 centimeters] and moderately slow below 36 inches. Available water capacity is 6.5 inches [16 centimeters] to a depth of 60 inches [1.5 meters]. Organic matter content in the surface layer is about 4 percent. Effective rooting depth is about 60 inches [1.5 meters]. Surface runoff is rapid and erosion hazard is high under potential native vegetation and very high if vegetation is removed and the soil is left bare. Erodibility is low. This soil is used for range, wildlife habitat, and mining operation.

Taxonomic classification is loamy-skeletal, mixed Typic Haploboralls.

A typical pedon of Datino very stony fine sandy loam, 55 to 70 percent slopes was described on the bank about 150 feet North of the old mine portal about 300 feet North and 300 feet East of the SW corner of Section 24, T16S, R7E.

A11 - - 0 to 3 inches [0 to 8 centimeters]; brown [10YR 5/3] very stony fine sandy loam, dark brown [10YR 3/3] when moist; moderate fine granular structure; soft, very friable, non-sticky, non-plastic; many very fine, few medium and course roots; moderately calcareous; moderately alkaline [ph 8.4]; abrupt amooth boundary.

A12 - - 3 to 16 inches [8 to 41 centimeters]; yellowish brown [10YR 5/4] stony fine sandy loam, dark brown [10YR 3/3] when moist; weak medium granular structure; soft, friable, non-sticky, non-plastic; many very fine and fine, few medium and coarse roots; 2 percent boulders, 10 percent stones, 10 percent cobbles, 10 percent gravel; moderately calcareous; moderately alkaline [ph 8.4]; clear smooth boundary.

B2 - - 16 to 36 inches [41 to 91 centimeters] very pale brown [10YR 7/3] very stony sandy clay loam, pale brown [10YR 6/3] when moist; weak medium subangular blocky structure; slightly hard, firm, slightly sticky, plastic; common very fine and fine roots; many fine pores; 2 percent boulders, 15 percent stones, 15 percent cobbles, 10 percent gravel; moderately calcareous; strongly alkaline [ph 8.6]; abrupt wavy boundary.

C1 - - 36 to 60 inches [91 to 152 centimeters] very pale brown [10YR 8/4] stony silty clay loam, light yellowish brown [10YR 6/4] when moist; moderate medium and coarse subangular blocky structure; hard, firm, sticky plastic; few very fine and fine roots, common fine pores; 2 percent boulders, 10 percent stones, 10 percent cobbles, 5 percent gravel; strongly calcareous; strongly alkaline [ph 8.9.].

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 228 NORTH LA SALLE STREET, CHICAGO, ILLINOIS 60601 · AREA CODE 312 726-8434

Reply to
Instrument Analysis Division
490 Orchard Street
Golden, CO 80401

Phone: 303-278-9521

November 23, 1981

Mr. Jack Blair
Commercial Testing & Engineering Co.
139 South Main Street
Helper, UT 84526

Co-op Mining Co.
Lab No. 57-7609

Re: IAD #97-H654-335-01

Analytical Report

One sample was received for analyses on October 28, 1981. This sample was given our identification IAD #97-H654-335-01.

A portion of the sample (≈100 g) was extracted at pH_5 for 24 hours according to the procedures of EPA/Test Methods for Evaluating Solid Wastes, SW-846, 1980, EP Toxicity. The sample required ≈170 mls of 0.5 N acetic acid to adjust the pH to 5. The extracted solution was brought to volume (2000 ml) and filtered with a 0.45 µm membrane filter. A portion of the filtered extract solution was acidified with nitric acid prior to metals analyses.

The solution was analyzed for Lead, Silver, Barium, Cadmium, and Chromium by flame atomic absorption; for Arsenic and Selenium by hydride generation atomic absorption; and for Mercury by cold vapor flameless atomic absorption using a permanganate/persulfate digestion and the gold amalgamation analytical technique to concentrate the Mercury.

The results of these determinations are presented in Table No. I and are reported in milligrams per litre (mg/L) in the filtered extract solution. The EP Toxic maximum contaminant levels are also presented.

Charter Mer

OVER 40 BRANCH LABORATORIES STRATEGICALLY LOCATED IN PRINCIPAL COAL MINING AREAS, TIDEWATER AND GREAT LAKES PORTS, AND RIVER LOADING FACILITIES

Table No. I
(mg/L)
EP Toxicity

Parameter	Co-Op Mining 57-7609	Maximum Contaminant Levels
Arsenic	<0.001	5.0
Selenium	<0.001	1.0
Mercury	0.0004	0.2
Silver	<0.005	5.0
Barium	1.1	100
Chromium	<0.01	5.0
Cadmium	<0.005	1.0
Lead	<0.05	5.0

If there are any questions concerning these results, please call.

Bruce A. Hale
Section Supervisor

M. L. Jacobs, Ph.D., Mngr.
Instrumental Analysis Div.

BAH/cl

l Copy Watermarked
Your Protection

UMC 817.103 Covering Coal and Acid and Toxic Forming materials

The PH, acid-base potential, texture and electrical conductivity of these materials must be included in the data reported.

Co-op Reply

The Co-op has submitted a sample to CT&E testing for this data at the time this submittal was prepared. A copy of the report will be sent directly to the UDOGM upon receipt. In the interim, the Co-op will commit to removing any and all such material should it be on the site. Also, the Co-op does not feel this regulation is applicable, for the area in question is not to be utilized in a manner which will constitute the stockpiling or storage of coal and/or refuse.

COMMERCIAL TESTING & ENGINEERING CO.

Reply to
Instrumental Analysis Division
490 Orchard Street
Golden, CO 80401

July 22, 1983

Phone: 303-278-9521

Mr. Jack Blair
CT & E Co.
224 South Carbon Ave.
Price, Utah 84501

CO-OP MINING COMPANY
Pond Sample
Lab No. 57-13312

Re: IAD # 97-M179-335-01

Analytical Report

One coal sample was received for analysis on July 12, 1983. This sample was assigned our IAD identification # 97-M179-335-01.

The sample was prepared to No.10 mesh size in accordance with the procedure of U.S.D.A. Handbook #60. Electrical Conductivity and pH were determined in accordance with the same publication.

Acid/Base Potential was determined in accordance with the procedure of the Environmental Protection Agency, EPA-670/2-74-070. This procedure is used for the Wyoming DEQ and in telephone conversation with the Utah Division of Oil, Gas & Mining we were advised that this procedure is acceptable for the requirements of the State of Utah.

The results of these determinations are presented in Table No.1 and are reported in units as indicated in the Table.

Table No. I

Parameter	57-13312
pH, paste (Standard Units)	7.6
Electrical Conductivity (µmhos/cm)	195
Acidity Potential*	0
Neutralization Potential*	29.8
Acid/Base Potential*	29.8

*Values are reported in Tons $CaCO_3$ Equivalent / 1000 Tons.

Texture determination was not performed as the sample is carbolithic and thus the determination of Sand, Silt and Clay fractions is not applicable in this case.

If you have any questions concerning these results, please call.

Harold A. Connell
Harold A. Connell
Assistant Lab Manager

Robert L. Taylor
R.L. Taylor, Ph.D., Manager 22 Jul 83
Instrumental Analysis Division

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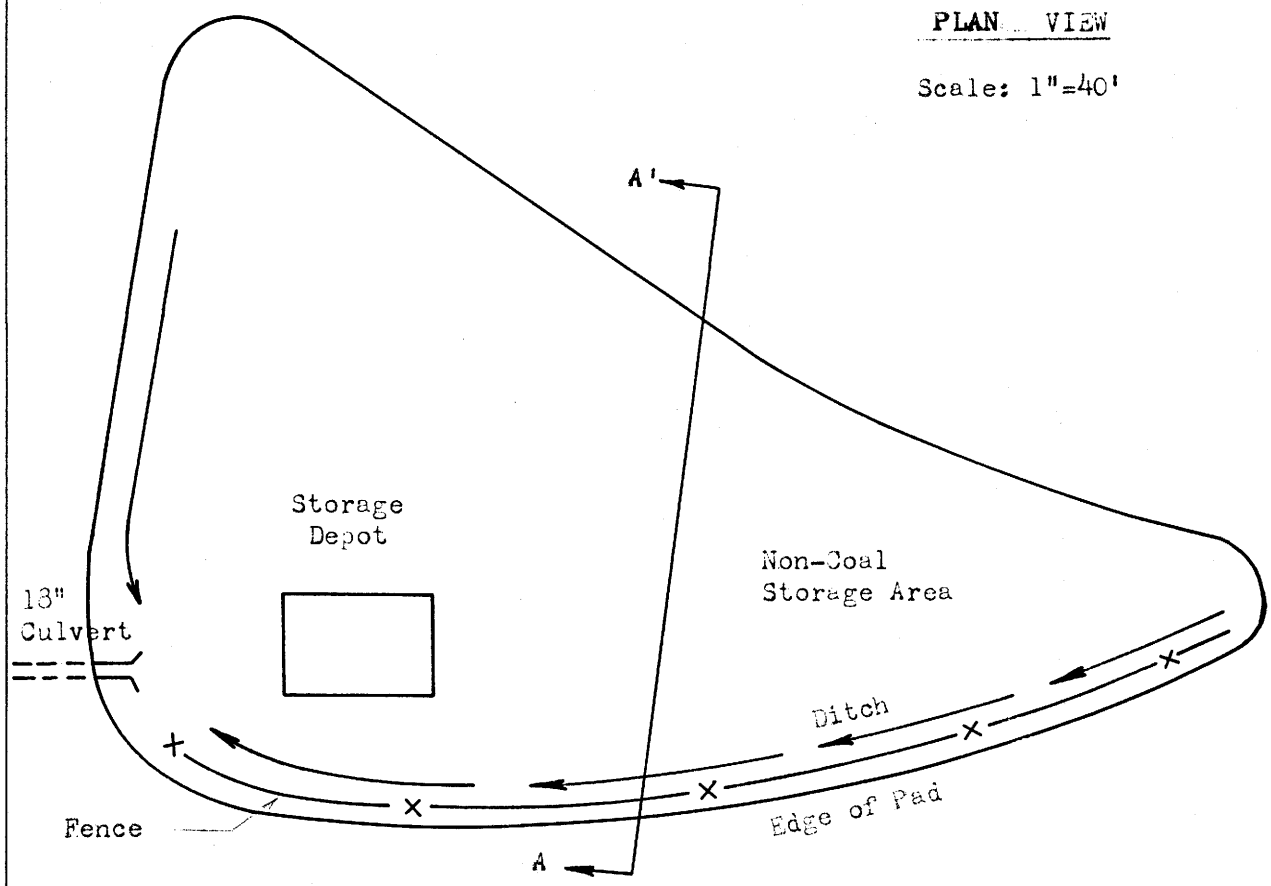
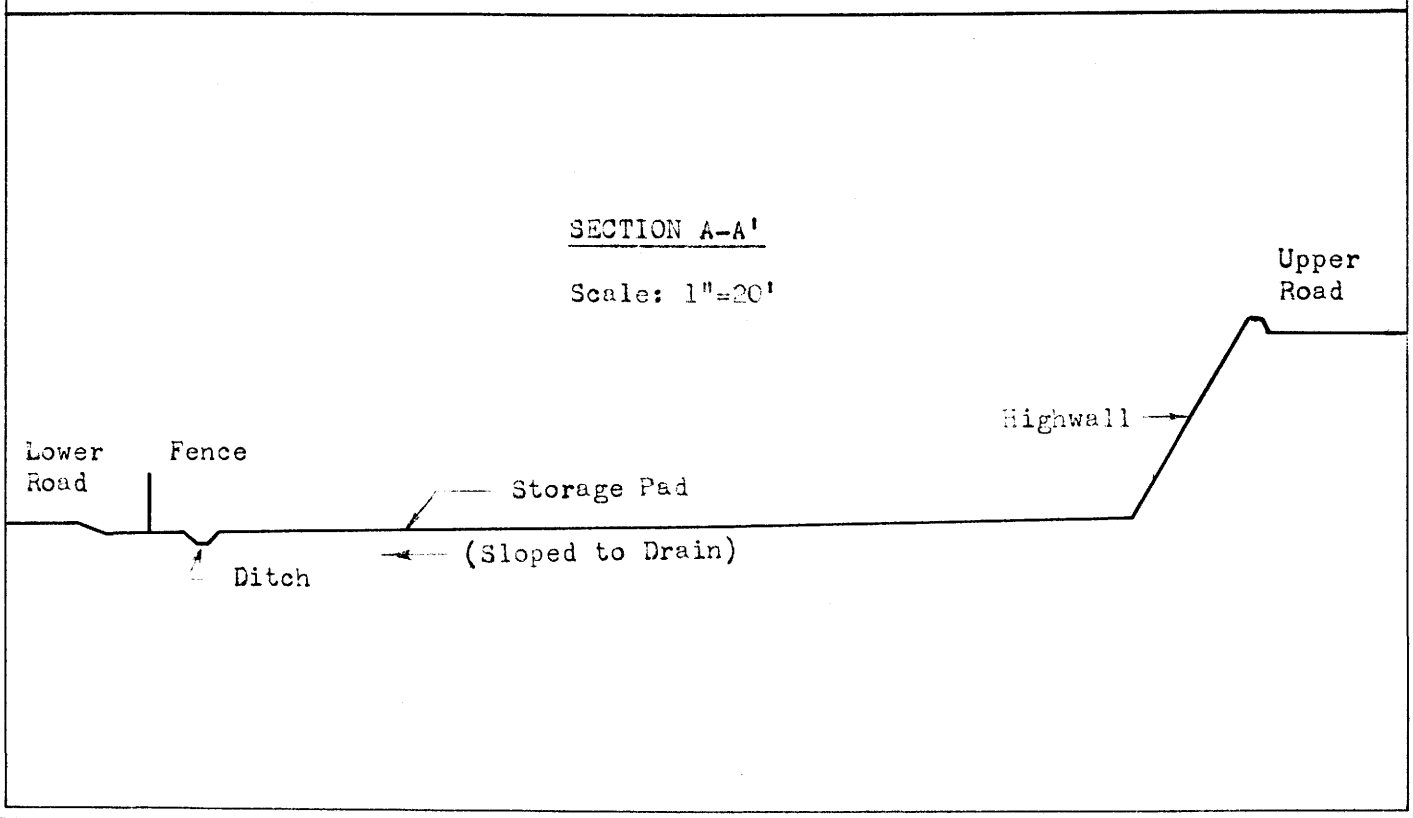
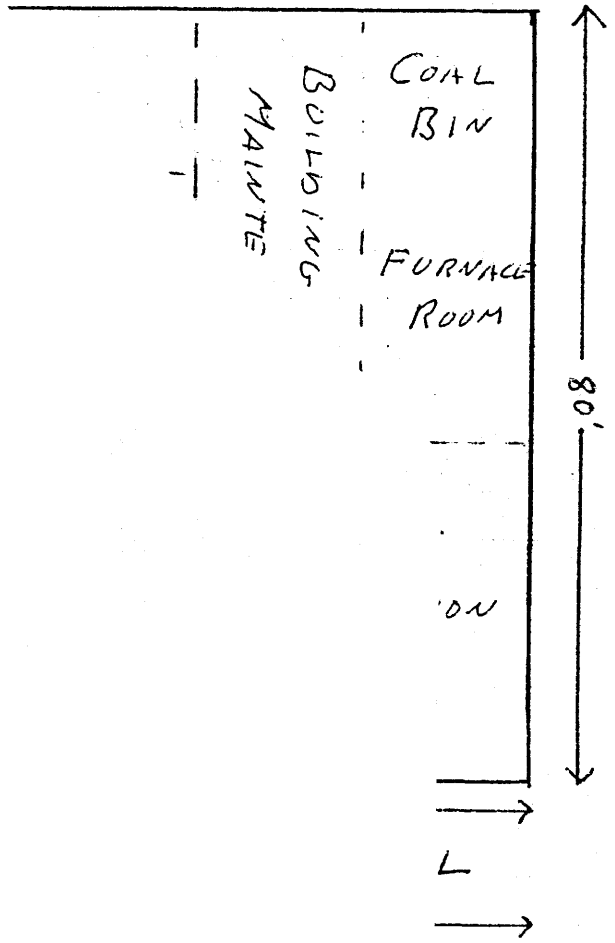
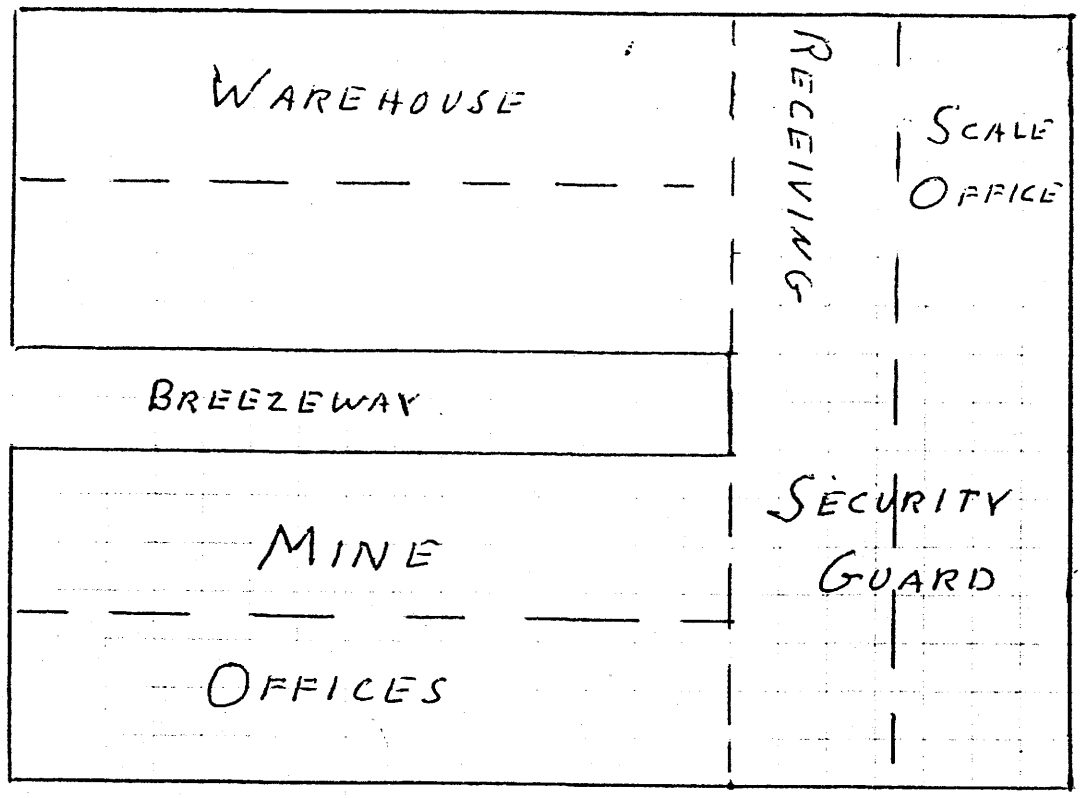


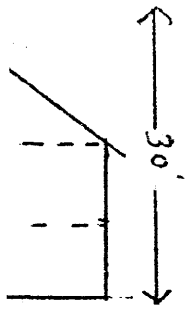


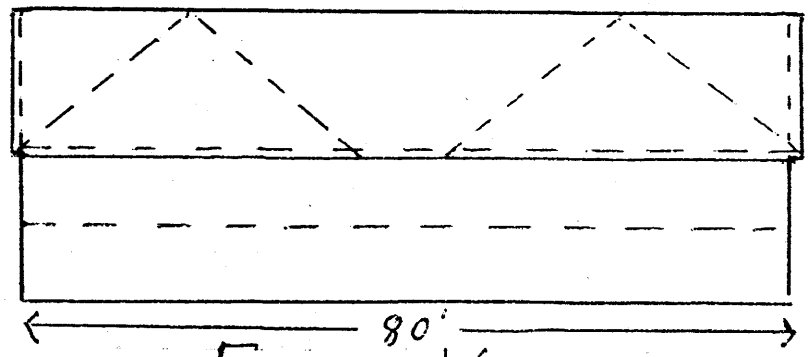
NON-COAL STORAGE AREA	BEAR CANYON	FIGURE NO. 3.8.1





PLAN VIEW - UPPER LEVEL





FRONT VIEW

TABLE 3-6

Parameters Included in Surface Water and Groundwater Monthly Monitoring Plan

1. Flow (gpm)
2. pH
3. Temperature (°C)
4. Total Dissolved Solids (mg/l)
5. Dissolved Calcium (mg/l)
6. Dissolved Iron (mg/l)
7. Dissolved Magnesium (mg/l)
8. Dissolved Potassium (mg/l)
9. Dissolved Sodium (mg/l)
10. Dissolved Bicarbonate (mg/l)
11. Dissolved Carbonate (mg/l)
12. Dissolved Chloride (mg/l)
13. Dissolved Nitrate (mg/l)
14. Dissolved Sulfate (mg/l)
15. Total Suspended Solids (mg/l)

Note: See Figure 7-4 for reporting format.

Removal or Reduction of Highwalls

The highwalls will be reduced along the pad and road areas where feasible. This will be accomplished by recovering material from the edge of pad and road fill areas with a backhoe and placing it against the base of the highwall. The material will be compacted with a cat to promote stability of the backfill. Erosion controls, such as straw dikes or water bars, will be placed below the backfilled areas to minimize washing of the fill material. The backfill material is native, consisting of material originally generated from the construction of the highwall areas and compacted into the road or pad fill areas.

Complete rock highwalls will be left in some areas to lessen the probability of erosion on backfilled materials or to minimize the amount of additional disturbance that would result from highwall reduction (see Plate 3-20).

The rationale for leaving or reducing the highwalls is based on the following:

1. Natural cliffs are common in the Blackhawk Formation, and in this area. The highwalls proposed to be left are similar in height and exposure to existing cliffs in the area and will therefore be compatible with existing topography.

2. The highwalls will provide habitat for cliff-dwelling wildlife, and the pad areas will provide for other wildlife grazing. This proposal is therefore compatible with the post-mining land use of wildlife habitat;

3. The rock highwalls could be partially shot down; however, this would extend the disturbance furthur up the steep slopes, resulting in more exposure and erosion potential;

4. The proposed highwalls to be left or reduced are on the south facing slopes in the area. These are the steeper slopes in the area, as well as the slopes more commonly containing rock exposures similar to the proposed highwalls

5. The fill areas at the base of the highwalls will be stabilized by reseeding and the use of erosion controls as discussed earlier. The toe of these areas will be terraces or gentle slopes (less that 10%) adding to their stability. These will eventually take the appearance of "talus slopes" a common structure at the base of exposed cliffs in this area. The natural weathering of cliffs and highwalls will be very similar, providing for a furthur compatibility with the geomorphic processes of the area.

6. The existing (and proposed) highwalls will be stable. There are no seeps known to exist in any areas where highwalls are proposed to be left. The stability analysis

run on this site show the highwalls of the pad and road areas to have a static safety factor of 2.61 for dry conditions and a factor of 2.41 for saturated conditions. Each of these far exceed the 1.3 safety factor required for highwalls proposed to be left or reduced. (Details on the stability analysis are included in the next section.)

STABILITY ANALYSES

Highwall Stability

Highwalls at the site face south, southeast, and east. The highwalls are nearly vertical, with an average slope of 1V:.2H, or 80°.

The highwall stability analysis is based on a rotational shear analysis using the Hoek method. Compressive strengths of materials in the Blackhawk Formation are highly variable, ranging from 290 PSI for soft shale to more than 20,000 PSI for certain sandstones. An average value of 5,000 PSI has been used for this analysis. This is a very conservative figure, based on the relative proportions of sandstones and shales in the exposed highwalls.

Cohesion can be calculated from compressive strength by the following formula:

$$C_i = \frac{Co}{2} \tan(45 - \frac{\theta}{2});$$

where:

C_i = Intact rock shear strangth or cohesion

Co= Intact rock compressive strength

θ = Internal friction angle.

Using a typical internal friction angle of 45 for Wasatch Plateau rock types, and a 5,000 PSI compressive strength, a cohesion or intact rock strength of approximately 1,000 PSI is found. Since the 1,000 PSI value is for intact or solid rock, the value must be adjusted fo compensate for jointing and fracturing common to all rock masses. A method of relating fracture intensity and cohesion was developed by Stimpson and Ross-Brown and can be found in the article entitled, "Estimating the Cohesive Strength of Randomly Jointed Rock Masses", Mining Engineering, Vol. 31, No. 2, pp. 182-188. Based on this method and using a conservative figure of 4 joints per meter, a .065 factor is determined for calculating Cm or rock mass cohesion. Based on a C_i of 1,000 PSI, Cm becomes 65 PSI.

A typical or average rock mass bulk density of 155 lbs/ft^3 was selected for the analysis, and a slightly conservative, but commonly used value of 31° was selected for the rock mass sliding friction angle.

The following parameters were used with the Hoek slope chart (Hoek, E., and J.W. Bray, 1981, Rock Slope Engineering, Revised Third Edition, IMM, London):

H = Maximum Slope Height - 100'

θ = Slope Angle (average) - 80°

C_m - Rock Mass Cohesion - 65 psi

ϕ = Rock Mass Friction Angle - 31°

γ = Rock Mass Bulk Density - 155 lbs/ft^3

Plotting the above parameters on the Circular Failure Charts Nos. 1 and 5, it can be seen that the projected highwalls will have a safety factor of 2.61 under dry conditions and 2.40 under saturated conditions. It should be noted that the safety factors exceed the required 1.5 safety factor.

Embankment Stability

Embankment or backfill will be placed in lifts not to exceed 36" and will be compacted to 90% Slopes will not exceed 1V:1.5H or 33.7°. Soil properties are based on those used in the "Slope Stability Analyses for the Bear Creek Portal and Access Road", by Dames and Moore, February 20, 1981.

A rotational shear analysis was performed using the Hoek method to determine stability of the backfilled slopes. The following parameters were used for the slopes.

H = Embankment Height - 30'

θ = Slope Angle - 33.7°

C_m = Soil Cohesion @ 90% Compaction - 4.375 psi

ϕ = Friction Angle - 26°

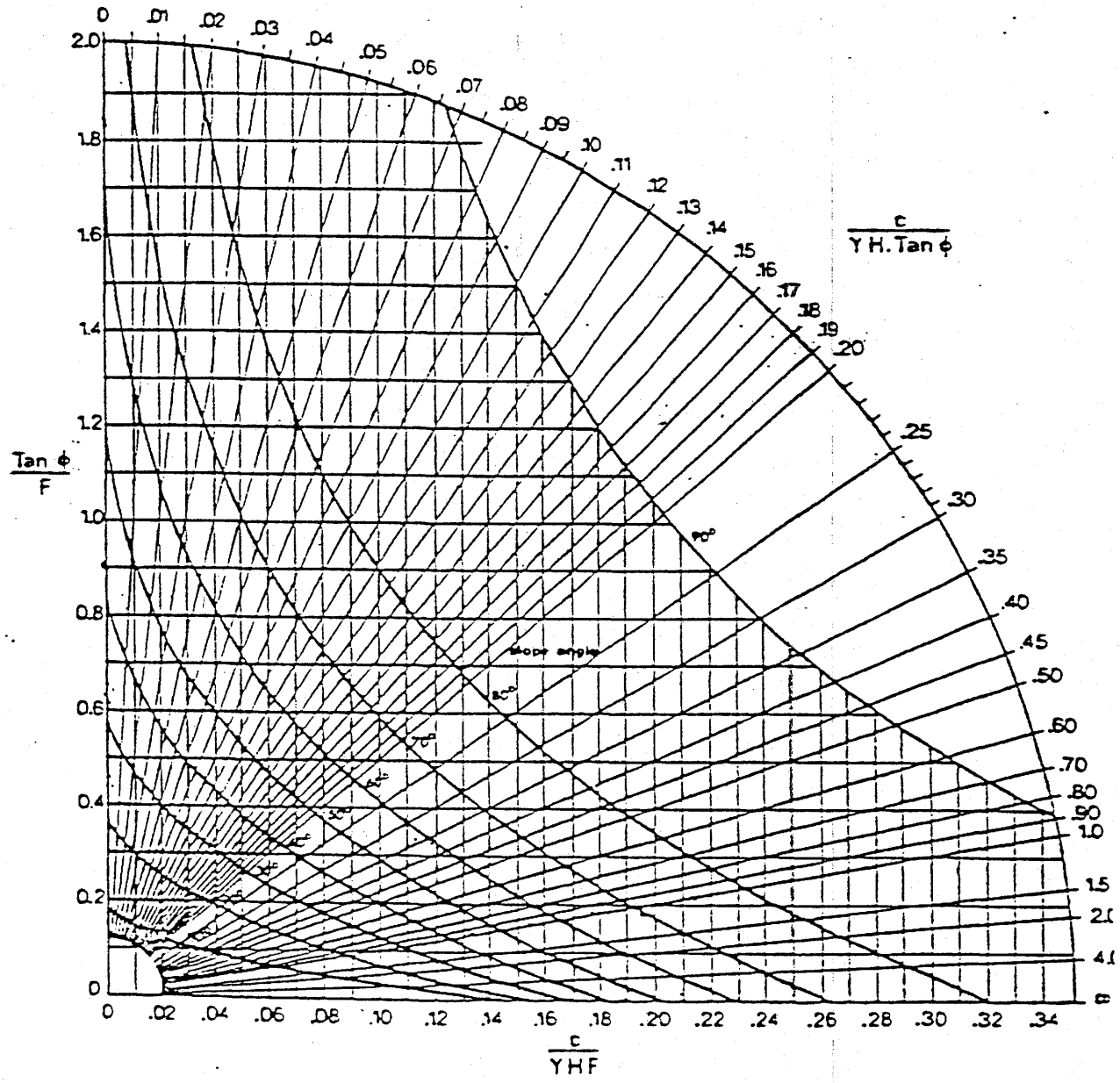
= Rock Mass Bulk Density (90%) - 108 lbs/ft^3

Based on the above criteria, backfilled slopes are found to have an expected safety fector of a maximum of 2.21 for dry conditions to

a minimum of 1.68 for saturated conditions. Both cases exceed the required static safety factor of 1.3. It should also be noted that the previous slope stability analyses by Dames & Moore resulted in static safety factors ranging from a minimum of 1.43 to 2.15 for side-cast cut and fill material in this area.

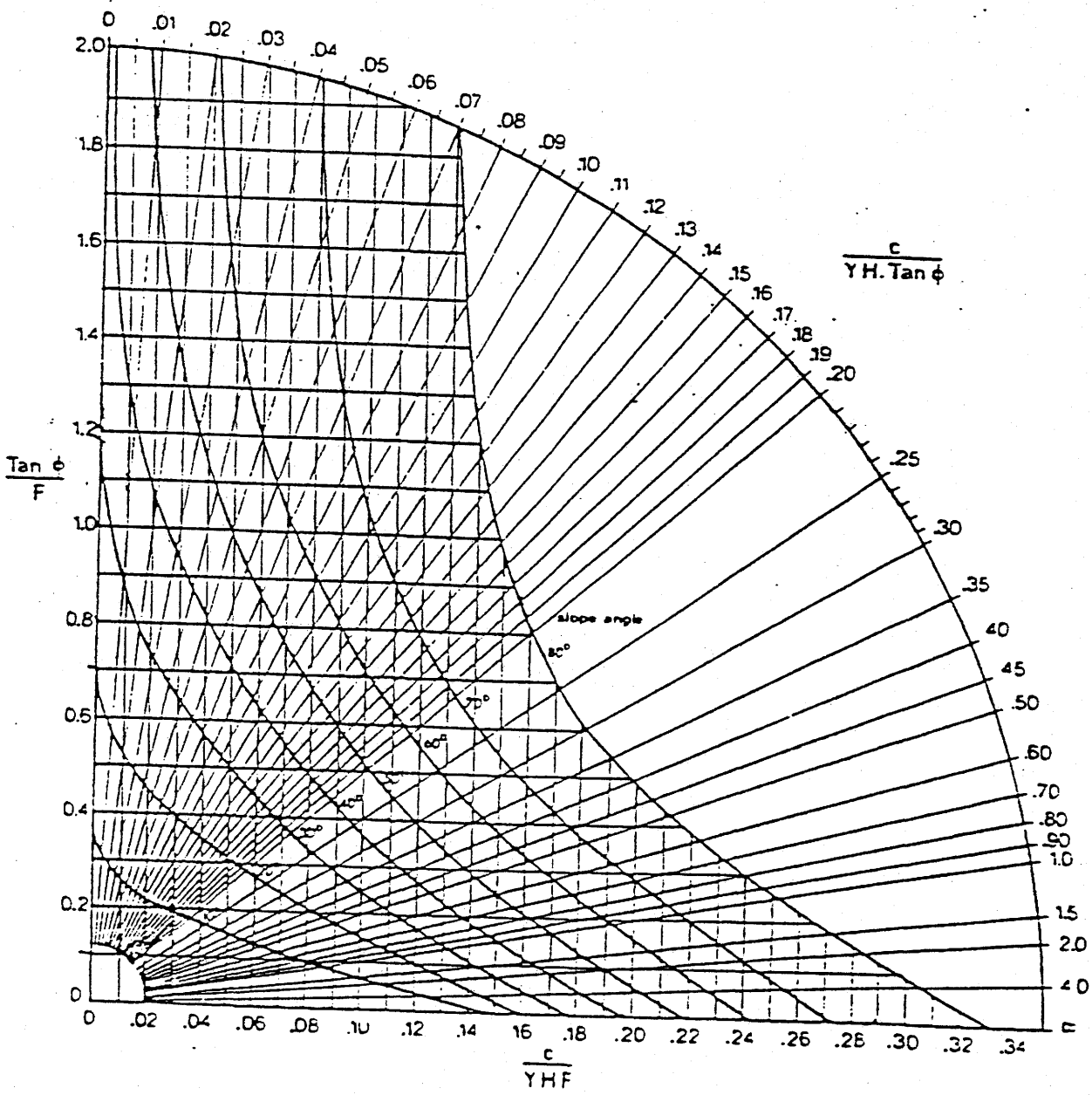
(DRY CONDITIONS)

CIRCULAR FAILURE CHART NUMBER 1



(SATURATED CONDITIONS)

CIRCULAR FAILURE CHART NUMBER 5



STABILITY ANALYSES

Highwall Stability

Highwalls at the site face south, southeast, and east. The highwalls are nearly vertical, with an average slope of IV:.2H, or 80°.

The highwall stability analysis is based on a rotational shear analysis using the Hoek method. Compressive strengths of materials in the Blackhawk Formation are highly variable, ranging from 290 PSI for soft shale to more than 20,000 PSI for certain sandstones. An average value of 5,000 PSI has been used for this analysis. This is a very conservative figure, based on the relative proportions of sandstones and shales in the exposed highwalls.

There are 2 joint sets typically found in this area. The major set has a strike of about N 10° E and dips 80° to vertical. The minor set has a strike of approximately N 70° W and also dips greater than 80°. The bedding in the highwall area is nearly flat.

Cohesion can be calculated from compressive strength by the following formula:

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$$C_i = \frac{Co}{2}\tan(45 - \frac{\theta}{2});$$

where:

C_i = Intact rock shear strength or cohesion

Co= Intact rock compressive strength

θ = Internal friction angle.

Using a typical internal friction angle of 45° for Wasatch Plateau rock types, and a 5,000 PSI compressive strength, a cohesion or intact rock strength of approximately 1,000 PSI is found. Since the 1,000 PSI value is for intact or solid rock, the value must be adjusted to compensate for jointing and fracturing common to all rock masses A method of relating fracture intensity and cohesion was developed by Stimpson and Ross-Brown and can be found in the article entitled, "Estimating the Cohesive Strength of Randomly Jointed Rock Masses", Mining Engineering, Vol. 31, No. 2, pp. 182-188. Based on this method and using a conservative figure of 4 joints per meter, a .065 factor is determined for calculating Cm or rock mass cohesion. Based on a C_i of 1,000 PSI, Cm becomes 65 PSI.

A typical or average rock mass bulk density of 155 lbs./ft.^{3} was selected for the analysis, and a slightly conservative, but commonly used value of 31° was selected for the rock mass sliding friction angle.

The following parameters were used with the Hoek slope chart (Hoek, E., and J. W. Bray, 1981, Rock Slope Engineering, Revised Third Edition, IMM, London):

H = Maximum Slope Height - 100'

θ = Slope Angle (average) - 80°

C_m = Rock Mass Cohesion - 65 PSI

ϕ = Rock Mass Friction Angle - 31°

γ = Rock Mass Bulk Density - 155 lbs./ft.^{3}

Plotting the above parametes on the Circular Failure Charts Nos. 1 and 5, it can be seen that the projected highwalls will have a safety factor or 2.61 under dry conditions and 2.40 under saturated conditions. It should be noted that the safety factors exceed the required 1.5 safety factor.

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Embankment Stability

Embankment or backfill will be placed in lifts not to exceed 36" and will be compacted to 90% of the laboratory obtained T-99 Standard Proctor. Slopes will not exceed IV:1.5H or 33.7°. Soil properties are based on those used in the "Slope Stability Analyses for the Bear Creek Portal and Access Road", by Dames and Moore, February 20, 1981, and the "Geotechnical Consultation, Bear Creek Portal", by Dames and Moore, December 29, 1980, and the "Bear Creek Canyon Mine Site, Sedimentation Pond "A" Stability Analysis", by Horrocks and Corollo Engineers on July 12, 1984.

Based on the proposed plan, and the results of samples taken during the above studies, the following parameters were established for the safety factor calculations:

(1) H = Embankment Height = 30'; this represents the maximum height of compacted embankment proposed in the plan;

(2) θ = Slope Angle = 33.7°; this is the maximum slope (IV:1.5H) proposed for the reclaimed embankments;

(3) C_m = Soil Cohesion @ 90% Compaction = 4.375 PSI; Actual Cohesion tests on compacted native material at this site showed a cohesion value of 700 PSF at a density of 118 lbs./ft.^{3} and a compaction value ranging from 89% to 94%. (See Sediment Pond "A" Stability Analysis", by Horrocks & Corollo Engineers, July 12, 1984.) To provide for maximum safety in the calculation, the cohesion factor is reduced by the compaction factor.

700 pfs X 0.9 = 630 psf = 4.375 psi;

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(4) ϕ = Friction Angle = 26°; This angle is based on the measurements taken and reported in the Feb. 20, 1981 Dames & Moore Slope Stability Analysis on the Bear Creek Portal and Access Road;

(5) Υ = Rock Mass Bulk Density (90%) = 108 lbs/ft.^{3}; Once again, this is a conservative number, established by taking actual values of 118 to 120 lbs./ft^3 as reported in the above reference stability analysis,

and allowing for 90% compaction - 120 X 0.90 = 108 lbs./ft.^{3}.

A rotational shear analysis was performed using the Hoek method to determine stability of the backfilled slopes. The following parameters were used for the slopes:

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H = Embankment Height - 30'

θ = Slope Angle - 33.7°

C_m = Soil Cohesion @ 90% Compaction - 4.375 psi

$\emptyset$ = Friction Angle - 26°

γ = Rock Mass Bulk Density (90%) - 108 lbs./ft.^{3}

Based on the above criteria, backfilled slopes are found to have an expected safety factor of a maximum of 2.21 for dry conditions to a minimum of 1.68 for saturated conditions. Both cases exceed the required static safety factor of 1.3. It should also be noted that the previous slope stability analyses by Dames & Moore resulted in static safety factors ranging from a minimum of 1.43 to 2.15 for side-cast cut and fill material in this area.

Note: The embankment compaction factors and cohesion values are based on previous tests performed in the Bear Canyon area. Although the tests were not site specific, they were run on the existing soils which are the same as those to be used in reclamation. The values used for rock compressive strengths were taken from rock parameters typical of the Blackhawk Formation in the Wasatch Plateau, and commonly used and accepted for this type of calculations.

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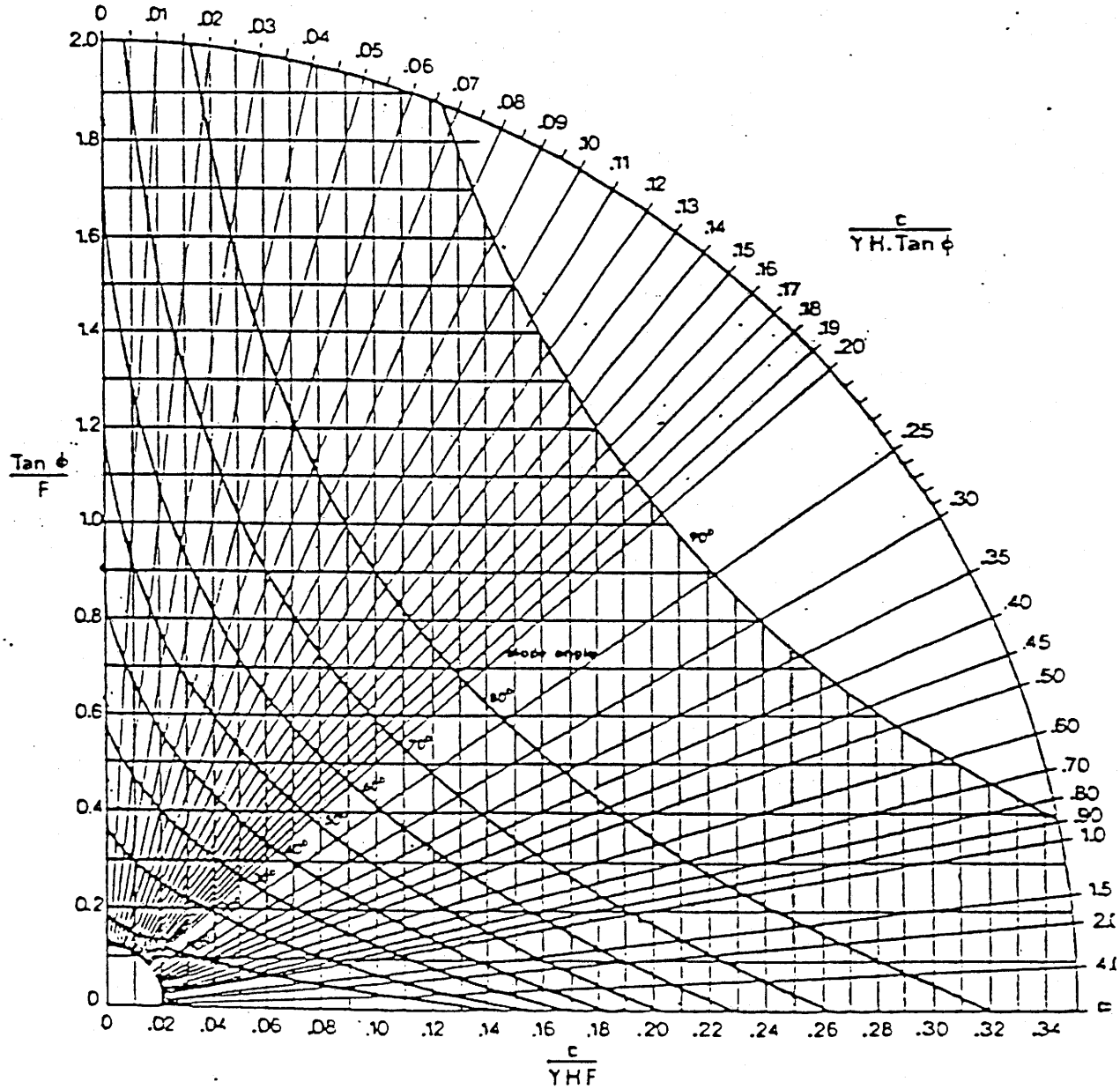
(DRY CONDITIONS)

CIRCULAR FAILURE CHART NUMBER 1



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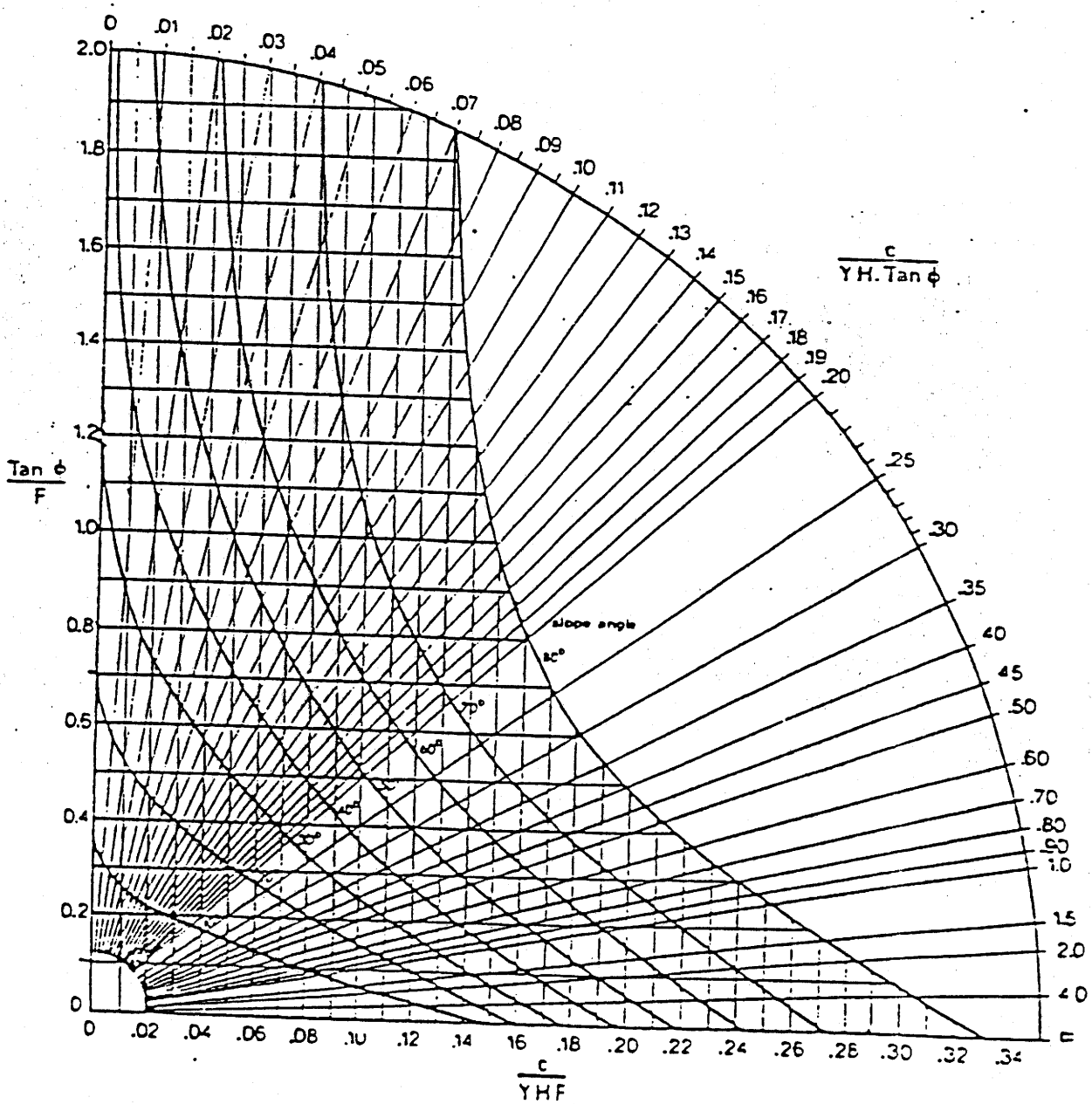
(SATURATED CONDITIONS)

CIRCULAR FAILURE CHART NUMBER 5



If it is determined necessary, Co-Op will commit to taking site specific tests on the soils and highwall rock to further verify the factors of safety. These tests would be performed prior to reclamation, or at the discretion of the Division.

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Removal or Reduction of Highwalls

The highwalls will be reduced along the pad and road areas where feasible. This will be accomplished by recovering material from the edge of pad and road fill areas with a backhoe and placing it against the base of the highwall. The material will be compacted with a cat to promote stability of the backfill. Erosion controls, such as straw dikes or water bars, will be placed below the backfilled areas to minimize washing of the fill material. The backfill material is native, consisting of material originally generated from the construction of the highwall areas and compacted into the road or pad fill areas.

Complete rick highwalls will be left in some areas to lessen the probability of erosion on backfilled materials or to minimize the amount of additional disturbance that would result from highwall reduction (see Plate 3-2).

The rationale for leaving or reducing the highwalls is based on the following:

1. Natural cliffs are common in the Blackhawk Formation, and in this area. The highwalls proposed to be left are similar in height and exposure to existing cliffs in the area and will therefore be compatible with existing topography.

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2. The highwalls will provide habitat for cliff-dwelling wildlife, and the pad areas will provide for other wildlife grazing. This proposal is therefore compatiable with the post-mining land use of wildlife habitat;

3. The rock highwalls could be partially shot down; however, this would extend the disturbance furthur up the steep slopes, resulting in more exposure and erosion potential;

4. The proposed highwalls to be left or reduced are on the south facing slopes in the area. These are the steeper slopes in the area, as well as the slopes more commonly containing rock exposures similar to the proposed highwalls

5. The fill areas at the base of the highwalls will be stabilized by reseeding and the use of erosion controls as discussed earlier. The toe of these areas will be terraces or gentle slopes (less than 10%) adding to their stability. These will eventually take the appearance of "talus slopes" a common structure at the base of exposed cliffs in this area. The natural weathering of cliffs and highwalls

will be very similar, providing for a furthur compatibility with the geomorphic processes of the area.

6. The existing (and proposed) highwalls will be stable. There are no seeps known to exist in any areas where highwalls are proposed to be left. The stability analysis run on this site show the highwalls of the pad and road areas to have a static safety factor of 2.61 for dry conditions and a factor of 2.41 for saturated conditions. Each of these far exceed the 1.3 safety factor required for highwalls proposed to be left or reduced. (Details on the stability analysis are included in the next section).

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APPENDIX 3-G

ROADS

Class I Roads

The Bear Canyon Haul Road is approximately 1800' long from the gate to the scale house as shown on Plates 3-5 and 2-2. As shown on the map, this portion of the road has been included in the Permit Area. This Class I road is constructed 30' wide and is surfaced with 6" of 3/4" gravel, crowned in the middle as shown on the cross section. Drainage will be provided along the road by ditches with a minimum depth of 1.8 feet. Erosion protection, such as straw bales at 100' intervals or 6" median diameter rip rap on a bed of -1" gravel 6" thick, shall be provided in all areas where velocities are expected to exceed 5 ft. per sec.. Culverts are installed as shown on the drawings; In addition, the two proposed 30" CMP culverts are now in place as indicated on the map. Culvert inlets will be protected by rock-lining or concrete headwalls. In areas where culverts are placed, at least 30" of headwater depth is available to allow for a avariance to allow the 18" culverts to pass the 10-year, 24-hour storm event. The culvert on the submitted drawing is to scale, and was installed with a trash rack to prevent plugging, a rock headwall at the inlet, and rip rap at the outlet to prevent erosion.

This road will be maintained in such a manner that the performance standards will be met throughout the life of

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the entire transportation facility, including maintainance of the surface, shoulders, parking and side areas, and erosion control structures for safe and efficient utilization of the road.

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Upon completion of the operation and reclamation of the mine site disturbed area, it is anticipated that this portion of the Bear Canyon Road will also be reclaimed. This will occur at approximately the same time as the final removal of the sedimentation pond and diversions on the mine site. The road surfacing material will be removed and either salvaged or disposed of within the pond site and buried. The reclamation will then be accomplished by ripping up the remaining base, spreading the material across the (roadway) disturbed area, and planting the area with the approved seed mix. During this time, all culverts shall be removed and either salvaged or disposed of in an approved landfill, and the natural drainage patterns shall be restored.

Class II Roads

The mine area and portal access road is approximately 2,112' long. A cross-section and profile of this road is shown on Plate 3-5. Culvert locations and ditches are also shown on this drawing, as well as on Plate 3-1. This road is primarily used for access to the mine portals and

other facilities. The road was originally constructed for access to the old Bear Mine, and has since been widened and fitted with proper drainage controls to protect the environment. The road is designed, used and maintained to meet the requirements of UMC 817.151 - 817.156, and to control or minimize erosion and siltation, air and water pullution, and damage to public or private property.

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The road is located along the canyon floor above the stream, and along the stable slope leading to the portals. The overall grade of the road does not exceed I:V:10h (10%) and the maximum pitch grade does not exceed IV:6.5h (15%). The horizontal alignment is consistent with the existing topography and with the volume, speed, and weight of anticipated traffic.

As mentioned earlier, the initial road was constructed under pre-law conditions, using the cut/fill side-cast method. A stability analyses was performed on the road by Dames & Moore in 1981 (Appendix 3-F). Their conclusion was that the Bear Canyon Portal Access Road has a stability factor of safety of a minimum of 1.43, and ranges upward to 2.15.

There are 3 other Class II roads within the Permit Area. Following is a description of each of these:

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1. Road to Sediment Pond A - This road is 430" long, and was constructed to allow access to the Sediment Pond and to facilitate cleaning of the drainage to the pond. The road has an overall slope of approximately 4.0% and does not exceed 15% at any point. The horizontal alignment is consistent with the existing topography and with the volume, speed, and weight of anticipated traffic.

2. Road to the coal preparation facility - This road is 600' long, and was constructed to provide access to the Coal Preparation Facility. The road has an overall slope of approximately 10.0%, and does not exceed 15% at any point. The horizontal alignment is consistent with the existing topography and with the volume speed, and weight of the anticipated traffic.

3. Bathhouse Road - This road is 160' long, and provides access to the bathhouse. The road has an overall slope of approximately 3.0%, and does not exceed 15% at any point. The horizontal alignment is consistent with the existing topography and with the volume, speed, and weight of the anticipated traffic.

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Ditches and culverts have been added to the roads to control run-off and safely pass the run-off from a 10-year, 24-hour precipitation event. (See Plates 3-1 and 3-5). Ditches shall be maintained at a minimum depth of 1.8 feet, and at least 30" of headwater depth will be maintained at the inlet of the 18" culverts. Culverts are fitted with trash racks to prevent plugging, and buried and compacted a minimum of 30" to prevent crushing. In areas where velocities of run-off exveed 5 fps, erosion protection such as straw bales at 100' intervals or 6" median diameter rip rap on a bed of 2" gravel/sand 6" thick shall be maintained. Culvert spacing conforms with the requirements of UMC 817.153(c)(z)(i) Rock or concrete headwalls shall be provided at the inlet to all culverts, and rip rap or other erosion protection shall be provided at the outlet.

The roads are surfaces with 4" of -3/4 gravel, and is maintained in such a manner that the approved design standards are met throughout the life of the facility. Damage to the roads from use or weather events shall be promptly repaired.

These roads shall be removed upon completion of the mining operation. The timing and procedure of removal and reclamation is discussed in detail uner the Backfilling and Grading Plan in Sec. 3.6.4.

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Class III Roads

The only Class III Road on the permit area is a jeep trail that was constructed pre-law, probably as a cattle trail. This road is shown on Plate 2-2, Surface Facilities Map. The road is blocked off and is not used; therefore, no maintenance or reclamation plan is proposed for this trail.

All roads shall be maintained in such a manner to prevent damage to fish, wildlife, and related environmental values. This is accomplished by:

1. Maintaining hydrologic controls, such as ditches, culverts, diversions and sedimentation ponds to assure that disturbed drainage is conveyed away from undisturbed drainages and either held or cleaned before releases.

2. Watering of roads as necessary to reduce fugitive dust.

3. Protection of wildlife within the permit area and reporting of sightings of threatened and endangered species.

4. Contemperaneous reclamation.

5. Advocating good-housekeeping practices to reduce the possibility of contamination of surface waters in the area.

6. Co-Op is committed that all support facilities will be restored to prevent damage to fish, wildlife, and related environmental values and the possibility of additional contributions of suspended solids to streamflow or runoff outside the permit area will be minimal.

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CHAPTER 3

OPERATION AND RECLAMATION PLAN

CHAPTER 3

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3.5.3 Protection of hydrologic balance

3.5.2 Protection of human values

3.5.4 Preservation of soil resources

3.5.5 Protection of vegitative resources

3.5.6 Protection of fish and wildlife

3.5.7 Protection of air quality

3.5.8 Subsidence control plan

3.5.9 Waste disposal

3.6 Reclamation plan

3.6.1 Contemporaneous reclamation

3.6.2 Soils

3.6.3 Final abandonment

3.6.4 Backfilling and grading

3.6.5 Revegetation

3.6.6 Schedule of reclamation

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BEAR CANYON MRP

4/30/84

This material replaces corresponding chapters
and pages in Co-Op Mining Company's MRP Submittal of 10/26/83

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3.4.6 Mine safety

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3.5 Environmental protection

3.5.1 Preservation of land use

3.5.3 Protection of hydrologic balance

3.5.2 Protection of human values

3.5.4 Preservation of soil resources

3.5.5 Protection of vegitative resources

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3.6.3 Final abandonment

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3.6.5 Revegetation

3.6.6 Schedule of reclamation

3.6.7 Reclamation Bonding

3.6.8 Alluvial Valley Floors

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Appendix 3.3.6 - A	Water rights
Appendix 3.3.11 - A	Class I road
Appendix 3 - B	Roof control plan
Appendix 3 - C	Interim reclamation plan
Appendix 3 - D	Topsoil
Appendix 3 - E	Toxic materials

3.1 SCOPE

This part describes the actions and procedures of Co-op Mining Company to satisty the requirements for underground mining operations and reclamation.

3.2 SURFACE FACILITIES - EXISTING

The mine which existed at the proposed site has been abandoned for over 30 years and subsequently there is no evidence of long existing facilities.

3.3 SURFACE FACILITIES - NEW

Subsection 3.3.1 and 3.3.2 deal exclusively with proposed new facilities.

3.3.1 Site Selection and Preparation of Proposed Facilities

Plate 2-2 is an overlay of the new location of all surface facilities. In addition an accurate determination of where each facility is in relationship to the existing topographic as well as structual fixtures such as highways.

3.3.2 Portals

3.3.3 Surface Buildings and Structures

The present plan calls for the following structures:

Surface structures will consist of; a single building complex containing shops, parts warehouse, bath house, and mine offices; truck scales, weighman office, caretaker dwelling, mine run coal receiver bin, crushing and sizing structure, truck load out bins, stockpile towers, and conveyors to carry coal to storage and load out sites, etc.. A complete list is included on page 3-126 and shown on Plate 2-2. Detailed plans for each structure are attached in Addendum 3.3.4-A Plans.

3.3.4 Coal Handling, Storage and Loading

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Coal carried from the mine by conveyor belt to a receiver bin, conveyed to the sizing and crushing plant, the lump removed and diverted to the lump bin, the rest of the oversized crushed, and the coal sized to meet the

various requirements of the different customers, then conveyed to the truck load out bins, or the stockpile area.

3.3.5 Power System, Transmission Lines and Substations

Power will be delivered by U.P. & L. transmission lines at 12,500 V. direct to a substation (See Plate 2-2), reduced to 480 V. for tipple use, and to 240 V. for shop and other use.

Surface power systems, transmission lines and substations will be removed and the areas reclaimed as prior when they are no longer required.

3.3.6 Water Supply System

A water right transfer has been applied for; if this is approved, a cistern system would be utilized. (See Appendix 3.3.6-A)

The system, which carries water from the Mine or Cistern to the loadout area, wash plant,

bathhouses and offices, consists of a 2-inch pipeline and water storage tanks, will be removed. The area will be topsoiled and revegetated. Plans and permit applications are attached in Appendix 3.3.6-A.

3.3.8 Water Diversion Structures

Water diversion structures will be maintained until revegetatated areas are well established and stable. Unless an accepted and approved use for these is established after mining, they will be removed as above; graded and revegetated.

3.3.9 Sedimentation Control and Water Treatment Facilities

This facility will be maintained as long as it is required to meet the effluent limitations of applicable federal or state laws for runoff or drainage. When their usefulness is ended, they will be removed and the sites reclaimed as described previously.

3.3.10 Storage, Waste and Refuse Areas

Not Applicable

bathhouses and offices, consists of a 2-inch pipeline and water storage tanks, will be removed. The area will be topsoiled and revegetated. Plans and permit applications are attached in Appendix 3.3.6-A.

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3.3.10 Storage, Waste and Refuse Areas

Co-Op will not generate coal refuse. Non-coal waste is addressed under"Surface Facilities."

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3.3.10 Storage, Waste and Refuse Areas

Co-Op disposes of underground development waste in abandoned areas underground in line with UMC 817.71-74 and MSHA regulations.

3.3.11 Transportation, Roads and Parking Areas

Roads and parking areas will be treated in the same manner as other working areas. Any asphalt or treated surfaces will be removed prior to reclamation. Approximately 1.2 miles of access road will be rehabilitated upon completion of mining. See Plate 3-1 and road agreement under Appendix 3.3.11.-A.

The Bear Canyon Road is approximately 1800' long from the gate to the scale house as shown on Plate 3-5. This road is constructed 30' wide and is surfaced with 6" of -3/4" gravel, crowned in the middle as shown on the cross-section. Drainage will be provided along the road by ditches with a minimum depth of 1.8 feet. Erosion protection, such as straw bales at 100' intervals or 6" median diameter rip-rap on a bed of -1" gravel 6" thick, shall be provided in all areas where velocities are expected to exceed 5 ft. per sec.. Culverts are installed as shown on the drawings; in addition, the two proposed 30" CMP culverts are now in place as indicated on the map. Culvert inlets will be protected by rock-lining or concrete headwalls. In areas where culverts are placed, at least 30" of headwater depth is available to allow for a variance to allow the 18" culverts to pass the 10 year-24 hour storm event. The culvert on the submitted drawing is to scale, and was installed with a trash

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rack to prevent plugging, a rock headwall at the inlet, and rip-rap at the outlet to prevent erosion.

This road will be maintained in such a manner that the performance standards will be met throughout the life of the entire transportation facility, including maintainance of the surface, shoulders, parking and side areas, and erosion control structures for safe and efficient utilization of the road.

Upon completion of the operation and reclamation of the mine site disturbed area, it is anticipated that this portion of the Bear Canyon Road will also be reclaimed. This will occur at approximately the same time as the final removal of the sedimentation pond and diversions on the mine site. The road surfacing material will be removed and either salvaged or disposed of within the pond site and buried. The reclamation will then be accomplished by ripping up the remaining base, spreading the material across the (roadway) disturbed area, and planting the area with the approved seed mix. During this time, all culverts shall be removed and either salvaged or disposed of in an approved landfill, and the natural drainage patterns shall be restored

The mine area and portal access road is approximately 2,112' long. A cross-section and profile of this road is

shown on Plate 3-5. Culvert locations and ditches are also shown on this drawing, as well as on Plate 3-1. This road is primarily used for access to the mine portals and other facilities. The road was originally constructed for access to the old Bear Mine, and has since been widened and fitted with proper drainage controls to protect the environment. The road is designed, used and maintained to meet the requirements of UMC 817.151 - 817.156, and to control or minimize erosion and siltation, air and water pollution, and damage to public or private property.

The road is located along the canyon floor above the stream, and along the stable slope leading to the portals. The overall grade of the road does not exceed 1:v:10h (10%) and the maximum pitch grade does not exceed 1v:6.5h (15%). The horizontal alignment is consistent with the existing topography and with the volume, speed, and weight of anticipated traffic.

As mentioned earlier, the initial road was constructed under pre-law conditions, using the cut/fill side-cast method. A stability analyses was performed on the road by Dames and Moore in 1981 (Appendix 3-F). Their conclusion was that the Bear Canyon Portal Access Road has a stability factor of safety of a minimum of 1.43, and ranges upward to 2.15.

Ditches and culverts have been added to the road to control run-off and safely pass the run-off from a 10 year-24 hour precipitation event. (See Plates 3-1 and 3-5). Ditches shall be maintained at a minimum depth of 1.8 feet, and at least 30" of headwater depth will be maintained at the inlet of the 18" culverts. Culverts are fitted with trash racks to prevent plugging, and buried and compacted a minimum of 30" to prevent crushing. In areas where velocities of run-off exceed 5 fps, erosion protection such as straw bales at 100' intervals or 6" median diameter rip-rap on a bed of 2" gravel/sand 6" thick shall be maintained. Culvert spacing conforms with the requirements of UMC 817.153(c)(z)(i Rock or concrete headwalls shall be provided at the inlet to all culverts, and rip-rap or other erosion protection shall be provided at the outlet.

The road is surfaced with 4" of -3/4 gravel, and is maintained in such a manner that the approved design standards are met throughout the life of the facility. Damage to the road from use or weather events shall be promptly repaired.

This road shall be removed upon completion of the mining operation. The timing and procedure of removal and reclamation is discussed in detail under the Backfilling and Grading Plan in Sec. 3.6.4. A detailed description of each road is included in Appendix 3-G.

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All roads, conveyors and other facilities shall be maintained in such a manner to prevent damage to fish, wildlife, and related environmental values. This is accomplished by:

1. Maintaining hydrologic controls, such as ditches, culverts, diversions and sedimentation ponds to assure that disturbed drainage is conveyed away from undisturbed drainages and either held or cleaned before releases.
2. Watering of roads as necessary to reduce fugitive dust.
3. Protection of wildlife within the permit area and reporting of sightings of threatened and endangered species.
4. Contemporaneous reclamation.
5. Advocating good-housekeeping practices to reduce the possibility of contamination of surface waters in the area.
6. Co-Op is committed that all support facilities will be restored to prevent damage to fish, wildlife and related environmental values and the possibility of additional contributions of suspended solids to streamflow or runoff outside the permit area will be minimal.

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3.3.12 Topsoil Storage Piles

Topsoil storage piles are located as shown in Plate 2-2. This material will be stockpiled, protected and seeded to prevent erosion. It will be recovered as needed to carry out the reclamation plan described herein.

3.3.13 Explosives Storage and Handling

Co-Op does not have an explosives storage facility within the permit area, and Co-Op does not anticipate the use of explosives in their normal mining operation. However, in the unlikely event the need arises, the following procedures will be adhered to:

Use of Explosives

There are no surface blasting activities incident to this under ground operation. There is a possibility os the need to use exlosives in the underground operation to advance through faults, dikes, or other rock strata too hard for cutting by the continuous miner. Any use of explosives in the underground operation will be in compliance with all applicable state and federal laws, and will be conducted by persons trained, examined and certified as provided by 30 CFR 850 and the Utah State Industrial Commission.

Blasting material will be stored in fire proof bullet proof magazines and clearly designated as an (Explosives Storage Area", as required by state and federal laws.

3.3.11 Transportation, Roads and Parking Areas

Roads and parking areas will be treated in the same manner as other working areas. Any asphalt or treated surfaces will be removed prior to reclamation. Approximately 1.2 miles of access road will be rehabilitated upon completion of mining. See Plate 3-1 and road agreement under Appendix 3.3.11.-A.

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Topsoil storage piles are located as shown in Plate 2-2. This material will be stockpiled, protected and seeded to prevent erosion. It will be recovered as needed to carry out the reclamation plan described herein.

3.3.13 Explosives Storage and Handling

Co-op does not anticipate the use of explosives in their normal mining operation. However, in the unlikely event the need arises, the following procedures will be adhered to:

Co-op will adhere to all State and Federal requirements, regulations and mandates applicable to the prescribed use and quantity. Including, but not limited to:

A federally approved storage facility.

An individual trained and certified in the use of explosives.

All forms, notifications and reporting procedures.

3.3.14 Relocation or Use of Public Roads

There are no public roads within the permit area.

3.3.14.1 Protective Measures

Access roads will be posted with "Authorized Personnel Only", speed and road information signs upon entrance to the property; use of these roads is restricted to authorized personnel. Security is maintained by adequate security personnel.

3.3.14.2 Maps

Plate 3-1 shows the location of all roads in the permit area.

3.3.14.3 Cross-Sections

Plans and cross-sections of the new access road to the portal area are show on Plate 3-1 and Section D-D ; Mine Access Road - Construction and Reclamation Plan.

3.3.15 Total Area for Surface Disturbance During Permit Term

Total area or surface disturbance during the permit term is approximately 10 acres. Individual areas are shown on Plate 3-2 .

3.3.16 Additional Area for Surface Disturbance for Life of Mine

Surface disturbance in addition to what has already

been disturbed is not anticipated.

3.3.17 Detailed Construction Schedule

Construction of coal handling and processing facilities to begin on or about April 1, 1981, scheduled for completion by Aug. 1, 1984. Construction of truck scale and caretaker dwelling to begin on or about Sept. 1, 1982, scheduled for completion by Sept. 1, 1984. Construction of shop complex to begin on or about Aug. 15, 1983, scheduled for completion on or about Aug. 1, 1984.

3.4 OPERATION PLAN

We are entering the first coal seam through an existing mine. The underground mining plans, (roof control, ventilation, barrier pillar, and etc.) are included as Appendix 3-B .

3.4.1 Mining Plans

There are three seams in the Bear Canyon property, the Upper Bear, (upper), the Bear or Blind canyon seam (middle), and the Hiawatha (lower). The old existing mine is in the middle seam. Our projected plan is to

begin mining in the existing mine.

3.4.1.1 Portals, Shafts and Slopes

See Plate 3-1.

3.4.1.2 Mining Methods

Room & Pillar Methods will be employed.

3.4.1.3 Projected Mine Development

See Plate 2-3.

3.4.1.4 Retreat Mining

Underground coal mining procedures follow two basic approaches to the recovery of involved reserves. These are advancing and retreating. Sometimes considerable advantage can be obtained if the entire reserve can be developed and then mined from the most remote area back to the portal. However, this is not generally possible. As a result, development work and

mining are usually accomplished simultaneously as the workings advance into the property. Depending upon the mine layout, this can be an advancing system until development reaches the property boundary, after which it can become retreating and mine back to the portal. Thus, we have an advance-retreat situation for the entire property.

This concept can be applied to various parts of the mine as well - for instance, the main entries, submain entries and even panels. If mining advances along both sides of any set of entries from their starting point to their termination, the system is advancing; if mining is not started until the entries reach their limit and then begins at the termination point on both sides, the system is retreating. If mining begins at the initiating point of the entries on one side and advances to the end, then moves to the other side and works out to the starting point, it becomes an advance-retreat system.

Frequently this method is attractive, as it permits high production work to proceed in combination with development, creates favorable strata control conditions and, if done properly, facilitates ventilation and enhances safety of the operation. An overall advance-retreat system is projected for this mine. However, where longwall mining is used, the faces will retreat along the panel entries.

Advance-retreat is not to be confused with first and second mining, which applies primarily to room and pillar work. First mining refers to the excavation of rooms and entries, leaving the intervening pillars of coal in place. Second mining can accompany first mining as it advances into a solid block of coal, in which case it is advancing; or it can retreat through an area which has been first-mined. The former is probably the safer and preferred method. It will be used where second mining is applicable in the Bear Canyon Mine.

3.4.1.5 Roof Control, Ventilation, Water Systems, Dust Suppression, Dewatering and Electrical

a. Roof Control

Roof control is described in the approved roof control plan (Appendix 3B). Basically, mine roofs are bolted on 5-foot centers with either expansion shield or resin grouted bolts not less that 48 inches long. Roof bold plates and, if desired, wooden cap pieces are used. Wooden posts and cap pieces can also be installed as needed.

Generally, roof strata are not expected to create major difficulties. The roof of the coal seams are predominatly sandstone; it provides good anchorage for roof bolts.

Floor strata throughout appear to be adequate and should create few problems. Some minor floor heaving may occur.

b. Ventilation

A fan with a combined capacity of 850,000 ft.

Table 3-1

Coal Reserves - Bear Canyon Mine

Coal Seam	Surface Acres of Seam	Avg. Thickness of Coal	Coal Reserves In Place	Coal Reserves Recoverable
Bear Canyon Seam	750	10'	13,065,500	6,532,500
Hiawatha Seam	800	5'	6,968,000	3,484,000
		TOTAL	20,033,000	10,016,500

3/min. supply air to the underground mining units.

Intake air is carried in the entries on one side of a set, while return air is carried through the entries on the other side. Air is directed through the mine by stoppings, doors, overcasts, regulators and brattice cloth. After sweeping the working faces of each section the air is directed into the return aircourses and out of the mine. Little or no methane gas is generated in any of the Blackhawk seams.

c. Dewatering, Water Systems and Dust Suppression

Water generated in the mine is collected in sumps and used at the mine. Some water from the roof is collected and pumped directly outside for use in the bathhouses and as drinking water in the offices. Tests for potability are made bi-monthly. Water also serves for sprays on the machines at the working faces,

on the coal at belt heads and transfer points and for storage in the 5,000 gal. underground reservoir for the wash plant. Presently water generated is used or contained at the mine; there is no discharge to surface waters. However, a National Pollution Discharge Elimination System (NPDES) permit has been obtained in case increased volumes are encountered.

d. Electrical

Electric power is currently purchased from a public utility at 12,500 V. and distributed over the surface of the property through company-owned overhead and buried transmission lines. At the mine portals, company substations convert the power to 13,200 V. for underground distribution and 440/220/120 V. for use on the surface.

Underground distribution voltages are transformed to 440/220/120 V. at a power center for use by the machines. All circuits are isolated by switches and protected by adequate circuit breakers and overload devices as required by law.

3.4.2 Barrier Pillars

Pillars of coal generally are left underground to protect a surface or underground feature which must be maintained and protected for the life of the mine (main entries) or permanently (oil or gas wells). The size of some is specified by law; others are designed by the operator to provide the protection needed. Those along the outside property boundary will be 100 feet wide. Shaft pillars will be large enough to prevent damage by subsidence, outcrops will be protected by a minimum of 200' barrier pillars.

3.4.2.1 Protection of Oil, Gas and Water Wells

There are no active or abandoned oil or gas wells within the permit boundary.

3.4.2.2 Protection of Manmade Features (Surface & Subsurface)

Manmade features and structures do not exist on the mineable portion of the permit area. There are some forest trails but they are all located beyond the coal outcrops. Maxi-

mum coal recovery in the controlled uniform manner planned for this mine should result in even surface subsidence with minimum disturbance.

3.4.2.3 Protection of Natural Surface Structures & Streams

Co-Op is committed to maintain a minimum of a 200' barrier pillar to the outcrop to minimize detrimental impacts to nesting raptor in the event of an escrapment failure. The stream channels will be safeguarded through protective berms and sediment controls on all disturbed waters.

3.4.2.4 Property Boundaries

Area boundaries of individual leases and fee property are shown in Plate 2-1. Total area covered by this permit is that enclosed by the heavy outside line. Protection of these lines and property adjacent to the permit area is provided by continuous barrier pillars 100 feet wide or wide enough to prevent subsidence across the boundary resulting from angle of draw.

3.4.2.4.1 Buildings Within 1,000 Feet of Permit Area

No buildings lie within 1,000 feet of the permit area.

3.4.2.4.2 Existing Public Roads

The main access road to the property is a public road. It provides access from Huntington Canyon to the mine. Access beyond the gate entrance to the mine is controlled by the company and the road is posted with no trespassing, speed control and general traffic control signs. When mining has been completed, the road would be reclaimed.

3.4.2.5 Outcrop Protection

In most areas, the coal outcrops are buried. That is, they are not visible from the surface, either because they are covered to some depth with overburden or because, in many areas, the coal has been burned for some distance from the surface. Where neither of these situations exist, routine tests of the coal may show that it has been "weathered" or "oxidized" and mining would be stopped within 200 feet of the outcrop.

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The main access road to the property is a public road. It provides access from Huntington Canyon to the mine. Access beyond the gate entrance to the mine is controlled by the company and the road is posted with no trespassing, speed control and general traffic control signs. When mining has been completed, the road would be reclaimed.

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In most areas, the coal outcrops are buried. That is, they are not visible from the surface, either because they are covered to some depth with overburden or because, in many areas, the coal has been burned for some distance from the surface. Where neither of these situations exist, routine tests of the coal may show that it has been "weathered" or "oxidized" and mining would be stopped within 100 feet of the outcrop.

3.4.3 Conservation of Coal Resource

Maximum recovery of this reserve will be practiced from the time Co-op Mine begins mining on this property. In addition, mining plans have established mine layouts to reach all areas of the property and, at the same time, by the adoption of pillar recovery techniques in room and pillar work, raise the percentage of recovery of reserves in the mining area to the maximum. Whereas room and pillar methods without pillar mining recover approximately 50% of the coal, the above procedures show recovery of 80% to 90% in the mining area or close to 60% overall.

Seams will be mined to a minimum thickness of 5 feet which is the lower limit for operation of the equipment that must also mine to full seam heights of 10 feet or more.

Barrier pillars to protect main and submain entries have been made large enough (200 feet or greater) to assure preservation of the entries for their useful life. When the area

they service is mined out, the entry pillars will be recovered on the way out.

3.4.3.1 Recovery Factors

Various factors and combinations of factors affect the amount of coal recovered from any given area of a reserve. Natural conditions such as incompetent roof strata, soft floor strata, water, depth of overburden and residual tectonic forces in the strata influence operating procedures and their effectiveness. Manmade conditions including mine layout, mining sequences and operating procedures can significantly influence the amount of overall recovery.

Present indications of natural conditions within the permit area are encouraging. Roof and floor conditions are generally satisfactory with the exception of some faulting, which may create difficulties.

Burned areas of coal along the outcrops also are not definitely delineated. This will affect the total in-place reserve estimate if

such burning has penetrated the seam to a greater distance than anticipated.

Co-op Coal Company's engineers have assured recovery of the highest percentage of in-place reserves by adoption of sound engineering principles in design and strict observance of these principles in operation.

3.4.3.2 Projected Maximum Recovery and Rate

The mining systems adopted by Bear Canyon Mine for use on this property will assure maximum recovery of the reserve with thorough application of the most advanced current mining technology and equipment. Pillar recovery in room and pillar work follows procedures that assure thorough and uniform removal of the coal to maintain effective roof control over the working and adjacent areas.

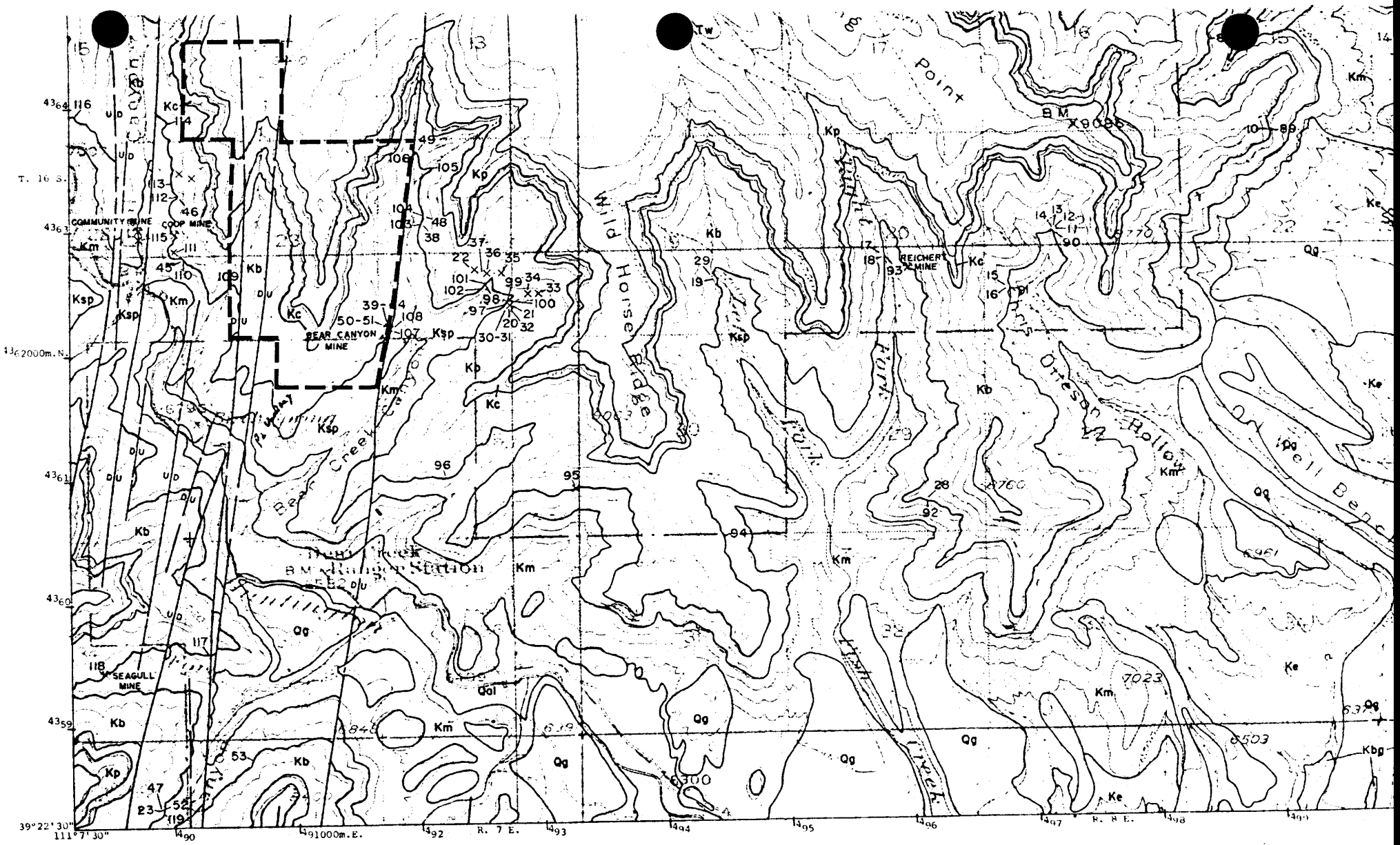
3.4.3.2.1 Recoverable Reserves in the Permit Area

Table 3-1 in Section 3.4.1 shows the reserves in each seam determined from our most recent data.

Co-Op Coal Company plans to extract all coal reserves, to the extent allowed by economics, safety conditions and prudent mining practice, from the lands it controls.

The "upper seam" in this area is the Upper Bear Canyon Bed, which is probably just a split off the main Bear Canyon Seam in which the mine is located. This seam lies only 15' to 20' above the Bear Canyon Seam at the minesite, and is evidenced only by a ledge and some burning. Speiker and Doelling have both referred to a probable upper split of the Bear Canyon Seam in this area, likely with a small lateral extent and little, if any, mining potential. An additional seam outcrops about 200' above the mine portals; however, this is one of the "upper beds" listed on Table 1, page 6-15, and apain, is not considered to have any economic potential due to limited lateral extent and extreme burning of seams in this horizon (Doelling p. 6-14).

Due to the burning, questionable lateral extent and inability to trace these upper seams (or splits), and due to the close proximity of the Upper Bear Canyon split to the main bed



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SCALE 1:42240

Geology and coal data by
E. M. Spieker, 1931, USGS

PERMIT AREA

Coal and geology map, Hiawatha NE quadrangle

FIGURE 3.4-1

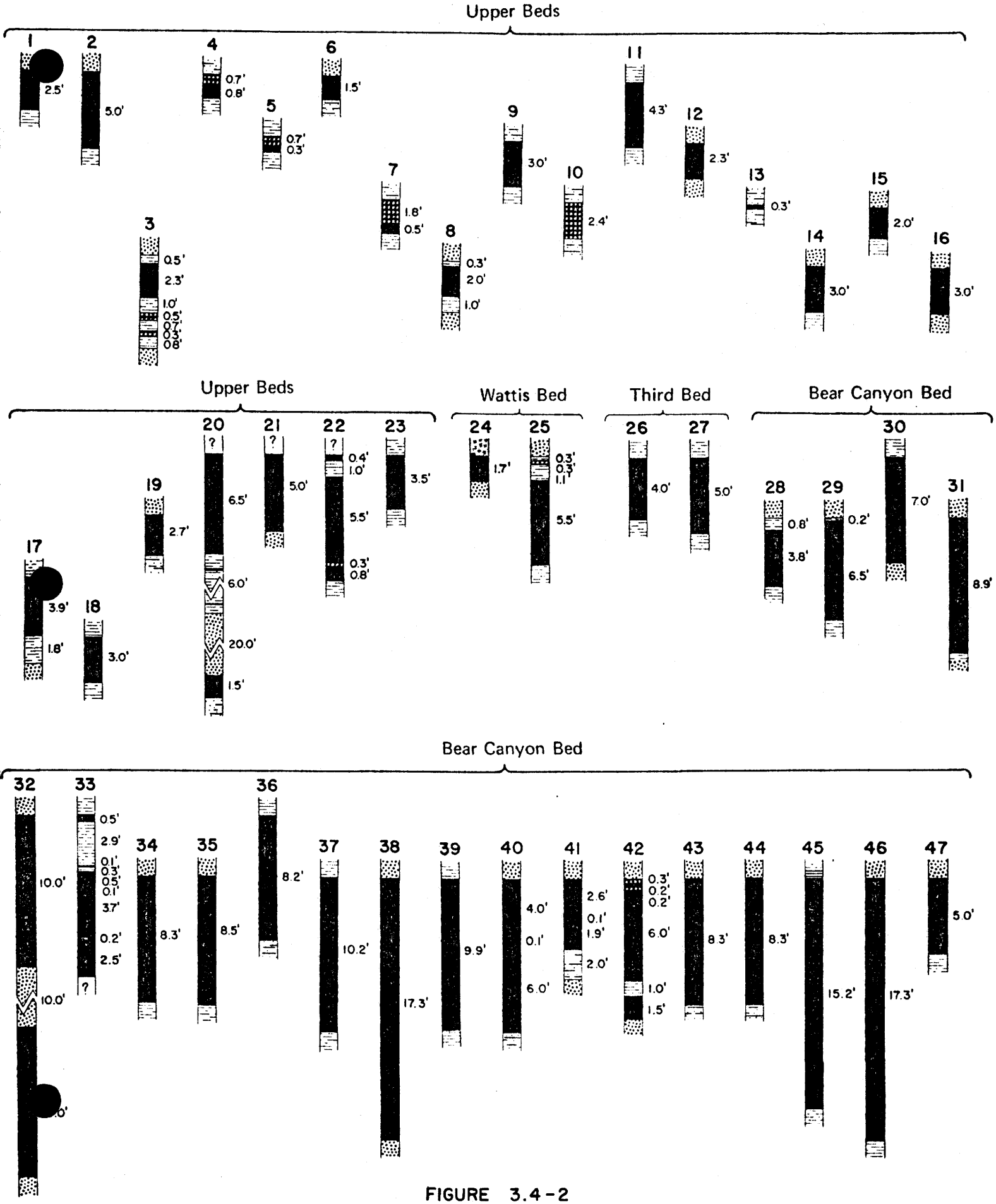
Upper Beds
1
2.5'
2
5.0'
4
0.7'
0.8'
5
0.7'
0.3'
6
1.5'
7
1.8'
0.5'
8
0.3'
2.0'
1.0'
9
3.0'
10
2.4'
11
4.3'
12
2.3'
13
0.3'
14
3.0'
15
2.0'
16
3.0'
3
0.5'
2.3'
1.0'
0.5'
0.7'
0.3'
0.8'
Upper Beds
Wattis Bed
Third Bed
Bear Canyon Bed
17
3.9'
1.8'
18
3.0'
19
2.7'
20
?
6.5'
6.0'
20.0'
1.5'
21
?
5.0'
22
?
0.4'
1.0'
5.5'
0.3'
0.8'
23
3.5'
24
1.7'
25
0.3'
0.3'
1.1'
5.5'
26
4.0'
27
5.0'
28
0.8'
3.8'
29
0.2'
6.5'
30
7.0'
31
8.9'
Bear Canyon Bed
32
10.0'
10.0'
33
0.5'
2.9'
0.1'
0.3'
0.5'
0.1'
3.7'
0.2'
2.5'
?
34
8.3'
35
8.5'
36
8.2'
37
10.2'
38
17.3'
39
9.9'
40
4.0'
0.1'
6.0'
41
2.6'
0.1'
1.9'
2.0'
42
0.3'
0.2'
0.2'
6.0'
1.0'
1.5'
43
8.3'
44
8.3'
45
15.2'
46
17.3'
47
5.0'

FIGURE 3.4-2

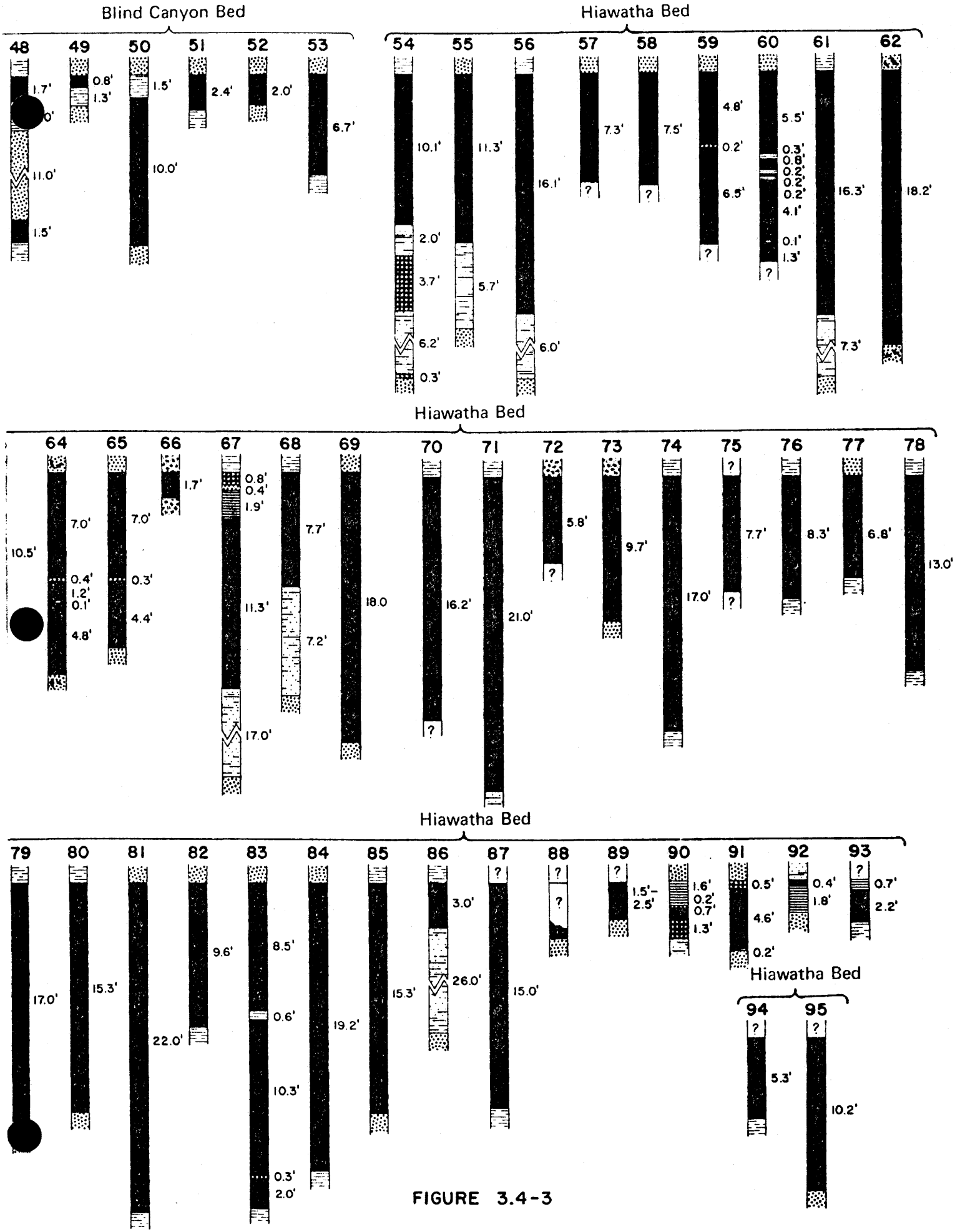
Blind Canyon Bed
48
1.7'
0'
11.0'
1.5'
49
0.8'
1.3'
50
1.5'
10.0'
51
2.4'
52
2.0'
53
6.7'
Hiawatha Bed
54
10.1'
2.0'
3.7'
6.2'
0.3'
55
11.3'
5.7'
56
16.1'
6.0'
57
7.3'
?
58
7.5'
?
59
4.8'
0.2'
6.5'
?
60
5.5'
0.3'
0.8'
0.2'
0.2'
0.2'
4.1'
0.1'
1.3'
?
61
16.3'
7.3'
62
18.2'
Hiawatha Bed
64
10.5'
7.0'
0.4'
1.2'
0.1'
4.8'
65
7.0'
0.3'
4.4'
66
1.7'
67
0.8'
0.4'
1.9'
11.3'
17.0'
68
7.7'
7.2'
69
18.0
70
16.2'
?
71
21.0'
72
5.8'
?
73
9.7'
74
17.0'
75
?
7.7'
?
76
8.3'
77
6.8'
78
13.0'
Hiawatha Bed
79
17.0'
80
15.3'
81
22.0'
82
9.6'
83
8.5'
0.6'
10.3'
0.3'
2.0'
84
19.2'
85
15.3'
86
3.0'
26.0'
87
?
15.0'
88
?
?
89
?
1.5'-
2.5'
90
1.6'
0.2'
0.7'
1.3'
91
0.5'
4.6'
0.2'
92
0.4'
1.8'
93
?
0.7'
2.2'
Hiawatha Bed
94
?
5.3'
95
?
10.2'

FIGURE 3.4-3

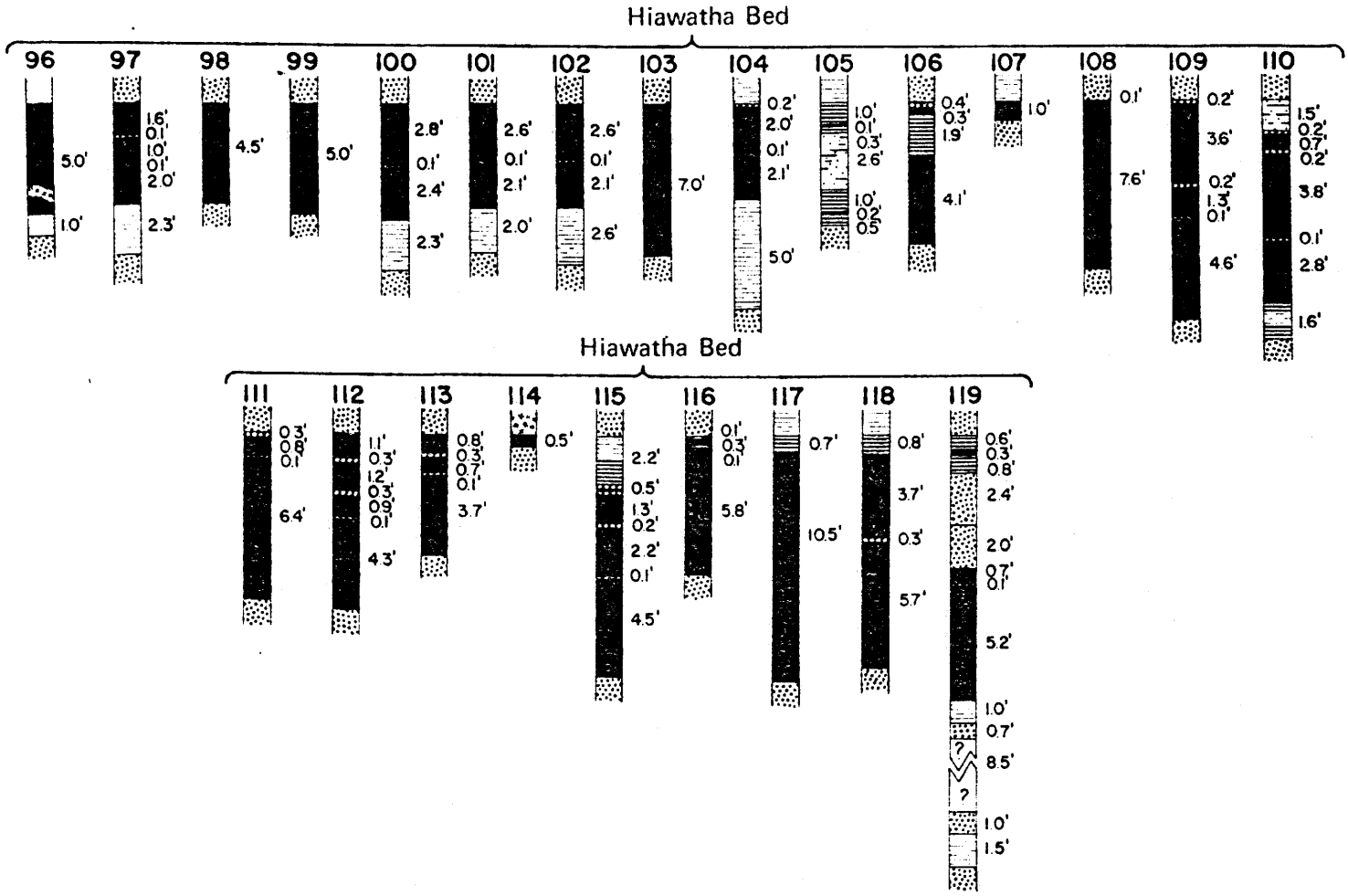
Hiawatha Bed
96
5.0'
1.0'
97
1.6'
0.1'
1.0'
0.1'
2.0'
2.3'
98
4.5'
99
5.0'
100
2.8'
0.1'
2.4'
2.3'
101
2.6'
0.1'
2.1'
2.0'
102
2.6'
0.1'
2.1'
2.6'
103
7.0'
104
0.2'
2.0'
0.1'
2.1'
5.0'
105
1.0'
0.1'
0.3'
2.6'
1.0'
0.2'
0.5
106
0.4'
0.3'
1.9'
4.1'
107
1.0'
108
0.1'
7.6'
109
0.2'
3.6'
0.2'
1.3'
0.1'
4.6'
110
1.5'
0.2'
0.7'
0.2'
3.8'
0.1'
2.8'
1.6'
Hiawatha Bed
111
0.3'
0.8'
0.1'
6.4'
112
1.1'
0.3'
1.2'
0.3'
0.9'
0.1'
4.3'
113
0.8'
0.3'
0.7'
0.1'
3.7'
114
0.5'
115
2.2'
0.5'
1.3'
0.2'
2.2'
0.1'
4.5'
116
0.1'
0.3'
0.1'
5.8'
117
0.7'
10.5'
118
0.8'
3.7'
0.3'
5.7'
119
0.6'
0.3'
0.8'
2.4'
2.0'
0.7'
0.1'
5.2'
1.0'
0.7'
?
8.5'
?
1.0'
1.5'

FIGURE 3.4-4

each seam. The recoverable coal reserves was then estimated by multiplying the in-place reserve by a recovery factor of 50%. A 60% recovery factor could be used based on actual recovery experience by Co-Op Mining Company in the seams in this area; however, the 50% factor was used to assure the reserve estimate is conservative.

Co-Op plans to enter the Hiawatha Seam at a later date, although , at this time it is not known precisely when that will occur, or at what location. It is possible that access to the lower Hiawatha Seam may prove to be most economic through new portals in the outcrop; however, as mining progresses, and fault locations and displacements are better delineated, it may become even more feasible and less environmentally destructive to enter the lower seam through rock tunnels. In any event, Co-Op will commit to provide the Division with complete plans for entering the lower seam prior to taking such action. These plans will be submitted as a modification to this MRP and will be submitted in a timely manner to allow for review and approval prior to com-

mencing work on entering the Hiawatha Seam.

3.4.3.2.2 Recovery Rate

Mining recovery of the above reserves is projected to be 50% of the total inplace raw coal tonnage.

The operation will produce 200,000 tons of raw coal per year with at least 3 miner sections working 240 days. This is 833 tons per day with 2 production shifts operating.

This rate of production (considering a lower rate during the initial buildup years plus the tonnage still to be mined in the area of old workings) will make the projected mine life 50 years.

3.4.3.2.3 Justification for Mining Engineering Techniques

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Co-op Coal Company plans to extract all coal reserves, to the extent allowed by economics, safety conditions and prudent mining practice, from the lands it controls.

3.4.3.2.2 Recovery Rate

Mining recovery of the above reserves is projected to be 60% of the total in-place raw coal tonnage.

The operation will produce 200,000 tons of raw coal per year with at least 3 miner sections working 240 days. This is 833 tons per day with 2 production shifts operating.

This rate of production (considering a lower rate during the initial buildup years plus the tonnage still to be mined in the area of old workings) will make the projected mine life 50 years.

3.4.3.2.3 Justification for Mining Engineering Techniques

Mining techniques and operating procedures adopted by Co-op for this property are based upon current engineering principles and modern equipment in relation to existing knowledge of the property, natural conditions and production desired. Approaches are not those of the Co-op staff alone; they are the result of consultation with reputable consulting mining engineers of this country as well, all of whom are familiar with western U.S. coal conditions.

Mine layout has considered the seam condition and minable areas so that all recoverable coal can be reached. Main entries are designed for maximum protection throughout their life with adequate capacity to supply ventilating air to working areas as well as trouble-free haulage systems for coal, men and materials.

3.4.3.2.4 Justification for Non-Recovery

Only that coal required by law to be left in place and that which is economically or physically unrecoverable because of adverse natural conditions or safety considerations will not be recovered.

Mine layout assures that all areas of coal within the permit boundaries are accessible to mining.

Even in the suspected area of faulting, plans have been made to locate panels between and parallel to the faults for maximum recovery.

3.4.3.2.5 Access to Future Reserves

Not Applicable

3.4.4 Economic Validity of Operation

Economic information provided in this application is in compliance with OSM and DOGM regulations 782.16 (b) AND (784.13(b)(6). Reclamation costs are discussed in Section 3.6.7.

3.4.5 Equipment Selection

Co-op Mining Company will utilize the equipment described in the following list for its mining operation and will acquire any additional equipment as required to maintain a sound mining operation.

3.4.5.1 Surface Equipment

Vibrating screens
crushers
conveyors
Front end loaders
road grader
crawler tractor
fork lift

3.4.5.2 Underground Equipment

continuous miner
electric shuttle cars
belt lie with feeder-breaker
roof bolter
scoop
service vehicle
personel carrier
boss buggy
rock dusters
water pumps
supply tractor
stopper
power center

3.4.6 Mine Safety, Fire Protection and Security

The mine complies with all federal, state and local

regulations on safety, fire control and security in underground and surface areas, as discussed below.

3.4.6.1 Signs

Signs used on the property are constructed of suitable material, employ uniform and standard designs and conform to local ordinances and codes. They will be maintained during the conduct of all activities to which they pertain. The gate at the main entrance will be posted with a sign containing the company name, address, telephone number and identification number. Table 3.4.6.1 lists signs and duration of maintenance and placement. Surface blasting is not planned at this underground mine. If such blasting becomes necessary for some reason, "Blasting Area" signs will be posted on access roads and on public roads within 200 feet. In addition, the blasting area will be conspicuously flagged in the vicinity of charged holes. All other requirements of the Utah DOGM mining regulation pertaining to surface blasting will also be satisfied.

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In the event that surface blasting becomes

Table 3.4.6.1

Sign Maintainance

Stream Buffer Zone Signs	Until Bond Release
*Perimeter Markers	Until Bond Release
Vegetation Reference Area	Until Bond Release
Mine Identification Signs	Until Bond Release
Top Soil Signs	Until soil is redistributed
Blasting & Warning Signs	Until all hazardous activity is concluded
Road & Caution Signs	Until Bond Release
Flammable Materials Signs	Until all such material is removed
Hazardous Material Sign	Until all such material is removed

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*Perimeter Markers- The permimeter of the mine disturbance area is marked with steel rods approximately 4' in length (roof bolts) and are painted a flourescent orange on top. The rods are placed in such a manner that a person can site from one rod to the next and the line can be clearly determined.

regulations on safety, fire control and security in underground and surface areas, as discussed below.

3.4.6.1 Signs

Signs used on the property are constructed of suitable material, employ uniform and standard designs and conform to local ordinances and codes. They will be maintained during the conduct of all activities to which they pertain. The gate at the main entrance will be posted with a sign containing the company name, address, telephone number and identification number.

Surface blasting is not planned at this underground mine. If such blasting becomes necessary for some reason, "Blasting Area" signs will be posted on access roads and on public roads within 200 feet. In addition, the blasting area will be conspicuously flagged in the vicinity of charged holes. All other requirements of the Utah DOGM mining regulation pertaining to surface blasting will also be satisfied.

In the event that surface blasting becomes

Combustible non-coal materials such as paper, used oil and wood will be collected routinely, transported to an approved sanitary land fill and disposed of.

Diesal fuel and gasoline are stored in tanks with capacities of 1,000 and 5,000 gallons. The tanks are located and positioned so as not to affect any slope or shaft opening. The storage tanks will be protected from corrosion by cathodic coat protection or other effective methods considered most compatible with existing soil conditions. The tanks will be inspected to ensure no leakage into the surrounding soil. All surface tanks will have protective berm constructed within 90 days of permit approval; Also, the tanks are located so as any major spillage runs directly to the sediment pond. (See Plate 2-2). Loose coal and the coal faces are sprayed with water prior to and during cutting by the water sprays on the machines. In addition, routine periodic (20-minutes) inspection and tests are made for methane gas during this operation.

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Buildings and structures are protected against fire by the location of adequate numbers, sizes and types of fire extinguishers in compliance with regulations. Water is available from the surface water distributing system.

3.4.6.3.3.1 Facilities

Discussed above under Section 3.4.6.3.3

3.4.6.3.3.2 Coal Stockpiles

Monitored daily.

Refuse Piles

Co-Op does no produce processed coal and does not produce coal refuse.

3.4.6.3.4 Explosives

This is an underground mine using continuous mining methods which does not necessitate the need for blasting. In the event blasting would be necessary it would be in accordance with existing federal and state laws.

All surface work, such as site preparation is completed at this time. No surface blasting is anticipated in the permit term.

3.4.6.4 Compliance with Regulations

Co-Op Mining Company will comply with all federal and state regulations pertaining to the operation of this mine within the permit area.

3.4.6.4.1 Routine Reports

All routine reports pertaining to the operation will be submitted to the proper governmental agencies, in particular those required under CFR 30 Chapter 75.1800-1808.

3.4.6.4.2 Reporting of Accidents

All accidents will be reported to MSHA in accordance with CFR 30 Chapter 1 Subpart B par. 80.1080.12; Subpart C par.

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80.20-80.24; and Subpart D par. 80.30-80.33. Such reporting will also include the Utah DOGM.

3.4.6.4.3 Corrective Action Accidents

Immediately after an accident, an on-site investigation will be initiated by company safety personnel accompanied by federal and state officials if required. The investigation and report will determine the cause of the accident, contributing factors and methods for prevention. Corrective action will be taken immediately. All data will be reviewed with mine personnel at their regular safety meetings and pertinent data will be incorporated into safety training classes.

Federal, state and other appropriate officials will be notified of all accidents in accordance with current regulations.

3.4.6.4.4 Good Housekeeping

The company believes that neat, clean

working areas are conducive to greater safety, pride and productivity. Its practice will be therefore, to require that supplies and materials be stored neatly in designated areas, that trash be cleaned up daily and transported to control areas for disposal and that spillage of coal or other materials be reduced to a minimum. Inadvertent spillages will be removed as soon as possible.

3.4.6.4.5. Mine Maps

Maps of underground section working will be updated by Section Foremen using their own measurements of face advance and width. Sections will be regularly and accurately surveyed by the Salaried Personel and all mine maps will be kept up to date and filed. These records will be reported to the appropriate agencies as required by current regulations.

3.4.6.4.6 Mine Records

Mine operating records will be maintained daily to show progress, production, work-force, conditions, ets. These records will be maintained in the mine files and will be accessible to authorized personnell when necessary.

3.4.7 Operations Schedule

The mine operating schedule as outlined is, of course, subject to change from a variety of causes, i.e., strikes, changes in market, underground mining conditions, surface transportation, etc. However, the following data show the projected performances.

3.4.7.1 Annual Production for Permit Time

If the market conditions warrant, annual production could reach 200,000 tons, and increase to 400,000 tons, (projection) by the year 1995. Prior to the 200,000 ton, an approval from the Executive Secretary in accordance with Sec. 3.1 UAR will be gained.

3.4.7.2 Operating Schedule

The mine will operate 240 days per year, 5 days per week to produce the above ton-

3.4.6.4.6 Mine Records

Mine operating records will be maintained daily to show progress, production, workforce, conditions, etc. These records will be maintained in the mine files and will be accessible to authorized personnel when necessary.

3.4.7 Operations Schedule

The mine operating schedule as outlined is, of course, subject to change from a variety of causes, i.e., strikes, changes in market, underground mining conditions, surface transportation, etc. However, the following data show the projected performances.

3.4.7.1 Annual Production for Permit Time

Annual production; 200,000 Tons, increased to 400,000 Tons, (projection).

3.4.7.2 Operating Schedule

The mine will operate 240 days per year, 5 days per week to produce the above ton-

ages. It will use a total of 30 + miners working 3 shifts per day and producing 400 + ton per shift per unit.

3.4.7.3 Employment

Total personnel will be 35, 5 of whom will be salaried and 30 hourly employees.

3.4.8 Mine Permit Area

3.4.8.1 Acreage and Delineation

The permit area comprises approximately 900 acres located and outlined as shown on Plate 2-1.

The permit area is made up of properties owned in fee by COP Development Company.

3.4.8.2 Mining Sequences

Plate 2-3 show the mining sequence on the property each year for the first five years and each five years thereafter for the life of the mine.

3.4.8.3 Acreage in Each Scheduled Sequence of Underground Activity (Not Surface Disturbance)

YEAR	ACREAGE
1984	11
1985	11
1986	11
1987	11
1988	13
1989-1993	65
1994-1998	65
1999-2003	65

3.4.9 Mine Plan Area

The "mine plan area" is defined for the purposes of this section to consist of the permit area.

The permit area has been discussed previously (Section 3.4.8).

The tentative acreages to be disturbed for each activity described above are as follows:

3.4.8.3 Acreage in Each Scheduled Sequence

YEAR	ACREAGE
1984	11
1985	11
1986	11
1987	11
1988	13
1989-1993	65
1994-1998	65
1999-2003	65

3.4.9 Mine Plan Area

The "mine plan area" is defined for the purposes of this section to consist of the permit area.

The permit area has been discussed previously (Section 3.4.8).

The tentative acreages to be disturbed for each activity described above are as follows:

Mine Shop Area		.175 acres
Mine Access Road	3.7	2.15 acres
Portal and Pad Areas	3.26	~~5.1~~ acres
Sediment Treatment Area		.5 acres
Scales Area	1.56	1.42 acres
		9.72 Ac

3.5 ENVIRONMENTAL PROTECTION

3.5.1 Preservation of Land Use

COP Development Company, which is the legal owner of affected surface operations, anticipates that the postmining land uses of the affected areas will remain the same as the premining land uses. These uses are identified in Chapter 4. State or local governments have not proposed any changes in land use following reclamation.

Once operations in an area have ceased, the disturbed area will be scarified, sloped and seeded before the next growing season. The site will be reseeded with a mixture of seed such as mountain varities of wheatgrass, hard fescue, or species

transmission facilities will be constructed to be raptor protected. See Appendix 10-C.

Co-Op is further committed to report the presence of any Golden eagles observed on the property to the Division.

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specified by the Division of Oil, Gas, and Mining. Grass will be maintained by fertilization or reseeding until stable up to five years. (See Interim Reclamation Plans - Appendix 3-C.

The proposed mine access roads to the mine portal will be reclaimed and revegetated. This will accomplish a dual purpose of controlling runoff and revegetating the hillsides with vegetation comparable to existing growth.

Co-op Coal Company will cooperate with all state and local land use plans and programs.

Emery County zoning ordinances classify the Bear Canyon Mine plan area as Industrial Mining.

3.5.1.1 Projected Impacts of Mining on Current and Future Land Use

The management objectives and the impacts from the Bear Canyon Mine per-

taining to these objectives are described in detail in Chapter 4.

Impacts

Approximately 10 acres of soil will be disturbed within the permit area. This includes loadout areas, offices, shops and substations, roads, portal areas and the topsoil storage area.

The reduction in desirable plant species will temporarily reduce forage production and wildlife capacities.

The short-term negative impact of vegetation removal would be outweighted by the positive impacts of revegetation and improved fire protection and prevention.

Wildlife in the area will adapt to the operation in a relative short time as witnessed by existing coal operations. Proposed construction may temporarily disrupt wildlife if human disturbance is not kept to a minimum. These

topics are discussed in detail in the Wildlife Report, Chapter 10.

3.5.1.2 Control Measures to Mitigate Impacts

Reclamation activities in the permit area will be directed toward minimizing the overall impact of coal mining. This can be accomplished by careful planning of the disturbed areas that must be later reclaimed.

The mine surface operation facilities proposed, will be returned to a wildlife/grazing habitat at the conclusion of the mining operation. The premining and proposed postmining uses are therefore identical for all areas. (Chapter 4)

The initial step in the reclamation plan is to seal all large diameter openings. This will be accomplished by backfilling these openings with non-combustible material. The seals will be designed so that

mine drainage, if any, will not enter surface water bodies. For a more detailed description of the sealing of openings see Section 3.6.3.1, Sealing of Mine Openings, Drill Holes, Wells, etc.

The next step in reclamation would be the removal of all surface structures, equipment and road blacktop. Next, all solid waste generated in abandonment opperation will be collected and removed from the reclaiming areas. Additional information concerning this aspect of the reclamation plan is presented in Section 3.6.3.2., Removal of Surface Structures.

Backfilling of the subterranean portion of the silos, holes and depressions will be the next reclamation activity. Once backfilling is completed, drainages will be returned and disturbed areas will be graded and recontoured. A detailed description of this reclamation phase is

found in Section 3.6.4, Backfilling and Grading Plans.

A suitably permanent and diverse vegetative cover, as required by the appropriate land management agency, will be established on all affected land. (See Sec. 9.5 and 10.5 for details).

Land reclamation will take place as soon as possible after surface disturbance. All cut and fill slopes resulting from construction of the access road will be stabilized and revegetated at the first seasonal opportunity. Areas occupied by support facilities such as roads, office buildings, shops and coal handling structures will not be reclaimed until conclusion of the mining operation.

3.5.2 Protection of Human Values

There are no public parks nor historical sites worthy of preservation in the permit area.

3.5.2.1 Projected Impact of Mining on Human Values, Historical and Cultural

The projected impact of mining on cultural resources can be direct or indirect. Direct impacts are a direct consequence of project development and operation, such as earthmoving. Indirect impacts arise from activities that are not strictly part of the project developement and operation, such as changes in local populaton.

3.5.2.2 Control Measures to Mitigate Impacts

Co-Op is committed to take all necessary steps to remedy any adverse impacts from slides and to notify the Division by the fastest available means to safeguard human and environmental values.

3.5.3 Protection of Hydrologic Balance

Co-op Mining Company will conduct all mine site operations in such a way as to minimize potential impact to surface and ground water quality.

Water originating in or flowing through disturbed areas will be collected by a drainage control system and the additional suspended material allowed to settle in a sediment treatment facility before discharge into the natural

drainage system. No permanent changes to the natural drainage channels are anticipated. Postmining land use will be similar to premining use, and the hydrological aspects of the reclamation effort have been planned accordingly.

Present mine portals are designed to ensure that water will not be discharged from the mine, once the water right issue is resolved and the present discharge will be utilized.

In compliance with 30 CFR 75.1711-2, seals will be installed in all entries as soon as mining is completed and the mine is to be abandoned. The seals will be located at least 25 feet inside the portal mouth entry.

Culinary water usage at the mine site will qualify as a public water supply and will meet State of Utah primary and secondary water standards.

3.5.3.1 Projected Impacts of Mining on the Ground Water Hydrologic Balance

Geology largely controls the occurrence and quality of water in any region. Since the region surrounding the mine plan area consists of the same geologic formation, the effects of mining on hydrologic balance should be the same throughout the area. Further, it can be assumed that the impacts from future mining will be the same as the minor impacts that have resulted from the mining of the past 50 years.

The existing hydrologic balance will be discussed in detail in Chapter 7, Hydrology.

3.5.3.2 Control Measures to Mitigate Impacts

No significant impacts to the ground water system are expected from the mining operation. The ground water monitoring plan, discussed in Section 3.5.3.3, will provide

a means to follow the possible effect of the mining activities on the ground water system. No surface or ground water will be discharge into the mine under any circumstances. If mine water is encountered at the working face, which on an areawide basis generally yields less than 10 gal./min. per active face, it will be collected in the face area and pumped to impoundments located within the mine. The impoundments will be designed to allow sufficient time for suspended solids to settle. If necessary, mechanical devices will be installed to remove grease and oil that might be present in the water before it is used for dust suppression.

The construction of proposed surface facilities will result in increases of the suspended solids concentration increases, however are expected to be temporary because of compliance with the regulatory requirements that sediment control features be provided for all areas of surface disturbance.

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Water quantity will remain generally unaffected due to the geological conditions in the mine area. Therefore, there will be little or no impact, adverse or otherwise, on the hydrologic system.

State and federal regulations (30 CFR 817.54 and UMC 817.54) require that an alternate water supply be provided to replace any water supplies in the area, Co-op Mining Company will provide this alternate supply if needed. Several alternate sources of supply exist:

1) Water from springs could be piped to the affected site.

2) Water rights could be purchased for springs damaged by Co-op Mining Company, or, alternate water shares could be substituted. (See App. 3.3.6., Proof of Ownership).

3) A well could be drilled at the affected site to provide an alternate supply (since artesian conditions do not exist).

4) Water produced in the mine could be piped to the affected site.

5) Water shares presently owned could be transferred.

Alternative 4 may mean treating of poorer quality water and pumping to overcome elevation differences.

In the unlikely event that mining adversely affects a water source, the Co-op Mining Company will select an alternative after considering all possibilities of each site-specific circumstance.

3.5.3.3 Ground Water Monitoring Plan

An ongoing ground water monitoring program will be conducted.

3.5.3.4 Projected Impacts of Mining on the Surface Water Hydrologic Balance

The occurrence and quality of water in any region is highly controlled by geology. The majority of the mine plan area is strong structurally and consists of the same geologic formations. It is presumed that mining activities will have little adverse impact on the area hydrologic system.

3.5.3.5 Control Measures to Mitigate Impacts - Surface Water

Runoff from all disturbed areas will be passed through sediment treatment facilities. Any discharge from facilities will be monitored in accordance with NPDES permit standards and state and federal regulations.

The effects of the mining operation on the surface water system will be analyzed through the surface water monitoring plan described in the next section. In the unlikely event that monitoring shows that the surface water system is being adversely

TABLE 3-6

COMPREHENSIVE WATER QUALITY ANALYTICAL SCHEDULE

FIELD MEASUREMENTS	LABORATORY MEASUREMENTS
Discharge	Iron, total
pH	Magnesium, total
Temperature, Air	Total Dissolved Solids
Temperature, Water	Total Suspended solids*

*Surface waters only

affected by mining activities, additional steps will be taken to rectify the situation in consultation with state and federal regulatory agencies.

3.5.3.6 Surface Water Monitoring Plan

An ongoing hydrologic monitoring program will be conducted.

As required, water quality data collected from surface water monitoring stations will be submitted within 60 days of the end of each quarter, depending upon the speed of the laboratory analyses.

3.5.4 Preservation of Soil Resources

Co-op Mining Company is prepared to meet the requirements specified by 30 CFR 784.15. Backfilling, soil stabilization, compacting, grading and any other necessary operations will be performed when necessary with the best technology available, as approved by the regulatory agency. Section 3.6, Reclamation Plan, provides a detailed discussion

affected by mining activities, additional steps will be taken to rectify the situation in consultation with state and federal regulatory agencies.

3.5.3.6 Surface Water Monitoring Plan

An ongoing hydrologic monitoring program will be conducted if in the event they are deemed necessary.

As required, water quality data collected from surface water monitoring stations will be submitted within 60 days of the end of each quarter, depending upon the speed of the laboratory analyses.

3.5.4 Preservation of Soil Resources

Co-op Mining Company is prepared to meet the requirements specified by 30 CFR 784.15. Backfilling, soil stabilization, compacting, grading and any other necessary operations will be performed when necessary with the best technology available, as approved by the regulatory agency. Section 3.6, Reclamation Plan, provides a detailed discussion

of the reclamation effort.

3.5.4.1 Projected Impacts of Mining on Soil Resources

Since the Bear Canyon Mine is an underground mine at the site of an old works, the overall impact of mining on soils will be minor. The impacts of surface operations and mining facilities on soil resources consist of coverage of soil by facilities, disturbance of soils during construction activities, erosion created by removing vegetation, reduced forage growth due to nutrient degradation, reduced wildlife capacity and particulate emissions to the air. However, the abandoned mine had large accumulations of debris which has now been cleaned up, which to a large degree constitutes enhancement.

3.5.4.2 Control Measures to Mitigate Impacts

The objective of the proposed backfilling,

soil stabilizing, compacting, contouring and grading process is to create a reclaimed surface that provides a variety of topographic features to enhance postmining land use.

Section 4.5.1, Postmining Land Use, and Section 3.6, Reclamation earthwork activities to be conducted. This section summarizes the steps to be taken in the backfill, soil stabilization, compaction, contouring and grading program.

Topsoil Removal and Protection

Before any new construction or mining activity that will disturb the surface of native undisturbed areas, topsoil will be removed from the affected area after vegetation has been removed. The topsoil will be segregated from any other material removed and stockpiled separately in a stable site within the permit area protected from erosion, compaction, or contamination. The stockpile will be stabilized by seeding.

As soon as operations are concluded in each disturbed area, the removed topsoil will be redistributed on the site in the manner required. Methods and techniques are detailed in Section 3.6.4.4, Soil Redistribution and Stabilization. (See Appendix 3-D Approved topsoil handling plan)

Backfill, Compaction and Grading

To the maximum extent practicable, disturbed surface areas will be backfilled, compacted and graded according to the approved time schedule. The purpose of these operations is to return disturbed areas to approximate original makeup and contour. Wherever possible, backfilling will return the various soil horizons to their original site and make them compatible with surrounding areas. Compaction will help the returned soils remain in place. Grading will restore the contour to as near the original state as possible; however, because of local conditions, large-scale backfilling, compaction and grading will not be possible in many areas.

STATE OF UTAH
NATURAL RESOURCES
Oil, Gas & Mining

Scott M. Matheson, Governor
Temple A. Reynolds, Executive Director
Dr. G. A. (Jim) Shirazi, Division Director

4241 State Office Building • Salt Lake City, UT 84114 • 801-533-5771

August 17, 1983

Mr. Wendell J. Owen
Co-op Mining Company
P. O. Box 1245
Huntington, Utah 84528

RE: Approval for Consolidation of
Topsoil Stockpiles
Bear Creek Canyon Mine
ACT/015/025, Folder Nos. 4 & 7
Emery County, Utah

Dear Mr. Owen:

Following is the approval of the proposed plan for consolidation of the several topsoil stockpiles located at Bear Canyon. The approval lists the deadlines for completing the work and a change in the recommended seed mix.

Please be aware that failure to meet these deadlines will subject Co-op to a violation for failure to operate in accordance with an approved plan.

Division approval is hereby granted to consolidate the topsoil piles in Bear Creek Canyon and provide accurate topsoil volume calculations by August 31, 1983 as proposed in Co-op Mining Company's June 24, 1983 submittal. Approval to implement protection measures of topsoil stockpiles is granted with the exception of utilizing the seed mix proposed. The use of the seed mix listed in Attachment 2-A is not recommended for topsoil pile protection as the shrubs included, given 20-40 years of growth, would in all likelihood cause problems in the topsoil redistribution process. It is suggested that Co-op utilize an appropriate seed mix for topsoil protection which does not contain shrubs.

Since fall seeding would produce the most optimal success in germination and establishment of a vegetative cover, seeding my occur as late as October 14, 1983.

Since this mine produces no acid-forming or toxic-forming materials, backfilling required to cover such materials will be unnecessary. (See Laboratory test Appendix 3E)

Physical and Chemical Soil Stabilization

Soils will be stabilized by physical and chemical methods before planting. This may include placement of crushed heavy material at the toe of roadfill slopes, for example. Other approved and proven methods will be employed as necessary. Chemical stabilization may include the addition of neutralizing chemicals to soils shown to be excessively acidic or basic. Nutrients and soil amendments will be added in the amounts indicated by soil tests to assure that the surface soil layer can sustain the approved postmining land use.

Biological Soil Stabilization

Returned soils will be stabilized bio-

logically by revegetation of disturbed areas. This stabilization effect will be accomplished by the holding capacity of the root systems of the new vegetative cover, particularly small shrubs and trees. This aspect of soil stabilization will begin as soon as topsoil is redistributed. Section 3.6.5, Revegetation Plan, provides specific detail on this aspect of the reclamation plant.

3.5.5 Protection of Vegetative Resources

Co-op Mining Company has maintained a commitment to reclaim the unused disturbed areas to to the extent of the cover of the natural vegetation on the mine plan area. Chapter 9, Vegetative Resources, provides a preliminary report on the vegetative resources of the area.

3.5.5.1 Projected Impacts of Mining on Vegetative Resources

Since the Bear Canyon Mine is an under-

ground mine, the overall impact on surface vegetation is minor. The effects of surface operations on vegetative resources consist of removal of vegetation from new construction areas, on-site erosion and reduction of desirable plant species, which will reduce forage production and wildlife capacity.

3.5.5.2 Mitigating Measures to be Employed to Reduce Impacts on Vegetative Resources

All disturbed areas will be planted and revegetated during the first appropriate season following grading and redistribution of topsoil. This program will include any necessary addition of remedial treatments to the soil. A suitable, permanent and diverse vegetative cover selected on the basis of appropriate land management agency requirements will be established on all reclaimed areas. The schedule of the program is presented in

Section 3.6.6 What follows is an outline of the major aspects of the revegetation plan. The specific measures involved will be addressed on a site specific basis.

Seeding and Planting

All plants used to revegetate the disturbed. areas will be native or compatible species selected specifically for the vegetative community, as detailed in Section 9.3.2. The choice of dominant species will be determined by suitability for post-mine land use. Seed types will include wheatgrass, salina wildrye, sagebrush, pinyon and juniper. Wherever possible, seed will be drilled or disced into the ground. In steep slope areas, where such techniques are difficult or impossible, hydro-seedings or cyclone spreader seeding will be done.

Native shrubs will be used for shrub replanting. These will be potted seedlings, if available. Bare-root trees will be

used to tome extent.

Mulching and Moisture Retention

As required, all regraded and retopsoiled areas will be mulched or otherwise treated to promote germination of seeds and to retain moisture. Various moisture-retention products are available.

Maintenance

Should such procedures prove necessary to the success of the revegetation plan, protection of replanted areas from animals may be carried out. Such procedures, however, are unlikely to be needed because the species to be selected should not require continuous or considerable maintenance beyond replanting.

3.5.5.3 Monitoring Procedures

All revegetated areas will be monitored closely for at least 5 years after revegetation. Any maintenance indicated by the results of these inspections will be

carried out promptly.

Vegetation will be measured yearly on all revegetated plots for at least the first 5 years. If success is achieved, further measurements will be made at 5-year intervals. Any area not achieving success will be re-evaluated and revegetated again in light of the most recent findings.

3.5.6 Protection of Fish and Wildlife

Wildlife is present in the mine plan permit area. Due to the size of the total disturbance impacts on the various mammal, amphibian and reptile species should be minimal. In addition, Co-op Mining Company is commited to mitigating as much as possible the adverse effects of all new construction and maintaining the natural abundance and diversity of the area.

3.5.6.1 Projected Impacts of Mining on Fish and Wildlife

Mammals

The Bear Canyon Mine plan area is inhabited by 84 species of mammals, of which 25 species are considered of high interest and 14 of these are protected by state or federal law (see Table 10-1).

Elk that are thought by the Utah Division of Wildlife Resources (UDWR) to be stable and productive use portions of the mine plan area at various times of the year for such necessary activities as wintering and feeding. This use, however, is marginal and not crucial. The minimal disturbance caused by planned surface facilities will have no significant impact on the herd.

Mule deer utilize the whole permit area, taking advantage of various habitat at different times of the year. Browse in the wintering range within the permit area is in good shape and should facili-

Mammals

The Bear Canyon Mine plan area is inhabited by 53 species of mammals, of which 19 species are considered of high interest and 14 of these are protected by state or federal law (see Table 10-1).

Elk that are thought by the Utah Division of Wildlife Resources (UDWR) to be stable and productive use portions of the mine plan area at various times of the year for such necessary activities as wintering and feeding. This use, however, is marginal and not crucial. The minimal disturbance caused by planned surface facilities will have no significant impact on the herd.

Mule deer utilize the whole permit area, taking advantage of various habitat at different times of the year. Browse in the wintering range within the permit area is in good shape and should facili-

tate over-wintering of the herd. Projected impact from proposed surface operations is expected to be minimal. The range of cougars in the permit area is determined by the migration patterns of mule deer and by human disturbance. Since the cougar population is low and since their range is far greater than the areas of proposed construction, mining activities will have little impact on the species.

Black bear may inhabit the permit area but the area is small compared to the overall habitat area. Black bears are not numerous, nor are they likely to be disturbed during the most sensitive times of their annual cycle. Impact will be minor at most.

Cottontail rabbits are likely to be affected only by subsidence, which will be limited to relatively small areas thus causing little negative impact. Disturbance to vegetation resulting in

seral succession will actually improve the reproduction potential of the rabbits.

Impact on snowshoe hares will be minor since the species's habitat in conifer-aspen stands is limited in the permit area.

Furbearers using underground burrows may be affected by subsidence within limited portions of the permit area. However, such effects will be temporary and the species are widespread and adaptable to human activity. Long-term impact will be minimal.

Mining activity will have little effect on the habitat of small mammals. Subsidence damage to burrows could increase mortality and reduce reproductive success temporarily, but the effect would be temporary because of the continued survival of the breeding population in

contiguous areas and to the high densities of these species.

Birds

The list of bird species found in the mine permit area are listed in Tables 10-10 and 10-11.

Only two species found in the mine permit area are on the endangered species list: the bald eagle and the peregrine falcon. The bald eagle is a winter resident only and the peregrine falcon is not known to nest within the permit area.

Potential impact on bird species would be limited to the proposed new construction areas. Impacts, however, should be minor since the areas involved are small and since equivalent habitat is readily available close by. (See Raptor Survey UDWR - Appendix 10-A

Amphibians

The three amphibians occurring in the permit area (see Table 10-4) occupy similar habitats throughout the region and are unlikely to be affected in any major way by planned activities.

Reptiles

Reptiles found in the permit area are located in many other similar habitats and their populations will not be seriously impacted by planned activities. UDWR personnel will be notified if any denning sites are discovered during mining or construction.

Aquatic Wildlife

Since there are no perennial streams in the surface operation areas, little impact to aquatic wildlife is expected. Huntington Creek, the closest perennial stream to the permit boundary, is located a considerable distance from the surface operation, 1.5 miles. This high quality fishery is protected through Co-Op's Sediment Control Structures (see Chapter 7).

3.5.6.2 Mitigating Measures to be Employed To Protect Fish and Wildlife

To minimize habitat disturbance and loss, surface activity at the breakout and the ventilation shaft will be minimal. The proposed site is located at the mine portal at Trail Canyon, so no new disturbance will result. Construction will be scheduled to minimize conflict with deer and elk use periods.

The disturbed areas will be reseeded within the next growing season and the resulting seral succession will actually benefit deer and elk. Habitat loss due to construction is limited to the size of the disturbed area and will be small. All water in the permit area is ephemeral channels. Any water sources necessary to wildlife will be protected or an alternative source will be provided. In addition, riparian habitat will be enhanced. (See Section 10-D).

Structures that pose a barrier or hazard will be provided with passageways, buffers, fences, or other necessary protection, as directed by UDWR.

Co-Op is committed to reclaim all disturbed land and remove all support facilities upon completion of mining to prevent damage to fish, wildlife, and related environmental values.

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The applicant will inform employees of the vulnerability of local wildlife and will admonish them to avoid all harassment or unnecessary activity. In addition the training film offered by the UDWR "Coal Mining and Wildlife" will be shown annually to all employees.

Any discovered wildlife impact not described here will be mitigated by Co-op Mining Company with methods agreed upon by UDWR.

Since no impacts are expected to the ephemeral waters of mine area in the near future, no special mitigation plan concerning Bear Creek is presented here.

3.5.6.3 Monitoring Procedures

Bear Creek does not warrant a biological or habitat monitoring effort in the area of the mine lands.

determined by consultation with UDWR.

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3.5.6.3 Monitoring Procedures

Bear Creek does not warrant a biological or habitat monitoring effort in the area of the mine lands.

3.5.7 Protection of Air Quality

Co-op Mining Company will use the best mining technology available to maintain maximum utilization and conservation of coal while preserving environmental integrity. The operator will employ the best management practices for fugitive dust control. The National Ambient Air Quality Standard (NAAQS) will be well maintained.

3.5.7.1 Projected Impacts of Mining Operation on Air Quality

Particulates are the only pollutant which might impact air quality at the mine area. Increase in concentrations of other pollutants such as sulfur dioxide, nitrogen oxide, carbon monoxide and photochemical oxidants would be neglible. The main source of total suspended particulates (TSP) would be coal particles, which would settle out within short distances (1 mile or less) downwind. The mining operation would not be a "major source" under the Prevention of Significant

Deterioration (PSD) regulations because total annual controlled emissions of particulate matter are expected to be less than 250 ton/year.

The level of estimated impacts can be put in perspective by comparing the calculated pollutant ground-level concentration with the NAAQS established for protection of human health and welfare. The worst case analysis of impacts (Aero-Vironment, 1977) shows that the total ground-level concentration includeing an average background of 20 Hg/m^3 would be well under the federal secondary standard of 150 Hg/m^3.

During typical meteorological conditions, impacts in the region would be lower than quantities derived from the worst case analysis resulting from increased dispersion during the 24-hour period. The increased dispersion would be brought on by more normal wind speeds and more meander in the wind direction than considered in the worst case analysis.

The annual TSP concentrations (including background) would be 25 Hg/m^3, which is less than the NAAQS of 60 Hg/m^3. The greatest impact would be near Huntington Canyon and it would be caused by human activity.

The impacts of TSP concentrations from one sub-air basin to adjoining ones would be low because of mixing and fallout over the distances involved.

3.5.7.2 Mitigating Measures to be Employed to Control Air Pollutants

The main source of air pollutants would be dust from autos and trucks traveling on unpaved roads and from coal loading sites. Unpaved roads used in conjunction with the mining activities will be treated with water and/or non-toxic chemical dust suppressants.

Vehicular traffic will be restricted to authorized personnel and maximum vehicle speed will be limited to 20 miles per hour.

The speed restriction signs will be posted along the roads.

3.5.7.3 Air Quality Monitoring Plan

The mining operation would not be a "major" source" under the PSD regulations because total annual controlled emissions of particulate matter are expected to be less and 250 ton/year. Therefore, the requirement for air quality monitoring is not anticipated. (See Chapter 11, U. Health Approval letter).

3.5.8 Subsidence Control Plan

Co-op Mining Company will use the room and pillar method of mining. This method is outlined in detail in Section 3.4.1

Maximum extraction could result in surface subsidence over a long term. Subsidence will depend on the amount of cover over the coal seam, the amoumt of coal removed under the methods of mining and the stratigraphy of the formations above the coal seams. Partial extraction leaving the pillars in place

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will reduce or eliminate subsidence, but is less desirable from a standpoint of maximum economic resource recovery.

There are no known anticipated effects from subsidence due to the amount of overburden and the strata above the coal seam. Surface fractures on the permit area have been minimal.

Necessary support pillars will be left in place to assure entries for the continuation of mining as per mine plan.

Barrier pillars will be left to protect the escarpments from mass failures. Rock formations are all sedimentary. They are composed of stratified layers of friable sandstone and soft silt and clay shales. The jointed, weathered nature of the rock, combined with the interlayering of the sandstone and shale contribute to frequent rockfalls and minor slope failures along the steep escarpment slopes.

Subsidence will have no effect on the surface facilities since no such structures are located over mined-out areas.

3.5.8.1 Projected Impacts of Subsidence

The surface of the area to be mined that might be impacted by subsidence is used primarily for cattle grazing and wildlife habitat. No known aquifer exists above the immediate coal zone. Buildings, conveyors, etc. for the mining operation are all located East of the coal field. In general the area is rugged with limited access and not readily accessible to the public. Subsidence is not expected to be significant at the depths involved in the new areas.

3.5.8.2 Control Measures to Mitigate Impacts

The impact of the observed subsidence will be evaluated and used as a guide in determining the need for control of subsidence and for mitigation. The need for subsidence control and for a specific mitigating measure will need to be site specific. The surface water supply will need to be protected or mitigating measures utilized if adverse impacts occur.

Subsidence control can be accomplished by several methods as needed, such as:

1) Not pulling pillars in selected sensitive areas (i.e. near outcrops).

2) Uniform extraction to minimize impacts.

Mitigating measures are limited in this relatively inaccessible area. Damage to any surface structures including fences and roads can be repaired. The mitigation of flow reductions or drying up of a water source must be site specific Flow from springs can be diverted or conveyed over a crack that might disrupt flow. Water can be supplied to the area if a critical need exists.

3.5.8.3 Subsidence Monitoring

A base map has been prepared showing contours and surface features that might be impacted by subsidence, such as surface structures and springs (Plate 3-3). The extent of

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mining is shown on Plate 3-4 and the area where pillars will be removed is indicated. This base map will be updated annually. Co-Op will notify adjacent porperty owners concerning subsidence potential prior to approaching their boundaries. Co-Op will conduct an annual survey to identify all evidence of subsidence. An annual field survey will be made to identify observable subsidence. Details are attached under Appendix 3-5-8A.

When subsidence is observed to adversely impact a surface structure or resource, the extent of the impact will be evaluated.

As pillars are pulled under the western portion of the mine plan area, impacts will be anticipated and hazards assessed on a site-specific basis. An overburden of approximately 1,000 feet or more in the western portion of the mine plan area should minimize surface impacts. Sandstone formations overlaying the Blackhawk coal bed should better distribute stresses and reduce the tendency for surface cracks and subsidence at the surface.

3.5.9 Waste Disposal Plans (Spoils, Coal Processing Wastes, Mine Development Wastes, Non-Coal Wastes, Removal, Handling and Storage.

Co-Op does not anticipate the handling of development waste

rock in its mining operation although a contingency plan has been developed if the need were to become critical in the effort to maximize coal removel. It is for the above purpose that Co-Op has designated a waste rock storage site in Trail Canyon. This area was used historically in this capacity and has the necessary hydrolic safeguards presently implemented. The waste would be handled in the same manner as coal and truck hauled to this area. This area would be addressed as a permit modification of New Permit Application. Co-Op will submit plans for the underground waste disposal site at least 90 days prior to anticipated need and will not use the site until such area is approved.

UMC 817.89 DISPOSAL OF NON-COAL WASTE

The Co-Op is presently undertaking a massive clean-up operation wherein large quantities of scrap have already been removed from the permit area. Once the operation is complete (September 1, 1983) the balance of the salvageable equipment will be stored in the designated area.

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A plan for this type of storage yard was discussed with a number of the technical staff in July of 1983 and was generated and submitted to the Division for their review prior to implementation. It is discussed in Appendix 3.3.4.A Sec. 8 pages 3 through 125.

In the interim, the equipment which is not scrapped out will be temporarily stored on the disturbed sites in both Bear and Trail Canyon. These sites will be situated in such a manner to insure that whatever runoff results from the area will pass through designated sediment facilities. The non-coal waste (other than rock refuse) generated in the operation of the mine will be placed in metal dumpsters which are strategically located on the property. A local trash collector is contracted to replace these bins when they are approximately 80% full.

3.5.9.1 Projected Impacts of Disposal Areas and Methods on the Environment

Not Applicable

3.6 RECLAMATION PLAN

Co-op Mining Company, upon completion of mining on this permit area, will reclaim all disturbed surface areas as diligently and rapidly as possible, to restore the property to a variety of alternative uses.

The postmining land uses could be grazing, recreation, wildlife and mineral. Portals will be closed and concrete foundations will be buried with fill material.

Where physically possible, disturbed areas will be scarified, sloped, topsoiled and seeded or planted before the next growing season. The site will be revegetated with a mixture of grasses, forbs, brush and trees as agreed upon with the appropriate land management agencies. Reclaimed areas will be maintained until stable up to five years. Seed will be planted with the best techniques available at that time. (Seed List Attached under 3-F)

Proposed access roads, to the mine portals, will be reclaimed and revegetated. This will accomplish a dual purpose of controlling runoff and revegetating the hillsides with vegetation comparable to existing growth.

The initial step in the reclamation plan is to seal all large-diameter openings by backfilling these openings with non-combustible material. The seals

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Proposed access roads, to the mine portals, will be reclaimed and revegetated. This will accomplish a dual purpose of controlling runoff and revegetating the hillsides with vegetation comparable to existing growth.

The initial step in the reclamation plan is to seal all large-diameter openings by backfilling these openings with non-combustible material. The seals

will be designed such that mine drainage, if any, will not enter surface water bodies. For a more detailed description of the sealing of openings, see Section 3.6.3.1, Sealing of Mine Openings, Drill Holes, Wells, etc.

The next step in reclamation would be the removal of all surface structures, equipment and road blacktop. Once this has been accomplished, all solid waste generated in the abandonment operation will be collected and removed from the reclaiming areas. Additional information concerning this aspect of the reclamation plan is present in Section 3.6.3.2, Removal of Surface Structures.

Backfilling of the subterranean portion of the silos, holes and depressions will be the next reclamation activity. Once the backfilling is completed, the disturbed areas will be graded and recontoured. A detailed description of this reclamation phase is found in Section 3.6.4, Backfilling and Grading.

Reclamation Timetable

A suitably permanent and diverse vegetative cover

to benefit wildlife will be established on all affected areas of land.

Land reclamation will take place as soon as possible after surface disturbance. All cut and fill slopes resulting from construction of access roads and railroads will be stabilized and revegetated at the first seasonal opportunity. Areas occupied by support facilities such as roads, office buildings, shops, coal handling structures and conveyors will not be reclaimed until conclusion of the mining operations. Demolition and removal of structures should commence in March, April, 2033. Portal seals and grading should commence in June and be completed by September, 2033. Drill and hydroseeding and stream enhancement work should be completed by October 30th. The area should be monitored during July, 2034, and again during July, 2035. At this point shrub and tree density, as a result of planting, can be determined. When the vegetation standard is achieved, the sediment control structures will be removed.

3.6.1 Contemporaneous Reclamation

Interim reclamation (during operations) will occur in areas that are no longer needed or that

to benefit wildlife will be established on all affected areas of land.

Land reclamation will take place as soon as possible after surface disturbance. All cut and fill slopes resulting from construction of access roads and coal yards will be stabilized and revegetated at the first seasonal opportunity. Areas occupied by support facilities such as roads, office buildings, shops, coal handling structures and conveyors will not be reclaimed until conclusion of the mining operations. Demolition and removal of structures should commence in March, April, 2033. Portal seals and grading should commence in June and be completed by September, 2033. Drill and hydroseeding and stream enhancement work should be completed by October 30th. The area should be monitored during July, 2034, and again during July, 2035. At this point shrub and tree density, as a result of planting, can be determined. When the vegetation standard is achieved, the sediment control structures will be removed.

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3.6.1 Contemporaneous Reclamation

Interim reclamation (during operations) will occur in areas that are no longer needed or that

require short-term stabilization. These areas will be seeded and mulched. Other areas may be reclaimed at different times during the operation as specific activities are concluded. (Appendix 3-C). This same procedure will apply to any area which becomes available during the life of the mine, and will be implemented upon the first available favorable season.

3.6.2 Soil Removal and Storage

To prevent suitable topsoil from being wasted or contaminated by spoil or other waste materials topsoil will be removed from any new construction areas as a separate operation. The topsoil will be stockpiled and protected from wind and water erosion and contamination which might lessen its capability to support vegetation. The following subsections deal specifically with the various phases of the topsoil and subsoil handling plan. There is approximately 2,600 cu. yds. of topsoil on site in Bear Canyon. The balance of 5,500 cu. yds. has been purchased from RACO Company and was tested to insure its compatibility. Sec. 8.6 pages 8-16 through 8-16D detail storage. (See Appendix 3-D).

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require short-term stabilization. These areas will be seeded and mulched. Other areas may be reclaimed at different times during the operation as specific activities are concluded. (Appendix 3 - C)

3.6.2 Soil Removal and Storage

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Topsoil Removal

At the start of any construction phase, topsoil has been collected from the area where useable soil existed. Existing vegetation has been removed and the topsoil collected prior to excavation or other surface disturbance operations within the affected areas.

The depth of topsoil removal in each case depends on the amount of A and B horizon material as defined in OSM Regulation 30 CFR 783.21 and 783.22.

The topsoil removed in these areas consists of A horizon quality material and B horizon quality material. The C horizon material was not removed since it is not sufficiently capable of supporting diverse vegetation. Chapter 8 presents additional soil information.

The equipment used for topsoil removal consisted of bulldozers, front-end loaders and dump trucks. The use of bulldozers require pushing of the topsoil to a collection point for loading into

dump trucks or other means of transportation to the designated stockpile. Adequate supervisory personnel were present at the time of topsoil removal to instruct the equipment operators in the proper techniques of topsoil removal and to ensure that required horizons were removed and stored.

Topsoil Stockpile

During any stockpiling operation, unnecessary compaction was prevented by limiting the equipment traffic over the stockpile.
Plans involving topsoil storage can be labeled as "short term" or "long term" depending on completion of activities in each area and the reclamation schedule presented in Section 3.6.6.

o Short-Term Topsoil Storage Areas

Short-term stockpiles of topsoil will be for areas to be reclaimed almost immeadiately upon cutting and at final grade. Topsoil will be redistributed promptly to minimize natural degradation processes. (such as pipeline trenches, etc.)

Long-term Topsoil Storage Areas

During any new construction of areas that will be used for the duration of the mining operation within the permit area, topsoil will be collected and and stockpiled. The topsoil will be used later for postmining reclamation of the abandonment areas. Other long-term stockpiles will be established at the proposed loadout site.

Topsoil Protection

The short-term topsoil stockpile will be sprayed with water or temporarily vegetated to retard erosion. The long-term topsoil stockpile will be protected by the following operational steps:

- A stable surface will be provided in an area outside the influence of active operation.

- As a stockpile is completed, it will be left in a rough condition to minimize erosion.

- Stockpiles will be situated and protected to prevent water erosion and sprayed with a tacifying agent.

- Storage piles will be vegetated with quick-growing soil-stabilizing plants.

- Signs will be posted to protect the stockpiles from accidental use as fill or from other inadvertent material contamination.

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- The establishment of noxious plant series will be prevented.

The stockpiled topsoil will not be removed or otherwise disturbed until required for the redistribution operation on a prepared, regraded disturbed area.

Topsoil Redistribution

Prior to topsoil redistribution, regraded land will be scarified by a ripper-equipped tractor. The ground surface will be ripped to a depth of 14" in order to reduce surface compaction, provide a

roughened surface to assure topsoil adherence and promote root penetration.

Within a ten day period prior to seeding, topsoil will be distributed on all areas to be reclaimed. During this time the topsoil will be allowed to settle and attain equilibrium with its natural environment. This procedure will be followed for all areas in which facilities such as roadbed, mine pads and building sites are to be abandoned.

Topsoil redistribution procedures will ensure approximate uniform thickness of 6" consistant with the proposed reclamation plan. Topsoil will be redistributed at a time of the year suitable for ? establishment of permanent vegetation.

To minimize compaction of the topsoil following redistribution, travel on reclaimed areas will be limited. After topsoil has been applied, surface compaction will be reduced by using a dryland chisel ? plow running at a suitable depth. This operation will also help prepare a proper seed bed and protect the redistributed topsoil from wind and water

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erosion. Co-op Mining Company will exercise care to guard aganist erosion during and after application of topsoil and will employ the necessary measure outlined in Chapter 8, to ensure the stability of topsoil on graded slopes.

3.6.3 Final Abandonment

Co-op Mining Company anticipates that the postmining land uses of the permit area will be the same as the premining. State and local governments have not proposed any land use changes for the postminig period. This section delineates the abandonment and reclamation steps to be taken which will allow a return to the original land use once mining operations are complete. In general, disturbed portions of the mine plan area will be returned to their original wildlife/grazing habitat.

Method of Achieving and Supporting Postmining Land Uses

The following presents the abandonment steps and revegetation/reclamation activities which represent the method of achieving and supporting postmining land uses. The activities are organized in the ap-

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proximate order of execution. These listed activities are also discussed in Chapter 4.

3.6.3.1 Sealing of Mine Openings, Drill Holes, Wells, etc.

Exploratory Holes, Bore Holes, and Wells

Upon abandonment of drilling operations, all drill holes are to be cemented with an approved slurry. The slurry mixture will consist of 5.2 - 5.5 gall. of water per bag of cement. Co-Op is committed to plugging all drill holes with 5 feet of cement as required by rule M3(5) UMLR Act of 1975.

Shafts

The shafts will be filled from bottom to collar with non-combustible material. A cap consisting of a 6 inch thick reinforced concrete slab will be used as a seal.

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The cap will be equipped with a 2 inch diameter vent pipe and will extend for a distance of 15 feet below the surface of the shaft collar.

Mine Entries - UMC 817.13-15

Seals will be installed in all entries as soon as mining is completed and the mine is to be abandoned. The seals will be located at least 25 feet inside the portal mouth entry. Prior to installation, all loose material within 3 feet of the seal area will be removed from the roof, rib and floor. The mine entry seals will be made of solid concrete blocks (average minimum compressive strength of 1,800 lfb/in^2 tested in accordance with ASTM C140-70) and mortar (1 part cement, 3 parts sand and no more than 7 gallons of water per sack of cement) to form a wall two blocks thick.

Seals will be installed in the following manner: The seal will be recessed at least 16 inches deep into the rib and 12 inches deep into the floor. No recess will be made into the roof. The blocks will be at least 6 inches high, except in the top course and 8 inches wide. The

The blocks will be laid and mortared in a transverse pattern. In the bottom course, each block will be laid with its long axis parallel to the rib. The long axis in succeeding courses will be perpenducular to the long axis block in the preceding course. An interlaced pilaster will be constructed in the center. The seals will have a total thickness of 16 inches. Where conditions permit, the portal seals will be graded to conform with existing surface contours and planted. In those instances where sizable highwalls established in preparing the portal site cannot be returned to original contours, the opening in front of the wall will be filled with non-combustible material as above and the portal and entire exposed seam on the highwall will be covered with 6 to 8 feet of non-combustible material, graded, covered with suitable material and seeded. For illustration of a typical seal, see Fig. 3-1 .

3.6.3.2 Removal of Surface Structures

Co-op Mining Company will restore disturbed land-surface areas to their approximate premining conditions, to the extent technologically and economically feasible.

The blocks will be laid and mortared in a transverse pattern. In the bottom course, each block will be laid with its long axis parallel to the rib. The long axis in succeeding courses will be perpendicular to the long axis block in the preceding course. An interlaced pilaster will be constructed in the center. The seals will have a total thickness of 16 inches. Where conditions permit, the portal seals will be graded to conform with existing surface contours and seeded. In those instances where sizable highwalls established in preparing the portal site cannot be returned to original contours, the opening in front of the wall will be filled with non-combustible material as above and the portal and entire exposed seam on the highwall will be covered with 6 to 8 feet of non-combustible material, graded, covered with suitable material and seeded. For illustration of a typical seal, see Fig. 3-1. Temporary seals are discussed in Appendix 3-F.

3.6.3.2 Removal of Surface Structures

Co-Op Mining Company will restore disturbed land-surface areas to their approximate premining conditions, to the extent technologically and economically feasible. All surface facilities including support facilities will be removed and restored to prevent damage to fish, wildlife, and associated environmental values.

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Building Removal

Office, shop, storage, scale, buildings and bath house:

- Each structure will be removed.
- Foundations will be removed if they are close to the surface. Deeper foundations will be fractured and covered with at least 3 feet of dirt.

Road Abandonment

The access road and small support roads will be reclaimed. Culverts and blacktop surfacing material will be removed. Reclamation would then include recontouring, ripping, adding cross drains, water bars, topsoil and seed. See Appendix 3-G, Detailed Plan.

Mine Operational System Removal

Systems such as domestic water will be phased out and removed or buried.

Area Cleanup

Building Removal

Office, shop, storage, scale, buildings and bath house:

- Each structure will be removed.
- Foundations will be removed if they are close to the surface. Deeper foundations will be fractured and covered with at least 3 feet of dirt.

Road Abandonment

The access road and small support roads will be reclaimed. Culverts and blacktop surfacing material will be removed. Reclamation would then include recontouring, ripping, adding cross drains, water bars, topsoil and seed.

Mine Operational System Removal

Systems such as domestic water will be phased out and removed or buried.

Area Cleanup

Solid waste generated in the abandonment operation will be collected and removed.

3.6.3.3 Disposition of Dams, Ponds and Diversions

After the disturbed areas are stabilized and runoff is comparable to the area's premining conditions without detention time, the site drainage system will be removed. The site drainage system areas will be backfilled and revegetated. All ponds will be drained and allowed to dry; thereafter they will be backfilled and revegetated.

Natural drainage patterns will be returned to a horizontal drainage pattern similar to the original.

3.6.4 Backfilling and Grading Plans

The objective of the proposed backfilling, soil stabilizing, compacting, contouring and grading process is to achieve a reclaimed surface which will

provide a variety of topographic features enhancing postmining land use.

Reclamation earthwork activities will be conducted as oulined in Section 4.5, Postmining Land Use and Section 3.6.6, Schedule of Reclamation. The steps to be taken in the backfill, soil stabilization, compaction, contouring and grading problems are described in the following subsections. Stability annalyses of backfilled areas are discussed in Appendix 3- F.

Backfilling operations, utilizing equipment such as rubber-tired srapers, front-end loaders and dump trucks, will be conducted in the portal and treatment facility areas. Holes or depressions will be filled when the mining operation is concluded. Compaction operations utilizing equipment such as sheeps-foot tampers, will be conducted to stabilize all filled holes and depressions. The portal fill material will be put in place with an LHD (load, haul, dump) unit to ensure proper backfilling.

In general, the backfilling and grading operation will take place in the following manner:

1. All mining portals will be sealed and backfilled as previously described.

2. Solid waste generated in the facilities removal will be collected and removed to an approved landfill.

3. A backhoe and dozer will work in conjunction to remove the outer edge of the operational benches and compact it against the highwall. This will be accomplished by the backhoe reaching over the edge of the bank approximately 20' pulling the material back. The dozer will then push and compact this material from the highwall outward to reach a bench slope of approximately IV:0.33h for drainage purposes.

4. This operation will start on the upper bench and work accross the banch to the upper access road.

5. The backhoe and dozer will work in the same manner to eliminate the access road, working down to the lower pad. A typical cross-section of the reclaimed road cut is shown in Fig. 3.6.4-A.

6. The above procedure will continue on down the canyon reshaping the mine yard and disturbed area to the configuration shown on Plate 3-2, Postmining Topography.

7. As backfilling and grading is completed, operational areas will be scarified by ripping to a depth of 14" with a dozer where possible. Steep slopes will receive special ripping to create ledges, crevices, pockets and screes. This will reduce compaction and prevent topsoil slippage, and improve soil retention and vegetation establishment

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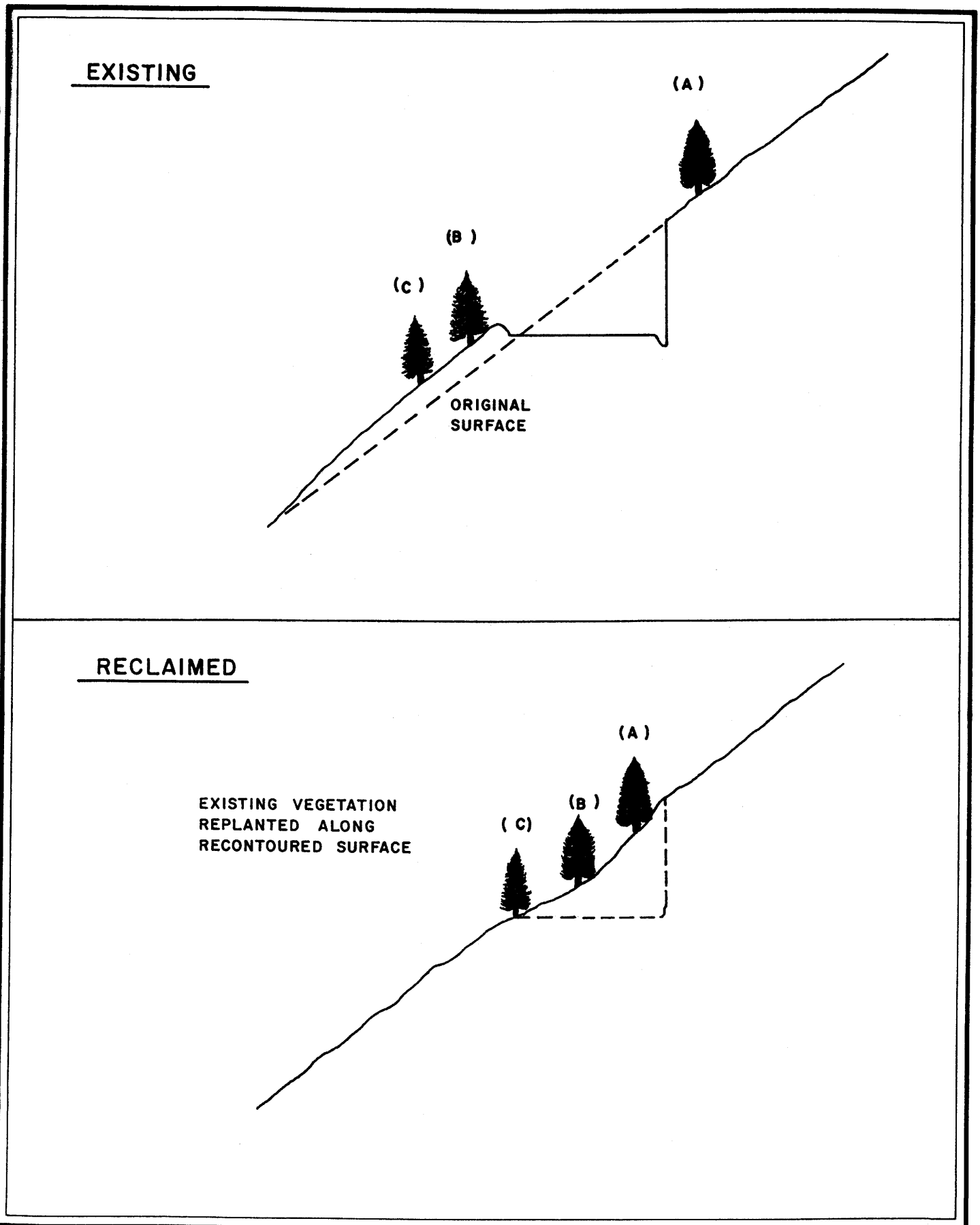

TYPICAL SLOPE RECLAMATION	ATTACHMENT 2	FIGURE NO. 3.6.4.-A

8. Topsoil will be spread over the disturbed areas after the grading and ripping is complete.

9. Upon completion of the above, the area will be reseeded as per the plan.

10. Material used for the recontouring will be taken from side slopes or other existing embankments within the disturbed area. In general, material to be compacted or used for fill will be taken from a side slope or embankment close enough to allow for pushing into place by a dozer, rather than loading and hauling by truck.

3.6.4.1 Recontouring

The cut slopes will be constructed in a manner which will achieve the necessary physical stability. This design will prevent slides and other related erosional damage. Upon abandonment, slopes will only be reduced to the amount physically possible. This amount will be limited to the reach of a back hoe, approximately 20'. Steep slopes and highwalls are inaccessible to conventional equipment, and thus, cannot be reduced or flattened qppreciably during reclamation. Stability analyses on these areas have confirmed that they have a factor of safety greater than 1.3 as they presently exist.

Stability and the designated post-mining land use can be achieved without extensive backfilling and return to the approximate original contour.

In February 1981, a slope stability analysis was performed by Dames & Moore on the Bear Canyon Mine access road. The purpose of this study was to analyze the static safety factor of the side-cast cut and fill slopes along this road. The conclusion of this study was that the slope stability had a safety factor ranging from a minimum of 1.43 to 2.15. This study was performed on the soil characteristics of the down-cast material which was not compacted. This is the same material that will be partially pulled back and compacted against the highwalls, increasing both the cohesion and unit weight of material and increasing the safety factor above the minimum of 1.43. This will result in a factor of safety well above the required 1.3. (Copies of the Dames & Moore report along with an earlier report are included in Appendix 3-F.)

3.6.4.2 Removal or Reduction of Highwall

Highwalls will be reduced to the extent practiceable to develope a static safety factor of at least 1.3.

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Only those highwalls that can be lessened by reaching with a backhoe will be reduced. Highwalls greater than 20' in height will be left as shown on Plate 3-2, Postmining Topography; however, these highwalls are shown to have a stability safety of greater than 1.3 by the following analyses:

A 1981 slope stability study of the Bear Creek Mine Access Road by Dames and Moore indicated a static safety factor of 1.43 to 2.15. (Appendix 3-F). This study was performed to analyze the static safety factor of the side-cast cut and fill slopes along the Bear Creek Portal Access Road. The maximum static safety factor of 2.15 was achieved in the trial arc which included the highwall area. (Shown on Plate 2 of their report). As a furthur note on page 5 of their Feb. 20, 1981 report, they indicate, "It should be noted that the factor of safety of the trial arc which cuts deep into the slope does not consider the presence of bedrock, increasing strength of the natural soils with depth, or the effect of the calcium carbonate cementation in the soil. If the above were incorporated

into the analysis, the factor of safety would be significantly higher." Since the highwalls are commonly made up of varying layers of bedrock material, it is reasonable to assume their strength and stability will increase accordingly.

As a further check on the highwall stability, a separate analysis was performed using a different method. This analysis uses the Hock method, and is based on rock parameters typical of those contained in the Blackhawk Formation of the Wasatch Plateau. The safety factor is calculated using the following parameters:

Maximum Slope Height	100'
Slope Angle	80
Rock Mass Cohesion	65 psi
Rock Mass Friction Angle	31
Rock Mass Bulk Density	155 lbs/ft^3

Based on these parameters, and utilizing the Hock charts, included as Fig. 3.6.4.2.A and Fig. 3.6.4.2.B, the highwalls have a safety factor of 2.61 for dry conditions and 2.40 for saturated conditions.

Figure 3.6.4.2.A

(DRY CONDITIONS)

CIRCULAR FAILURE CHART NUMBER 1

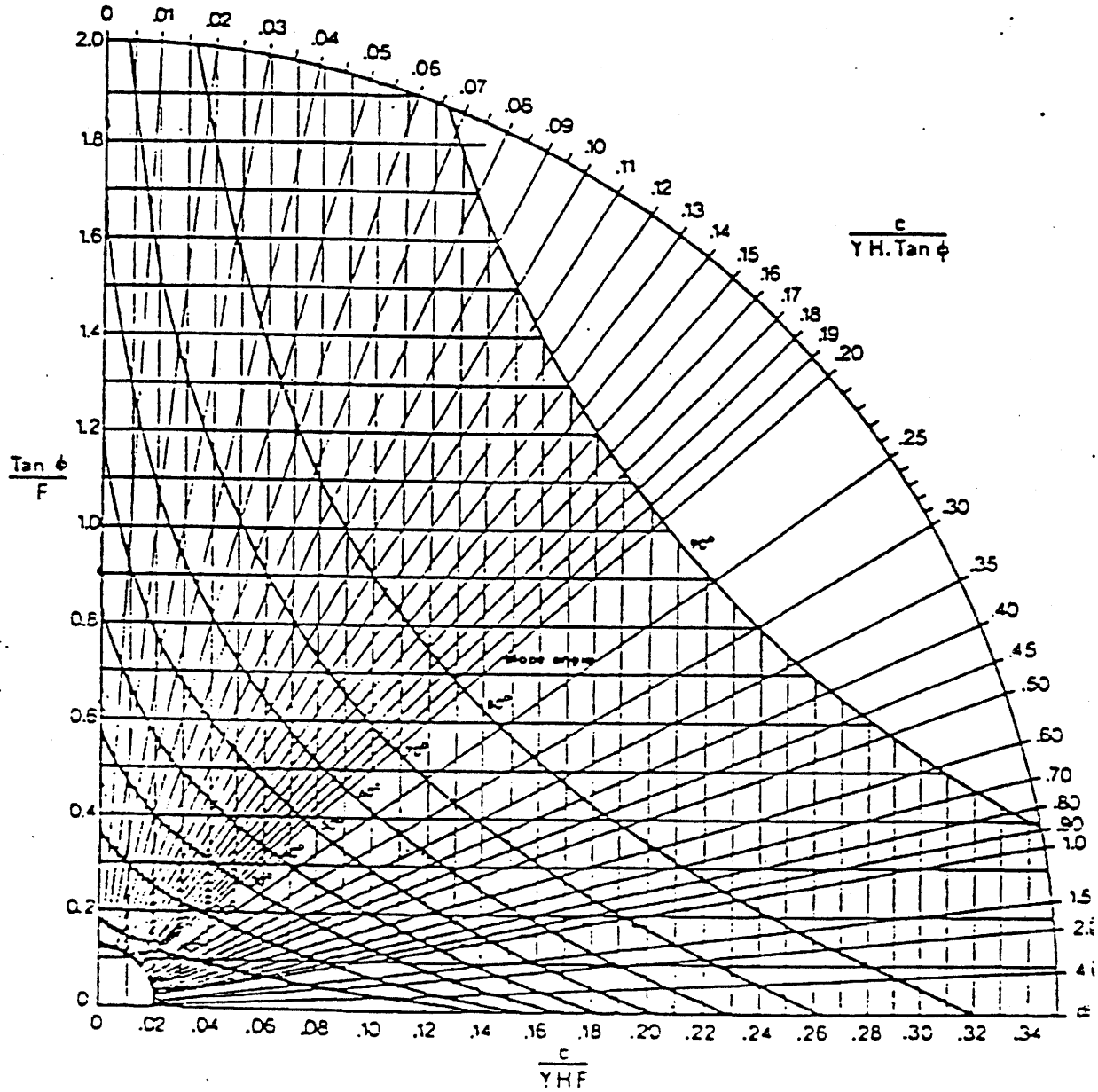

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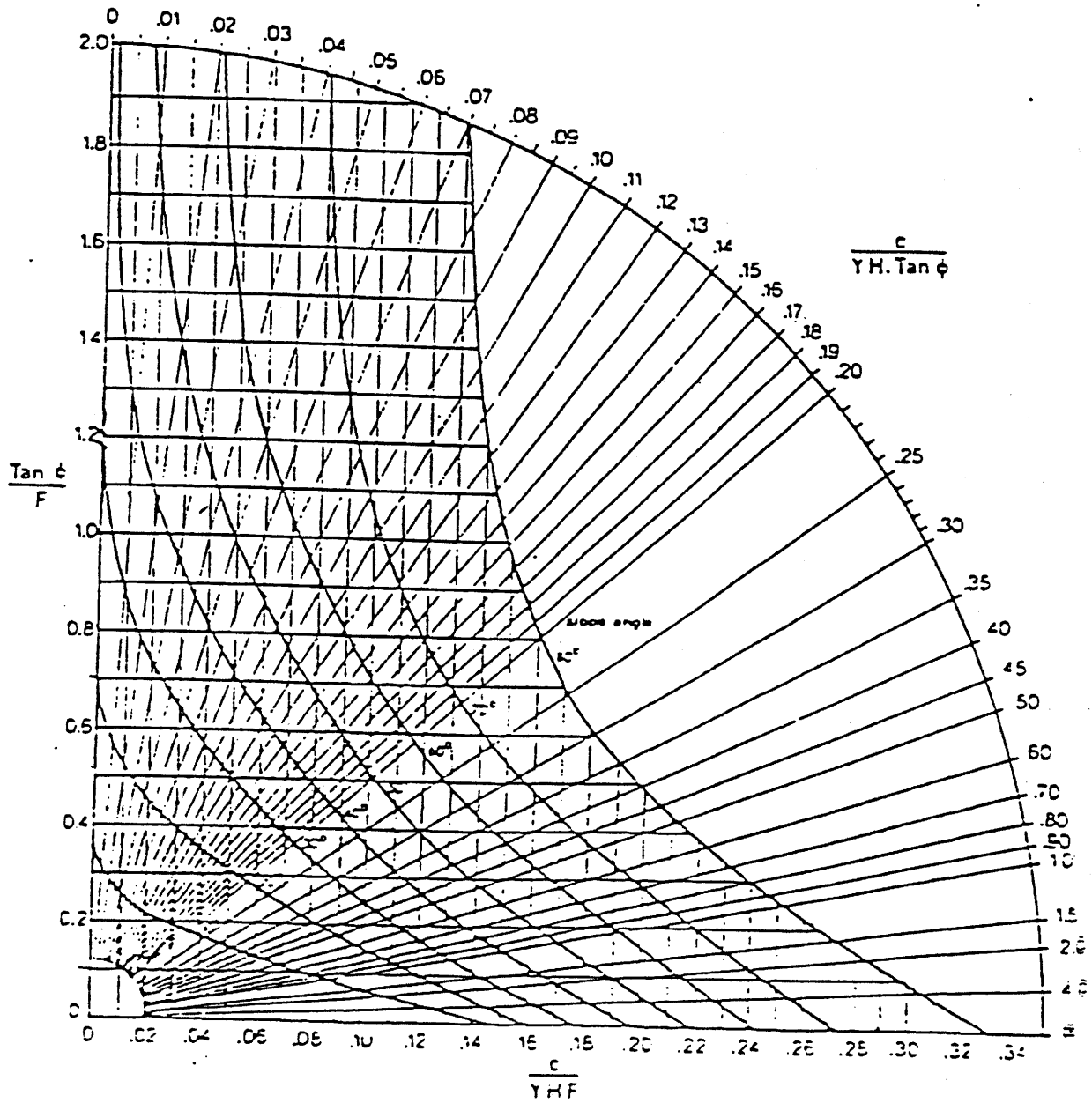
Figure 3.6.4.2.B

(SATURATED CONDITIONS)

CIRCULAR FAILURE CHART NUMBER 5



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This agrees with the projections made in the Danes and Moore report, and furthur substantiates that the highwalls proposed to be left in place will have a static safety factor of greater than 1.3.

Retention of highwalls is therefore proposed based on the following:

1. The retained highwalls will not be significantly greater in height or length than the dimensions of existing cliffs in the surrounding area. Extensive, high cliffs are common in the Wasatch Plateau.

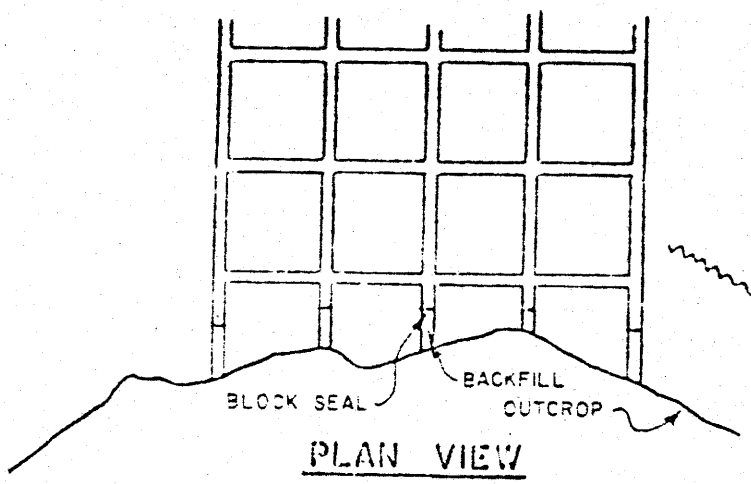
2. The residual highwall is similar in structural composition to the pre-existing cliffs in the surrounding area, and will be compatible with the visual attributes of the area. Highwalls are composed primarily of sandstones and sandy shales which are common in the natural cliffs of the area.

3. The residual highwall will have a static safety factor of greater than 1.3 and will be compatible with the geomorphic processes of the area. The rock types common in the highwall are very similar to those in surrounding vertical cliffs; therefore, the highwalls will react similarly to the geomorphic processes in this area.

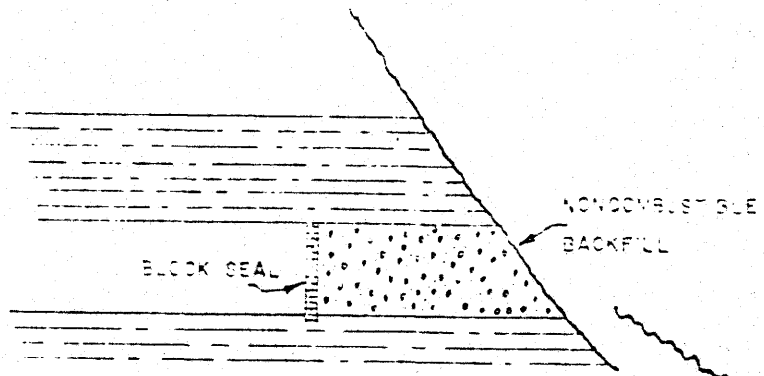
3.6.4.3 Terracing and Erosion Control

The need to terrace some of the steeper slopes within the mine plan area currently is not anticipated.

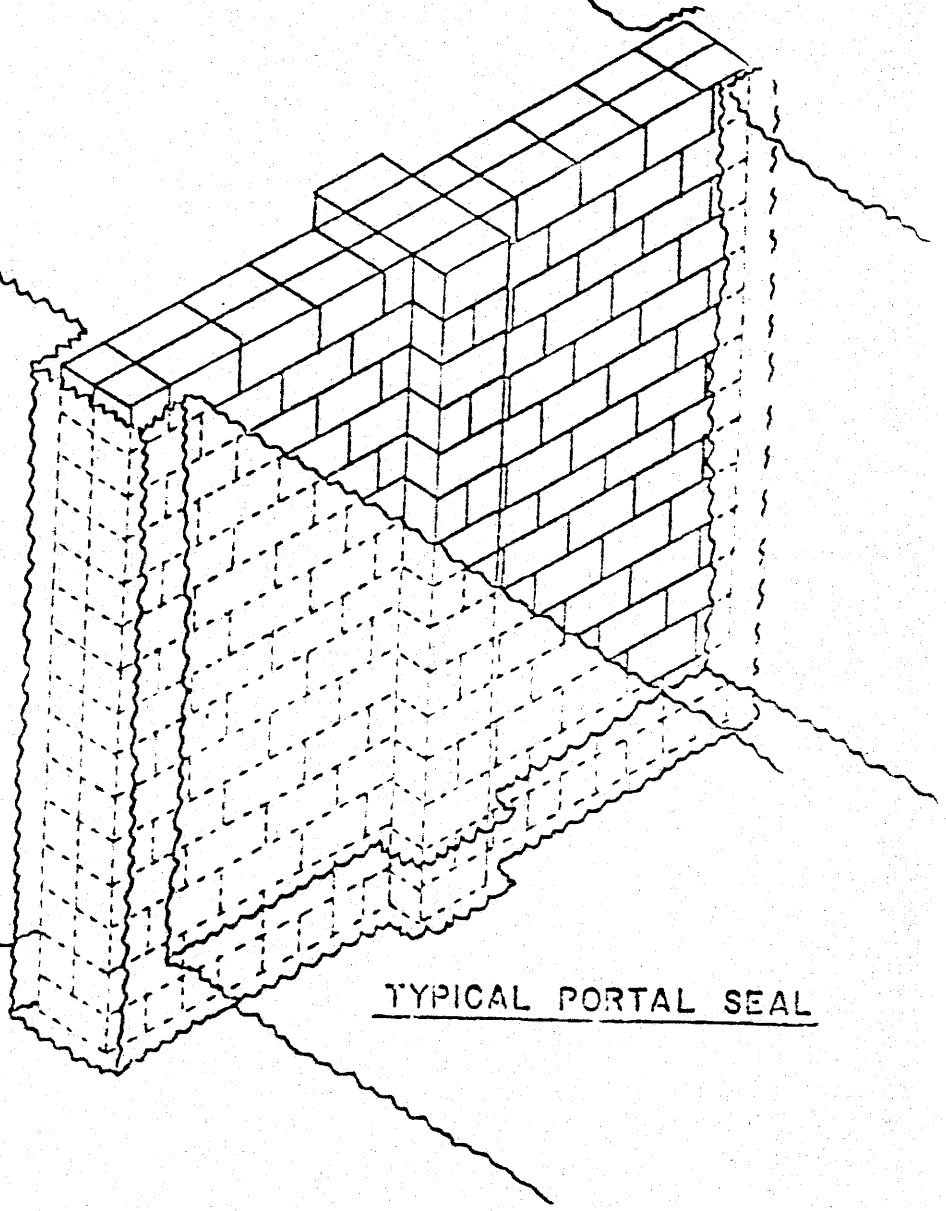
Erosion control measures which will be employed are specific to each situation. Mulching to reduce and limit rainfall impact will be a widely used erosion control practice.



PLAN VIEW



SECTION VIEW



TYPICAL PORTAL SEAL

PORTAL SEALS

Fig 3-1

3.6.4.4 Soil Redistribution and Stabilization

Prior to redistribution, the regraded land will be scarified by a ripper-equipped tractor. The ground will be ripped to a depth of 14" to reduce surface compaction, provide a roughened surface to assure topsoil adherence and promote vegetational root penetration.

Within a 10 days period prior to seeding, topsoil will be distributed on all areas to be reclaimed. During this time, the topsoil will be allowed to settle and attain equilibrium with its natural environment. This procedure will be followed for all areas in which facilities such as roadbeds, mine pads and building sites are to be abandoned.

Topsoil redistribution procedures will ensure an approximate 6" thickness consistent with the proposed reclamation plan. Topsoil will be redistributed in the fall of the year suitable for establishing permanent vegetation.

To minimize compaction of the redistributed topsoil, travel on reclaimed areas will be limited. After topsoil has been applied, surface compaction will be reduced with suitable equipment. This operation

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will also help prepare a proper seedbed and protect the redistributed topsoil from wind and water erosion. Co-Op Mining Company will exercise care to guard against erosion during and after application of topsoil and will employ the necessary measures to ensure the stability of topsoil on graded slopes as outlined in Chapter 8 page 23.

In addition to the vegetative stabilization discussed in Section 3.6.5 Revegetation Plan, physical stabilization of the soil is also planned. The specific methods to be implemented are defined in Chapter 8 page 23. An example of the soil stabilization methodology that will be used includes the placement of

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crushed and heavier material at the toe of road-fill slopes.

3.6.5 Revegetation Plan

All disturbed areas will be planted and revegetated during the first appropriate season following grading and topsoil redistribution procedures and will include, as necessary, the addition of remedial soil treatments. A suitable, permanent, diverse vegetative cover, selected on the basis of UDWR recommendations, will be established on all reclaimed areas. The proposed reclamation schedule is presented in Section 3.6.6, Schedule of Reclamation. The following subsections describe the major aspects of the proposed revegetation plan.

3.6.5.1 Soil Preparation

Scarifying Areas

Operational areas will be scarified to reduce compaction and to prevent topsoil slippage. Steep slope areas which must remain after abandonment will receive special ripping to create ledges, crevices, pickets and screes. This will allow better soil retention and

and vegetation establishment.

Fertilization and Neutralization - UMC 817.25

The topsoil will be tested before it is seeded to determine the type and amount of fertilizer or neutralizer required. Soil analyses will measure the following components:

- Micronutrients
- Potassium, calcium, magnesium
- Phosphorus
- Nitrogen
- Soil pH and salinity
- Soil texture

Chemical analyses for micronutrients may be conducted by testing soil extracts with DTPA solution and measured by use of an atomic absorption analyzer. Ammonium acetate may be used to extract potassium, calcium and magnesium for atomic absorption analysis. Phosphorus may be determined with sodium bicarbonate extraction and colorimteric analysis. The Kjeldahl method may be used for determination of total nitrogen. Soil texture may be determined by a Bouyoucus hydrometer method (solium herametaphosphate dis-

persing agent). Soil pH may be determined on a 1:1 soil/water mixture tested with an electrode pH meter. Salinity may be analyzed by using a Wheatstone conductivity cell on an extract of each soil sample.

All necessary fertilization or neutralization, as determined by soil testing will be done.

3.6.5.2 Seeding and Transplanting

Steep slopes will be seeded with a hydro-seeder. Gently sloping and flat areas will be seeded with a drill seeder. Many shrubs and all trees will be planted by hand setting to ensure a permanent plant cover.

3.6.5.2.1 Species and Amounts/Acre - Shrubs, Trees, Grasses and Forbs - Different Plans for Different Areas

With UDWR recommendations and the 1981 vegetation field study as a basis, a suitable permanent, effective and di-

verse vegetative cover of species native to the permit area, or appropriate substitutes, will be established on all affected areas.

Plants used to revegetate the disturbed sites will be selected specifically for the vegetative community to be established in the given area.

The dominant species used for each vegetative type will be chosen on the basis of premine diversity values (see Section 9.3.6), available seed source and enhancement of postming land use. Some of the native plants to be used for revegetation will be wheatgrass, salina wildrye, sagebrugh, pinyon and juniper.

The species ultimately selected for use and the numbers or amounts per acre will depend also on the steepness and exposure of the slopes to be revegetated. For south-facing and sunny slopes, a mixture of big sagebrush, rubber rabbitbrush, Saskatoon service-berry, pinyon pine and Utah juniper may be planted by hand-set-

ting or seeding on an appropriate schedule to produce the equivalent of 1-m (3.25 foot) intervals.

Further recommended species and seeding protocol can be found in Appendix 9C and 9D.

3.6.5.2.2 Methods Including Quantity and Spacing

Methods, quantity and spacing of seeding are covered above in Section 3.6.5.2 and 3.6.5.2.1

3.6.5.3 Mulching

On all reclaimed areas a wood fiber mulch will be used to enhance the moisture retention required for seed germination. Mulch will have tackifier to adhere to the soil. The steeper slopes will require a hydromulch of a more permanent nature and/or the addition of burlap or soil-retaining matting. Mulch with tacifying agent may be used on steep banks.

3.6.5.4 Irrigation

Since the species used for reclamation are known for their survival characteristics, it is felt that artificial application of additional water will not be required. Should lower than average precipitation or irregularities in distribution of precipitation occur following the initiation of reclamation procedures, irrigation may be used on a short-term basis. Otherwise, irrigation may be primarily used if initial revegetation attempts fail and if such irrigation is considered to be a major factor in achieving revegetation.

3.6.5.5 Management

Deer and rodent use of areas planted with tree and shrub species will be observed yearily. If heavy use of the planted trees and shrubs by deer appears probable, appropriate protection measures will be taken. Also, should significant rodent damage become likely, a control program may be developed in conjunction with UDWR and appropriate land management

3.6.5.4 Irrigation

Since the species used for reclamation are known for their survival characteristics, it is felt that artificial application of additional water will not be required. Should lower than average precipitation or irregularities in distribution of precipitation occur following the initiation of reclamation procedures which temporarily precludes vegetation establishment, a preferred course of action would be to replant problem areas.

3.6.5.5 Management

Deer and rodent use of areas planted with tree and shrub species will be observed yearily. If heavy use of the planted trees and shrubs by deer appears probable, appropriate protection measures will be taken. Also, should significant rodent damage become likely, a control program may be developed in conjunction with UDWR and appropriate land management

agencies.

3.6.5.6 Vegetative Monitoring, Revegetation Success, Assessment and Test Plots on Interum Revegetation

All interum seeded areas will be inspected at the end of each growing season to determine the success of the seeding program for a period of at least five years (reclamation years 1-5). Where success is apparent, as represented by achievement of 80% original cover during the 5-year period, monitoring will be immediately investigated to determine the possible failure cause(s), so that positive steps can be taken to establish the desired interum vegetation during the next seasonal opportunity. Planting and/or seeding will be implemented on a contemporaneous basis as soon as backfilling or grading are complete. This effort will ensure a temporary cover of small grains, grasses or legumes until a permanent cover can be established.

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Standard methods, as outlined in Chapter 9, Vegetative Resources, will be applied to determine the degree of success for revegetation attempts.

3.6.5.7 Soil Testing Plan

The soil testing plan is discussed above in Section 3.6.5.1.

3.6.6 Schedule of Reclamation

The general timetable for completing the major steps in reclamation is:

2033-	Landfills and solid wastes will be regraded and seeded as they are completed.
2033-	Underground mine openings will be closed and sealed as they are abandoned.
2033-	Surface facilities will be removed as they become unnecessary.
2033-2034-	The completion of surface reclamation will be in as short a time as possible after operations cease.

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3.6.6.1 Detailed Timetable for Completion of Each Major Step in Reclamation

The specific timetable for completing each major step or phase in reclamation is not applicable for all. Reclamation will commence upon abandonment (year 2033).

3.6.6.2 Reclamation Monitoring

Upon completion, the reclaimed area will be monitored to determine when bond release parameters are achieved. If the monitoring indicates inadequacies, and rills and/or gullies develope on reclaimed areas, the damage will be addressed in such a manner to allow re-application of seed and mulch and tack the next available growing season. Earth work will constitute; (1) the diversion of water concentrations away from eroded areas with small hand-made berms, (2) distribution of additional soil if necessary to fill gullies, (3) recontouring with equipment as warranted and, (4) re-application of seed, tack, mulch and fertilizer in the approved manner as outlined in Chapter 9.

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If gullies constitute an overall change in drainage

pattern, a plan to stabilize and modify drainage pattern will be submitted to the Division for approval prior to implementation.

The monitoring procedures will be the same sampling methodologies which were incorporated in establishment of the reference areas. Starting in year 3 after reclamation, years 1 and 2 will be ocular estimates with the intent of identifying problem areas.

The success of the reclamation effort will be evaluated by detailed sampling of cover and production on reclaimed areas. The data from the reclaimed areas and the reference area will be collected during the same growing season. If there is no significant difference in cover and production between the reclaimed areas and the reference areas when tested at the 95 percent significance level using a one-tailed t-test, then the areas will be judged to be adequatly reclaimed relative to cover and production. Woody plant density will be determined by sampling each reference area prior to planting in order to establish a standard for each vegetation type.

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Cover and production on reclaimed and reference areas will be measured using the same methods employed during the baseline studies. Cover will be estimated in randomly located 1.0 square meter quadrats. Production will be measured using a SCS methodology. Shrub density will be evaluated based on the procedure described above.

One of the greatest challenges of revegetation is to create reclaimed areas which have a large number of desireable species. Species diversity on the reclaimed areas will be encouraged by including a

variety of grasses, forbs, and shrubs in seeding and planting mixes. Species diversity will be judged adequate when the relative cover and percent distribution of biomass for the major life form groups approximates that which occurs in the reference areas. That is, if the relative cover by perennial grasses is 50 percent in the reference areas, then the relative cover by perennial grasses on the reclaimed areas should also be approximately 50 percent. This same relationship should also hold true for productivity. If most of the cover and production were being provided by annual forbs on the reclaimed areas and by perennial grasses on the reference areas, then the reclamation would be judged unsuccessful.

The purpose of the above procedures is to demonstrate that based on cover, production, woody plant density, and species diversity, the disturbed areas have been returned to stable plant communities capable of withstanding the intended post-mining land use.

3.6.7 Schedule of Reclamation for Co-Op Bear Canyon Mine

3.6.7.1 Detailed Timetable for Completion of Major Reclamation Processes

The following schedule of reclamation is proposed to be initiated within 90 days (weather permitting) of final abandonment of the mining operation:

		Acc. Time
1.	Seal Portal - 1 week	1 week
2.	Remove Structures - 2 weeks	3 weeks
3.	Soil Placement (backfilling & grading)	
	a. Upper Pad - 1 week (Including Road)	4 weeks
	b. Channel Restoration - 1 week	5 weeks
	c. Lower Pad & Diversion - 1 week (Including Road)	6 weeks
4.	Seedbed Material & Hindling - 1 week	7 weeks
5.	Reseeding & Fertilizing - .5 week	7.5 weeks
6.	Mulching - .5 week	8 weeks
7.	Protective Fencing - 2 weeks (concurrently)	
		8 weeks

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The above reclamation tasks are therefore proposed to be completed within 8 weeks following the start of reclamation activities.

Equipment	Cost Per hour
1. Loader - 950B ($2\frac{1}{2}$ cy bucket)	$ 113.20
Operator	29.25
	$ 142.45
2. Crane - Groves RT-580 20T	78.80
Operator	29.90
	$ 108.70
3. Truck and Operator	$ 79.30
4. Cat D-7G	$ 152.55
Operator	29.90
	$ 182.40
5. Backhoe (Cat 235)	$ 211.90
Operator	29.90
	$ 241.80

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Backhoe (BH) Cycle Time Estimates - 235 Backhoe

Average	
Load Bucket	6.5 sec.
Swing Bucket	6.0 sec.
Dump Bucket	2.5 sec.
Swing Empty Bucket	5.0 sec.
Total Average	**20 sec. - 2.12 yds^3**

Medium to hard digging (hard packed soil with up to 50% rock content) depth to 70% of machine's capability.

3 cy/min X 2.12 yds X 60 = production/hr. = 381.60 cu.yd/hr

Cut and fill yardages (Same Number - 1 cycle)

Crawler Tractor (D7G) Cycle Time Estimates

D7G Cut Material - 200 yd.run

Average Blade Load of 15 cu. yd.

Cycle time	7.6 min	Loaded Average
	4.0 min	Return
	11.6 min	Cycle

Efficiency 50 min/hr.

50 min/11.6 min cycle X 15 yds/cycle = 64.65 yds/hr.

950B Loader Cycle Time		.50 min.
1.	Pile (10" material and smaller	+.01 min.
2.	Common ownership of trucks	-.04 min.
3.	3/4" to 6"	.00 min.
	113 cu yds./hr.	.53 min.
	196 cu. yds/hr. Topsoil	

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3.6.7.2 Summary of Reclamation Cost Estimate

A.	Seal Portal	$ 2,994.00
B.	Removal Structures	22,205.00
C.	Cleanup	2,353.00
D.	Soil Placement (Backfilling & Grading)	37,081.00
E.	Channel Restoration	7,953.00
F.	Reseeding and Fertilizer	13,750.00
G.	Mulching	3,500.00
H.	Protective Fencing	6,000.00
I.	Overhead and Contingency	11,760.00
J.	Maintenance and Monitoring	2,500.00
	1985 Dollars	$ 110,096.00

3.6.7.3 Reclamation Cost Estimate for Co-Op Mine

A. Seal Portal

Labor - 2 men X 179.20/man day X 5 days	1,794.00
Materials - 200 blocks/seal X 5 seals X 1.00/block	1,000.00
Mortar, sand, etc.	200.00
Subtotal	$ 2,994.00
Subtotal A	$ 2,994.00

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B. Removal Structures

Fan

Labor - 2 men X 179.20/day X 2 days	717.00
Equipment (hauling) - 1 truck + operator X 4 hours X 79.35/hour	317.00
20 T crane X 2 hrs X 78.80/hour	158.00
2 hours X Crane Operator X 29.90/hr	60.00
Subtotal	$ 1,252.00

Structures and Conveyor (Principle)

Labor - 3 men X 179.20/day X 2 days	1,075.00
Equipment (hauling) - 1 truck + Operator X 16 hrs X 79.35/hr.	1,270.00
1 loader + operator X 16 hrs X 142.45 (950 B - $2\frac{1}{2}$ cv vd bucket)	2,279.00
Subtotal	4,624.00

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Substation Power Transformer

Labor - 2 men X 179.20/day X 2 days	717.00
Hauling - 1 truck + operator X 16 hrs X 79.35	1,270.00
Loader - 4 hrs X 142.45/hr (+operator)	570.00
Subtotal	$ 2,557.00

Bathhouses, Shop, Warehouse, I Mine Offices

Labor - 2 men X 179.20/day X 3 days	$ 1,075.00
Equipment (Hauling) - 1 truck + operator X 12 hrs X 79.35/hr	952.00
Loader - 4 hrs X 142.25/hr + oper.	569.00
Subtotal	$ 2,596.00

Water System

Labor - 2 men X 179.20/day X 1 day	358.00
Hauling- 1 truck + operator X 4 hrs X 79.35/hr	317.00
Loader - 2 hrs X 142.25/hr + oper.	285.00
Subtotal	$ 960.00

Fuel Storage Tank and System

Labor - 2 men X 179.20/day X 2 days	717.00
Hauling - 1 truck + operator X 16 hrs X 79.35/hr.	1,270.00
Loader - 8 hrs @ 142.25/hr + oper.	1,138.00
Subtotal	$ 3,125.00

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Truck Loadout

Labor - 2 men X 179.20 X 2 days	717.00
Lowboy truck + oper. @ 79.35/hr X 4 hr.	317.00
1 20 ton crane 1 hr X 78.80	79.00
Operator @ 29.90 X 1	30.00
Subtotal	$ 1,143.00

Stacking Facility

Labor - 4 men X 179.20 X 1 day	717.00
Truck & operator 79.35 X 4 hrs	317.00
1 20 ton Crane 2 hrs. X 78.80	316.00
1 950B Loader 118.55/hr X 4 hrs	474.00
1 Crane operator 29.90 X 2 hrs.	60.00
Subtotal	$ 1,884.00

Crusher Facility

Labor - 2 men @ 179.20/day X 4 days	1,434.00
1 20 T Crane 6 hrs X 78.80	473.00
1 Truck + operator 8 hr X 79.35	635.00
6 hrs Crane Operator X 29.90	180.00
Subtotal	$ 2,088.00

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Oil Slack Load Out

Labor - 2 men @ 179.20/day X 2 days	717.00
1 20 T. Crane 2 hrs X 78.80	159.00
1 Truck + operator 4 hrs X 79.35	317.00
2 hrs Crane operator 29.90	60.00
Subtotal	$ 1,253.00

Watchman Facility

2 men X 1 day X 179.20	358.00
D7G Crawler 2 hrs X 182.40	365.00
Subtotal	$ 723.00

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SOIL PLACEMENT - (Reference Area Post-Mining Contour Map)

Areas	Earth Moved	Cu. Yds.	Cost/Hr.D7G	Cost/Hr.BH-235	Time	Cost
Scale Area	cut	889	182.40		64.65 hr.	2,508.00
Sed. Pond B	fill	450		241.80	1.17 hr.	282.90
Sed. Pond A	fill	1333		241.80	3.49 hr.	843.88
Ditch to Pond A	fill	377	182.40		5.83 hr.	1,063.39
Bath House Area	cut	1111	182.40		17.18 hr.	3,133.39
Load Out	cut fill	3352 3352		241.80	8.78 hr.	2,123.00
Road Coal Prep.	cut fill	2222 2222		241.80	5.82	1,407.00
Lower Rd.to Swith-Back	cut fill	3377 3377		241.80	8.84	2,137.50
Up Rd. to Portal	cut fill	6622 6622		241.80	17.35	4,195.23
Portal Fan Area	cut fill	4444 4444		241.80	11.64	2,814.55
Total	**cut** **fill**	**21,820** **21,777**			**19 days**	**20,510.00**

8,000 cu. yds. topsoil - transport .65 miles = 950B Loader 41 hrs. 142.45 5,840.00

dump and regrade - 2 trucks & operator = 41 hrs @ 79.35 3,253.00

Spreading and ripping - D7G = 41 hrs. @ 182.40 7,478.00

Temporary Scale House reclaimed 10/1/85

Hiawatha Seam Portal reclaimed 6/30/85

C. Cleanup

Labor - 2 men X 179.20/day X 4 days	1,434.00
Hauling - 1 truck + operator X 8 hrs X 79.35/hr	635.00
Loader (+operator) - 2 hrs X 142.45	285.00
Subtotal	$ 2,353.00
B & C Subtotal	$ 24,558.00

D. Soil Placement (Backfilling and Grading)

See Table D-1 p. 108E

D Subtotal	$ 37,081.00

E. Channel Restoration

Backhoe + operator X 241.80 X 24 hrs.	5,803.00
Labor - 4 men X 179.20/day X 3 days	2,150.00
Subtotal	$ 7,953.00

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F. Reseeding & Fertilization (10 acres)

Hydroseeder, operator and driver	
seed = $ 1,275.00	
Crew = $ 100/acre	13,750.00
Subtotal	$ 13,750.00

G. Mulching (10 acres)

Hydromulcher, operator and driver

$350/acre X 10 acres	3,500.00
Subtotal	3,500.00

H. Protective Fencing (10 acres)

6 foot high X 3,000 linear feet X

$2.00/foot installed	$ 6,000.00
Subtotal	6,000.00

I. Overhead and Contingency

1. Baseball park seeding	2,400.00
2. Retaining wall removed	300.00
3. Borehole plugging	700.00
4. Contemporaneous reclamation	6,000.00
5. Administration	2,360.00
Subtotal	$ 11,760.00

J. Maintenance and Monitoring

5 years @ $500.00/year	2,500.00
Subtotal	2,500.00
Total	$ 110,096.00

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Note all costs estimates are based on 1985 dollars

Co-Op will deposit with the Division of Oil, Gas & Mining, an irrevocable bank letter of credit upon the approval of bond amount.

3.6.8 Alluvial Valley Floor Determination UMC 785.19

Co-Op contends there are no alluvial valley floors within the permit area. This opinion is based on the following evidence:

1. The soils are of such a nature that both the water holding capacity and the rocky nature preclude any but the sparsest of vegetation cover (See Chapter 8 Soils).

makes no difference

2. The area receives less than 14" annual precipitation and has no evidence of subterrainian irrigation.

3. Water quality of the intermittant Bear Creek is marginal and the flows are tied to precipitation event rather than ground water interation.

4. The area has no history of agriculture attempts and the terrain is such as to preclude any but the minimum of level areas of small size to facilitate USC.

Co-Op Mine requests the Division to evaluate the site-specific conditions and render a judgement in this regard.

3.6.9. Temporary Cessation

In the event of a temporary cessation of operation, Co-Op will notify the Division within 48 hours of pending shut down and will submit all information regarding exact number of surface acres and the horizontal and vertical extent of sub-surface strata in the permit area prior to cessation or abandonment, extent and kind of surface reclamation, and identification of backfilling, regrading, revegetation, environmental monitoring, underground opening closures and water treatment activities that will continue during temporary cessation.

3.6.9.1 Temporary Portal Seals

Co-Op will seal portals which are not to be utilized for mine inspection or access during temporary cessations of operation. These seals will be constructed of woven wire and securely attached to the portal entry so as to make tresspass by men or animals prohibitive. All portals which are to be utilized will be posted with "No Tresspassing" and " Keep Out" notices. Where doors exist such as fan entries, this will also be locked and signed accordingly.

Each mine entry which is temporarily inactive, but has a further projected useful service under the approved permit application, shall be protected by barricades or other covering devices, fenced, and posted with signs, to prevent access into the entry and to identify the hazardous nature of the opening. These devices shall be periodically inspected and maintained in good operating condition by the person who conducts the underground coal mining activities.

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Co-Op is committed to sealing all portals in the prescribed manner which are temporarily inactive in course of normal mining activities.

INCORPORATED UNDER
THE LAWS OF THE STATE OF UTAH

NUMBER

SHARES

Huntington-Cleveland Irrigation Company

Capital $150,000 150,000 Shares

This Certifies that C. W. Kingston is the owner of

*****Three Hundred Thirty Three and 77/100**** Shares of the Capital Stock of

Huntington-Cleveland Irrigation Company

transferable only on the books of the Corporation by the holder hereof in person or by Attorney upon surrender of this Certificate properly endorsed.

IN WITNESS WHEREOF, the said Corporation has caused this Certificate to be signed by its duly authorized officers and its Corporate Seal to be hereunto affixed this 16 day of February A.D. 19 62

Secretary

President

SHARES 100 PAR

©GDES 154

3-115

RECLAMATION PLAN

MINE PORTAL ROAD

The following procedures are designed to revegetate and control erosion. They will satisfy the commitments made by Co-Op Mining Co. in their permit application and all applicable portions under CFR 784.13. The area in question will be along and adjacent to the main mine access. The reclamation will be of a permanent nature. (See Plate 3-1). The actual ground involved comprises approximately 3 acres of disturbance.

METHODOLOGY

The actual implementation of abandonment and ultimate reclamation can be broken down into four major catagories and classification of types of work needed:

(1). Earth moving: redistribution of top soil and redistribution of road cut material to approximate original contour of surface.

(2). Clump planting of adjacent vegetation on recontoured surface.

(3). Seeding and mulching to re-establish interum species and reduce erosion until climax vegetation can be established.

(4). Intermittant stream channel restoration and reconstruction of permanent drainage.

PHASE # 1 EARTH MOVING

The road system can be brought back to a reasonable configuration by implementation of a large backhoe unit. The actual method will involve the pulling of surface material from the road surface and berm and placing it against the opposing high wall. This material will then be covered with approximately 1 foot of top soil by pulling material from about 10 feet below the road cut up onto the road surface and spreading and compacting this material with the front bucket, at the same time pulling the leading edge of the high wall down to alleviate the degree and angle of the high wall. All work done both above and below the road will take into consideration existing vegetation and all effort will be made to minimize disturbance and utilize existing vegetation. When there is no alternative other than disturbance, an effort will be made to relocate earth and maintain existing vegetation in place, attempting to relocate the vegetation in the proximity of the road disturbance. (See attachment # 2).

PHASES # 2 AND 3 REVEGETATION

This procedure involves a two phase program: (1). To clump plant existing vegetation in small basins along the recontoured road, and, (2). To hydromulch the entire area to supplement revegetation and control run-off until stabilization is complete and to prepare a site which will be stable enough for a period of time to allow vegetation

Stream Buffer Zones UMC 817.57

Co-Op has attempted to protect Bear Creek in all areas where existing structure and disturbance preclude the establishment of a buffer zone. This has been accomplished by earthen berms along roads adjacent to the stream, culverting in the area of the scale house, silt fences, and straw filters on all tributaries which pass distubed runoff from haul roads. In addition, all disturbed area runoff other than haul roads pass through a sediment pond prior to discharge into Bear Creek. The buffer zone that does exist will be properly posted and signed.

No additional disturbance is anticipated in the Bear Canyon drainage however, if in the future, expansion is required, Co-Op is committed in taking all necessary safeguards to ensure the integrity of Bear Creek and establishing an adequate buffer zone.

PHASE #4 DRAINAGE CHANNEL STABILIZATION AND RECONSTRUCTION

In conjunction with the recontouring, all drainage areas will re-establish to approximate original configuration. In order to minimize the loss of soil, all drainages will be lined with hygronomy blankets for approximately 10 feet above and below the areas of disturbance. In addition, where conditions warrant, rock rip rap may also be utilized to add yet another parameter of stability.

CONCLUSIONS AND RECOMMENDATIONS

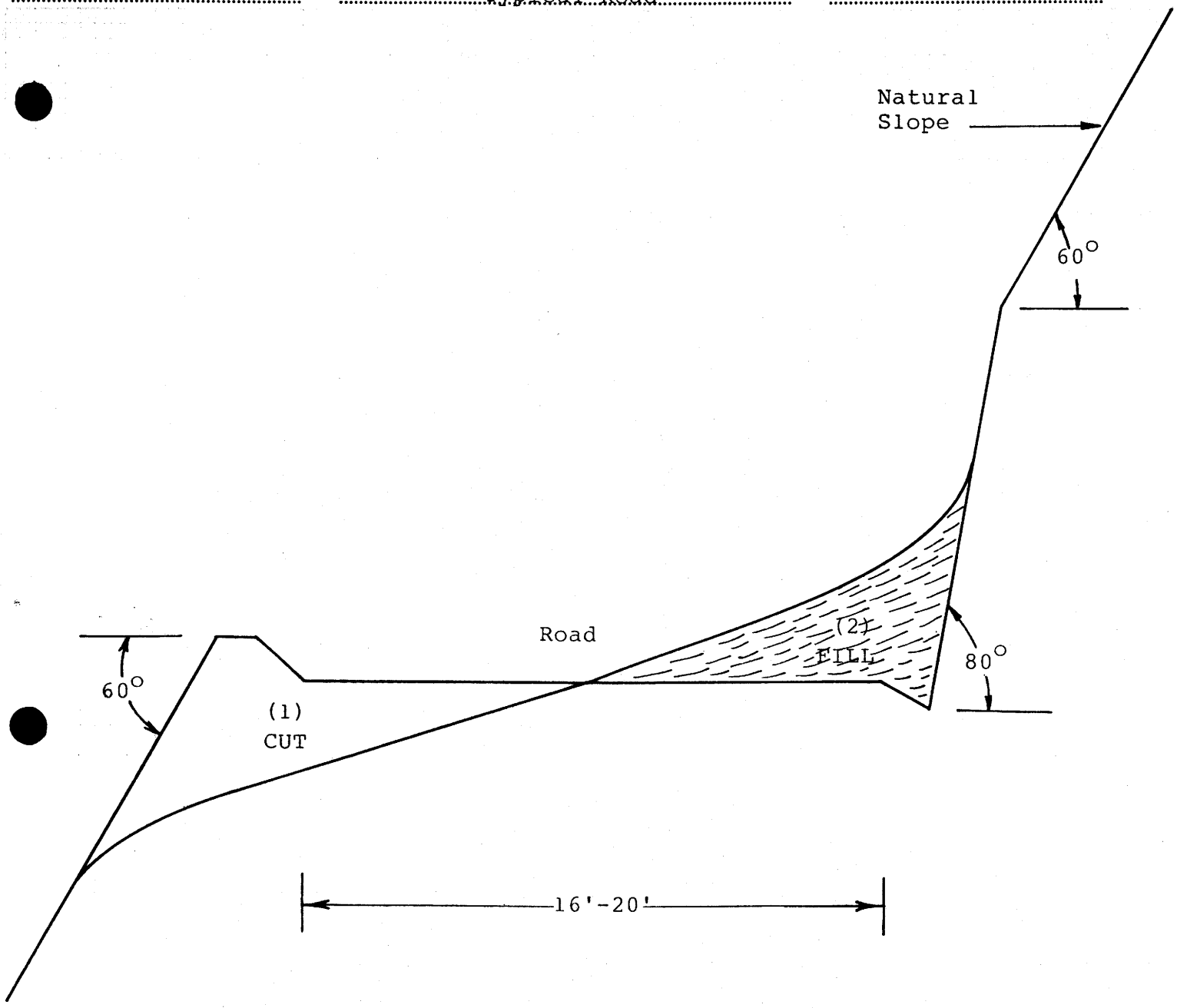
The advantages of this recommended procedure are as follows:

1. By utilizing a backhoe, associated disturbance will be kept minimal.
2. The clump planting procedure accomplishes all of the below:
   a. Immediate ground cover.
   b. Aesthetically pleasing upon completion.
   c. Maximize potential for native species to establish.
   d. Innoculation of soil with indigenous mycorrhiza.
   e. Modify and enhance the micro-environment surrounding each clump.
3. The hydroseeding, mulching, fertilization, and tackifying will virtually assure rapid establishment, thus minimizing wind and water erosion.
4. The channel liners are a proven method to eliminate erosion at the same time allowing for stabilization through revegetation.
5. A cost effective methodology to address a common problem associated with pre-law disturbance.

BY D. Guy DATE 5/11/85 SUBJECT Recontouring of Typical Road SHEET NO. 1 OF 1

CHKD. BY DATE JOB NO.

Scale: 1" = 5'



Note: Area (1) is placed in Area (2).

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EXISTING AND PROPOSED STRUCTURES

The Bear Canyon Mine has the following surface facilities:

- Temporary Scale House
- Truck Loadout
- Coal Storage Area and Stacking Facility
- Crusher Facility
- Principle Conveyor Structure
- Fuel Storage Tanks
- Oil Slack Loadout
- Shop
- Non-coal Storage Yard
- Power Transformer
- Caretaker Dwelling
- Single building complex containing shops, parts warehouse, bathhouse and mine offices
- Mine run coal Receiver bin

Work commenced on all structures June of 1982 with the exception of the proposed bathhouse, phase 2 loadout, and stacking tube. (A detailed plan of these proposed structures will be provided to the Division upon final drafting.)

The location of each of the listed structures is shown on Plate 2-2 Surface Facilities. Co-Op has sought interum approval for each structure in the course of construction, the hydrologic safegards have been implemented, top soil removed and stored, interum revegetation completed where earthwork is at final grade, and health and safety standards implemented as per MSHA standards.

All of the structures are to be reclaimed in the year 2033 and are detailed in Section 3.6.6. and 3.6.7 Bear Canyon MRP 4/30/84 submittal. In order to consolidate all previous plan submittals, current photographs were taken on 4/26/84 and are attached herein in a brief description of each facility is attached under "Facility Description" and is correlated to the representational photo. Also, Table 3.3.4.-1 lists each structure and the dates of construction, present state, etc.

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FACILITY DESCRIPTIONS

(1) Temporary Scale House

This structure consists of a 12' x 50' trailor which has temporarily been utilized as a scale office. It is to be removed and replaced by a more permanent structure in 1984. At present, all environmental safeguards are in place on an interum basis and permanent structures will be implemented upon completion. See Scale House Approval letter MRP Chapter 11 (approvals). Photo (1) see schematic "A" replacement structure.

(2) Fuel Storage Tank

There are 3 10,000 gal. fuel storage tanks installed at the downslope of the shop area. These tanks are contained within a natural berm of the slope with the only access by way of the disturbed drainage ditch leading directly to the sediment pond. The pond is designed to contain any spillage which could foreseeably occur. The area will be posted " No Smoking" and fire extinguishers are in place, all MSAH safety standards will be adhered to. See photo 2.

(3) Truck Loadout Facility

The truck loadout is a conveyor system designed to load tractor-trailor trucks from any of the storage areas. It is electrically manipulated so as to minimize spillage. As each unit is loaded, the area is cleaned of spilled coal on a daily basis, and all runoff is contained. See photo 3.

(4) Shop

The shop building is for servicing of both underground and surface equipment. Major and minor repairs are implemented and it is used to inventory parts to be utilized on a continual roll over basis. The

building is heated with a coal furnace and is equipped with standard heavy equipment handling implements such as wenches, welders, etc. See photo 4.

(5) Oil Slack Loadout

The oil slack loadout is designed to handle oiled stoker coal, primarily for non-commercial clients. It maintains a 20,000 ton storage bin with an electrical controlled auger to load small tonnages. The bin is fed via of a hopper and conveyor which is loaded by way of an end loader. See photo 5.

(6) Coal Storage and Stacking Tubes

The coal storage yard (phase 1) is equipped with a system of conveyors wherein coal can be segragated according to size and is of a short term nature where the piles are constantly being consumed and replenished. The area also contains two 6000 gallon oil storage tanks which are used to store oil for stoker coal. All run-off is controlled, and passes through the primary sediment pond. See photo 6.

(7) Crusher Facility

This facility is primarily a coal segragation site where the various sizes of coal can be separated and then stacked in the designed locations. This area is controlled run-off and is passed through the sediment pond. See photo 7.

(8) Non-Coal Storage Yard

This area is utilized for all material which is in storage on the property with projected use and or salvage value. A schematic is attached as Figure 3.8.1. Historically, the site has been utilized for this purpose and is designed with hydrologic safeguards to protect the watershed. Additional work is anticipated to upgrade the hydrolo-

logic measure upon Division approval. See photo 8.

(9) Transformer Substation

This facility is the concern of the mine's power supplier, Utah Power & Light. However, Co-Op does maintain the fence, and enforces health and environmental safeguards. Th structure is pictured on photo 9.

(10) Conveyor Structure

This conveyor is the route by which the coal exits the mine. Photo 10 pictures the conveyor in the lower tight corner, and shows the progression of coal through the various structures to the truck load-out. It is also a good overview of the property showing relative locations of each structure 1 - 8. Pictured in this photo, center top, is Co-Op's topsoil stockpile, not listed as a structure but in evidence on the surface.

(11) Single Building Complex (New Scale House) Containing small shop, parts warehouse, formans bathhouse, and mine offices.

A schematic of this structure of attached construction, is underway with an anticipated completion date of fall 1986.

(12) Caretakers Residence

This is a single-wide 14X50 house trailor. A number of small pens and sheds attached for storage and housing a collection of domesticated fowl.

(13) Mine run Coal Receiver Bin

As the name implies, is approximately 50' X 100' bin where coal fall from the conveyor shute prior to traveling to the crusher is pictured in photo #7.

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Co-Op is committed that all support facilities, mine disturbance or associated disturbance of any kind will be restored so as to prevent damage to fish, wildlife and related environmental values; and, minimize the possibility of additional contributions of suspended solids to streamflow or runoff outside the permit area.

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Table 3.3.4.-1

Existing Structure	Construction Dates Beginning	Construction Dates Completion	Photo #	Reclamation Time Frame
Temporary Scale House	10/1982	11/1983	1	replace in 1985
Fuel Storage Tanks	10/1983	6/1984	2	2033
Truck Loadout	9/1982	4/1983	3	2033
Shop	10/1983	9/1984	4	2033
Oil Slack Loadout	4/1983	7/1983	5	2033
Coal Storage & Stacking	6/1980	4/1983	6	2033
Crusher Facility	4/1980	12/1985	7	2033
Non-coal Storage Yd.	3/1980	9/1984	8	2033
Transformer Substation	4/1980	6/1980	9	2033
Conveyor Structure	3/1980	6/1980	10	2033
New Scale House (Modification approved) See Chapter 11	6/1984	10/1986		2033
Caretakers Dwelling	6/1980	7/1981		2033
Bath House	8/1984	11/1985		2033
Stacking Tube & Load-out (2nd Phase)	4/1985	10/1985		2033

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Scott M. Matheson
Governor

James O. Mason, M.D., Dr.P.H.
Executive Director
801-533-6111

DIVISIONS

Community Health Services
Environmental Health
Family Health Services
Health Care Financing

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Community Health Nursing
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STATE OF UTAH
DEPARTMENT OF HEALTH
DIVISION OF ENVIRONMENTAL HEALTH

150 West North Temple, P.O. Box 2500, Salt Lake City, Utah 84110-2500

Kenneth Lee Alkema, Director
Room 474 801-533-6121

December 20, 1983
533-6108

Wendell Owen
Co-Op Mining Company
P. O. Box 300
Huntington, Utah 84528

RE: Approval Order for Modifications to Air Pollution Control at Coal Mine, Emery County

Dear Mr. Owen:

On October 28, 1983, the Executive Secretary published a notice of intent to approve the modifications to the air pollution control equipment for the surface operations at your coal mine in Emery County. The 30 day public comment period has expired, and no comments were received.

This air quality approval order authorizes the modifications as proposed in your notice of intent dated October 14, 1983, with the following operating conditions:

1. All emission control equipment shall be properly installed, maintained, and operated as proposed in the notice of intent dated May 5, 1980, and subsequent information dated October 14, 1983.

2. No visible emissions from any point shall exceed 20% opacity as measured by EPA test Method 9.

3. Annual production of coal shall not exceed 200,000 tons without prior approval from the Executive Secretary in accordance with Section 3.1, UACR.

4. Crushers, screens, conveyors, and all transfer points shall be controlled by water sprays to minimize fugitive emissions. The water sprays shall operate whenever the mine is operating.

5. The haul roads and access roads shall be water sprayed to minimize fugitive dusts at least twice per eight hour shift unless daily precipitation exceeds 0.05 inches for that day.

An Equal Opportunity Employer

6. The stockpile and loadout areas shall be sprayed (water or other suppressant) as dry conditions warrant or as determined necessary by the Executive Secretary.

7. A compliance inspection shall be performed within 30 days of the date of this approval order.

The fee for issuing this modified approval order is $179.17. (See enclosures for breakdown of costs.) The amount is payable to the Utah Department of Health, sent to the Executive Secretary of the Utah Air Conservation Committee, and is due within 30 days after the approval order date.

Sincerely,

Brent C. Bradford
Executive Secretary
Utah Air Conservation Committee

MRK/ads
cc: EPA Region VIII (J. Philbrook)
Southeastern District Health Dept.
Enclosures (2)

4367

ITEMIZED COSTS FOR NOTICE OF INTENT

The following are final costs incurred by the Bureau of Air Quality to review your modification and issue an approval order.

Filing Fee	$ 50.00
Engineering Review	77.40
Administrative	51.77
Total	$ 179.17

CHARGEABLE FEES - BUREAU OF AIR QUALITY

Source CO-OP Mining Major _____ Minor X

Date Started _____ Non-Attainment _____ PSD X

Date Approved _____

NOTICE OF INTENT REVIEW

1. Pre-Design Date: 0

Filing Date: 10/14/83

1. Engineer/Hours _____
Engineer/Hours 0

2. $ 50.00

Engineering Review: Engineer/Date/Hours

Site Survey Date: 10-21 4 HR

Calculations:

Hours/Engineer $ _____

Hours/Engineer $ _____

TOTALS: 4 HRS @ 15/HR = 60 Hours with 29% fringe $ 77.40

2. Modeling:

Calculations:

TOTALS: Hours/Modeler 0 —

Computer $ 0 —

Analysis $ 0 —

3. Administrative Costs:

Survey Travel $ 0

Notice to Paper $ 46.35

Hearing Travel $ 0

Overhead @ 7% $ 5.42 (.07 x 77.40)

SUBTOTALS $ 51.77

FINAL TOTALS 4 HOURS $ 179.17 (50.00+77.40+51.

MRK:wml

ADDENDUM TO: SEWAGE WASTE DISPOSAL AND HANDLING FACILITY

BEAR CANYON SCALE HOUSE - BEAR CANYON MINE

RE: letter 09/08/83 received Co-op 09/29/83 State of Utah, Department of Health

2. More detail must be provided on the proposed lift station:

   a. Details of the lift station construction must be provided, ie., height, materials of construction, construction details etc., of the lift station wet well.

Co-op Reply:

The wet well will be constructed of 60 inch concrete culvert, 135 emulsion will be applied on both the inside and outside of the cylinder to an approximate thickness of 1/8th inch. The six ft. section of culvert will be set 4 inches into a 52" x 10" concrete pad (see Figure 2). The culvert will then be backfilled with sand to a depth of 5'6" leaving approximately 6" of the culvert end extending above the surface. A 4"

metal line from the 2,500 gal. septic tank will be welded into the 36" culvert at this point, a 3" metal line will be sealed at the same elevation on the opposing side (See figure 2). A 6" x 6' x 6' concrete pad will then be poured around the top of the culvert. A 2" depression to accomodate a conventional 60" manhole cover will be formed in place. See consturction diagram (Figure 3).

b. Details of the switches which will be used to activate pump and warning light must be provided.

Co-op Reply:

(See Figure 4)

c. The proximity of the lift station to the stream should be provided./Also provisions which would prevent waste water (if the lift station should flood) from entering the stream should be shown.

Co-op Reply

The wet well will be approximately 15 feet horizontal distance from the existing stream channel. However, Co-op is presently permitting a 200' 60" culvert that will seal this stretch of stream off for a minimum of 50' below the area of the well. In ad-

dition, the drainage from the entire pad area is designed to drain to the catch basin which will further ensure the intergrity of the stream.

d. Details of the screen over the lift station discharge line should be presented.

Co-op Reply:

A standard 100 mesh screen is provided on the intake portion of the pump unit. This, in combination with the 3 screen inlet pipe to the well, should maintain a relatively clear debris-free fluid in the well as well as the pump.

e. Details of the cover for the lift station should be provided.

Co-op Reply:

The cover is simply a standard 36" man-hole cover as provided by W. R. White Pipe Company of Price, UT.

f. Details of the lift station pump should be provided to ensure it is of adequate capacity and suitable for this application.

Co-op Reply:

If anything, a 200 gpm trash pump is oversized to accomodate a 300 gal. wet well, however, Co-op has contacted 3 pump manufacturers with the request for specifications and pricing. When a decision is reached, a set of specifications for the pump will be supplied to the Dept. of Health for the review and approval prior to purchase and/or installation.

3. The details of the 3 inch diameter sewer pipe crossing Bear Creek should be provided. These details should include relative elevation of the crossing pipe to the creek bottom, what type of pipe will be used, will the pipe be encased and if so what type of pipe will be used etc.

Co-op Reply:

3" PVC schedual 240# pipe will be installed at a depth of 40" - 48" at 10" from intersecting the 60" concrete culverted creek. This pipe will be run through a 6" PVC pipe for a distance of 40' which will by-pass the 60" culverted creek by a minimum of 10'.

STATE OF UTAH
NATURAL RESOURCES & ENERGY
Water Rights

Scott M. Matheson, Governor
Temple A. Reynolds, Executive Director
Dee C. Hansen, State Engineer

74 West Main Street • P.O. Box 718 • Price, UT 84501 • 801-637-1303

September 30, 1983

Division of Oil, Gas and Mining
Attn: Joseph C. Helfrich
4241 State Office Building
Salt Lake City, Utah 84114

Dear Mr. Helfrich:

At the request of Mr. Melvin Coonrod, consultant for Co-op Mining Company, please be advised that the above mentioned company has filed Change Application No. a-12921 (93-1067), of which a copy is enclosed, requesting the right to withdraw up to 0.25 sec.-ft. of water from a mine tunnel in Bear Canyon located at a point: N. 79 ft. & E. 75 ft. from the SW Cor. Sec. 26, T16S, R7E, SLB&M. It is proposed to use the water for mining and irrigation purposes within the SE¼, NE¼, T16S, R7E, SLB&M.

The change application was filed with this office on September 2, 1983. Normal processing time for such a request is 90-120 days, provided that there are no protests filed.

I trust that this brief explanation will help clarify their present water rights status. If I can assist further in any way please feel free to call on me.

Sincerely,

Mark P. Page

Mark P. Page
Area Engineer

cc: Melvin Coonrod
Co-op Mining Company

Enclosure

Form 114
25M 4-63

IN THE ....SEVENTH.... JUDICIAL DISTRICT COURT, IN AND FOR THE COUNTY OF .....EMERY..... STATE OF UTAH

IN THE MATTER OF THE GENERAL DETERMINATION OF RIGHTS TO THE USE OF ALL WATER BOTH SURFACE AND UNDERGROUND WITHIN THE DRAINAGE AREA OF THE SAN RAFAEL RIVER IN SANPETE AND EMERY COUNTIES IN UTAH.

STATEMENT OF WATER USER'S CLAIM
CODE NO. 93 SERIAL NO. 1067
MAP NO. 21

NOTE: This blank is sent to you in accordance with Utah Law. The information called for herein will be used in connection with the adjudication of water rights on the above mentioned drainage area. All questions applicable to your claim must be answered fully, and one copy of this form must be filed with the Clerk of the District Court at .....Castle Dale....., Utah, within sixty (60) days from date of service of the attached Notice. A copy shall be filed with the State Engineer, State Capitol, Salt Lake City. Failure to file the attached Statement of the Water User's Claim with the Clerk of the District Court within the time stated will forever bar and estop you from asserting any right to the use of water from said drainage area.

1. Name of Claimant Charles W. Kingston
2. Address 862 East Garfield Avenue Salt Lake City, Utah 484110 Interest Claimed Full
3. Name of particular spring, spring area, stream, well, tunnel or drain from which water is diverted is Underground Water (Mine Tunnel) in Emery County.
4. Priority date claimed January 20, 1964 Date when water was first used .....
   Date when work on diverting system was first begun ..... Date when diverting system was completed ..... Nature of work .....
5. Class of Right (Indicate by X):
   (a) ..... Right to surface water initiated by beneficial use before 1903 Claim No. .....
   (b) ..... Right to underground water initiated before 1935 Claim No. .....
   (c) ..... Right decreed by court, cite title of case .....
   (d) X Application filed, State Engineer's Office No. 35836 Cert. of App. No. Election Chng. a-6330
   (e) ..... Right acquired by adverse use prior to 1939
6. Nature (Indicate by X), Amount, and Annual Period of Use (by month & day):

(a) X	Irrigation	Sec. Ft. Inc.	from April 1	to October 31	(both dates incl.)
(b)	Stockwatering	Sec. Ft.	from	to	(both dates incl.)
(c)	Domestic	Sec. Ft.	from	to	(both dates incl.)
(d)	Municipal	Sec. Ft.	from	to	(both dates incl.)
(e) X	Mining	Sec. Ft. 0.25	from January 1	to December 31	(both dates incl.)

7. Direct Flow Appropriation (must be described with reference to U. S. Government Survey Corner)
   (a) Point of diversion from ~~[illegible]~~ tunnel ~~[illegible]~~ N. 210 ft. & W. 320 ft. from E¼ Cor. Sec. 22, T16S, R7E, SLB&M.
   (b) Description of spring area .....
   (c) Point of rediversion or point of return to natural channel .....
   (d) If flow is intermittently diverted, list by number or description, all rights involved .....
8. Where water is used for irrigation purposes:
   (a) Area irrigated in legal subdivisions of land by 40-acre tract. (All sources of water for same land or lands must be described in each instance by name or claim number) CLAIMS USED FOR PURPOSE DESCRIBED: 93-1067 on: 0.5 acre in SE¼NE¼ Sec. 22, T16S, R7E, SLB&M.

.....

.....

.....

.....

.....

.....

.....

(b) Do you get water under a ditch owned by several users..... If so, give names of all users and divisions of interest .....

9. Where water is used for Stockwatering:

(a) Number of each kind of stock watered .....

(b) All sources of water for same stock. (Describe by name or claim number) .....

.....

.....

10. Where water is used for Domestic: .....

(a) Number of families or their equivalent ..... All sources of water for same use. (Describe by name or claim number) .....

FORM 108

Exchange Application No. _____

APPLICATION FOR THE RIGHT OF EXCHANGE OF WATER STATE OF UTAH

For the purpose of obtaining permission to make an exchange of water, application is hereby made to State Engineer, based upon the following showing of facts submitted in accordance with the requirements of Sec. 73-3-20, Utah Code Annotated, 1953.

1. The name of the applicant is Mrs. Charles W.(Lavenda) Kingston
2. The post office address of the applicant is 862 E.Garfield Ave.SLC, Ut. 84110
3. The right to be exchanged was acquired by Application No. 35836 (93-1067)
   (Give application No., certificate No., Decree, stock purchase, or other identification.)
4. The quantity of water is 0.25 second-feet, or _____ acre-feet.
5. The period of use from January 1 *(Month)* *(Day)* to December 31 *(Month)* *(Day)*, inc.
6. The period of storage from _____ *(Month)* *(Day)* to _____ *(Month)* *(Day)*, inc.
7. The direct source of supply is Tunnel tributary to _____ in Emery county.
8. The point of diversion is* N 210' & W 320' from E¼ Cor. Sec. 22, T16S, R7E, SLM
9. The water is, or was, to be used for the following purposes:
   Irrigation SE¼ ne¼ Sec. 22, T16S, R7E, SLM
   Mining
   _____, Total 10 acres.
   (Give place of use by legal subdivision of land)

THE FOLLOWING EXCHANGE IS PROPOSED

10. 0.25 second-feet or _____ acre-feet of water represented by the foregoing right will be delivered from January 1 *(Month)* *(Day)* to December 31 *(Month)* *(Day)* incl. of each year, to satisfy other rights, into _____ at a point* N79' & E75' from the SW cor. Sec. 24 T16 R7E SLM
11. In exchange for the water delivered and described in par. 10, there will be _____ second-feet or _____ acre-feet diverted from _____ *(Month)* *(Day)* to

_____ incl., of each year from a well _____
(Month) *(Day)* *(diameter and depth)*

or stream _____, at a point* _____

_____

_____

12. The water will be used for _____

Irrigation

Mining, Total 10 acres.

NOTE: *The point of diversion, point of return or point of delivery must be located by course and distance or by rectangular distances with reference to some United States land survey corner.*

AGREEMENT

This agreement made and entered into this 3rd day of August 1983, by and between Emery County, a body corporate and politic (County), and Co-Op Mining Company, a Utah general partnership (Co-Op),

WHEREAS, there is an existing road in Emery County known as Bear Creek Road, and

WHEREAS, Co-Op requires extensive use of said road, and

WHEREAS, due to said extensive use, said road should be relocated for the health, safety and welfare of the citizens of County as well as others who may have occasion to use said road,

NOW, THEREFORE, be it agreed as follows:

1. The parties hereto agree and acknowledge that the southern 0.65 miles of the road known as Bear Creek Road is a County road. Said County road runs from State Road 31 in a northerly direction for approximately 0.65 miles to a presently existing gate. Thereafter the road is a private road.

2. That Co-Op will relocate the Bear Creek Road according to the plans and specifications prepared by the Emery County Engineer and described on the document entitled Bear Canyon County Road Relocation dated October 12, 1982.

3. Co-Op will relocate the Road according to the plans and specifications referred to above at their expense. Co-Op will reimburse County for engineering costs incurred by County concerning the preparation of said plans and specifications and site inspections up to One Thousand ($1,000.00) Dollars.

4. Co-Op will indemnify and defend County for any damage caused, or loss incurred to or claim made by any public or private individual, firm, group, association, partnership or corporation as a result of the construction conducted to relocate Bear Creek Road. Said indemnification will continue until such time as County approves the completed roadway and accepts the construction thereof.

5. Co-Op acknowledges and accepts the easements of North Emery Water Users and Huntington City which exist in, along and across the relocate Bear Creek Road. Said easements are in existence on the ground. Co-Op's acknowledgment thereof herein recognizes and preserves said easements.

6. Co-Op agrees to encase water lines of North Emery Water Users and Huntington City in nestable corrugated pipe pursuant to plans and specifications prepared by the Emery County Engineer.

7. Co-Op agrees to allow access to other property served by the relocated Bear Creek Road. Said access shall be allowed to the owner of the property, their successor in interest or any other individual, firm, group, association, partnership or corporation who requires access due to their association with the owner or because the owner has granted permission to the individual, firm, group, association, partnership or corporation to go upon his property. Co-Op will not withhold access due to the type of activity which the then owner or his agents, employees or invitees intend or in fact conduct.

8. Co-Op will provide a completion and performance bond to Emery County upon the execution hereof in the amount of Twenty-Five Thousand ($25,000.00) Dollars which will remain in force and effect for twelve (12) months after the date said road is accepted by County as indicated in paragraph 4 above.

9. Co-Op will provide liability insurance in an amount not less than Five Hundred Thousand ($500,000.00) Dollars to be in force during the construction of said road. Said policy will name County as an insured.

10. Co-Op agrees to complete said road in a timely manner not to exceed eighteen (18) months from the date of this agreement. County may make demand upon the bonding company under the bond provided pursuant to paragraph 8 above and secure completion of the relocation in the event construction is not completed within the agreed upon eighteen (18) months.

11. It is further understood that any additional improvements of the relocated Bear Creek Road will be at the expense of all primary users.

12. The Co-Op agrees to reclaim that portion of the old Bear Creek Road according to the specifications and requirements of the Bureau of Land Manager (BLM).

13. That the Co-Op agrees to provide Emery County with the necessary easement agreements with the Utah Department of Transportation.

14. Co-Op acknowleges and agrees to comply with standard number 6.3.8 "Protection Zone" of the Utah State Health Drinking Water Standards as it applies to supplies of drinking water in Bear Canyon.

15. County agrees to inspect the relocated Bear Creek Road within ten (10) days after notification by Co-Op of the completion thereof. County must within five (5) working days of said inspection accept the road or notify Co-Op of any deficiencies which must be then corrected by Co-Op within the time period outlined in paragraph 10 above. Should County fail to notify Co-Op of any deficiencies within five (5) working days, the road is deemed accepted by County and the twelve (12) month period indicated in pargaraph 8 above begins to run from the sixth (6th) day after inspection.

IN WITNESS WHEREOF, this agreement is executed the day and year above first written, at Castle Dale, Utah, pursuant to a resolution of the Emery County Board of Commissioners at a regularly scheduled meeting of the Board.

EMERY COUNTY, a body politic and corporate,

ATTEST

County Clerk

By _____
Chairman of the Emery County Board of Commissioners

IN WITNESS WHEREOF this agreement is executed at Huntington, Utah.
DATED this 3rd day of August, 1983.

CO-OP MINING COMPANY, a Utah general partnership

By _____
a General Partner

CO-OP MINING CO.
BOX 1245
HUNTINGTON, UTAH 84528

Aug. 8, 1983

S U B M I T T A L

RECEIVED
AUG 08 1983
DIVISION OF
OIL GAS & MINING

TO:

DIVISION OF OIL GAS AND MINING
4241 STATE OFFICE BUILDING
SALT LAKE CITY, UTAH 84114

Co-op Mining Co. submits the following plans for that portion of the haul road in the Bear Creek Canyon designated as a private road in the enclosed copy of the aggreement between Emery County and Co-op Mining Co. The road coincides with the existing Bear Canyon road, which follows the original contour of the land, minimizing additional disturbance or adverse effects on the environment. There will be no cut or fill sections, and no material side-cast. If any new area is disturbed, any suitable topsoil will first be removed and stockpiled as described in the topsoil plan previously submitted. At the time of final reclamation, the road will be reclaimed as outlined in the previously submitted reclamation plan, unless it is determined to be necessary for post mining land use. Hydrology for the drainage controls has been calculated by Horrocks Engineers (See appendage A). Culverts will be galvanized corrigated type.

Please see enclosed map, profile, and cross-section for construction detail. (Plate 3-5)

CO-OP MINING COMPANY

Wendell Owen

WENDELL OWEN

Coal Mine Safety and Health
District 9

March 1, 1983

Mr. B. W. Stoddard
General Superintendent
Co-op Mining Company
P. O. Box 300
Huntington, UT 84528

Re: Bear Canyon Mine
I. D. No. 42-01697
Roof Control Plan

Dear Mr. Stoddard:

The roof control plan dated January 7, 1983, has been reviewed by MSHA personnel and is approved. As required by 30 CFR, 75.200, the plan shall be reviewed by MSHA every six months.

Sincerely,

John W. Barton
District Manager

JWB:J.S.Miller:mh

cc: Price
Orangeville
DTSC
State

ROOF CONTROL PLAN
General Information

Date 1-7-83 Mine I.D. No. 42-01697

A. Company Co-op Mining Co.

Address P.O. Box 15309 Salt Lake City, Utah 84115
city state

B. Mine Bear Canyon #1

Mine Location

Huntington (city) Emery (county) Utah (state)

C. Location (reference to nearest highway route, direction, and distance)

2 Miles East Off Route No. 31

D. Type(s) of plan Spot Bolting Plan

E. Area(s) of mine covered by the plan Development of entries, rooms and crosscuts

F. Maximum cover: 1700 Feet

Main Roof — — — — Sandstone — — Up to 80 ft. thick

Immediate Roof	Coal - 2 to 4 feet
Coalbed	About 9 feet
Bottom	Coal - 5 to 7 feet
	Clay - 1 to 3 feet

Sandstone —— —— Up to 60 feet

G. BH Stoddard Mgr Supt. 1-7-83
Company Official's Signature Title Date

Roof Control Investigator

The Roof Control Plan approved this date hereby supersedes all previously approved plans

Approved by _____ _____
Date

Title _____

ROOF SUPPORT MATERIALS FOR RESIN GROUTED RODS

RODS

Manufacturer's

Manufacturer Bermingham OR EQUIVELANT Designation 6 or 7 x 72

Minimum Length 72" Diameter 3/4 or 7/8

Type Steel #40 rebar Type Head square

Minimum Yield 40,000 lbs.

Dimensions of Rod: Head 1 1/8" Flange 1 7/8"

BEARING PLATES

Dimensions Generally ¼ x 6" x 6"

Shape Embossed or dished Center Hole Size approx. 7/8"

RESIN

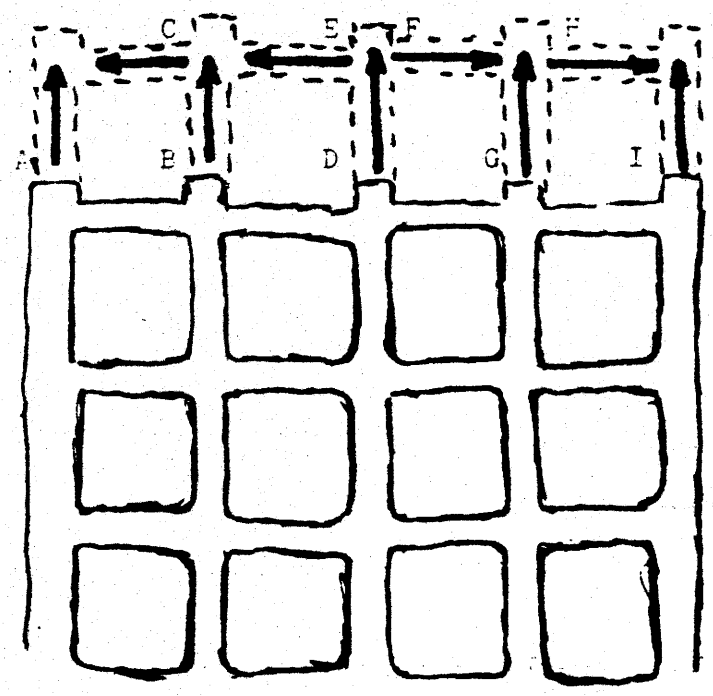
Manufacturer's

Manufacturer Celtite or equivelant Designation roof bolt cartridge

Type IV Size of Finishing Bit 1" +030

Prior approval shall be obtained before making any changes in the materials listed.

Sketch #1



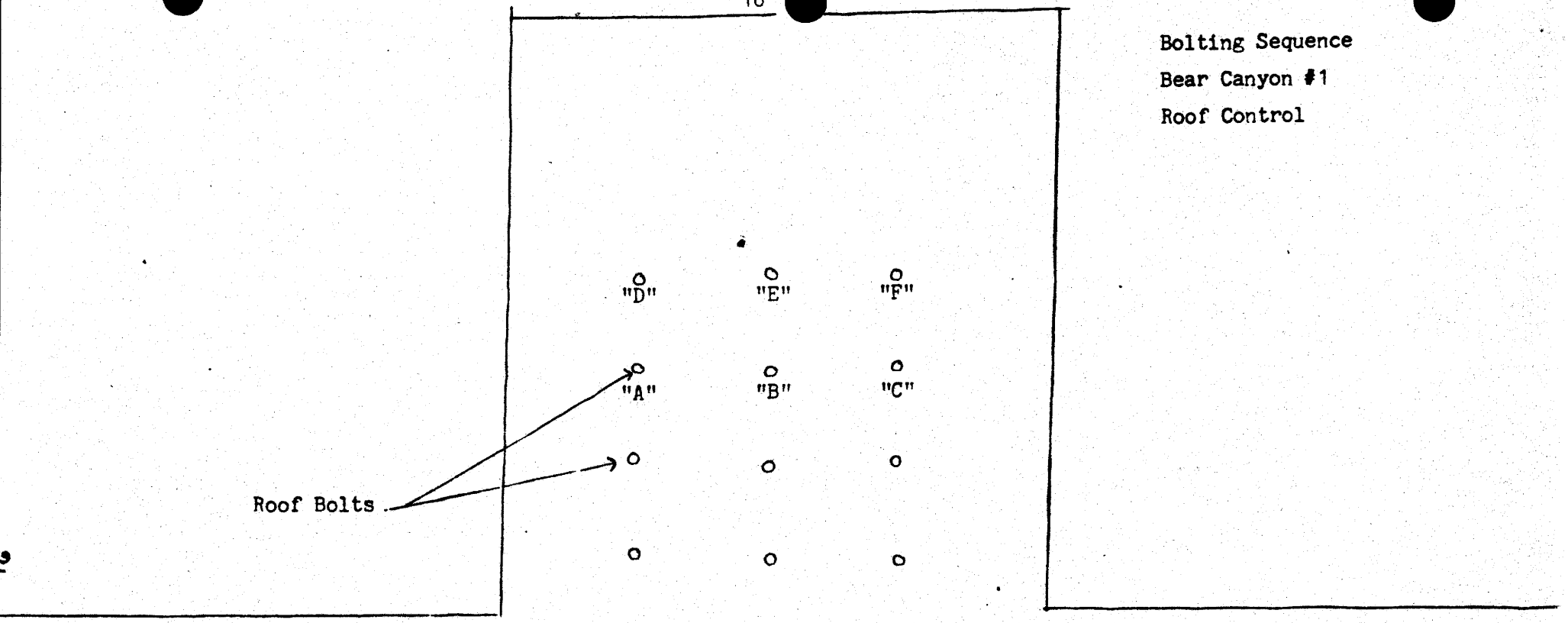
Sequence of Mining
Bear Canyon #1
Roof Control

Typical Section Mining Sequence

Starting on the far right (A) the entry or room is advanced the designated distance. Then the miner pulls back to (B) and this entry or room is advanced same as "A". Then a crosscut (C) is made to join A and B. The miner then pulls back to (D) and this entry or room is advanced same as "B" at this time a crosscut (E) is turned to the left to to join B and D then one is turned to the right (F). The miner pulls back to (G) and this entry or room then advances to crosscut (F), then a crosscut (H) is turned to the right. The miner is then moved to (I) and this entry or room is advanced to crosscut (H). This sequence is then repeated.

RECEIVED
JAN 14 1983

Bolting Sequence
Bear Canyon #1
Roof Control



Typical Sequence of Installing Bolts

Botls are installed on 5 foot centers. Bolts are installed from left to right. Starting from "A" to "B" to "C", then the sequence follow as in "D", "E" and "F".

RECEIVED
JAN 14 1983
DISTRICT 9
Denver, Co.

SAFETY PRECAUTIONS FOR A SPOT BOLTING PLAN

1. For the purpose of this plan, where the roof is strong and competent, as determined by a responsible person of higher authority than the section foreman, an entry may be advanced a maximum of 120 feet prior to roof bolting. Adjoining crosscuts may be run in addition to entries prior to roof bolting. A written record that defines the approved area and is dated and signed by the responsible official shall be kept in a book that is available for examination by interested persons.

2. In the absence of properly recorded approval as described above, an area is to be fully supported. All active faces in a section in an approved area shall automatically revert to a full overhead support if: (a) a roof fall occurs in or inby the last open crosscut in an active section; (b) roof bolts (or crossbars) are installed or needed for a distance in excess of 16 linear feet within such area; or (c) roof bolts (or crossbars) are installed or needed frequently in the general area, regardless of the distance supported in each instance. The official immediately responsible for the area shall report such change to the mine foreman; and the mine foreman shall record the loss of approval for the area in the aforesaid record book. The area may be re-approved per preceding paragraph.

U. S. Department of Labor

Mine Safety and Health Administration
P O Box 25367
Denver, Colorado 80225
Coal Mine Safety & Health
District 9

September 19, 1983

Mr. B. W. Stoddard
Operator
Co-op Mining Company
P.O. Box 300
Huntington, UT 84528

Re: Bear Canyon No. 1 Mine, I.D. No. 42-01697
Six Month Review of Roof Control Plan with
Pillar Extraction Addendum

Dear Mr. Stoddard:

In regard to your requested addendum, dated September 11, 1983, pursuant to your pillar extraction plan, it has been reviewed by MSHA personnel and is approved.

Your currently approved roof control plan with the pillar extraction addendum has been reviewed by this office and appears to be satisfactory and is approved. This plan supercedes all previously approved roof control plans. As required by 30 CFR, 75.200, the approved plan will remain in effect for another six months. If future conditions warrant, the plan may have to be changed.

Sincerely,

for John W. Barton
District Manager

Enclosure

M. Ile ✓

Co-op Mining Company
Bear Canyon No. 1
P.O. Box 300
Huntinton, Utah 84528

U.S. Department of Labor
Mine Safety and Health Administration
Coal Mine Safety and Health
P.O. Box 25367
Denver, Colorado 80225
District 9

9-11-83

Dear Sir;

Please find enclosed a plan and sketches for roof control during pillar extraction. This is the same system we used in the old Co-op Mine I.D. No. 42-00081. Although pillar extraction conditions were far worse in the Co-op Mine we had real good results in safety and clean caves while using this system. Because of these reasons we feel this a safe plan to use in Bear Canyon No. 1.

This plan is an addition to the Roof Control Plan already in effect at the Bear Canyon No.1 Mine I.D. No.. 42-01697.

If there are any questions please contact Bill Stoddard At 801-748-2777.

Thank You;
Operator
BW Stoddard
B.W. Stoddard

9.14.83
HG

TYPICAL ROOF CONTROL FOR PILLAR EXTRACTION

The following roof control plan is formulated for roof control during pillar recovery and is an addition to the roof control plan already in effect at the Bear Canyon #1 Mine I.D. No. 42-01697.

A. The plan now in effect is a minimum roof control plan and was formulated for normal roof conditions. Normal roof conditions means leaving 2 ft. to 4 ft. of top coal as the immidiate roof. Because the immidiate roof is coal, under normal conditions no roof support need be used while developing rooms.

B. This is a typical pillar extraction plan and is a general outline to follow. Any variation from this plan would be no less safe than the one given here.

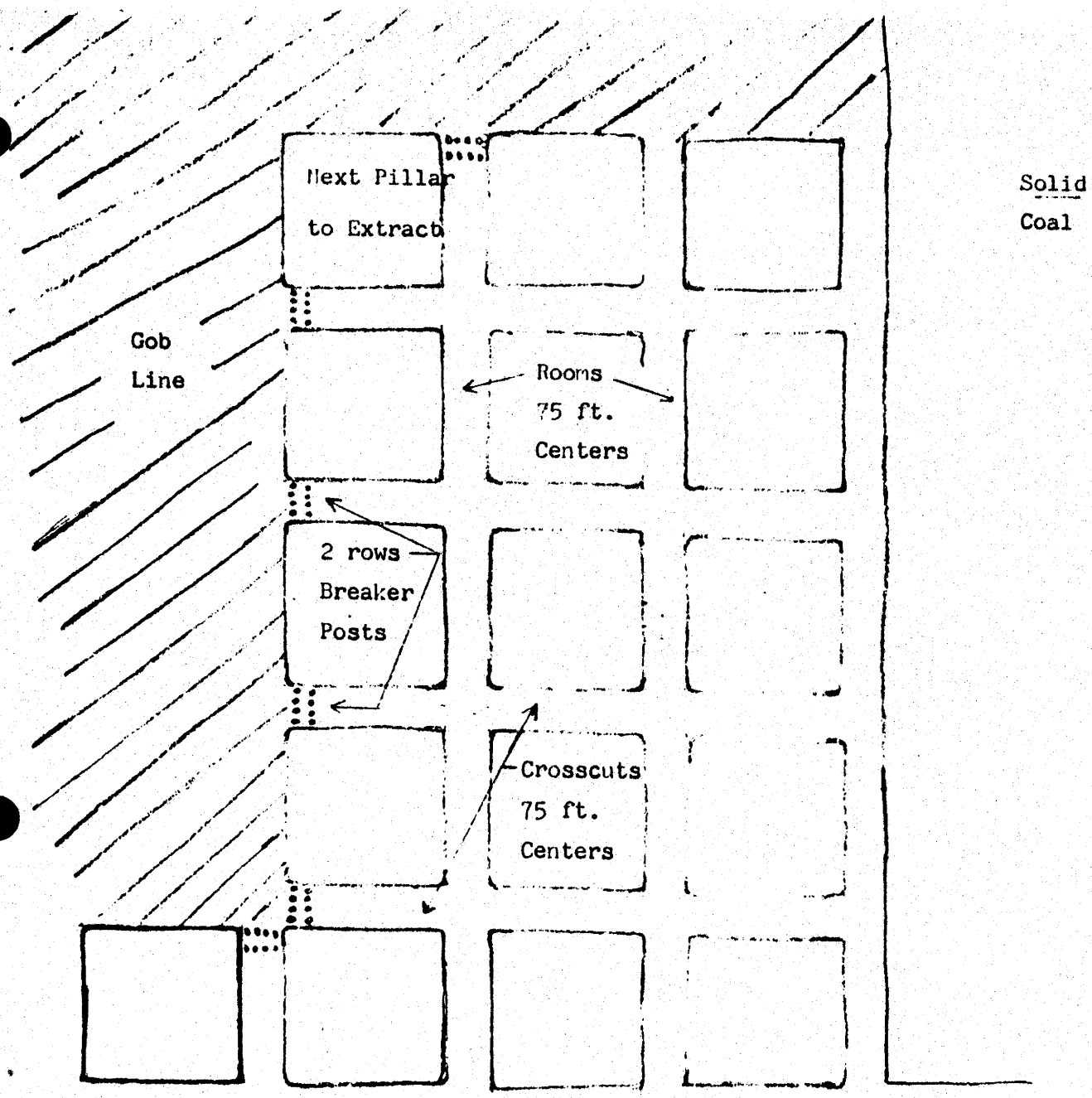
1. Rooms are run on 75 ft. centers and are 18 ft. to 20 ft. wide. crosscuts are run on 75 ft. centers and are run 18 ft. to 20 ft. wide. The total coal seam is about 19 ft. high. Rooms and crosscuts are developed about 9 ft. high. Four ft. of top coal is left for safe roof. About 6 ft. of bottom coal is left and this coal will be extracted with the pillars.

2. Two rows of breaker posts are set on 4 ft. centers across each opening leading into pillared areas. Such posts are installed near the breakline between the split being started and the gob. See sketch #1.

3. A row of turn posts set on 5 ft. centers will be installed leading into each pillar split. When this split is through the pillar 2 rows of breaker posts are installed next to the gob. Another set of turn posts is installed and the fender is split. A row of breaker posts is

set at the end of this split and the far stump is reduced in size enough to allow a cave. The close stump is then reduced enough to allow a cave. The remaining fender is mined from the crosscut in the same manner. It should be noted that if additional posts are needed they will be used. See sketch No's 2,3,4, and 5 for explanation of extracting a pillar.

4. The size of the posts being used will be not less than 6 inches in diameter. All posts shall be topped with a wooden cap piece. These cap pieces will not be less than 3" x 6" x 24" in size. Posts will be installed tight and on solid footing. Not more than two wooden wedges should be used to install a post.



ROOF CONTROL WHILE EXTRACTING PILLARS

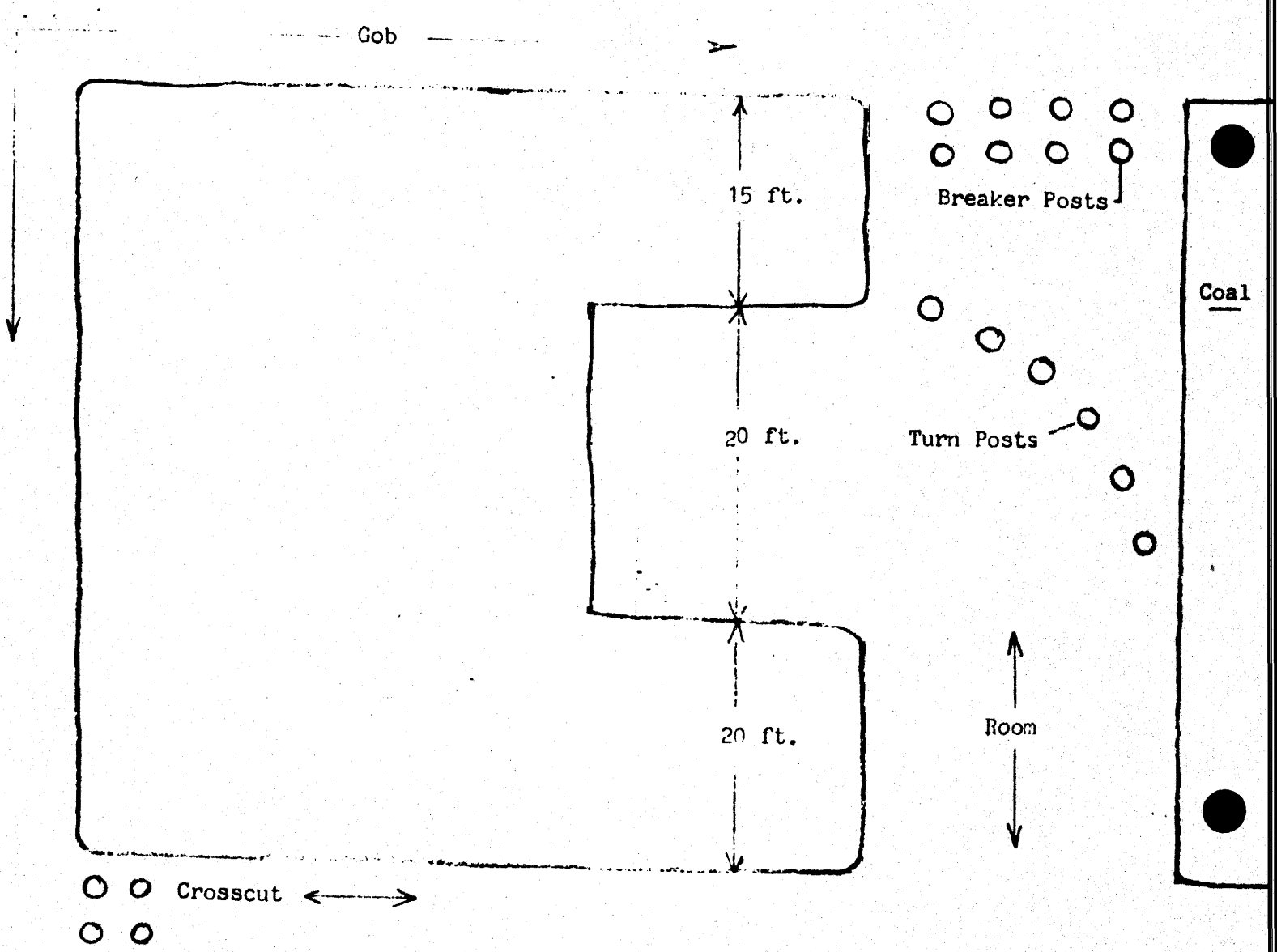
Two rows of breaker posts are set on 4 ft. centers across each opening leading into pillard areas. Such posts are installed near the break-line between the split being started and the gob.

Sketch No. 1

Bear Canyon No. 1

Mine I.D. No. 42-01697

Co-op Mining Co.



ROOF CONTROL WHILE EXTRACTING PILLARS

Starting Pillar Splits

Two rows of breaker posts are set on 4 ft. centers next to the gob line in both the room and crosscut. A row of turn posts is set on 5 ft. centers near the split being started. Pillars are approximatly 55 feet square. The split is about 20 ft. wide leaving about a 15 ft. fender next to the gob and 20 ft. next to the crosscut.

Sketch No. 2

Bear Canyon No. 1

Mine I.D. No. 42-01697

Co-op Mining Co.

Appendix 3-C

APPROVED INTERIM RECLAMATION PLAN

Scope

The following procedures are designed to revegetate and control erosion. They will to a large degree satisfy the commitments made by the Co-op Mining Company in their permit while also satisfying OSM regulations as pertaining to wildlife concerns and interim reclamation for those areas which will be utilized during mining operations.

The areas in question are along and adjacent to the coal stockpile and the topsoil storage pile and are of a contemporaneous nature.

The actual ground involved comprises approximately 1.6 acres of disturbed land primarily deck slope disturbance and the topsoil pile. (See Plate 3-2) Map). The actual procedures involve a two phase program: (1) Earthwork to prepare a site which will be stable enough for a period of time to allow vegetation to become established, (2) Hydroseed and

mulch the entire area to supplement revegetation and control runoff until stabilization is complete.

METHODOLOGY

Phase 1 - Earth Moving

The pad down slopes will be brought back to a reasonable configuration by implementation of a crawler tractor. The actual method will involve smooth contouring of the existing soil and walking the crawler up and down the slope attempting to minimize compaction while at the same time creating small indentations by the grouser on the track. This methodology creates an enhanced micro-climate for the establishment of seed and guarantees sufficient compaction as to assure integrity and stability of enbankment and prohibit failure.

Phase 2 - Seeding and Mulching

The entire area of disturbance will be hydroseeded during October, 1983. The seed mix and rate of application is attached. Hydro-seeding and mulching will be carried out in conjunction with the earth work of Phase 1. Recommendations for the hydroseeding and mulching operation are as follows:

This methodology involves the use of a hydro-seeder to apply the seed and tac to all disturbed areas and then to overspray the seeding with a wood-fiber mulch (approximately 2,000 lbs. per acre, long fiber) in combination with fertilizer and additional tacifying agents.

Co-op will follow the above recommendations.

The following rates of material should be utilized:

(Rates of tac were developed with respect to velocity and erosive power of water which is proportional to the square root of the slope). An emperical factor was determined from laboratory and field studies to arrive at the minimum tac to fiber ratio. Thus, 60 pounds of tac per ton of fiber is about minimum for slopes up to 20% and the emperical factor is determined as 60 ÷ 25% = 12. A 25% slope is about maximum for the minimum amount of tac. For a 100% slope (1 : 1 or 45) the ratio of tac to fiber is calculated as:

SUGGESTED RATIOS OF TAC TO FIBER FOR HYDRO-SEEDING AND HYDRO-MULCHING TO SERVE AS MULCH OR SOIL BINDER

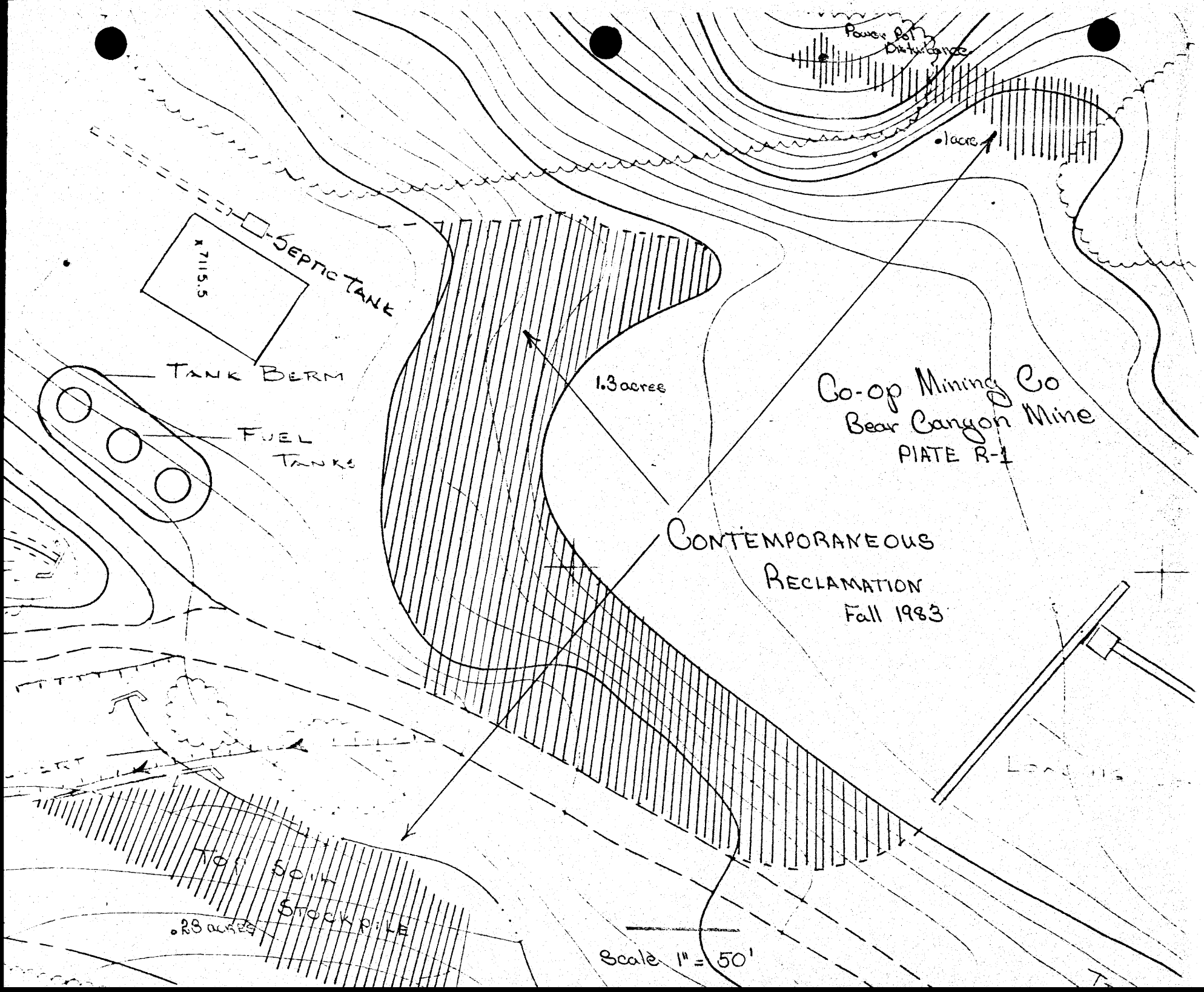
SLOPE ANGLE	SLOPE RATIO Rise:Run	PERCENT SLOPE	LBS. TAC Per Ton FIBER	RATIO TAC TO FIBER
14°	1 : 4	25%	60 (min.)	1 : 30
26°	1 : 2	50%	80	1 : 25
33°	1 : 1½	66%	100	1 : 20
45°	1 : 1	100%	120	1 : 16
57°	1½ : 1	150%	140	1 : 14
64°	2 : 1	200%	160 (min.)	1 : 12

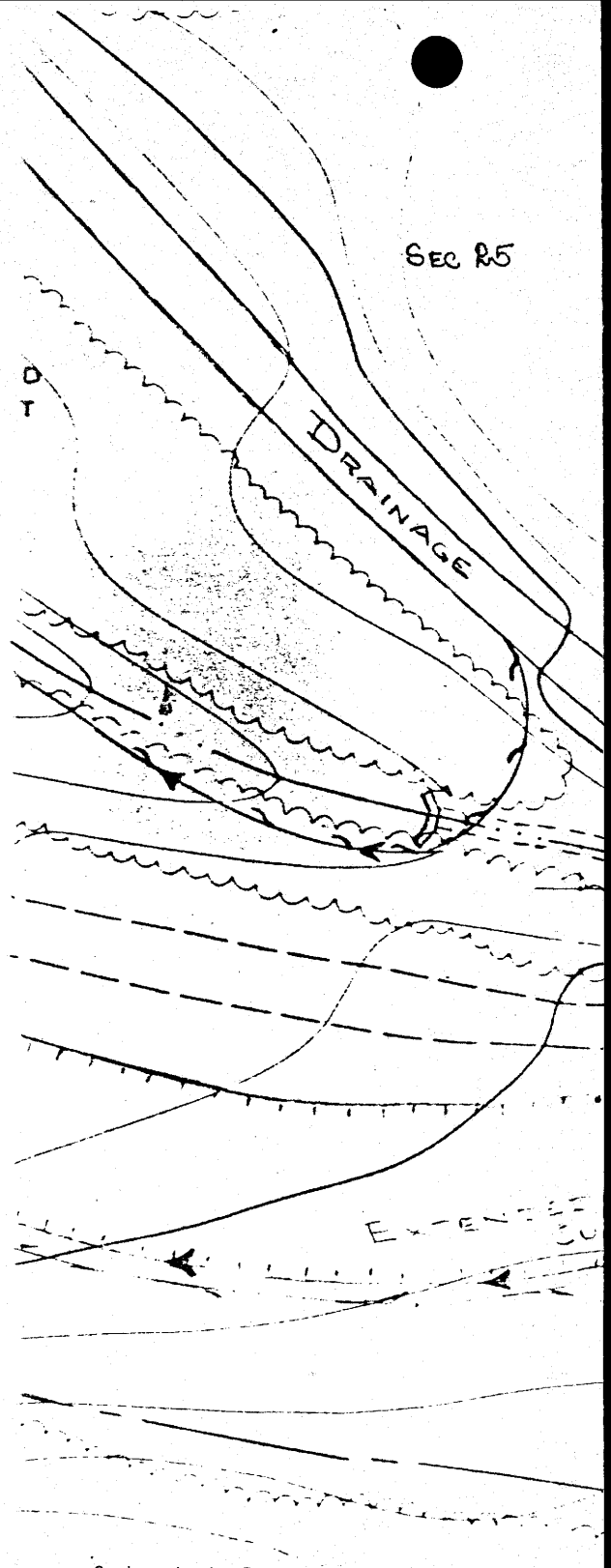
RECOMMENDED SEED MIX FOR INTERIM RECLAMATION

BEAR CANYON MINE

CO-OP MINING COMPANY

SPECIES	RATE PER ACRE HYDROSEED
GRASSES	
Agropyron dasystachyum Thickspike Wheatgrass	6
A. spicatum Bluebunch Wheatgrass	8
Elymus Salina Salina Wildrye	1.5
Oryzopsis hymenoides Indian Ricegrass	3
Poa secunda Sandberg Bluegrass	2
FORBS	
Ladak Alfalfa	2
Yellow Sweet Clover	2
COVER CROP	
Oats	20


Power Pol
Disturbance
.1 acre
Septic Tank
7115.5
Tank Berm
Fuel Tanks
1.3 acres
Co-op Mining Co
Bear Canyon Mine
PLATE R-1
Contemporaneous
Reclamation
Fall 1983
Top Soil
Stockpile
.28 acres
Scale 1" = 50'


SEC R5
DRAINAGE

CO-OP MINING CO.

P.O. Box 15809
Salt Lake City, Utah 84115
Phone (801) 467-4003

June 24, 1983

TOPSOIL STOCKPILE CONSOLIDATION

Bear Canyon Mine

The following plan for handling of topsoil and consolidation of piles to one storage area has been prepared for Co-op Mining Company by Mel Coonrod. Please refer to the request made by Co-op Mining Company on June 1, 1983 and the subsequent visit to the minesite by Ev Hooper and John Whitehead to discuss possible storage sites.

Co-op Mining Company

Wendell Owen

Wendell Owen

SOILS, PHYSICAL AND CHEMICAL PROPERTIES OF SOILS; RESULTS OF ANALYSIS, TESTS, TRIALS AND INTERIM RECLAMATION PLAN.

The 1982 Co-op field investigations provided information on the physical and chemical properties of soils in the permit area. A Soils Legend will be included for each soil in a map unit [Attachment 3A]. A rating for topsoil is included on this form, as are some chemical properties. In studies during the 1982 field season an onsite sampling was analyzed for the required chemical properties in all horizons [see Attachment 1-A].

SOIL SUBSTITUTE OR SUPPLEMENT

Not applicable.

SOIL REMOVAL, HANDLING, STORAGE, AND PROTECTION PLANS

To prevent suitable topsoil from being wasted or contaminated by waste materials, topsoil was removed from all new construction areas as a separate operation. The topsoil was stockpiled and will be consolidated and protected from wind and water erosion and contamination which might lessen its capability to support vegetation. The following subsections deal specifically with the various phases of the topsoil and subsoil handling plan.

Topsoil Removal

At the start of the construction phase, topsoil was collected from the area. Existing vegetation was removed and topsoil was collected prior to excavation or other surface disturbance operations within the affected areas.

The depth of topsoil removal in each case depends on the amount of A and B horizon material as defined in OSM Regulation 30 CFR 783.21 and 783.22. The topsoil removed in these areas consists of A horizon quality material

and B horizon quality material with vertually no distinctive difference. The C horizon material was not removed since it was not sufficiently capable of supporting diverse vegetation do to the excessive rock.

The equipment used for topsoil removal consisted of bulldozers, front-end loaders, and dump trucks. The use of bulldozers requires pushing of the topsoil to a collection point for loading into dump trucks or other means of transportation to the designated stockpile. Adequate supervisory personnel were present at the time of topsoil removal to instruct the equipment operators in the proper techniques of topsoil removal and to ensure that required horizons were removed and stored.

Topsoil Stockpile

Topesoil is presently being stored within areas of the permit boundary [see Map 1]. It is the Co-op intent to consolidate Piles #3 with Pile #4; to utilize Pile #2 which is principally rock and unsuitable as a growth media as rip-rap where ever the need arises; and to relocate Pile #1 which is primarily rock to the site of Pile #4 to be used as a top dressing upon final reclamation.

Plans involving topsoil storage can be labeled as "short term" or "long term" depending on completion of activities in each area and the reclamation schedule presented. These piles should be considered "long term".

Short-Term Topsoil Storage Areas

Short-term stockpiles of topsoil will be for areas to be reclaimed almost immediately upon cutting and at final grade. Topsoil will be redistributed promptly to minimize natural degradation processes.

Long-Term Topsoil Storage Areas

During any new construction of areas that will be used for the duration

of the mining operation within the permit area, topsoil will be collected and stockpiled. The topsoil will be used later for post-mining reclamation of the abandonment areas.

Topsoil Protection

The short-term topsoil stockpile will be sprayed with water or temporarily vegetated to retard erosion. The long-term topsoil stockpile will be protected by the following operational steps:

A stable surface will be provided in an area outside the influence of active operations.

As a stockpile is completed, it will be left in a rough condition to minimize erosion.

Stockpiles will be situated out of drainages to prevent water erosion.

Storage piles will be vegetated with quick-growing, soil-stabilizing plants. Revegetation will involve the immediate seeding of stockpiles topsoil during the next planting season with the seed mixture recommended in a report on vegetation and plant community analysis [see Attachment 2A Seed List] in compliance with the requirements of the appropriate land management agency.

Signs will be posted to protect the stockpiles from accidental use as fill or from other inadvertent material contamination.

The establishment of noxious plant species will be prevented.

The stockpiled topsoil will not be removed or otherwise disturbed until required for the redistribution operation on a prepared, regraded disturbed area.

PLANS FOR REDISTRIBUTION OF SOILS

Prior to topsoil redistribution, regraded land will be scarified by a ripper-equipped tractor. The ground surface will be ripped to a suitable depth in order to reduce surface compaction, provide a roughened surface assuring topsoil adherence, and promote root penetration. Steep slope areas which must remain after abandonment will receive special ripping to create ledges, crevices, pockets, and screes. This will allow better soil retention and vegetation establishment.

Within a suitable time period prior to seeding, topsoil will be distributed on areas to be reclaimed. During this time, the topsoil will be allowed to settle and attain equilibrium with its natural environment. This procedure will be followed for areas in which facilities such as roadbeds, mine pads, and building sites are to be abandoned.

Topsoil redistribution procedures will ensure an approximate uniform thickness consistent with the proposed reclamation plan. Topsoil will be redistributed at a time of the year suitable for establishment of permanent vegetation.

To minimize compaction of the topsoil following redistribution, travel on reclaimed areas will be limited. After topsoil has been applied, surface compaction will be reduced by using appropriate equipment running at a suitable depth. This operation will also help prepare a proper seed bed and protect the redistributed topsoil from wind and water erosion.

Co-op Mining will exercise care to guard against erosion during and after application toptopsoil and will employ the necessary measures to ensure the stability of topsoil on graded slopes. The specific methods to be implemented will be defined in the attached Interim Plan. An example of the soil stabilization methodology that might be used includes the placement of crushed and heavier material at the toe of fill slopes, and the random placement of large rocks and boulders on the surface. This procedure will

enhance the microclimate as well as make the reclaimed area more asthetically compatible with the undisturbed surroundings.

Phosphorus
Nitrogen
Soil pH and salinity
Soil texture

Chemical analysis for micronutrients will be conducted by testing soil extracts from the redistributed material. All necessary fertilization or neutralization, as determined by soil testing, will be done according to the final Reclamation Plan.

EFFECTS OF MINING OPERATIONS ON TOPSOILS, NUTRIENTS, AND SOIL AMENDMENTS

Since the Co-op Mine is an underground mine, the impact of mining on soils will be minor overall. The impacts of surface operations and mining facilities on soil resources consist of coverage of soil by landfills and refuse, disturbance of soils during construction activities, erosion created by removing vegetation, reduced forage growth due to nutrient degradation, reduced livestock capacity, and particulate emissions to the air.

The areas in which soil has been disturbed to date within the permit area, includes the loadout area, future offices, shops and substations, roads, portal areas, and the topsoil storage areas. Additional acreage may be disturbed in the future if Co-op elects to proceed with certain projects it is considering.

MITIGATION AND CONTROL PLANS: SOILS TESTING PLAN

Detailed Interim Reclamation Plans [Appendix 3-C] are attached and will be part of the Bear Canyon Mine Reclamation Plan in regard to stockpiling and long and short term plans and goals for final reclamation.

SOIL TEST REPORT

NO. 7406.0

AGRICULTURAL CONSULTANTS, INC.
P.O. DRAWER 507 — 240 S. FIRST AVENUE
BRIGHTON, COLORADO 80601
303/659-2313

DATE RCVD 11-12-82

REPORTED 11-23-82

REPORT TO: CO-OP MINING COMPANY ATTN: MR. OWEN

BILL TO: SAME

GROWER: SAME

SAMPLE ID: SCALES BEAR

TEXTURE s=silt, sily l=sand, sandy o=loam, loamy c=clay	pH		CEC Meq /100g	SALT Mmhos /cm	Na Meq /100g	Lime %	OM %	Org N Lbs	AVAILABLE NUTRIENTS ppm (1)										
	H_2O	Buf							NO_3	P(2)	K(2)	Ca	Mg	S(2)	B	Zn	Fe	Mn	Cu
LO	8.3	7.0	11.1	1.0	0.2	8.6	1.3	45.5	8	3	99	3400	210	31	0.6	0.6	3.8	2.0	0.3

CROP	YIELD GOAL	CROP RESIDUE T/A	MNR T/A	RECOMMENDATIONS POUNDS PER ACRE											
				N	P_2O_5	K_2O	Elem Sulfer	Lime	Mg	SO_4-S	Boron	Zinc	Iron	Mn	Cu
DL Native Grasses	Average	-	0	40	50	50	0	0	0	0	0	0	0	0	0

1.ppm=parts per million or lbs element per million lbs soil. ppm x 2 = lbs/acre 6-7" depth. ppm x 3.5 = lbs/acre feet. 2. P x 2.3 = P_2O_5 K x 1.2 = K_2O S x 3 =

Values reported but without specific remarks are considered to be within growth range of intended crop.

If poor moisture conditions reduce fertilization accordingly.

Supervised by Dian Lansing

ATTACHMENT 1-A

ATTACHMENT #2-A

RECOMMENDED SEED MIX
BEAR CREEK MINE
CO-OP MINING COMPANY

SPECIES	RATE* PER ACRE	APPROXIMATE NO. SEEDS/FT^2
GRASSES		
Agropyron dasystachyum	3	12
Thickspike wheatgrass		
A. spicatum	8	22
Bluebunch wheatgrass		
Elymus Salina	1.5	15
Salina wildrye		
Oryzopsis hymenoides	3	12
Indian ricegrass		
Poa secunda	1	21
Sandberg bluegrass		
FORBS		
Achillea millifolium	.15	10
Western yarrow		
Aster chilensis	.15	9
Pacific aster		
Hedysarum boreale	9	7
Northern sweetvetch		
Lupinus sericeus	20	6
Silky sweetvetch		
Penstemon Palmeri		
Palmer penstemon		
or		
P. Strictus	.5	7
Rocky Mountain Penstemon		

Attachment #2-A

SHRUBS

Amelanchier Utahensis Utah serviceberry	4	4
Artemisia tridentata ssp. vaseyana Big sagebrush	.15	9
Cercocarpus ledifolius Curlleaf Mountain mahogany	6	7
Chrysothamnus nauseosus var. albicaulus Whitestem rubber rabbitbrush	.5	5
Sambucus cerulea Blue elderberry	.8	4
For hydroseeding	59.75	159
1/2 application for drill seeded areas	30.00	

* Rate is pure live seed to be broadcast and lightly covered.

ATTACHMENT 3-A

SOIL LEGEND

SOIL SYMBOL	SOIL MAPPING UNIT NAME
D2E	Datino bouldery fine sandy loam, 5 to 20 percent slopes
D1G	Datino very stony fine sandy loam, 55 to 70 percent slopes

DESCRIPTION OF THE SOILS

D2E Datino bouldery fine sandy loam, 5 to 20 percent slopes

This Datino soil is very deep and well drained. It occurs on moderately steep alluvial fans and some sloping flood plains at elevations of 7,100 to 7,140 feet [2,165 to 2,177 meters]. This soil formed in alluvium and colluvium derived mainly from sandstone and shale. The average annual percipitation is 14 to 16 inches [36 to 41 centimeters]. Mean annual air temperature is 42 to 45 degrees F. [5 to 7 degrees C.], mean annual soil temperature is 44 to 47 degrees F. [6 to 8 degrees C.], and the average greeze-free season is about 80 to 110 days.

Slopes are 5 to 20 percent and mostly East facing. They are short and concave-convex.

Vegetation is dominatly pinyon, Utah juniper, salina wildrye, squirreltail, big sagebrush, Douglas-fir, and Rocky Mountain juniper.

Included in mapping are small areas of a similar soil except with 20 percent gravel and cobbles in the surface layer.

In a typical profile the surface layer is brown, bouldery fine sandy loam and cobbly loam about 10 inches [25 centimeters] thick. The subsoil is light brown very stony loam about 28 inches [71 centimeters] thick. The substratum is light reddish brown cobbly fine sandy loam to a depth of 60 inches [1.5 meters] or more.

Permeability is moderate. Available water capacity is 6 inches [15 centimeters] to a depth of 60 inches [1.5 meters]. Organic matter content in the surface layer is 4 percent. Effective rooting depth is about 60 inches [1.5 meters]. Surface runoff is medium and erosion hazard is moderate under potential native vegetation and high if vegetation is removed and the soil is left bare. Erodibility is low. This soil is used for range, wildlife habitat and mining operations.

Taxonomic classification is loamy-skeletal, mixed Typic Haploboralls.

A typical pedon of Datino bouldery fine sandy loam, 5 to 20 percent was described on the cut about 200 feet East and 1,100 feet South of the NW corner of Section 25, T16S, R7E.

A11 - - 0 to 2 inches [0 to 5 centimeters] brown [10YR 5/3] bouldery fine sandy loam, dark brown [10YR 3/3] when moist; moderate fine granular structure; loose, very friable, slightly sticky, non-plastic; common very fine to medium, few coarse roots; 10 percent boulders, 10 percent stones, 5 percent cobbles, 10 percent gravel; slightly calcareous; moderately alkaline [8.0]; abrupt smooth boundary.

A12 - - 2 to 10 inches [5 to 25 centimeters]; brown [10YR 5/3] cobbly loam, dark brown [10YR 3/3 when moist; moderate medium granular structure; soft, friable, slightly sticky, slightly plastic; common very fine to medium, few coarse roots; 10 percent cobble and 10 percent gravel; moderately calcareous; moderately alkaline [ph 8.2]; clear smooth boundary.

B2 - - 10 to 38 inches [25 to 96 centimeters]; light brown 7.5YR 6/4] very stony loam, brown [7.5YR 4/4] when moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine to medium roots; 1 percent boulders, 30 percent stone, 10 percent cobbles, 20 percent gravel; moderately calcareous; strongly alkaline [ph 8.5]; abrupt wavy boundary.

C1 - - 38 to 60 inches [96 to 152 centimeters] light reddish brown [5YR 6/4] cobbly fine sandy loam, reddish brown [5YR 4/4] when moist; massive; soft, very friable, slightly sticky, non-plastic; few very fine and fine roots; 10 percent cobbles, 5 percent gravel; strongly calcareous; strongly alkaline [ph 8.6].

D1G <u>Datino - Rock Outcrop Complex, 55 to 70 percent slopes</u>

This map unit is on very steep canyon sideslopes. Slopes are short and concave-convex. Elevation is 7,140 to 7,600 feet [2,177 to 2,318 meters]. The average annual precipitation is 14 to 16 inches [36 to 41 centimeters]. Mean annual air temperature is 42 to 44 degrees F. [6 to 7 degree C.] and the average frost-freeze season is 80 to 110 degrees.

This unit is 75 percent Datino very stony fine sandy loam, 55 to 70 percent slopes in single and concave areas and 15 percent rock outcrop on ridges.

Included in this unit is about 10 percent of a shallow soil that is about 6 to 15 inches in depth, associated with the rock outcrop.

The Datino soil is very deep and well drained. This soil formed in colluvium derived mainly from sandstone and shale. Slopes are 55 to 70 percent and East facing. They are short and concave-convex. Vegetation is dominantly pinyon, Utah juniper, Rocky Mountain juniper, salina wildrye, Douglas-fir, curlleaf mountain mahogany.

In a typical profile the surface layer is brown or yellowish brown, very stony fine sandy loam about 16 inches [41 centimeters] thick. The subsoil is very pale brown, very stony sandy clay loam about 20 inches [51 centimeters] thick. The substratum is very pale brown, very stony silty clay loam to a depth of more than 60 inches [152 centimeters].

Permeability is moderate to 36 inches [91 centimeters] and moderately slow below 36 inches. Available water capacity is 6.5 inches [16 centimeters] to a depth of 60 inches [1.5 meters]. Organic matter content in the surface layer is about 4 percent. Effective rooting depth is about 60 inches [1.5 meters]. Surface runoff is rapid and erosion hazard is high under potential native vegetation and very high if vegetation is removed and the soil is left bare. Erodibility is low. This soil is used for range, wildlife habitat, and mining operation.

Taxonomic classification is loamy-skeletal, mixed Typic Haploboralls.

A typical pedon of Datino very stony fine sandy loam, 55 to 70 percent slopes was described on the bank about 150 feet North of the old mine portal about 300 feet North and 300 feet East of the SW corner of Section 24, T16S, R7E.

A11 - - 0 to 3 inches [0 to 8 centimeters]; brown [10YR 5/3] very stony fine sandy loam, dark brown [10YR 3/3] when moist; moderate fine granular structure; soft, very friable, non-sticky, non-plastic; many very fine, few medium and course roots; moderately calcareous; moderately alkaline [ph 8.4]; abrupt amooth boundary.

A12 - - 3 to 16 inches [8 to 41 centimeters]; yellowish brown [10YR 5/4] stony fine sandy loam, dark brown [10YR 3/3] when moist; weak medium granular structure; soft, friable, non-sticky, non-plastic; many very fine and fine, few medium and coarse roots; 2 percent boulders, 10 percent stones, 10 percent cobbles, 10 percent gravel; moderately calcareous; moderately alkaline [ph 8.4]; clear smooth boundary.

B2 - - 16 to 36 inches [41 to 91 centimeters] very pale brown [10YR 7/3] very stony sandy clay loam, pale brown [10YR 6/3] when moist; weak medium subangular blocky structure; slightly hard, firm, slightly sticky, plastic; common very fine and fine roots; many fine pores; 2 percent boulders, 15 percent stones, 15 percent cobbles, 10 percent gravel; moderately calcareous; strongly alkaline [ph 8.6]; abrupt wavy boundary.

C1 - - 36 to 60 inches [91 to 152 centimeters] very pale brown [10YR 8/4] stony silty clay loam, light yellowish brown [10YR 6/4] when moist; moderate medium and coarse subangular blocky structure; hard, firm, sticky plastic; few very fine and fine roots, common fine pores; 2 percent boulders, 10 percent stones, 10 percent cobbles, 5 percent gravel; strongly calcareous; strongly alkaline [ph 8.9.].

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 228 NORTH LA SALLE STREET, CHICAGO, ILLINOIS 60601 · AREA CODE 312 726-8434

Reply to
Instrument Analysis Division
490 Orchard Street
Golden, CO 80401

Phone: 303-278-9521

November 23, 1981

Mr. Jack Blair
Commercial Testing & Engineering Co.
139 South Main Street
Helper, UT 84526

Co-op Mining Co.
Lab No. 57-7609

Re: IAD #97-H654-335-01

Analytical Report

One sample was received for analyses on October 28, 1981. This sample was given our identification IAD #97-H654-335-01.

A portion of the sample (≈100 g) was extracted at pH_5 for 24 hours according to the procedures of EPA/Test Methods for Evaluating Solid Wastes, SW-846, 1980, EP Toxicity. The sample required ≈170 mls of 0.5 N acetic acid to adjust the pH to 5. The extracted solution was brought to volume (2000 ml) and filtered with a 0.45 µm membrane filter. A portion of the filtered extract solution was acidified with nitric acid prior to metals analyses.

The solution was analyzed for Lead, Silver, Barium, Cadmium, and Chromium by flame atomic absorption; for Arsenic and Selenium by hydride generation atomic absorption; and for Mercury by cold vapor flameless atomic absorption using a permanganate/persulfate digestion and the gold amalgamation analytical technique to concentrate the Mercury.

The results of these determinations are presented in Table No. I and are reported in milligrams per litre (mg/L) in the filtered extract solution. The EP Toxic maximum contaminant levels are also presented.

Charter Mer

OVER 40 BRANCH LABORATORIES STRATEGICALLY LOCATED IN PRINCIPAL COAL MINING AREAS, TIDEWATER AND GREAT LAKES PORTS, AND RIVER LOADING FACILITIES

Table No. I
(mg/L)
EP Toxicity

Parameter	Co-Op Mining 57-7609	Maximum Contaminant Levels
Arsenic	<0.001	5.0
Selenium	<0.001	1.0
Mercury	0.0004	0.2
Silver	<0.005	5.0
Barium	1.1	100
Chromium	<0.01	5.0
Cadmium	<0.005	1.0
Lead	<0.05	5.0

If there are any questions concerning these results, please call.

Bruce A. Hale
Section Supervisor

M. L. Jacobs, Ph.D., Mngr.
Instrumental Analysis Div.

BAH/cl

l Copy Watermarked
Your Protection

UMC 817.103 Covering Coal and Acid and Toxic Forming materials

The PH, acid-base potential, texture and electrical conductivity of these materials must be included in the data reported.

Co-op Reply

The Co-op has submitted a sample to CT&E testing for this data at the time this submittal was prepared. A copy of the report will be sent directly to the UDOGM upon receipt. In the interim, the Co-op will commit to removing any and all such material should it be on the site. Also, the Co-op does not feel this regulation is applicable, for the area in question is not to be utilized in a manner which will constitute the stockpiling or storage of coal and/or refuse.

COMMERCIAL TESTING & ENGINEERING CO.

Reply to
Instrumental Analysis Division
490 Orchard Street
Golden, CO 80401

July 22, 1983

Phone: 303-278-9521

Mr. Jack Blair
CT & E Co.
224 South Carbon Ave.
Price, Utah 84501

CO-OP MINING COMPANY
Pond Sample
Lab No. 57-13312

Re: IAD # 97-M179-335-01

Analytical Report

One coal sample was received for analysis on July 12, 1983. This sample was assigned our IAD identification # 97-M179-335-01.

The sample was prepared to No.10 mesh size in accordance with the procedure of U.S.D.A. Handbook #60. Electrical Conductivity and pH were determined in accordance with the same publication.

Acid/Base Potential was determined in accordance with the procedure of the Environmental Protection Agency, EPA-670/2-74-070. This procedure is used for the Wyoming DEQ and in telephone conversation with the Utah Division of Oil, Gas & Mining we were advised that this procedure is acceptable for the requirements of the State of Utah.

The results of these determinations are presented in Table No.1 and are reported in units as indicated in the Table.

Table No. I

Parameter	57-13312
pH, paste (Standard Units)	7.6
Electrical Conductivity (µmhos/cm)	195
Acidity Potential*	0
Neutralization Potential*	29.8
Acid/Base Potential*	29.8

*Values are reported in Tons $CaCO_3$ Equivalent / 1000 Tons.

Texture determination was not performed as the sample is carbolithic and thus the determination of Sand, Silt and Clay fractions is not applicable in this case.

If you have any questions concerning these results, please call.

Harold A. Connell
Harold A. Connell
Assistant Lab Manager

Robert L. Taylor
R.L. Taylor, Ph.D., Manager 22 Jul 83
Instrumental Analysis Division

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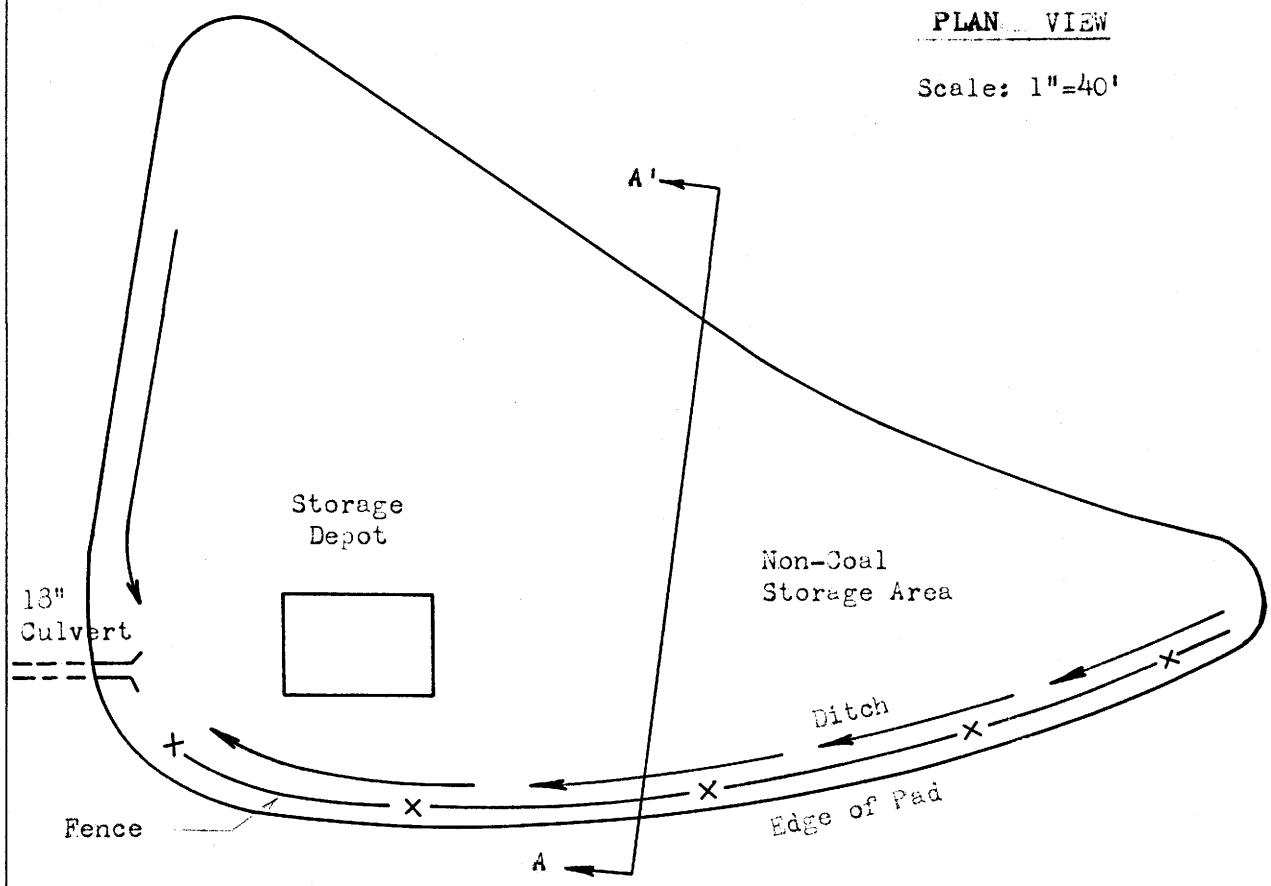
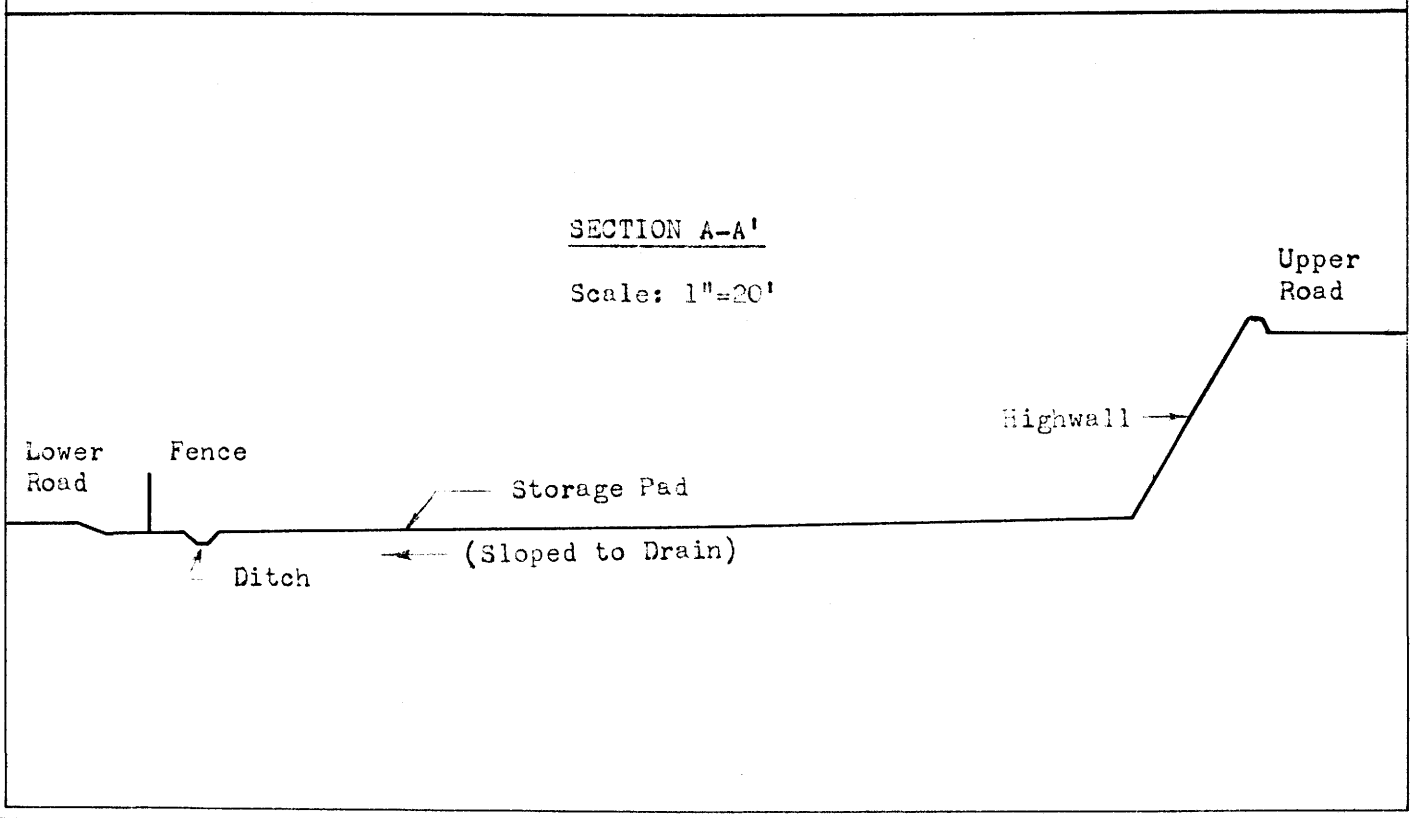
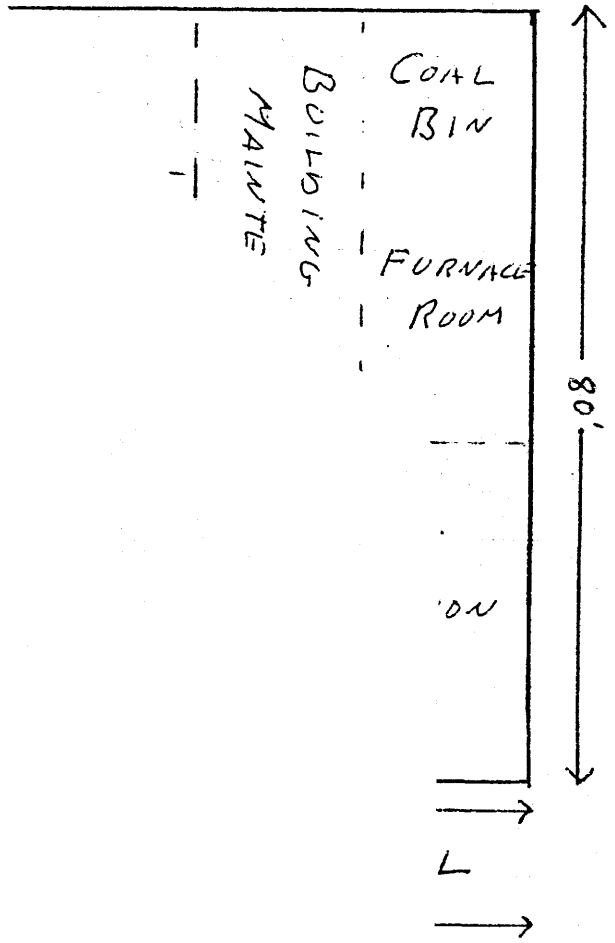
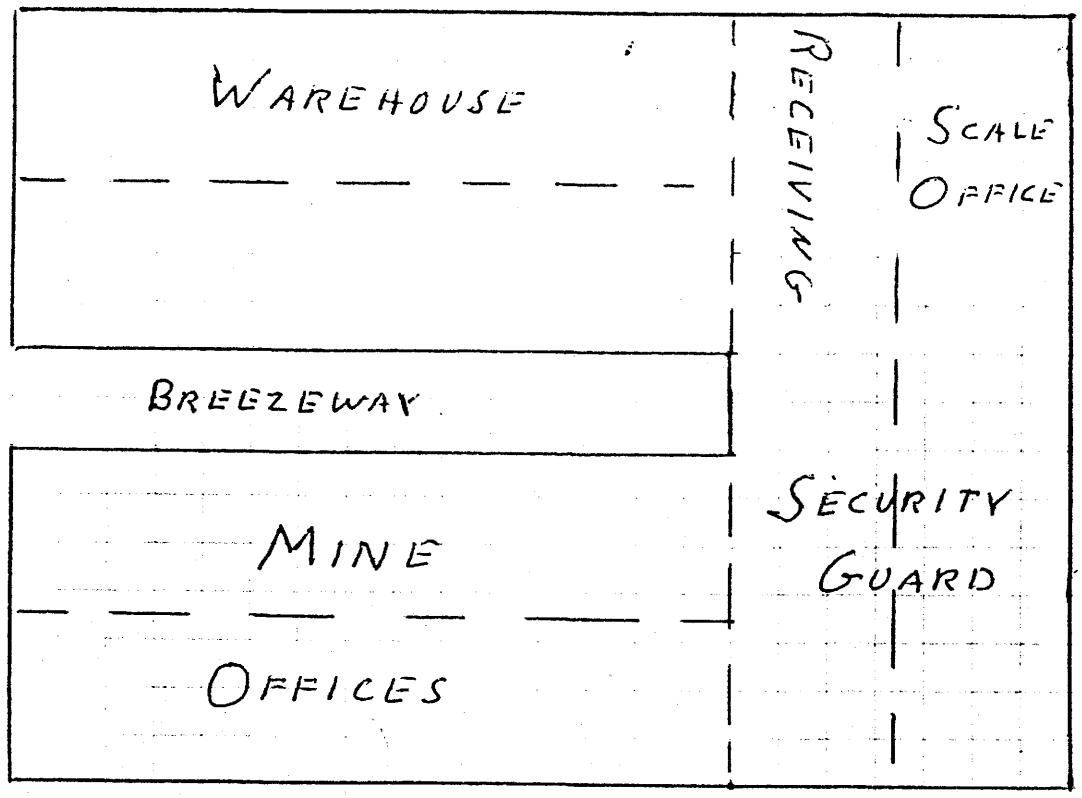


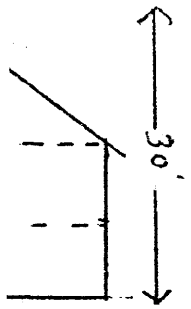


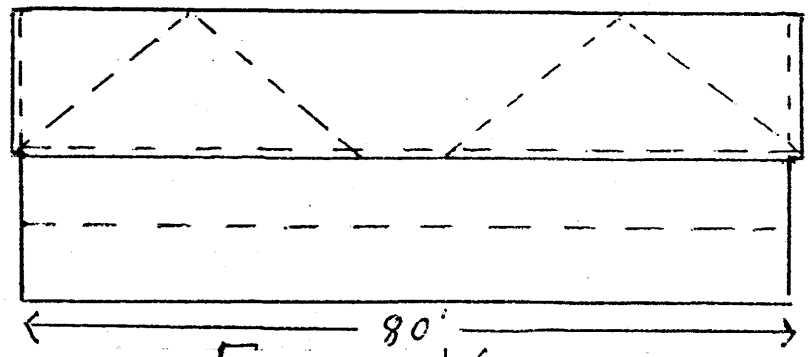
NON-COAL STORAGE AREA	BEAR CANYON	FIGURE NO. 3.8.1





PLAN VIEW - UPPER LEVEL





FRONT VIEW

TABLE 3-6

Parameters Included in Surface Water and Groundwater Monthly Monitoring Plan

1. Flow (gpm)
2. pH
3. Temperature (°C)
4. Total Dissolved Solids (mg/l)
5. Dissolved Calcium (mg/l)
6. Dissolved Iron (mg/l)
7. Dissolved Magnesium (mg/l)
8. Dissolved Potassium (mg/l)
9. Dissolved Sodium (mg/l)
10. Dissolved Bicarbonate (mg/l)
11. Dissolved Carbonate (mg/l)
12. Dissolved Chloride (mg/l)
13. Dissolved Nitrate (mg/l)
14. Dissolved Sulfate (mg/l)
15. Total Suspended Solids (mg/l)

Note: See Figure 7-4 for reporting format.

Removal or Reduction of Highwalls

The highwalls will be reduced along the pad and road areas where feasible. This will be accomplished by recovering material from the edge of pad and road fill areas with a backhoe and placing it against the base of the highwall. The material will be compacted with a cat to promote stability of the backfill. Erosion controls, such as straw dikes or water bars, will be placed below the backfilled areas to minimize washing of the fill material. The backfill material is native, consisting of material originally generated from the construction of the highwall areas and compacted into the road or pad fill areas.

Complete rock highwalls will be left in some areas to lessen the probability of erosion on backfilled materials or to minimize the amount of additional disturbance that would result from highwall reduction (see Plate 3-20).

The rationale for leaving or reducing the highwalls is based on the following:

1. Natural cliffs are common in the Blackhawk Formation, and in this area. The highwalls proposed to be left are similar in height and exposure to existing cliffs in the area and will therefore be compatible with existing topography.

2. The highwalls will provide habitat for cliff-dwelling wildlife, and the pad areas will provide for other wildlife grazing. This proposal is therefore compatible with the post-mining land use of wildlife habitat;

3. The rock highwalls could be partially shot down; however, this would extend the disturbance furthur up the steep slopes, resulting in more exposure and erosion potential;

4. The proposed highwalls to be left or reduced are on the south facing slopes in the area. These are the steeper slopes in the area, as well as the slopes more commonly containing rock exposures similar to the proposed highwalls

5. The fill areas at the base of the highwalls will be stabilized by reseeding and the use of erosion controls as discussed earlier. The toe of these areas will be terraces or gentle slopes (less that 10%) adding to their stability. These will eventually take the appearance of "talus slopes" a common structure at the base of exposed cliffs in this area. The natural weathering of cliffs and highwalls will be very similar, providing for a furthur compatibility with the geomorphic processes of the area.

6. The existing (and proposed) highwalls will be stable. There are no seeps known to exist in any areas where highwalls are proposed to be left. The stability analysis

run on this site show the highwalls of the pad and road areas to have a static safety factor of 2.61 for dry conditions and a factor of 2.41 for saturated conditions. Each of these far exceed the 1.3 safety factor required for highwalls proposed to be left or reduced. (Details on the stability analysis are included in the next section.)

STABILITY ANALYSES

Highwall Stability

Highwalls at the site face south, southeast, and east. The highwalls are nearly vertical, with an average slope of 1V:.2H, or 80°.

The highwall stability analysis is based on a rotational shear analysis using the Hoek method. Compressive strengths of materials in the Blackhawk Formation are highly variable, ranging from 290 PSI for soft shale to more than 20,000 PSI for certain sandstones. An average value of 5,000 PSI has been used for this analysis. This is a very conservative figure, based on the relative proportions of sandstones and shales in the exposed highwalls.

Cohesion can be calculated from compressive strength by the following formula:

$$C_i = \frac{Co}{2} \tan(45 - \frac{\theta}{2});$$

where:

C_i = Intact rock shear strangth or cohesion

Co= Intact rock compressive strength

θ = Internal friction angle.

Using a typical internal friction angle of 45 for Wasatch Plateau rock types, and a 5,000 PSI compressive strength, a cohesion or intact rock strength of approximately 1,000 PSI is found. Since the 1,000 PSI value is for intact or solid rock, the value must be adjusted fo compensate for jointing and fracturing common to all rock masses. A method of relating fracture intensity and cohesion was developed by Stimpson and Ross-Brown and can be found in the article entitled, "Estimating the Cohesive Strength of Randomly Jointed Rock Masses", Mining Engineering, Vol. 31, No. 2, pp. 182-188. Based on this method and using a conservative figure of 4 joints per meter, a .065 factor is determined for calculating Cm or rock mass cohesion. Based on a C_i of 1,000 PSI, Cm becomes 65 PSI.

A typical or average rock mass bulk density of 155 lbs/ft^3 was selected for the analysis, and a slightly conservative, but commonly used value of 31° was selected for the rock mass sliding friction angle.

The following parameters were used with the Hoek slope chart (Hoek, E., and J.W. Bray, 1981, Rock Slope Engineering, Revised Third Edition, IMM, London):

H = Maximum Slope Height - 100'

θ = Slope Angle (average) - 80°

C_m - Rock Mass Cohesion - 65 psi

ϕ = Rock Mass Friction Angle - 31°

γ = Rock Mass Bulk Density - 155 lbs/ft^3

Plotting the above parameters on the Circular Failure Charts Nos. 1 and 5, it can be seen that the projected highwalls will have a safety factor of 2.61 under dry conditions and 2.40 under saturated conditions. It should be noted that the safety factors exceed the required 1.5 safety factor.

Embankment Stability

Embankment or backfill will be placed in lifts not to exceed 36" and will be compacted to 90% Slopes will not exceed 1V:1.5H or 33.7°. Soil properties are based on those used in the "Slope Stability Analyses for the Bear Creek Portal and Access Road", by Dames and Moore, February 20, 1981.

A rotational shear analysis was performed using the Hoek method to determine stability of the backfilled slopes. The following parameters were used for the slopes.

H = Embankment Height - 30'

θ = Slope Angle - 33.7°

C_m = Soil Cohesion @ 90% Compaction - 4.375 psi

ϕ = Friction Angle - 26°

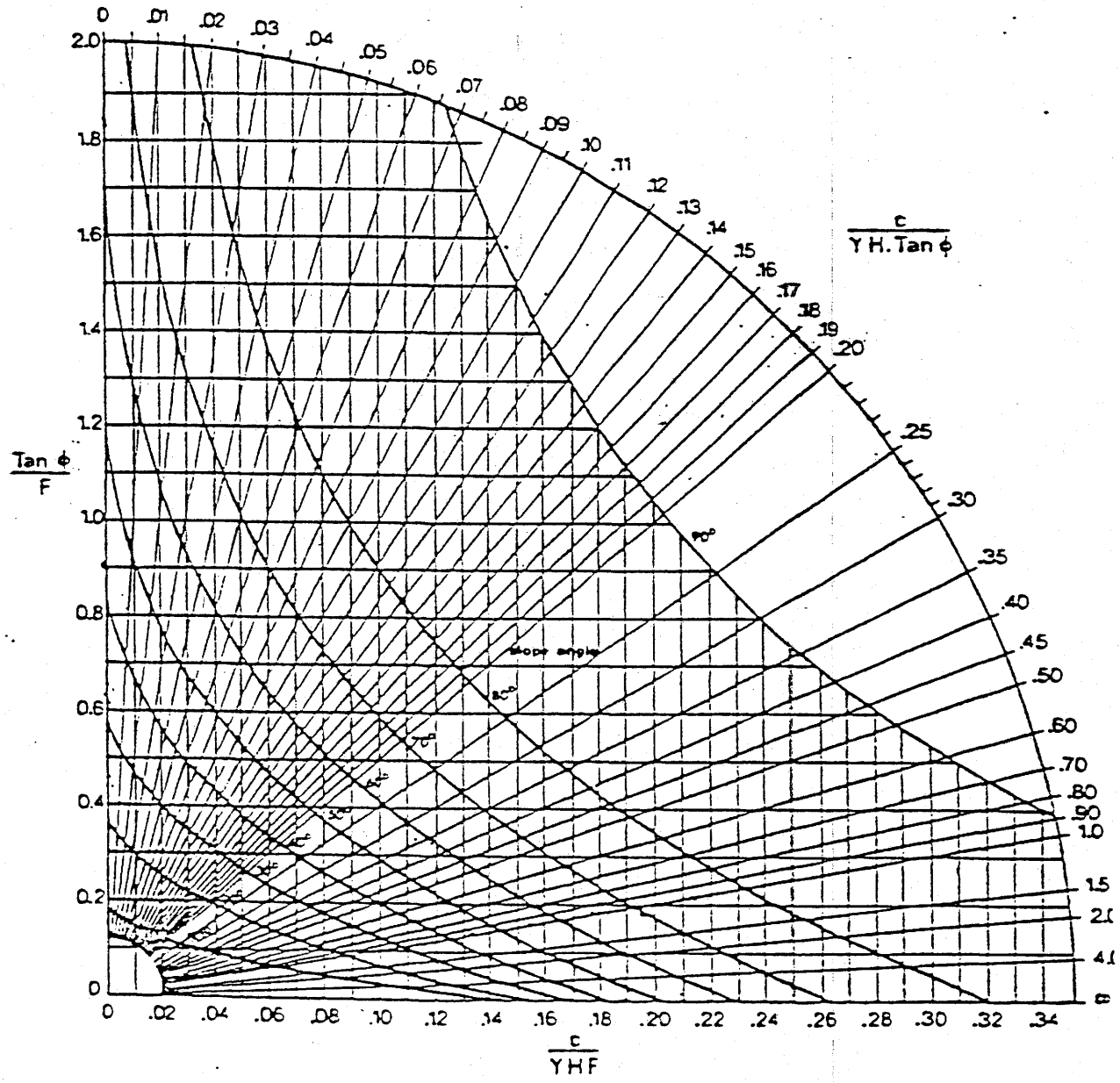
= Rock Mass Bulk Density (90%) - 108 lbs/ft^3

Based on the above criteria, backfilled slopes are found to have an expected safety fector of a maximum of 2.21 for dry conditions to

a minimum of 1.68 for saturated conditions. Both cases exceed the required static safety factor of 1.3. It should also be noted that the previous slope stability analyses by Dames & Moore resulted in static safety factors ranging from a minimum of 1.43 to 2.15 for side-cast cut and fill material in this area.

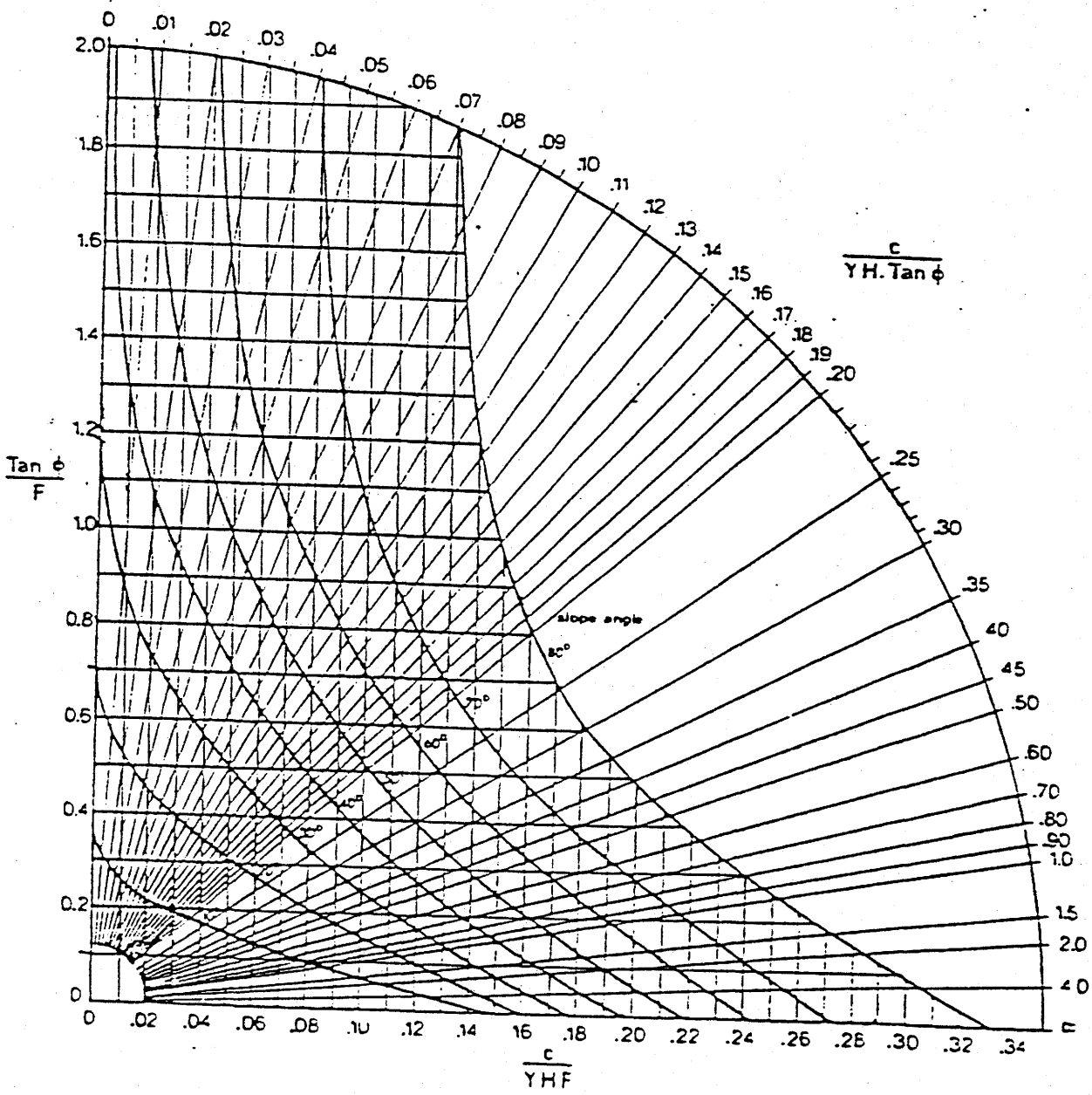
(DRY CONDITIONS)

CIRCULAR FAILURE CHART NUMBER 1



(SATURATED CONDITIONS)

CIRCULAR FAILURE CHART NUMBER 5



STABILITY ANALYSES

Highwall Stability

Highwalls at the site face south, southeast, and east. The highwalls are nearly vertical, with an average slope of IV:.2H, or 80°.

The highwall stability analysis is based on a rotational shear analysis using the Hoek method. Compressive strengths of materials in the Blackhawk Formation are highly variable, ranging from 290 PSI for soft shale to more than 20,000 PSI for certain sandstones. An average value of 5,000 PSI has been used for this analysis. This is a very conservative figure, based on the relative proportions of sandstones and shales in the exposed highwalls.

There are 2 joint sets typically found in this area. The major set has a strike of about N 10° E and dips 80° to vertical. The minor set has a strike of approximately N 70° W and also dips greater than 80°. The bedding in the highwall area is nearly flat.

Cohesion can be calculated from compressive strength by the following formula:

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$$C_i = \frac{Co}{2}\tan(45 - \frac{\theta}{2});$$

where:

C_i = Intact rock shear strength or cohesion

Co= Intact rock compressive strength

θ = Internal friction angle.

Using a typical internal friction angle of 45° for Wasatch Plateau rock types, and a 5,000 PSI compressive strength, a cohesion or intact rock strength of approximately 1,000 PSI is found. Since the 1,000 PSI value is for intact or solid rock, the value must be adjusted to compensate for jointing and fracturing common to all rock masses A method of relating fracture intensity and cohesion was developed by Stimpson and Ross-Brown and can be found in the article entitled, "Estimating the Cohesive Strength of Randomly Jointed Rock Masses", Mining Engineering, Vol. 31, No. 2, pp. 182-188. Based on this method and using a conservative figure of 4 joints per meter, a .065 factor is determined for calculating Cm or rock mass cohesion. Based on a C_i of 1,000 PSI, Cm becomes 65 PSI.

A typical or average rock mass bulk density of 155 lbs./ft.^{3} was selected for the analysis, and a slightly conservative, but commonly used value of 31° was selected for the rock mass sliding friction angle.

The following parameters were used with the Hoek slope chart (Hoek, E., and J. W. Bray, 1981, Rock Slope Engineering, Revised Third Edition, IMM, London):

H = Maximum Slope Height - 100'

θ = Slope Angle (average) - 80°

C_m = Rock Mass Cohesion - 65 PSI

ϕ = Rock Mass Friction Angle - 31°

γ = Rock Mass Bulk Density - 155 lbs./ft.^{3}

Plotting the above parametes on the Circular Failure Charts Nos. 1 and 5, it can be seen that the projected highwalls will have a safety factor or 2.61 under dry conditions and 2.40 under saturated conditions. It should be noted that the safety factors exceed the required 1.5 safety factor.

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Embankment Stability

Embankment or backfill will be placed in lifts not to exceed 36" and will be compacted to 90% of the laboratory obtained T-99 Standard Proctor. Slopes will not exceed IV:1.5H or 33.7°. Soil properties are based on those used in the "Slope Stability Analyses for the Bear Creek Portal and Access Road", by Dames and Moore, February 20, 1981, and the "Geotechnical Consultation, Bear Creek Portal", by Dames and Moore, December 29, 1980, and the "Bear Creek Canyon Mine Site, Sedimentation Pond "A" Stability Analysis", by Horrocks and Corollo Engineers on July 12, 1984.

Based on the proposed plan, and the results of samples taken during the above studies, the following parameters were established for the safety factor calculations:

(1) H = Embankment Height = 30'; this represents the maximum height of compacted embankment proposed in the plan;

(2) θ = Slope Angle = 33.7°; this is the maximum slope (IV:1.5H) proposed for the reclaimed embankments;

(3) C_m = Soil Cohesion @ 90% Compaction = 4.375 PSI; Actual Cohesion tests on compacted native material at this site showed a cohesion value of 700 PSF at a density of 118 lbs./ft.^{3} and a compaction value ranging from 89% to 94%. (See Sediment Pond "A" Stability Analysis", by Horrocks & Corollo Engineers, July 12, 1984.) To provide for maximum safety in the calculation, the cohesion factor is reduced by the compaction factor.

700 pfs X 0.9 = 630 psf = 4.375 psi;

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(4) ϕ = Friction Angle = 26°; This angle is based on the measurements taken and reported in the Feb. 20, 1981 Dames & Moore Slope Stability Analysis on the Bear Creek Portal and Access Road;

(5) Υ = Rock Mass Bulk Density (90%) = 108 lbs/ft.^{3}; Once again, this is a conservative number, established by taking actual values of 118 to 120 lbs./ft^3 as reported in the above reference stability analysis,

and allowing for 90% compaction - 120 X 0.90 = 108 lbs./ft.^{3}.

A rotational shear analysis was performed using the Hoek method to determine stability of the backfilled slopes. The following parameters were used for the slopes:

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H = Embankment Height - 30'

θ = Slope Angle - 33.7°

C_m = Soil Cohesion @ 90% Compaction - 4.375 psi

$\emptyset$ = Friction Angle - 26°

γ = Rock Mass Bulk Density (90%) - 108 lbs./ft.^{3}

Based on the above criteria, backfilled slopes are found to have an expected safety factor of a maximum of 2.21 for dry conditions to a minimum of 1.68 for saturated conditions. Both cases exceed the required static safety factor of 1.3. It should also be noted that the previous slope stability analyses by Dames & Moore resulted in static safety factors ranging from a minimum of 1.43 to 2.15 for side-cast cut and fill material in this area.

Note: The embankment compaction factors and cohesion values are based on previous tests performed in the Bear Canyon area. Although the tests were not site specific, they were run on the existing soils which are the same as those to be used in reclamation. The values used for rock compressive strengths were taken from rock parameters typical of the Blackhawk Formation in the Wasatch Plateau, and commonly used and accepted for this type of calculations.

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(DRY CONDITIONS)

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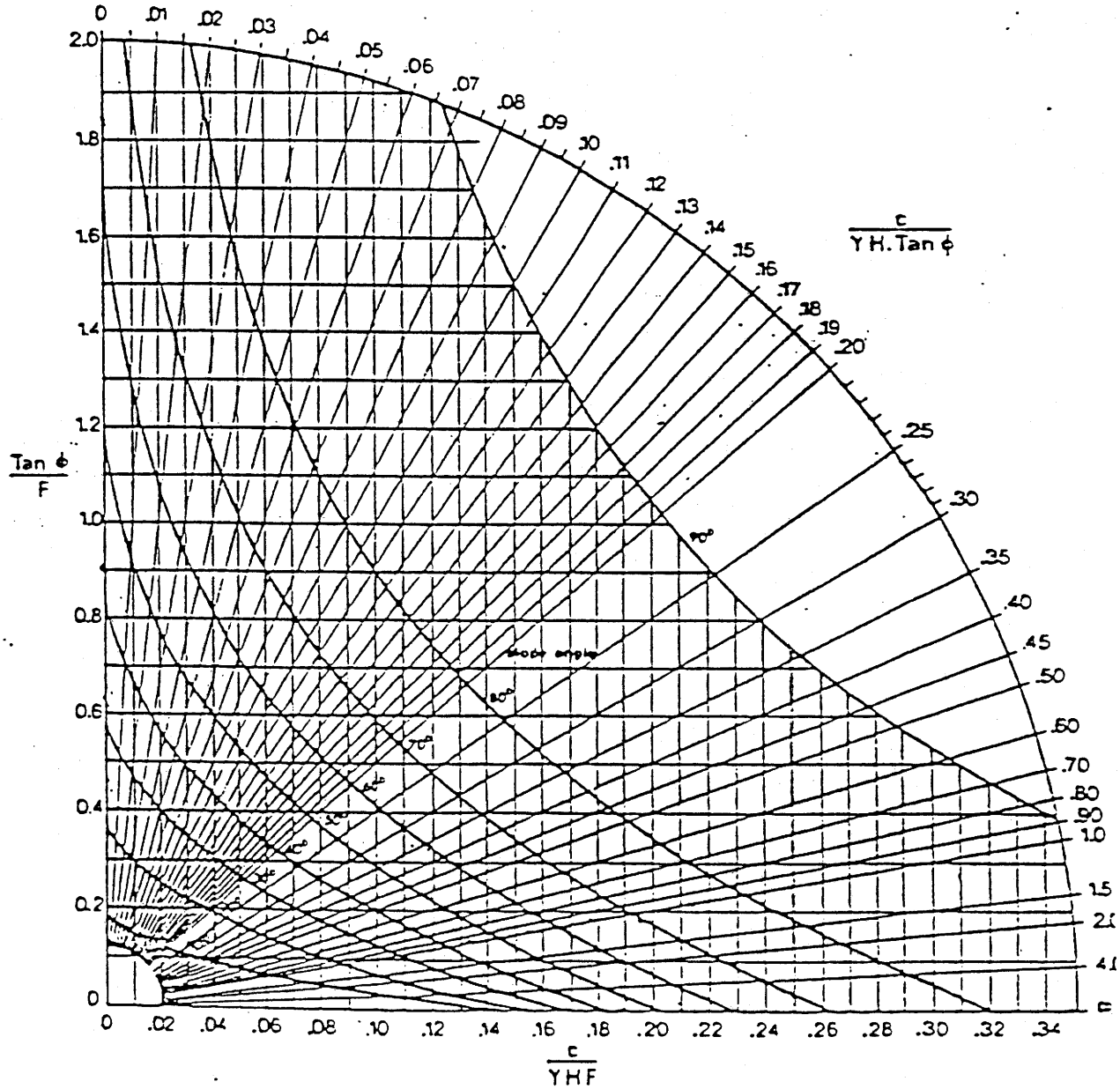

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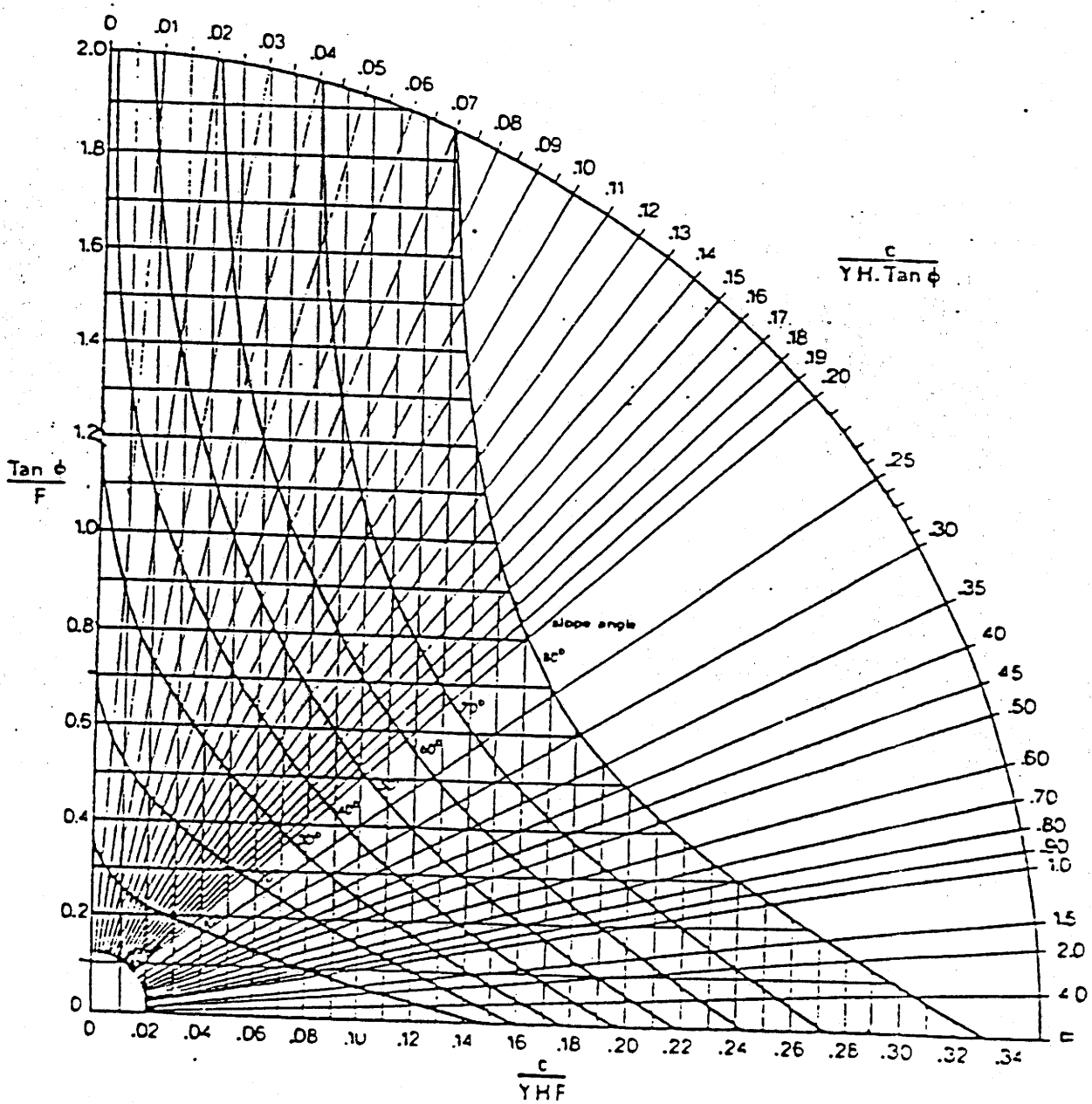
(SATURATED CONDITIONS)

CIRCULAR FAILURE CHART NUMBER 5



If it is determined necessary, Co-Op will commit to taking site specific tests on the soils and highwall rock to further verify the factors of safety. These tests would be performed prior to reclamation, or at the discretion of the Division.

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Removal or Reduction of Highwalls

The highwalls will be reduced along the pad and road areas where feasible. This will be accomplished by recovering material from the edge of pad and road fill areas with a backhoe and placing it against the base of the highwall. The material will be compacted with a cat to promote stability of the backfill. Erosion controls, such as straw dikes or water bars, will be placed below the backfilled areas to minimize washing of the fill material. The backfill material is native, consisting of material originally generated from the construction of the highwall areas and compacted into the road or pad fill areas.

Complete rick highwalls will be left in some areas to lessen the probability of erosion on backfilled materials or to minimize the amount of additional disturbance that would result from highwall reduction (see Plate 3-2).

The rationale for leaving or reducing the highwalls is based on the following:

1. Natural cliffs are common in the Blackhawk Formation, and in this area. The highwalls proposed to be left are similar in height and exposure to existing cliffs in the area and will therefore be compatible with existing topography.

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2. The highwalls will provide habitat for cliff-dwelling wildlife, and the pad areas will provide for other wildlife grazing. This proposal is therefore compatiable with the post-mining land use of wildlife habitat;

3. The rock highwalls could be partially shot down; however, this would extend the disturbance furthur up the steep slopes, resulting in more exposure and erosion potential;

4. The proposed highwalls to be left or reduced are on the south facing slopes in the area. These are the steeper slopes in the area, as well as the slopes more commonly containing rock exposures similar to the proposed highwalls

5. The fill areas at the base of the highwalls will be stabilized by reseeding and the use of erosion controls as discussed earlier. The toe of these areas will be terraces or gentle slopes (less than 10%) adding to their stability. These will eventually take the appearance of "talus slopes" a common structure at the base of exposed cliffs in this area. The natural weathering of cliffs and highwalls

will be very similar, providing for a furthur compatibility with the geomorphic processes of the area.

6. The existing (and proposed) highwalls will be stable. There are no seeps known to exist in any areas where highwalls are proposed to be left. The stability analysis run on this site show the highwalls of the pad and road areas to have a static safety factor of 2.61 for dry conditions and a factor of 2.41 for saturated conditions. Each of these far exceed the 1.3 safety factor required for highwalls proposed to be left or reduced. (Details on the stability analysis are included in the next section).

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APPENDIX 3-G

ROADS

Class I Roads

The Bear Canyon Haul Road is approximately 1800' long from the gate to the scale house as shown on Plates 3-5 and 2-2. As shown on the map, this portion of the road has been included in the Permit Area. This Class I road is constructed 30' wide and is surfaced with 6" of 3/4" gravel, crowned in the middle as shown on the cross section. Drainage will be provided along the road by ditches with a minimum depth of 1.8 feet. Erosion protection, such as straw bales at 100' intervals or 6" median diameter rip rap on a bed of -1" gravel 6" thick, shall be provided in all areas where velocities are expected to exceed 5 ft. per sec.. Culverts are installed as shown on the drawings; In addition, the two proposed 30" CMP culverts are now in place as indicated on the map. Culvert inlets will be protected by rock-lining or concrete headwalls. In areas where culverts are placed, at least 30" of headwater depth is available to allow for a avariance to allow the 18" culverts to pass the 10-year, 24-hour storm event. The culvert on the submitted drawing is to scale, and was installed with a trash rack to prevent plugging, a rock headwall at the inlet, and rip rap at the outlet to prevent erosion.

This road will be maintained in such a manner that the performance standards will be met throughout the life of

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the entire transportation facility, including maintainance of the surface, shoulders, parking and side areas, and erosion control structures for safe and efficient utilization of the road.

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Upon completion of the operation and reclamation of the mine site disturbed area, it is anticipated that this portion of the Bear Canyon Road will also be reclaimed. This will occur at approximately the same time as the final removal of the sedimentation pond and diversions on the mine site. The road surfacing material will be removed and either salvaged or disposed of within the pond site and buried. The reclamation will then be accomplished by ripping up the remaining base, spreading the material across the (roadway) disturbed area, and planting the area with the approved seed mix. During this time, all culverts shall be removed and either salvaged or disposed of in an approved landfill, and the natural drainage patterns shall be restored.

Class II Roads

The mine area and portal access road is approximately 2,112' long. A cross-section and profile of this road is shown on Plate 3-5. Culvert locations and ditches are also shown on this drawing, as well as on Plate 3-1. This road is primarily used for access to the mine portals and

other facilities. The road was originally constructed for access to the old Bear Mine, and has since been widened and fitted with proper drainage controls to protect the environment. The road is designed, used and maintained to meet the requirements of UMC 817.151 - 817.156, and to control or minimize erosion and siltation, air and water pullution, and damage to public or private property.

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The road is located along the canyon floor above the stream, and along the stable slope leading to the portals. The overall grade of the road does not exceed I:V:10h (10%) and the maximum pitch grade does not exceed IV:6.5h (15%). The horizontal alignment is consistent with the existing topography and with the volume, speed, and weight of anticipated traffic.

As mentioned earlier, the initial road was constructed under pre-law conditions, using the cut/fill side-cast method. A stability analyses was performed on the road by Dames & Moore in 1981 (Appendix 3-F). Their conclusion was that the Bear Canyon Portal Access Road has a stability factor of safety of a minimum of 1.43, and ranges upward to 2.15.

There are 3 other Class II roads within the Permit Area. Following is a description of each of these:

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1. Road to Sediment Pond A - This road is 430" long, and was constructed to allow access to the Sediment Pond and to facilitate cleaning of the drainage to the pond. The road has an overall slope of approximately 4.0% and does not exceed 15% at any point. The horizontal alignment is consistent with the existing topography and with the volume, speed, and weight of anticipated traffic.

2. Road to the coal preparation facility - This road is 600' long, and was constructed to provide access to the Coal Preparation Facility. The road has an overall slope of approximately 10.0%, and does not exceed 15% at any point. The horizontal alignment is consistent with the existing topography and with the volume speed, and weight of the anticipated traffic.

3. Bathhouse Road - This road is 160' long, and provides access to the bathhouse. The road has an overall slope of approximately 3.0%, and does not exceed 15% at any point. The horizontal alignment is consistent with the existing topography and with the volume, speed, and weight of the anticipated traffic.

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Ditches and culverts have been added to the roads to control run-off and safely pass the run-off from a 10-year, 24-hour precipitation event. (See Plates 3-1 and 3-5). Ditches shall be maintained at a minimum depth of 1.8 feet, and at least 30" of headwater depth will be maintained at the inlet of the 18" culverts. Culverts are fitted with trash racks to prevent plugging, and buried and compacted a minimum of 30" to prevent crushing. In areas where velocities of run-off exveed 5 fps, erosion protection such as straw bales at 100' intervals or 6" median diameter rip rap on a bed of 2" gravel/sand 6" thick shall be maintained. Culvert spacing conforms with the requirements of UMC 817.153(c)(z)(i) Rock or concrete headwalls shall be provided at the inlet to all culverts, and rip rap or other erosion protection shall be provided at the outlet.

The roads are surfaces with 4" of -3/4 gravel, and is maintained in such a manner that the approved design standards are met throughout the life of the facility. Damage to the roads from use or weather events shall be promptly repaired.

These roads shall be removed upon completion of the mining operation. The timing and procedure of removal and reclamation is discussed in detail uner the Backfilling and Grading Plan in Sec. 3.6.4.

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Class III Roads

The only Class III Road on the permit area is a jeep trail that was constructed pre-law, probably as a cattle trail. This road is shown on Plate 2-2, Surface Facilities Map. The road is blocked off and is not used; therefore, no maintenance or reclamation plan is proposed for this trail.

All roads shall be maintained in such a manner to prevent damage to fish, wildlife, and related environmental values. This is accomplished by:

1. Maintaining hydrologic controls, such as ditches, culverts, diversions and sedimentation ponds to assure that disturbed drainage is conveyed away from undisturbed drainages and either held or cleaned before releases.

2. Watering of roads as necessary to reduce fugitive dust.

3. Protection of wildlife within the permit area and reporting of sightings of threatened and endangered species.

4. Contemperaneous reclamation.

5. Advocating good-housekeeping practices to reduce the possibility of contamination of surface waters in the area.

6. Co-Op is committed that all support facilities will be restored to prevent damage to fish, wildlife, and related environmental values and the possibility of additional contributions of suspended solids to streamflow or runoff outside the permit area will be minimal.

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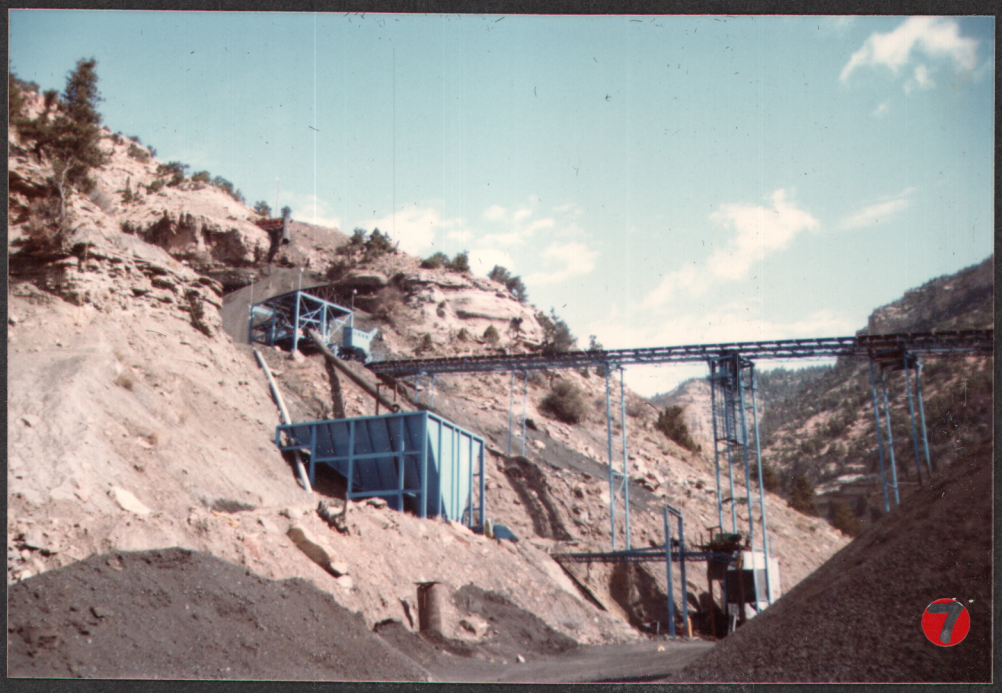
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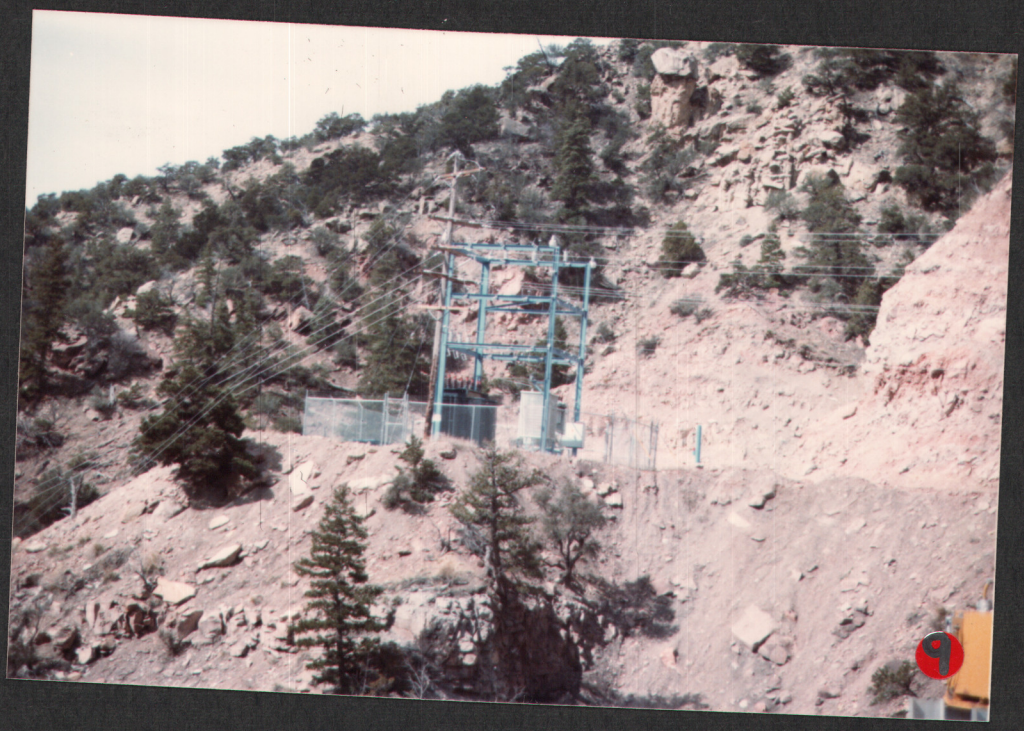
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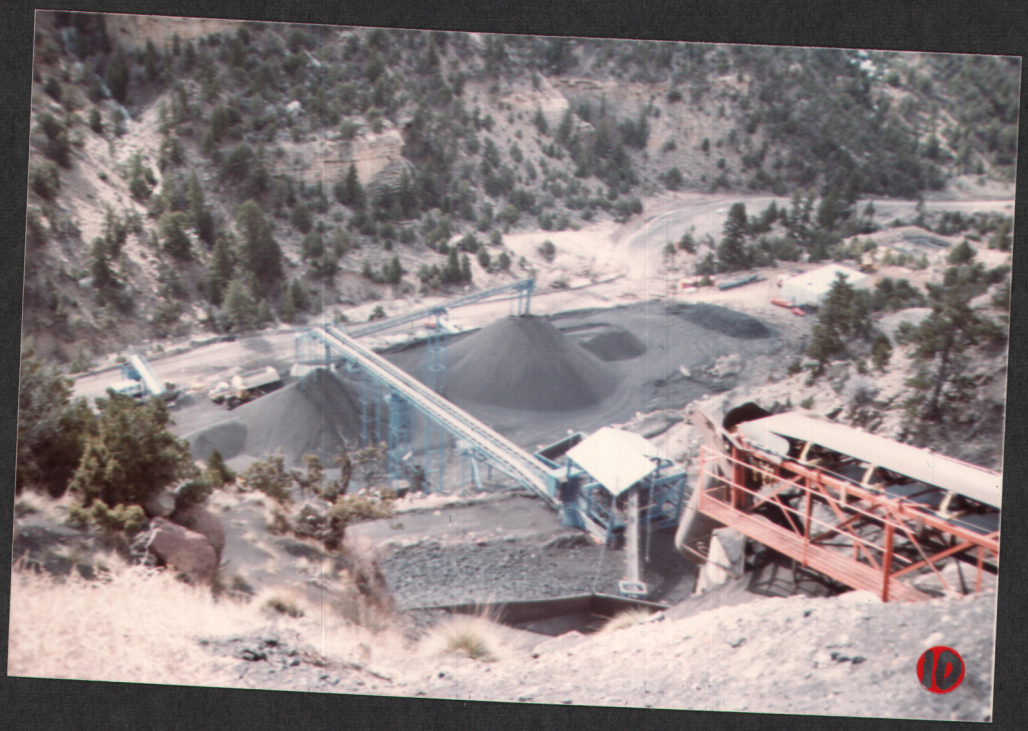
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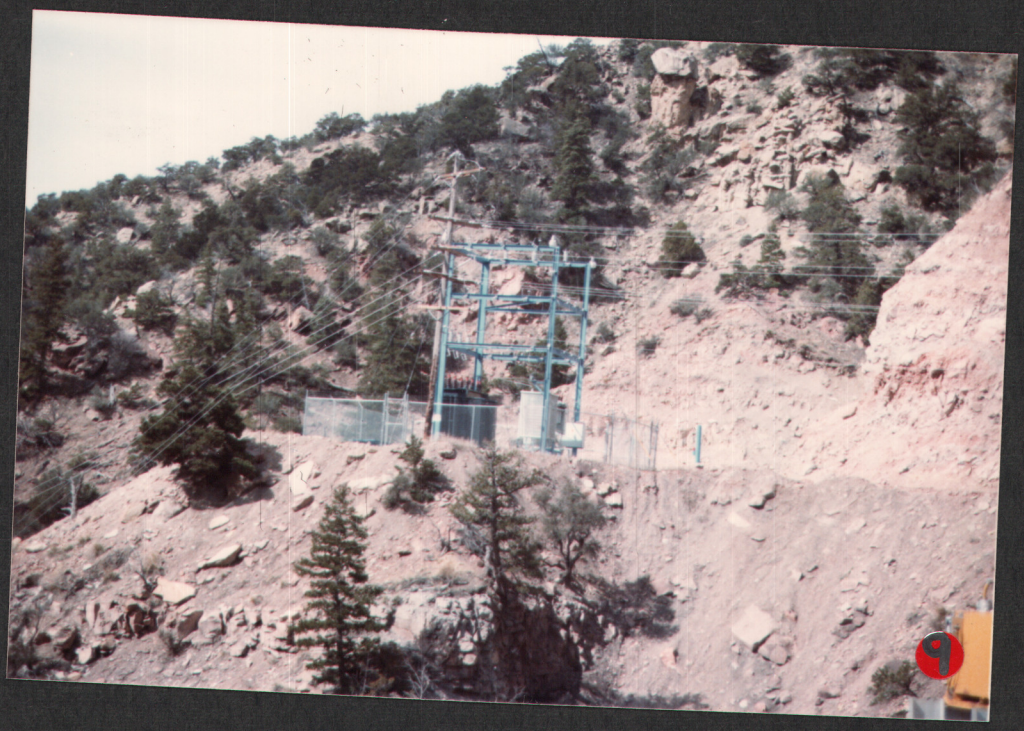
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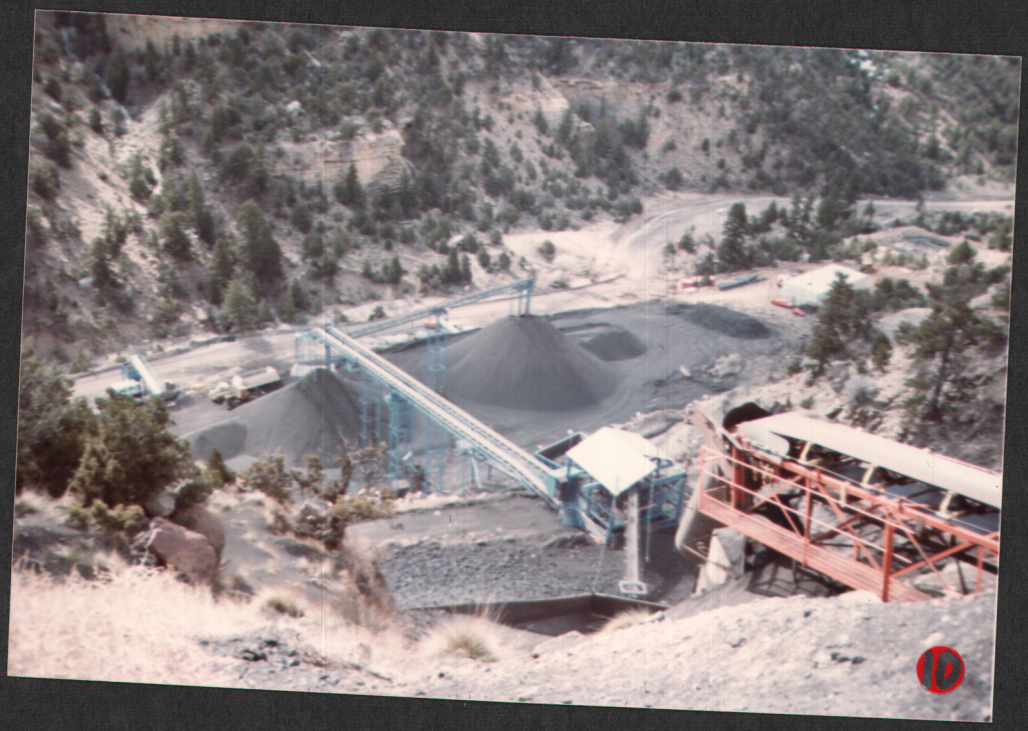
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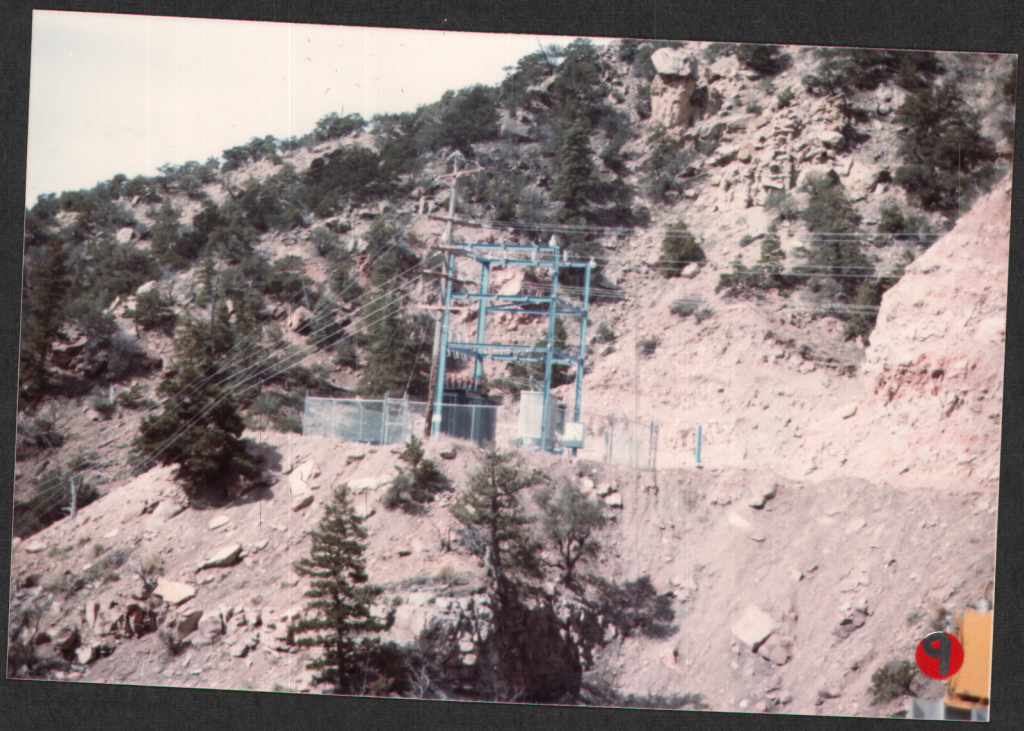
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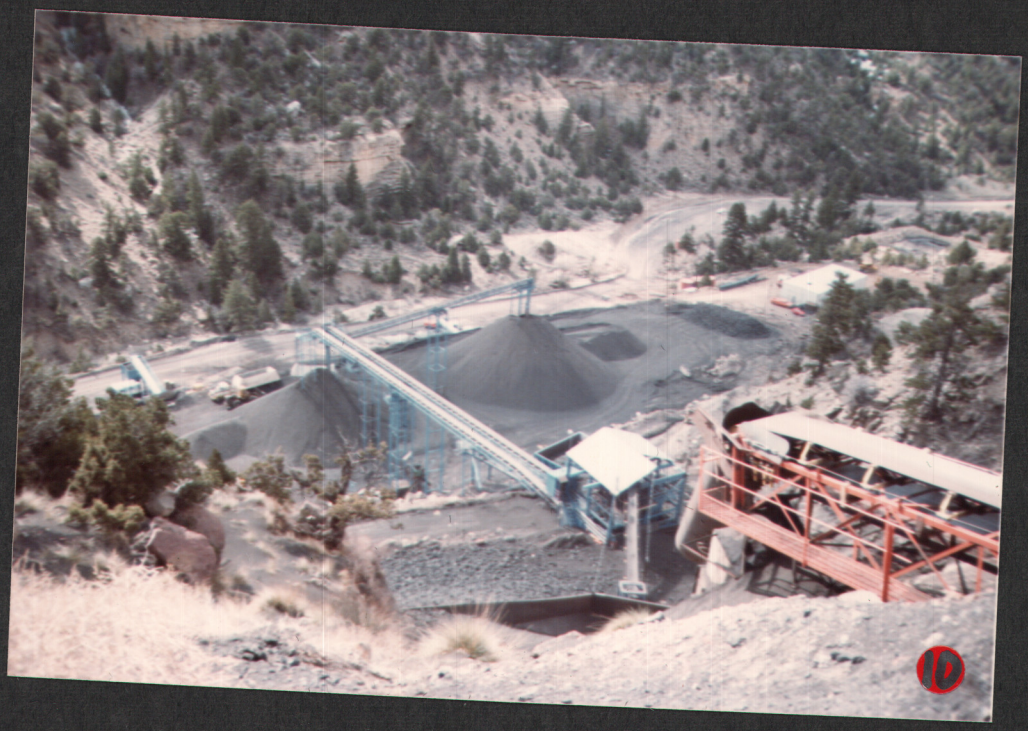
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APPENDIX 3-5-8A

SUBSIDENCE CONTROL AND MONITORING PLAN

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Structures

No manmade structures occur anywhere above the Bear Canyon Permit Area.

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Renewable Resources

The renewable resources that exist above the mine area are of a hydrologic and vegetative nature.

The vegetation resource above the mining area consists of some rangeland for grazing of stock and wildlife and limited potential for timbering. Again, past mining in the area has indicated no surface effects upon this resource. If subsidence should occur, the effects would be minimal, possible resulting in some fractures or slight depressions. The effect upon the vegetation resource would also be minimal, since subsidence (should it occur) is not likely to destroy vegetation, but merely displace it. It is not expected that subsidence will have any negative effect upon the plant communities or even become evident on the surface. Should this happen, mitigation measures may include: filling of fractures, regrading of broken areas, replanting degraded areas, intensified monitoring.

The hydrologic resources above the mining area consists primarily of a potential recharge zone for groundwater resources (springs) located in the strata below the mining. While it is unlikely that mining

activities will have any effect upon the springs, there is some potential for mining to have an effect upon the upper recharge zones. The potential effect of mining on the hydrologic regime, as well as any proposed mitigation measures are discussed in detail in Chapter 7 of the PAP.

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Mining Methods

Mining at the Bear Creek Mine is conducted by the room and pillar method. This method may result in 75% - 80% extraction within the pillar panels, with an overall extraction of approximately 50% for the entire reserve. Longwall mining is not currently a proposed mining method for this mine.

A 200' barrier is porposed to be left between the mining and the coal outcrop, and a 100' barrier will be left between mining and property boundaries.

It is not proposed to leave any other coal permanently in place for protection of resources above the mine, since thw resources that could potentially be affected by subsidence are not localized, but exist above the entire area. It is therefore proposed that subsidence protection measures will be employed only at the outcrops (and property boundaries), and that the company be prepared to implement mitigation measures as proposed if such resources are negatively impacted.

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Subsidence

Subsidence can normally be expected to occur over areas where second mining has taken place (pillaring). Based on the geologic interruptions within a mine, subsidence becomes very difficult to predict, due to the variable nature of the mining panels. However, the attached Figure will give an estimate of the maximum subsidence that may be expected in mines studied in the Western U.S. Maximum subsidence for an average panel in the Bear Canyon Mine has been estimated from Figure 1, using the following criteria:

Panel Width - 600'

Average Depth - 800'

Width/Depth Ratio - 0.75

Seam Thickness - 9.0'

Based on this criteria and the graph, subsidence could reach a maximum of 5.40' directly over a pillared panel. However, since past pillaring has been performed in this general area as much as 40 years ago, and there are ano obvious surface expressions of resulting subsidence, it is expected that this figure will be substantially less, if even measureable.

If both the upper and lower seams are extracted, maximum subsidence has been estimated from Figure 3-6 for the lower seam as follows:

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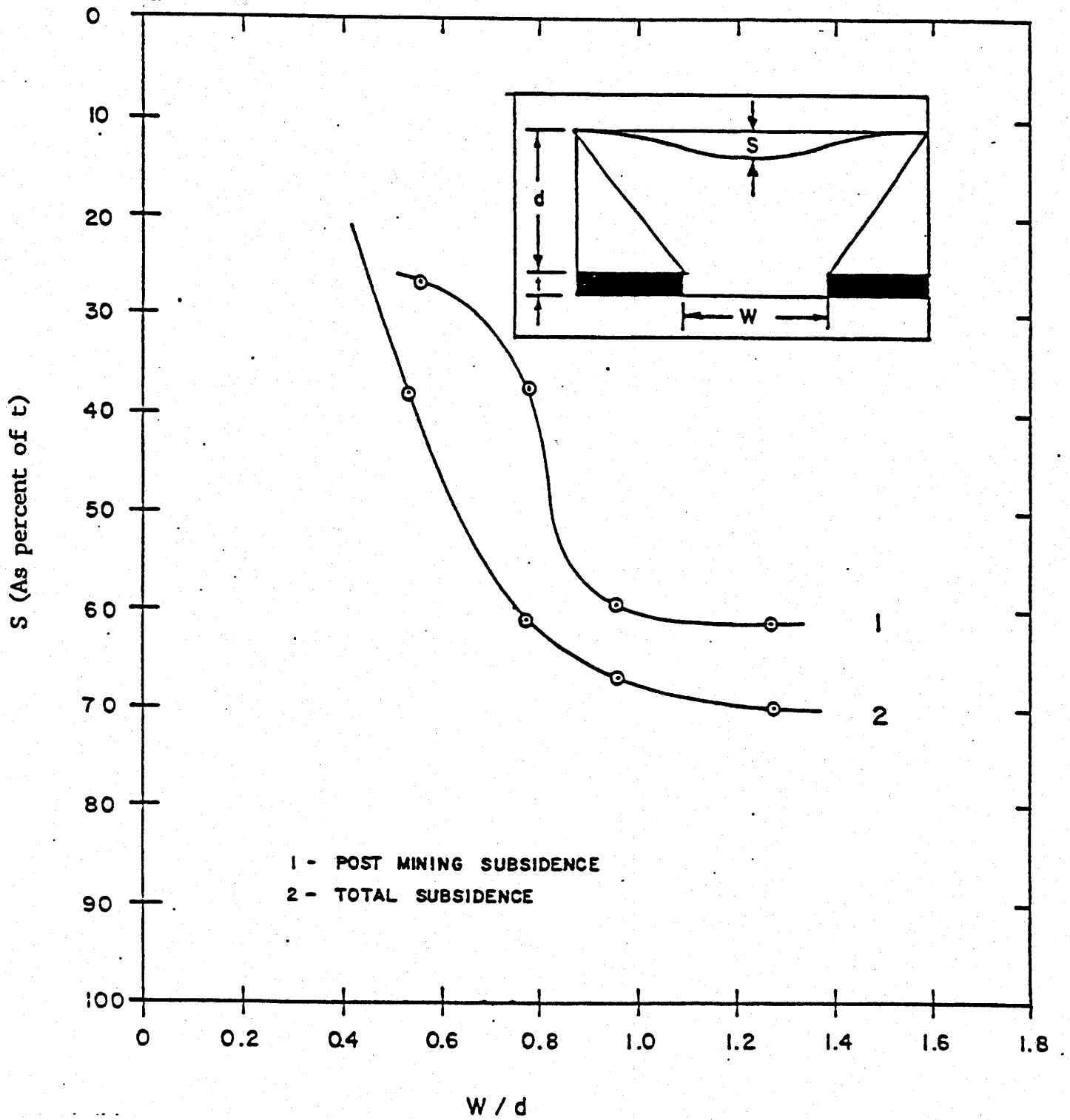
Figure 1



Maximum subsidence, as a percentage of seam thickness, versus width/depth ratio for room and pillar mining at Somerset, Colorado (after Dunrud, 1980).

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Panel Width - 600'

Average Depth - 860'

Width/Depth Ratio - 0.70

Seam Thickness - 5.0'

Based on the graph, subsidence for the lower seam could reach 3.20' directly over a pillared panel, and 8.60' if both seams are pillared. Again, past experience in this area shows no indication that subsidence would be this drastic.

Monitoring

Since subsidence may occur over any underground extraction, it is proposed to set up and maintain a monitoring network as described below.

It is proposed to install two permanent subsidence monitoring points, one at each end of the property, to allow for an on-going evaluation of subsidence or other mining-related surface impacts. The stations shall be monitored at nominal 6-month intervals, for changes in elevation, tilt or rotation. In addition, a field investigation shall be made at least once per year, and any obvious subsidence or mine related surface effects will be noted and located on a map. A copy of the results of the subsidence survey and map will be available for inspection at the office, and a summary of the survey results will be sent to the Division within 60 days following the final survey for the year.

It is proposed to use the SMS, or the Subsidence Monitoring System, described in detail in the following pages. This system is available commercially, and if approved by the Division, the program will be implemented in the Spring/Summer of 1985. The monitoring program will continue until the completion of reclamation has occurred. Location of monitoring stations are shown on Plate 3-3.

During the operation, all owners of property within the area that could be impacted by subsidence shall be notified by mail six months prior to mining beneath their property and be informed of:

1. Specific areas mining will take place
2. Dates of underground operations that could cause subsidence in the area.

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3. Measures to be taken to prevent and or control adverse surface effects.

Co-Op Mining Co. furthur commits to the following course of action should subsidence cause any material damage or a reduction in value of structures or land.

1. Restore, rehabilitate, or remove and replace, to the extent technologically and economically feasible, each meterially damaged structure, feature or value promptly after the material damage from subsidence is suffered, to the condition it would be in if no subsidence had occurred and restore, to the extent technologically and economically feasible, those surface lands that were reduced in reasonably foreseeable use as a result of such subsidence to a condition capable of supporting before subsidence; or

2. Purchase the damaged structure or feature (except structures or features owned by the person who conducted the underground coal mining activities) for its pre-subsidence fair market value. The person conducting the underground coal mining operation shall promptly, after the material damage or reduction in value or reasonably foreseeable use from subsidence occurs, to the extent technologically and economically feasible, restore the purchased structure or the structure owned by the person conducting the underground mining operations, restore those surface lands that were materially damaged or reduced in value or reasonable foreseeable use by such subsidence,

to a condition capable and approporate of supporting the structure, and any other foreseeable uses such surface lands were capable of supporting before mining. Nothing in the paragraph shall be deemed to grant or authorize an exercise of the power of condemnation or the right of eminent domain by any person engaged in underground coal mining activities; or

3. Compensate the owner of any surface structure in the full amount of the diminution in value resulting from subsidence, by purchase prior to mining of a noncancellable premium prepaid insurance policy or other means approved by the Division as assuring before mining begins that payments will occur; indemnify every person owning an interest in the surface for all damages suffered as a result of the subsidence; and, to the extent technologically and economically feasible, fully restore the land to a condition capable of maintaining reasonably foreseeable uses which it could support before subsidence.

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SUBSIDENCE MONITORING SYSTEM

Introduction: The Subsidence Monitoring System (SMS) is a complete subsidence and surface effects monitoring system for underground coal mines. The system consists of a monitoring tower and graduated base plate, which, when properly installed, allows for easy measurement of elevation changes, as well as magnitude and direction of tilt and rotation of the station. The SMS stations can be purchased separately and owner-installed, or they can be purchased with installation included. Precise surveying is required for initial set-up, as with all monitoring stations.

Purpose: The SMS is designed to assist underground coal operators to comply with the requirements of the subsidence monitoring and protection portion of the Surface Mining Regulations administered under the Office of Surface Mining (and related State Agencies) and the 43 CFR 3246 regulations under the Bureau of Land Management.

This station offers complete "subsidence" or "surface effects" data for undermined areas, by facilitating the measurement of elevation change, degree and direction of tilt, as well as rotation. Most subsidence stations are nothing more than a survey point and provide only data on elevation changes, completely ignoring the other common surface effects of underground mining - ground tilt and rotation. By determining all applicable surface effects, and correlating such effects with known mining conditions, the operator has a much better chance of predicting potential surface effects of the operation, and supporting those predictions as required.

The question of subsidence has long been a "gray area", not only in the industry, but particularly in the regulations. Laws require prediction (and generally monitoring) of mine subsidence; however, until recently, no definite guidelines or criteria have been pushed by

the agencies. This is changing with the advent of the "Permanent Program Approvals" required by the surface mining agencies, and the gradual "maturing" of the agencies themselves. The SMS is designed to allow an operator to get into and remain in compliance with the regulations, and when properly implemented, this system is guaranteed to comply with the requirements of the law and provide adequate data to allow reasonable prediction of surface effects from underground mining.

The SMS stations are initially somewhat more costly and complicated than conventional subsidence monitoring "points", however, not only will they provide more complete and reliable data, they will also result in cost savings as the monitoring program continues. The following is a partial list of the positive attributes of this system:

(1) Permanent installation.

(2) Elevations can be shot directly from long distance, reducing manpower and field costs.

(3) Station monitoring (other than elevation) requires only a plumb-bob and 60' of string, reducing time and effort from packing survey instruments over the mountainous terrain.

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(4) Station monitoring can be done in conjunction with required field inspections and/or aerial flagging visits.

(5) The system works extremely well with an aerial monitoring program, reducing survey time and costs.

(6) Provide measurement of elevation, as well

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as magnitude and direction of ground tilt and/or rotation.

(7) Meets or exceeds agency guidelines.

(8) Assures continued compliance, even if requirements are more strictly enforced or made more stringent.

The SMS is proposed to the industry for two main reasons:

1. To provide for complete and reliable data on the actual surface effects of underground mining.

2. To provide data that will enable companies and agencies to better predict possible surface effects of underground mining under various cover and extractions conditions.

With reliable data, it is conceivable that this program could ultimately result in the ability to predict that no surface effects will occur under certain mining conditions, possibly eliminating the need for further monitoring in the future. Thus, the ultimate goal of the SMS may very well become the elimination of its need under certain circumstances.

Principle: The SMS is designed to serve as a permanent subsidence monitoring point. It can either be used in conjunction with a conventional elevation survey, or with elevations determined from an aerial survey. In addition to providing an elevation base, this station readily displays direction and magnitude of tilt and/or rotation. The following procedure should be followed each time the station is checked:

(1) An elevation should be determined at the center of the base plate This can be accomplished by:

(a) A conventional level survey from a known, undisturbed benchmark.

(b) Shooting the station from a distant, known benchmark and calculating the new elevation by use of the vertical angle;

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(c) Performing an aerial survey to determine new elevations; Note that the SMS lends itself very well to (a) & (b) above, both of which require a minimum of manpower and time.

(2) An inspection of the surface around and between stations should be made, and any possible subsidence effects should be noted.

(3) A plumb-bob should than be hung from the hook inside the station cap, and allowed to swing freely about 1/8" above the base plate. If the point of the bob hangs directly over the center of the base plate, no tilt has occurred. If the plumb-bob point rests outside of the base plate center, the direction of tilt can be closely estimated from the compass on the base plate, and the degree of tilt can be read directly off the concentric rings on the plate. Record the results and;

(4) Remove the plumb-bob. Next, tie one end of the 50' - 60' string onto the south reference point and stretch the line through the station legs, tying it off on the north reference point. (The line should be free and taut between the points.) Now observe the location of the line in relation to the north-south line on the base plate. If the lines coincide, no rotation has occurred. If the line does not match the base plate north-south line, the degree and direction of rotation can be readily determined from the compass on the plate. It should be noted that the direction of rotation will be opposite to that shown on the compass. (Example: If the line matches the N 15 E bearing line on the plate, the degree of rotation is 15 , and the direction of

actual rotation is N 15° W.)

(5) Record all results and proceed to the next station.

A great deal of time and effort can be saved by locating several (or all) of the SMS stations in view of a single benchmark or reference station. In this manner, vertical angles can be shot to all visible stations from a minimum number of set-ups. The stations are made to allow for direct readings over a long distance, eliminating the need for a rodman to go to each station. This allows for completion of the elevation survey in a single step, eliminating the need to pack a transit or level to each of the stations. The only apparatus required for the rotation and tilt determinations is the plumb-bob and 60' of string.

The SMS system is even further simplified when used in conjunction with an aerial survey. Once initial elevations are determined, all that is required is a visit to each station to install (or check) the aerial flagging - of course, the tilt and rotation should be monitored at this time, with elevations to be determined during the aerial survey. In this situation, no transits or levels are needed at all, beyond the initial installation.

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SUBSIDENCE MONITORING SYSTEM

SPECIFICATION SHEET

1 - 6' aluminum tower, graduated in 0.1' intervals, painted red and white with black numerals. Note: Tower is 8' long, allowing for 2' in ground.

1 - 6.28" diameter, aluminum baseplate, inscribed in 15° compass increments and $\frac{1}{2}$° tilt indicator.

1 - North Reference Point

1 - South Reference Point

1 - Plumb-bob Hook

1 - 2" X 4" Brass Name Plate

6 $ft.^3$ Concrete for Installation (Provided only with installation package).

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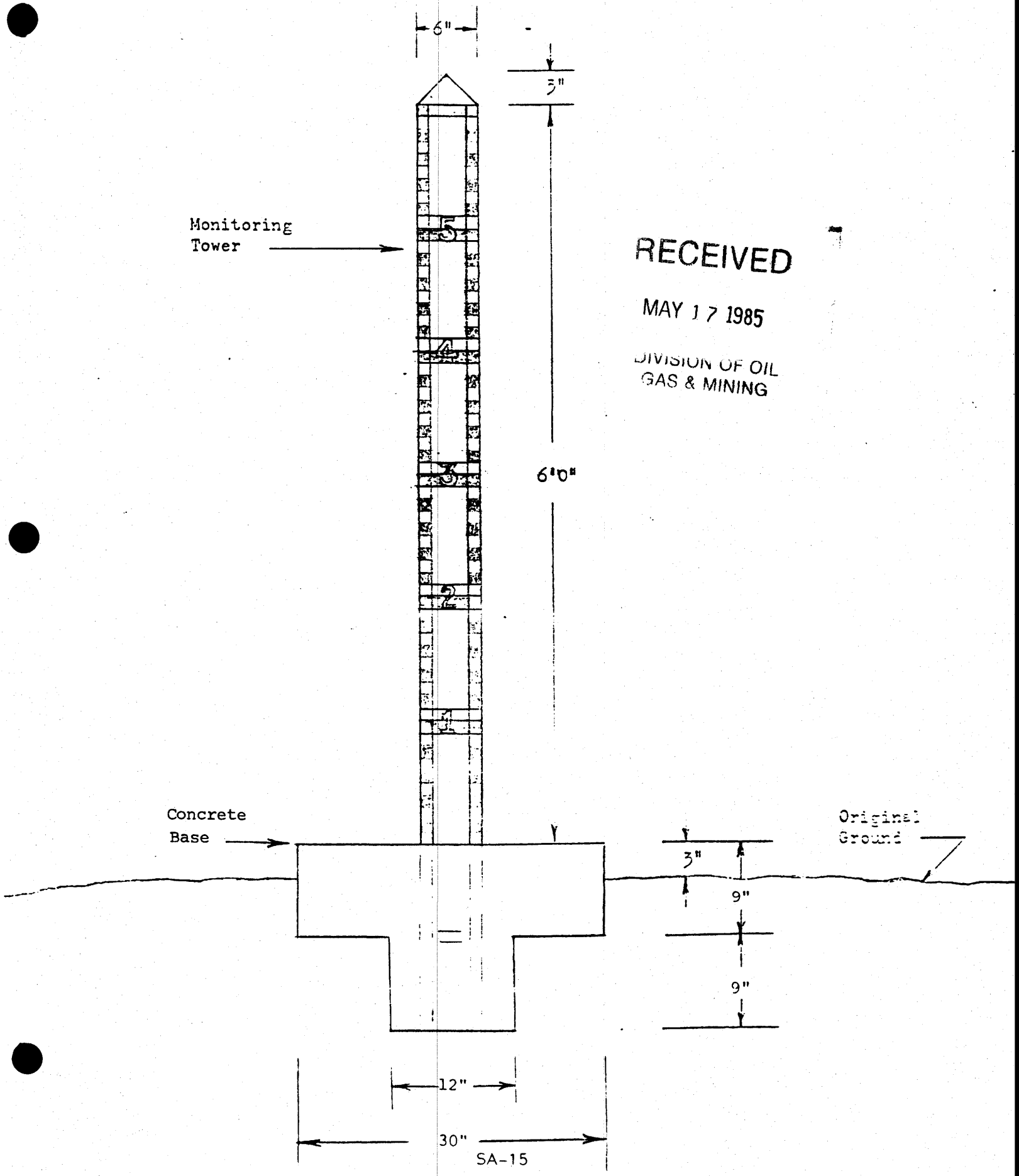
SMS MONITORING STATION

Scale: 1"=1'



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SA-15

SMS BASE PLATE

(Actual Size)

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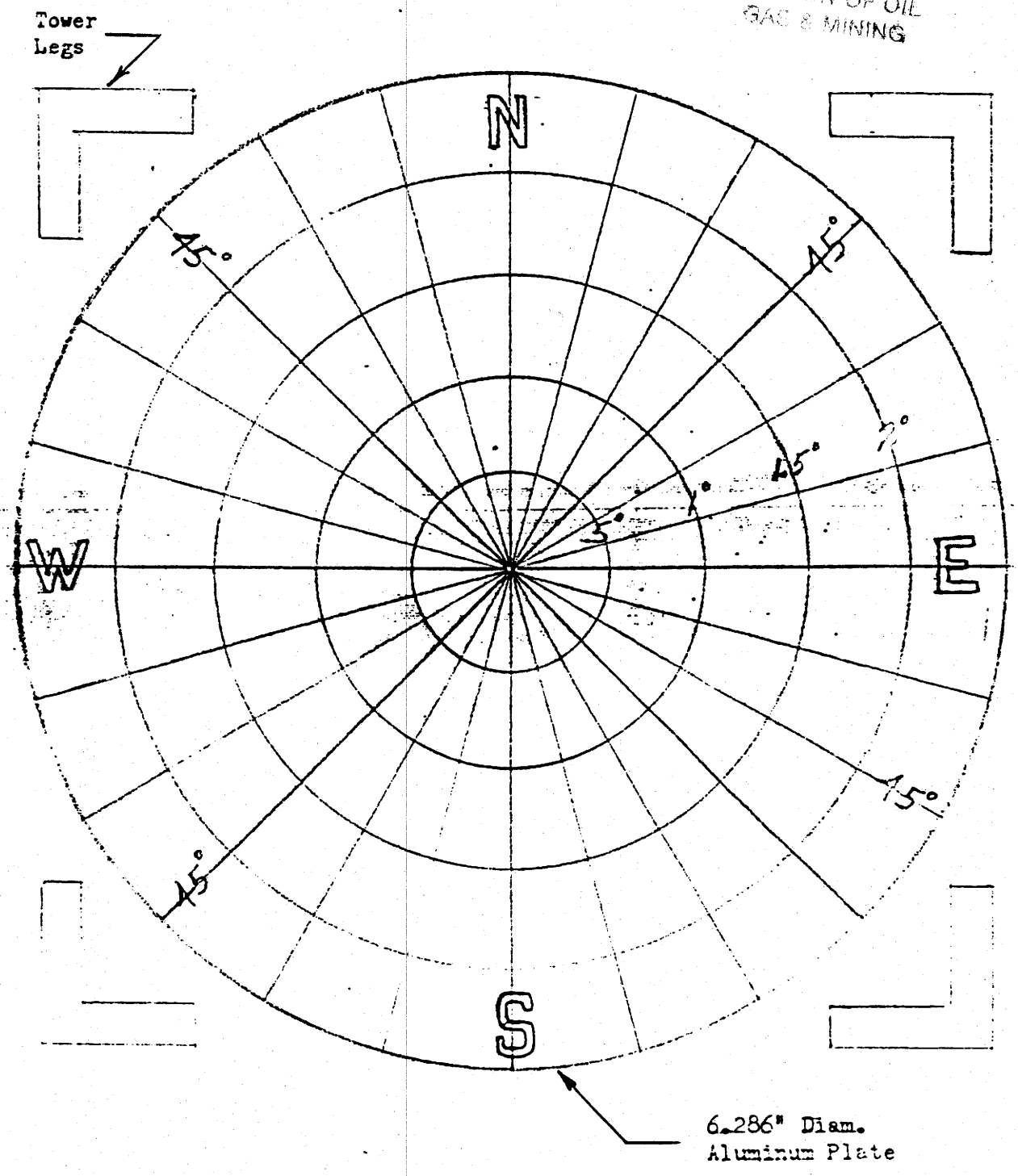
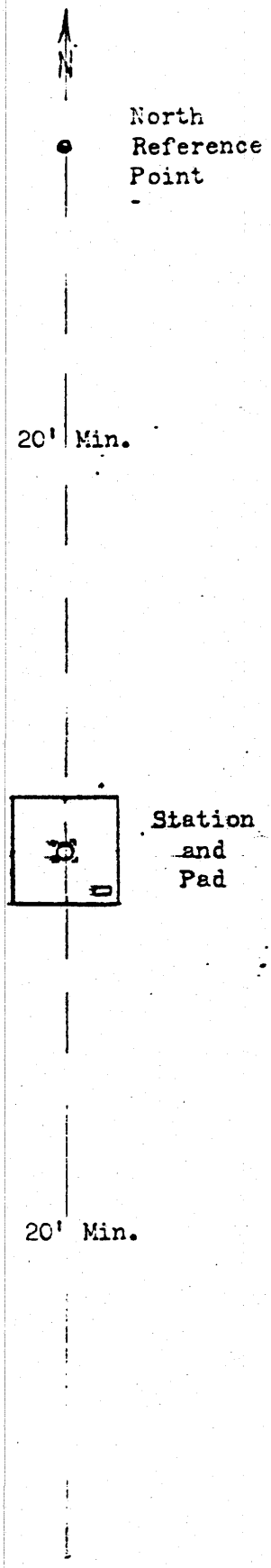


6.286" Diam.
Aluminum Plate



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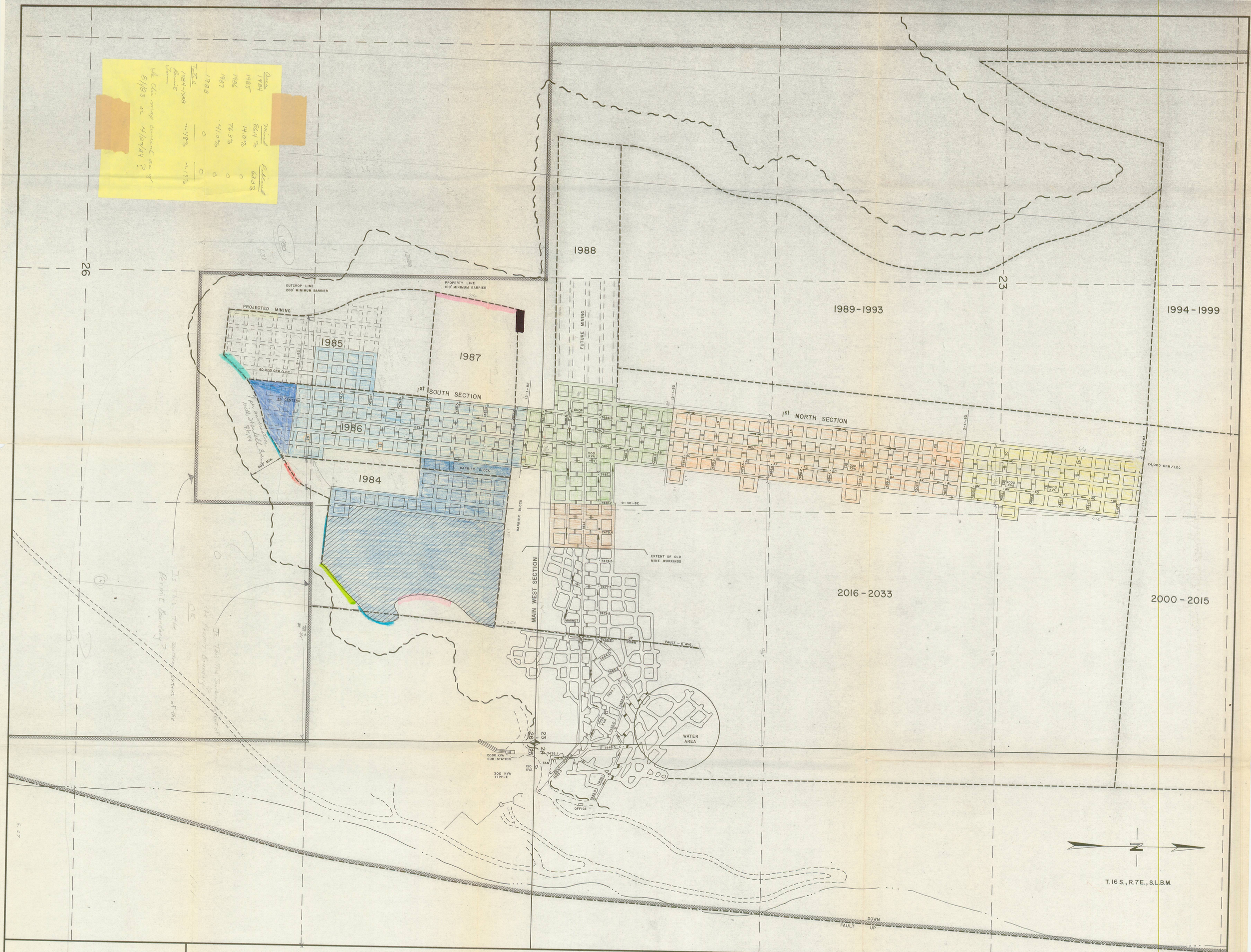
SMS STATION LAYOUT
(Plan View)



I, THE UNDERSIGNED, HEREBY CERTIFY THAT THIS MAP IS CORRECT, TO THE BEST OF MY KNOWLEDGE AND BELIEF.

DATE 4-27-84 SIGNATURE

REGISTERED PROFESSIONAL ENGINEER No. 4548 DAN W. GUY STATE OF OREGON

LEGEND

STOPPING	MINE WORKINGS	SECTION LINE
SEAL	PROJECTED MINING	FAULT LINE
INTAKE AIR / MAIN ESCAPEWAY	OVERCAST	PROPERTY LINE
BELT / SECONDARY ESCAPEWAY	REGULATOR	COAL OUTCROP
RETURN AIR	PILLARED AREA	ACCESS ROAD

CO-OP MINING CO.

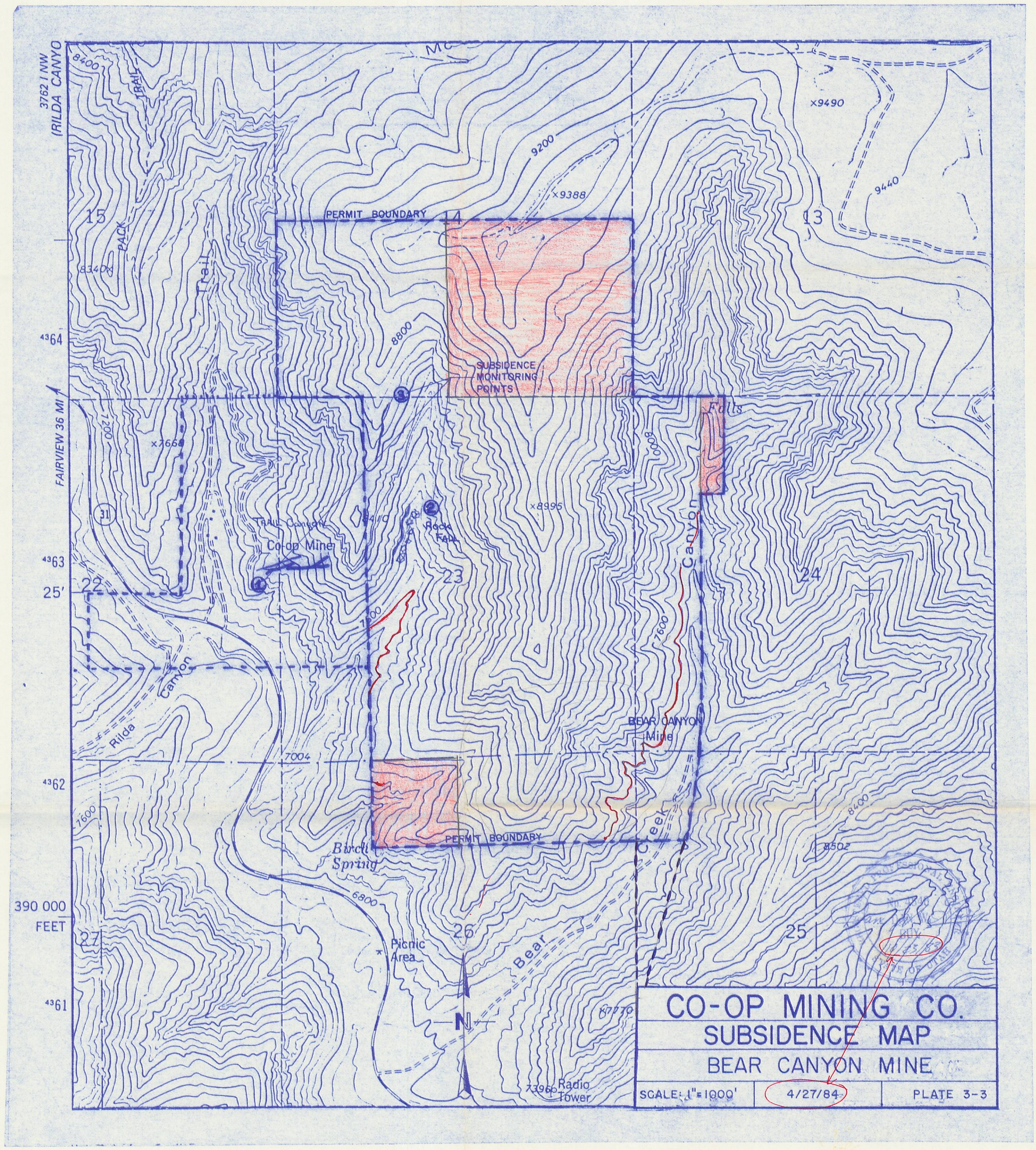
HUNTINGTON, UTAH

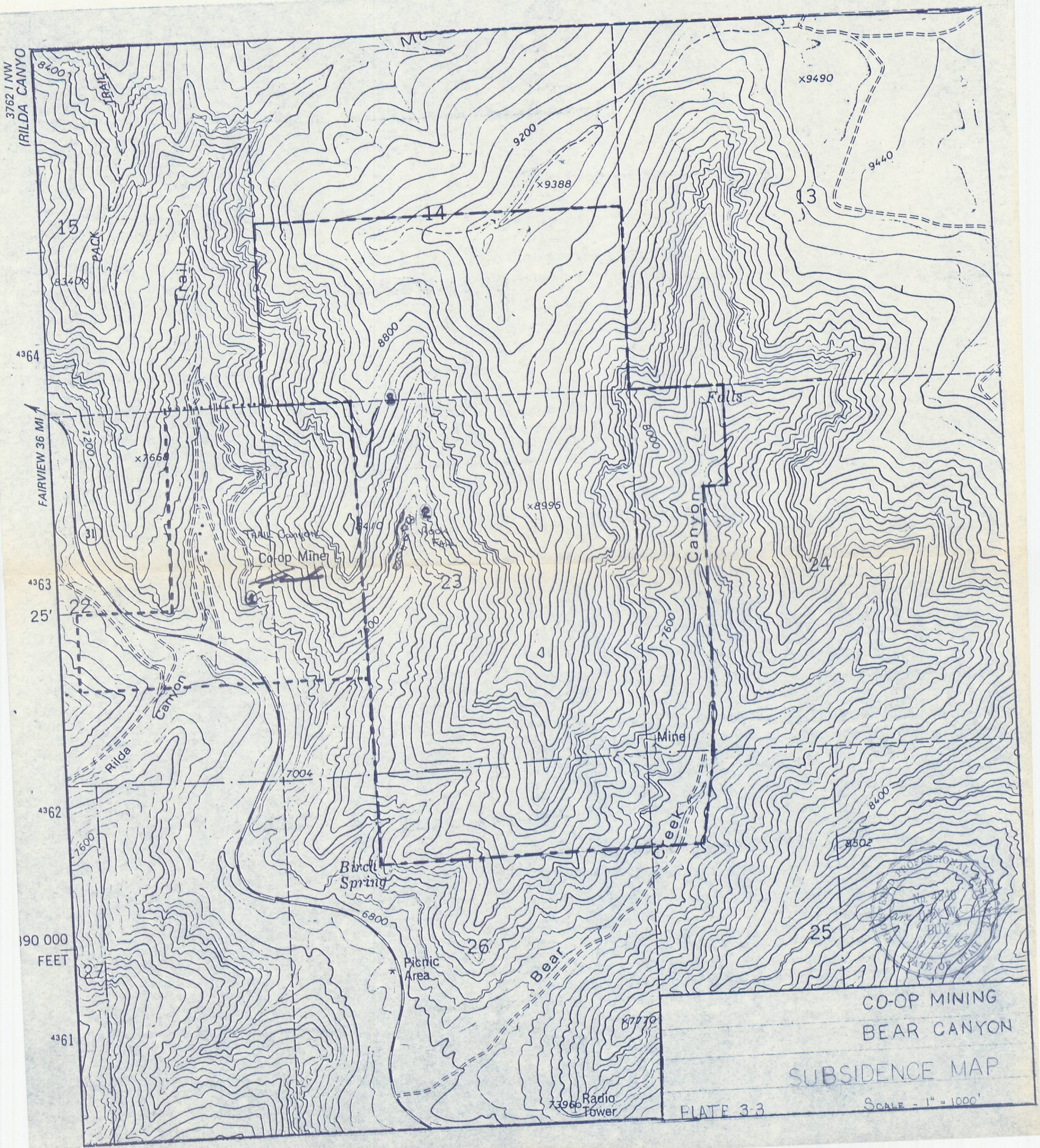
BEAR CANYON - NO. 1 MINE

M.S.H.A. I.D. NO. 42-01697

SCALE:	DRAWN BY:	DATE:
1" = 200'	D. GUY	4/27/84

BEAR CANYON | PLATE 3-4


3762 I NW
(RILDA CANYO
FAIRVIEW 36 MI
PACK TRAIL
Trail
PERMIT BOUNDARY
SUBSIDENCE MONITORING POINTS
Falls
Canyon
TRAIL Canyon
Co-op Mine
Rock Fall
Rilda Canyon
BEAR CANYON Mine
Birch Spring
Picnic Area
Bear Creek
Radio Tower
390 000 FEET
CO-OP MINING CO.
SUBSIDENCE MAP
BEAR CANYON MINE
SCALE: 1" = 1000'
4/27/84
PLATE 3-3


3762 I NW
(RILDA CANYO
FAIRVIEW 36 MI
8400
TRAIL
PACK
Trail
8340
15
14
13
9200
9388
9490
9440
8800
4364
Falls
7200
7668
8995
8000
Canyon
31
Trail Canyon
Co-op Mine
Rock Fall
23
24
4363
22
25'
7600
Canyon
Rilda
Mine
7004
4362
8400
8502
Creek
Birch Spring
6800
390 000 FEET
26
25
27
Picnic Area
Bear
8770
4361
7396
Radio Tower
CO-OP MINING
BEAR CANYON
SUBSIDENCE MAP
PLATE 3-3
SCALE - 1" = 1000'

LEGEND

FINAL RECLAMATION		CONTEMPORANEOUS RECLAMATION	
PERMIT BOUNDARY		CONTOUR LINE	7200
RESTORED DRAINAGE		REMOVED STRUCTURES	

REGISTERED PROFESSIONAL ENGINEER
No. 4540
DAN W. GUY
4/27/84
STATE OF UTAH

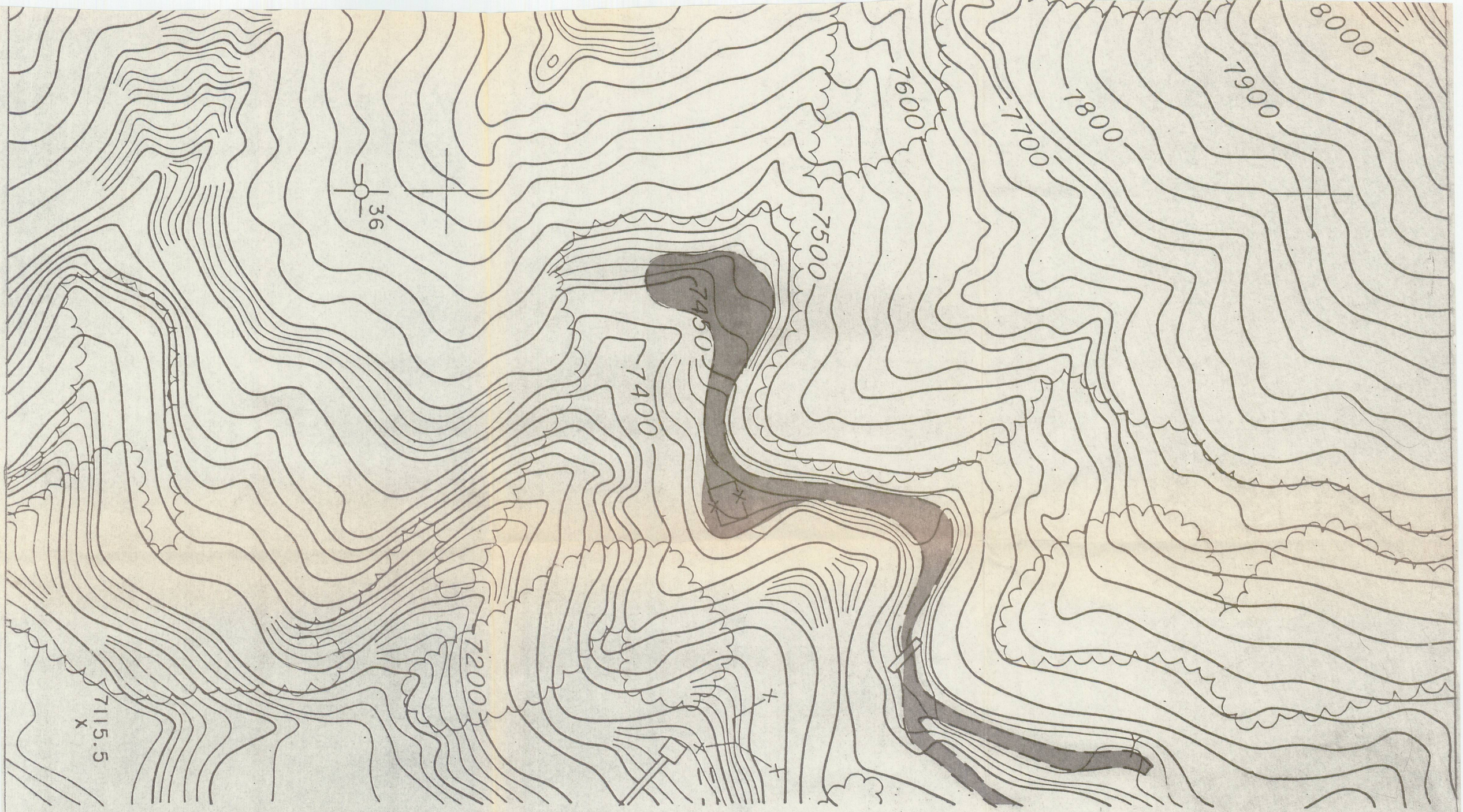
CO-OP MINING CO.

HUNTINGTON, UTAH

POST-MINING TOPOGRAPHY

SCALE:	DRAWN BY:	DATE:
1" = 50'	D. GUY	4/27/84

BEAR CANYON | PLATE 3-2

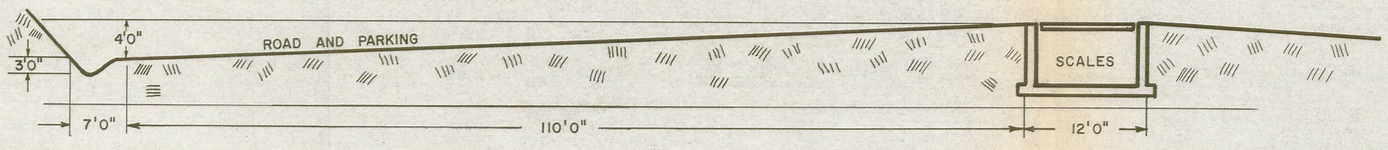


RECLAMATION MAP

PLATE 3-2 A

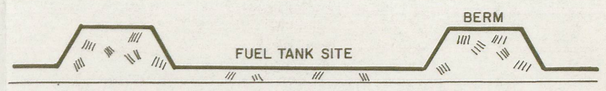
SCALE 1" = 100'-0"

REGISTERED PROFESSIONAL ENGINEER
No. 4415
SCOTT F. McNEIL
STATE OF UTAH



SECTION A-A

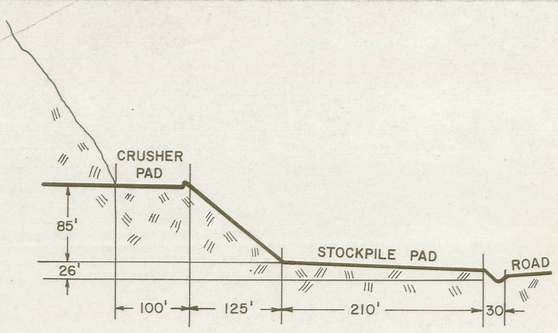
NOT TO SCALE



SECTION B-B

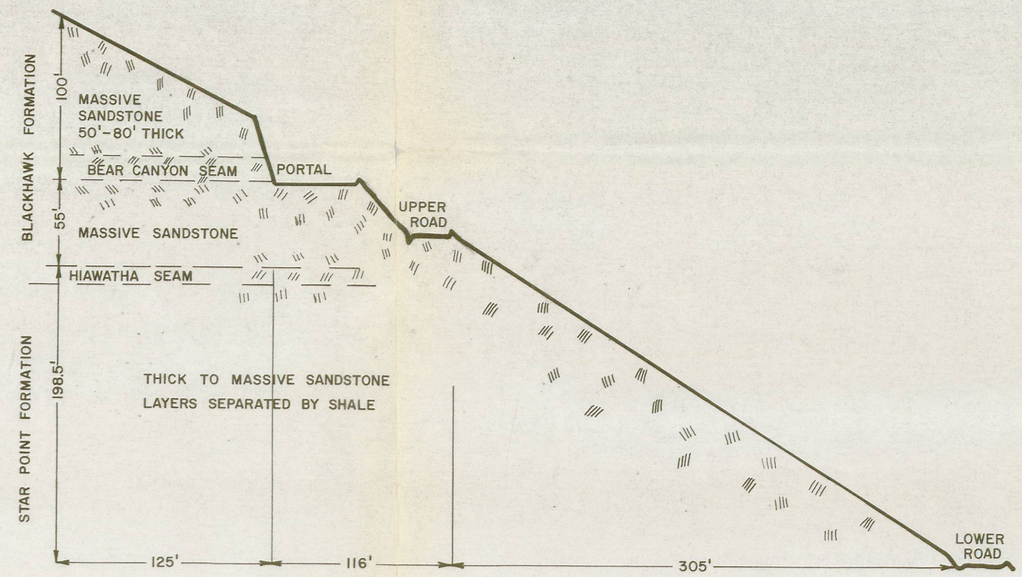
TYPICAL

NOT TO SCALE



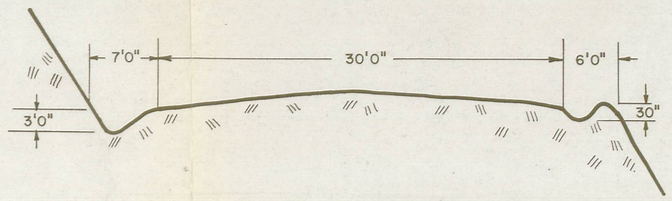
SECTION C-C

NOT TO SCALE



SECTION D-D

1" = 50'



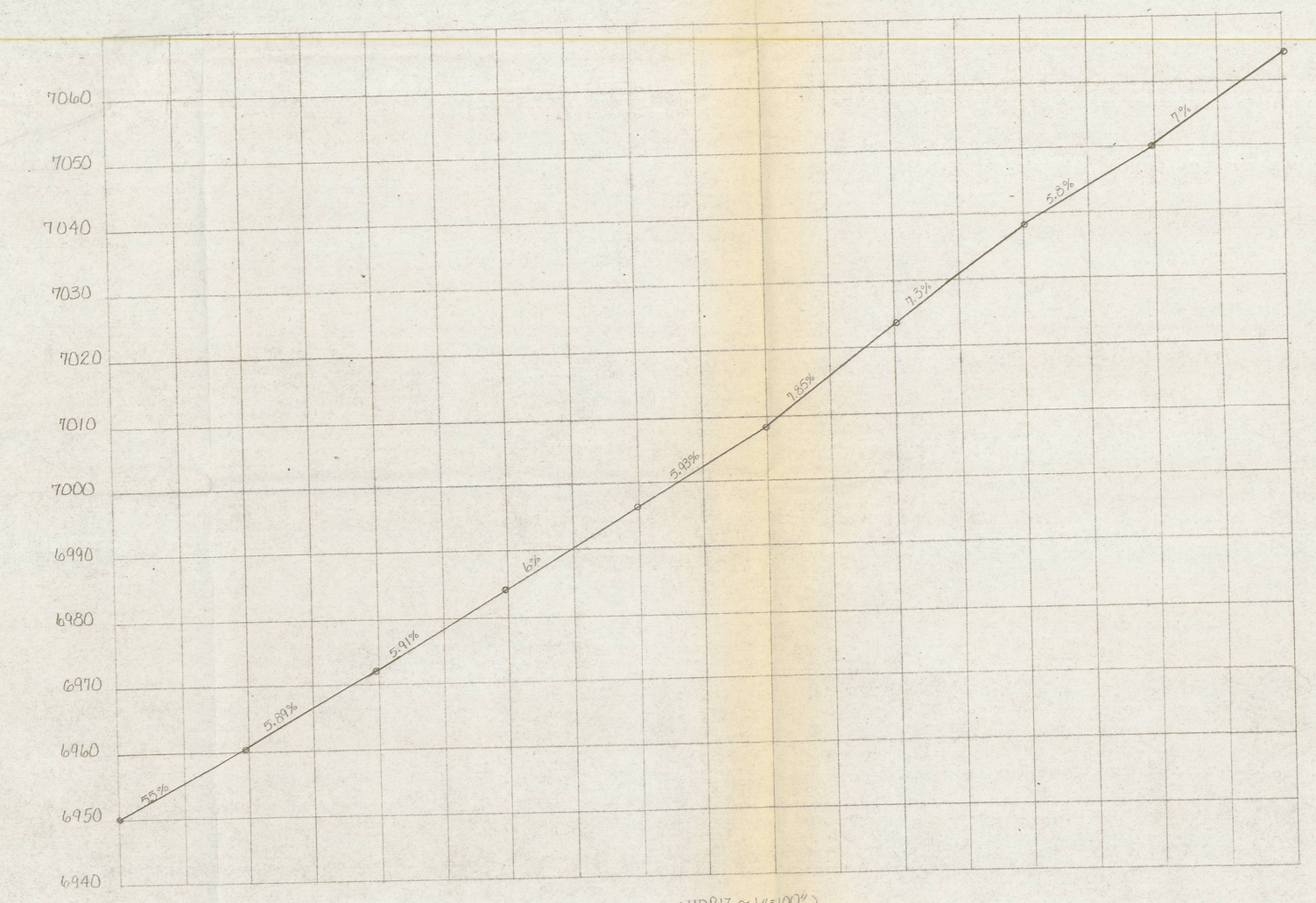
SECTION E-E

TYPICAL SECTION

NOT TO SCALE

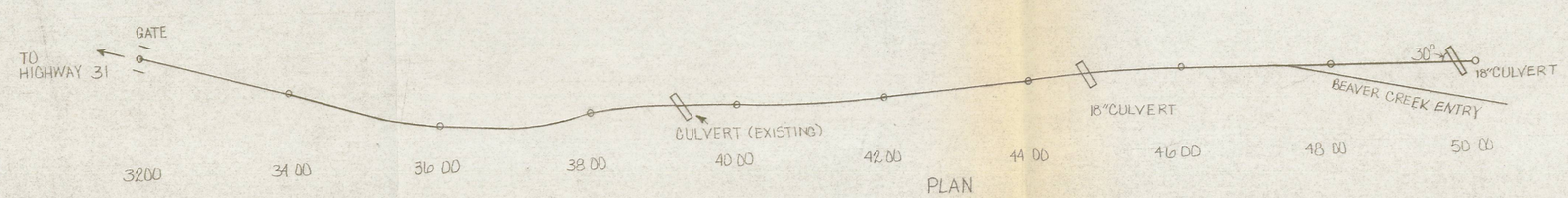
REGISTERED PROFESSIONAL ENGINEER
No. 4540
DAN W. GUY
4/27/84
STATE OF UTAH

CO-OP MINING CO.		
HUNTINGTON, UTAH		
CROSS SECTIONS		
SCALE: AS SHOWN	DRAWN BY: D. GUY	DATE: 4/27/84
BEAR CANYON	PLATE 3-1	

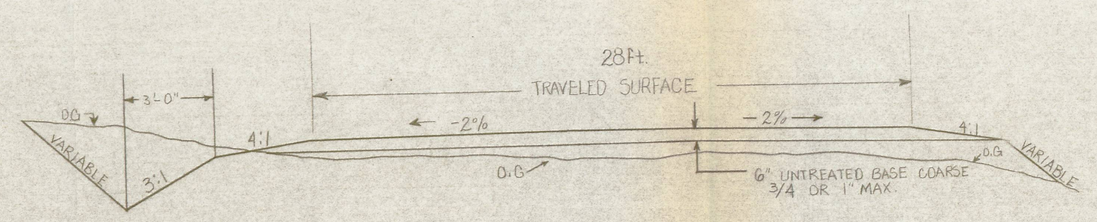


PROFILE SCALE: { HORIZ ~ 1" = 100' / VERT ~ 1" = 10' }

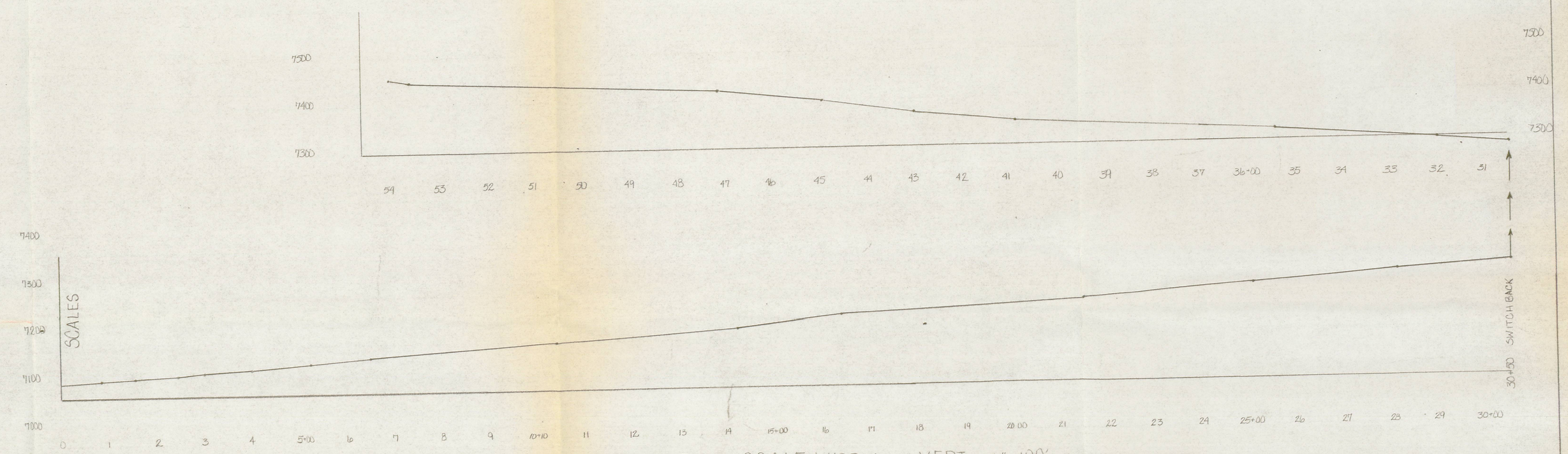
BEAR CANYON ROAD



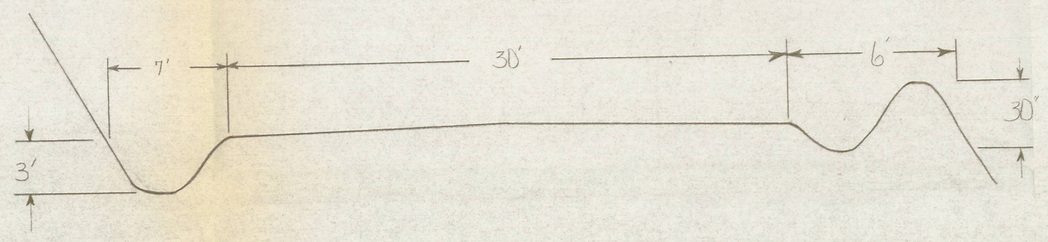
PLAN
SCALE ~ 1" = 100'



ACCESS ROAD



PROFILE SCALE: HORIZ. and VERT. ~ 1" = 100'



TYPICAL SECTION

SCALE ~ 1" = 4'

CO-OP MINING CO. HUNTINGTON, UTAH		
ROAD - DETAILS		
SCALE: 1" = 100'	DRAWN BY: D. GUY	DATE: 4/27/84
BEAR CANYON	PLATE 3-5	

CHAPTER 4

LAND STATUS, LAND USE AND POSTMINING LAND USE

CHAPTER 4

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Appendix 4-A Property owners statement of post mining land use

4.1 SCOPE

This chapter describes the status of the land within and adjacent to the permit boundaries of the Co-Op Coal Company's property located in the La Sal Mountain Range. Current land uses are described, along with plans for post mining land use. A brief discussion of socioeconomics is also included.

4.2 METHODOLOGY

This chapter is based mainly on the collection and review of existing published information. Existing legal documents and maps were used to support the section on land status. The discussion of current land use is based on scientific data and expert testimony from representatives of the SCS, BLM, UDWR, and the U. S. Forest Service, supplemented by information from a field survey of local, state, and federal land use policies and plans.

4.3 LAND STATUS

4.3.1 Surface Land Status/Mine Plan Area

The land within the Co-Op Mining Company's permit area fall under the jurisdiction of the State of

Utah, Emery County, and private surface owners. [See Plate 2-1].

County zoning ordinances classify the permit area as Industrial, to be used for "mining".

4.3.1.1 Ownership

Plate 2-1 shows the ownership of property within and contiguous to the permit boundaries. Land parcels within or adjacent to the permit boundaries are designated by capital letters. The fee owner of surface and mineral property rights, and holder of record of leasehold surface and mineral interests within the permit boundary is Cop Development Co.

4.3.1.2 Surface Managing Authorities

Plate 2-1 also shows the surface managing authorities for each parcel within the permit boundaries. These local, state, and federal managing authorities are Emery County, State of Utah, and the U.S. Forest Service.

The Emery County zoning ordinance zones the coal property for mining.

4.3.1.3 Utility Corridors and Other Rights-of-Way

Co-Op Mining Company has been granted a mine access right-of-way in Section 26 [see Plate 7-1]. Utility corridors, such as power lines, telephone lines and water pipes, are also shown in Plate 7-1.

4.3.1.4 Special Use Permits and Leases

Co-Op Mining Company leases land owned by Cop Development Company. Special Use permits and leases are not applicable.

Grazing, oil and gas, and other mineral leases for the permit area are owned by Cop Development.

4.3.2 Mineral Ownership/Mine Plan Area

Other than coal, no minerals of value have been mined within the lease and permit area. No other mineral resources are known to be present in commercial quantities.

4.3.2.1 Coal Ownership and Mines [Permit Area and Contiguous Areas]

Coal ownership and mines in the permit area and contiguous areas are shown in Plate 2-1. The names and addresses of the owners of coal in the area are listed in Section 4.3.1.1.

4.3.2.2 Coal Leases

The following coal leases are held by the Co-Op Mining Company adjacent to the permit area. For the locations of these coal leases, please refer to Plates 2-1, 2-1-A.

Trail Canyon Permit area

Bear Canyon Premit Area

4.3.2.3 Mineral Ownership and Mining Map

Plate 2-1 shows the mineral ownership of land parcels adjacent to the permit boundaries. Section 4.3.1.1 lists the fee owners of mineral property. Table 2-1 furthur lists the miner owners of each land parcel adjacent to the permit boundary.

4.3.2.4 Mineral Leases

Not Applicable

4.3.2.5 Oil and Gas Ownership and Wells

No oil and gas interests are represented.

4.3.2.6 Oil and Gas Leases

No oil and gas lease interests are represented.

4.4 LAND USE

The land in the project area and adjacent areas is used for mining, cattle grazing, recreation, and wildlife. Recreational uses consist primarily of hunting, camping, and picnicking. Past and present land uses of the project area and the region as a whole are discussed in the following sections.

4.4.1 Regional Land Use

The South East Utah coal region encompasses lands in federal, state, county, and private ownership. Land use management plans for public and National Forest lands generally allow for mine and mine-related

activities. Coal mining has been an integral part of the region's economy. Mining and related construction activity dominate employment in Emery county. Active mining is going on in areas adjacent to the project area and one new mine has been proposed adjacent on the east of the permit area.

Historically, the livestock industry has been an integral part of the region's economy. Early settlers depended on range land for grazing sheep, cattle and horses. As time passed, grazing operations became smaller, more numerous, and directly associated with small farms. Timber also has been tied to an integral part of the economy of the region, but on a much smaller scale than the livestock industry. Early settlers needed fenceposts, corral poles, house logs, mine timber, railroad ties and lumber; numerous small sawmills supplied local needs. As time passed and needs diminished, most mills went out of business. Little timber has been harvested for commercial purposes in the past 20 years.

Recreational use of the general region of the permit area consists of hunting, camping and picnicking. Snowmobiling also occurs where the slopes are not too steep.

4.4.2 Land Use in the Mine Plan Area

4.4.2.1 Existing Use

The Co-Op Mining property and adjacent area is currently used for grazing, recreation and coal mining.

Plate 2-1 coupled with Tables 2-1 2-2 show the fee ownership and leasehold interests adjacent to the permit boundary and the fee ownership of contiguous areas. This information provides a guide to the land uses of the various parcels.

The surface under which Co-Op Mining Company has leases is managed by the Co-Op Mining Company's owners under multiple use and sustained yield concepts. Present management emphasizes livestock grazing and wildlife; and watershed development. Coal preparation and management facilities are located on fee land.

Grazing

Private land owned by Cop Development Company is not grazed presently.

Recreation

Recreational use of the area affected by mining operations consists primarily of hunting and camping. Heavy hunting of mule deer occurs on the area. Camping frequently occurs on land adjacent to the property.

Forestry

There is no merchantable timber although much of the area is covered by pinyon pine and juniper.

Mining

The type and extent of mining activities are discussed in detail in Chapters 3 and 12.

4.4.2.2 Historical Use

Historically, the area in question was [illegible] site of an active coal mine. However, during [illegible] last five years, land use within the pe[illegible] boundary has not changed in any essenti[illegible]

4.4.2.3 Land Capability and Productivity Before Any Mining

Present land capability and productivity will be only slightly reduced compared to the after mining capability. Mining activities have proceeded on the current lease areas of the Co-Op Mining Company historically with only minor effects on productive capabilities in terms of soils, topography, vegetation or hydrology. The soils indigenous to the area affected by the operations are described in Chapter 8. Vegetation is discussed in Chapter 9.

Surface water in the permit area is limited to surface run-off that flows most heavily during the spring and early summer months and then normally dry up. The quality and quantity of this water and of the ground water will be identified in Chapter 7.

4.4.2.4 Land Productivity Before Mining in Terms of Average Yield of Food, Fiber, Forage or Wood Products

Land productivity in terms of plant products

before any mining will not differ greatly from future productivity. Early settlers depended upon range land for grazing sheep, cattle and horses. Timbering was active, but on a much smaller scale than grazing. Early settlers needed fenceposts, corral poles, house logs and railroad ties.

The permit area affected by Surface operations and facilities of the underground Bear Canyon mine is capable of supporting limited grazing and recreational uses. Farming in the area is prohibited by the steep and rocky terrain.

Current and future land use will suit the physical features of the mine plan area, which is mostly steep and rocky. Such land is well suited for management as a multi-use area and coal mining fits appropriately into the overall land use scheme.

Land productivity data were obtained from the U.S. Soil Conservation Service.

4.4.2.5 Previous Mining

The Bear Canyon mine was started in 1896 and was worked until 1906. Then reopened in 1938 and worked intermittantly until 1957. At this point the mine was abandoned until Co-Op Mining re-entered in 1981.

4.4.2.5.1 Mining Method

Room and pillar mining with continuous mining methods will be used with pillar recovery as mining conditions permit. The room and pillar system is the only logical choice for recovering the coal in the old workings and for driving development openings into the virgin areas.

All proposed mining will be done with continuous mining methods; coal loaded directly into diesel or electric shuttle cars, then to a belt system. The coal is transported directly out of the mine to a stockpile and then trucked to potential markets principally along the Wasatch front.

All proposed mining will be underground, with a minimum of surface disturbances. The current mining method is described in Chapters 3 and 12 in detail.

4.4.2.5.2 Coal Seams and Other Minerals Mined

Coal

The Co-Op Mining Company is located outside of Huntington, Utah, with the mine portal at approximately 7,300 feet above sea level. The coal-bearing strata are in the Blackhawk Formation. Coal will be extracted from 3 seams, which, from uppermost to lowermost, are the Upper, Bear Canyon, and, Lower seams. When mining began in the late 1800's, entry was made into the Bear Canyon Seam and coal extracted from it first. Mining has never been expanded into the other seams.

Minerals

No other minerals are known to exist within the permit area.

4.4.2.5.3 Extent of Coal Removal

The quantity of coal presently removed from the old workings is unknown.

4.4.3 Land Use During Operations

Mining has been in progress in the permit area in past years and land use presently and during operation is described in Section 4.4.2.1 [Existing Use] and in Section 4.4.2.2 [Historical Use]. Therefore, the subsections below describe the differences between current land use as opposed to land use during mining or future land use.

4.4.3.1 Effect of Operation on Land Use [On-Site and Adjacent]

There has been no significant land-use disturbance in the lease area due to mining activities since 1957. Land use should remain the same: recreation, grazing, wildlife and mining.

The simultaneous production of oil, gas, and coal should present no major conflicts. Though other minable coal seams may be at greater depths, the oil and gas zones are at sufficient depths to result in no overlap

between oil and gas zones and coal seams. Therefore, the production of oil, gas, and coal should be compatible.

4.4.3.2 Mitigation of Effects of Operation

The operation of the Bear Canyon, as with any mine, will have some environmental effects.

[illegible] 8.10, [illegible] and [illegible] plan are [illegible] in section [illegible].

4.5 POSTMINING LAND USE

4.5.1 Method of Achieving and Supporting Postmining Land Use

Chapter 3 present, in detail, the abandonment steps and revegetation/reclamation activities to be used to achieve the proposed postmining land uses.

Area Cleanup

[illegible] waste generated in the abandonment operation will be collected and removed.

Return of Other Drainages to Natural State

Natural drainage will be returned to patterns similar to the original patterns to the extent that this is physically possible. [See Appendix 7-G .]

Recontouring of the General Area

Grading and backfilling will be done to achieve a final contour suitable for the wildlife/grazing habitat specified as the postmining land use.

* Operational benches will not be removed. Their banks will be reduced whenever possible; their surface areas will have a 33h:1v slope for drainage.

* Side hill cuts will be reduced to the maximum extent physically possible. The cuts which are already physically stable will not be reduced.

Wind Protection Barriers

In addition to the wind protection provided by the abandonment slopes, rock wind barriers will be constructed by a small portion of the rock generated during the

mining operation. During abandonment small piles of this rock will be formed on the upper decks to provide protection from wind for wildlife.

Scarifying Areas

Operational areas will be scarified to reduce compaction and to prevent topsoil slippage. Steep slope areas which must remain after abandonment will recieve special ripping to create ledges, crevices, pockets and screes. This will allow better soil retention and vegetation establishment.

Distribution of Topsoil

Topsoil from the stockpile will be spread over the distsurbed areas in such a manner as to prevent excessive compaction.

Fertilization and Neutralization

Fertilization or neutralization determined as necessary by soil testing will be done.

Seeding and Tree Planting

Vegetation will be established to prevent erosion,

mining operation. During abandonment small piles of this rock will be formed on the upper decks to provide protection and stability to reclaimed areas.

Scarifying Areas

Operational areas will be s[illegible]ed to reduce compaction and to prevent topsoil slipp[illegible] Steep slope areas which must remain after abandonment will recieve special ripping to create ledges, crevices, pockets and screes. This will allow better soil retention and vegetation establishment.

Distribution of Topsoil

Topsoil from the stockpile will be spread over the distsurbed areas in such a manner as to prevent excessive compaction.

Fertilization and Neutralization

Fertilization or neutralization determined as necessary by soil testing will be done.

Seeding and Tree Planting

Vegetation will be established to prevent erosion,

to optimize the edge effect and to provide cover. Perennial woody species will be emphasized, along with those of proven nutritional value and ability to support wildlife. The types and amounts of such vegetation are discussed in Section 9.7 and Appendix 9D.

Moisture Retention

If operational testing determines that moisture retention is necessary, the following systems may be used:

* Straw - - Terrace benches

* Mulch - - Wood mulch may be sprayed on terrace banks

* Soil Retention Blanket - - Wood fiber held by plastic net may be used on steeper banks

* Jute Mesh and Straw - - Burlap material holding straw may be used on the steepest banks

* Tacifier - - Mulch with tacifying agent may be used on steep banks

Maintenance

Fencing, irrigation and weed control will be used only as needed, according to operational testing results.

Regrading and Reseeding

Erosion that develops in completed areas will be minimized by repeated grading and seeding.

Success Monitoring and Extended Responsibility Period

Vegetation and water will be monitored furing the applicable period of liability to determine success of abandonment reclamation. A determination of revegetation success will then be made.

Removal of Site Drainage Ditches and Sedimentation Ponds

After the disturbed areas are stabilized and the runoff meets the suspended solids standard without detention time, the site drainage system will be removed. The site drainage system areas will be backfilled and revegetated.

Maintenance

Fencing, irrigation and weed control will be used only as needed, according to operational testing results.

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Regrading and Reseeding

Erosion that develops in completed areas will be minimized by repeated grading and seeding as described in Chapter 3, page 103.

Success Monitoring and Extended Responsibility Period

Vegetation and water will be monitored furing the applicable period of liability to determine success of abandonment reclamation. A determination of revegetation success will then be made.

Removal of Site Drainage Ditches and Sedimentation Ponds

After the disturbed areas are stabilized and the runoff meets the suspended solids standard without detention time, the site drainage system will be removed. The site drainage system areas will be backfilled and revegetated.

4.5.1.2 Financial Feasibility and Attainment

Based on the reclamation costs discussed in Section 3.6.7, it appears at this time that the proposed postmining land use is financially feasible and attainable.

4.5.2 Differing Postmining Land Use Support

The mine site will be returned to wildlife/grazing [rangeland] habitat, which is similar to the premining land use.

4.5.3 Consistency with Underground Activities

The underground mining system is consistent with the land use plan since it minimizes subsidence effects. Pillars will be pulled uniformly from areas of room and pillar mining to promote even subsidence and thus reduce subsidence effects.

4.5.4 Final Surface Configuration

The proposed final surface contour plan would allow the side hill cuts and operational benches at the mine site to be brought back to original contour.

4.5.5 Compatibility with Surrounding Land Uses

Throughout the life of the project and especially during abandonment phases, the following assessments will be made:

* The visual resources will be assessed. The abandonment assessment will concentrate on how effectively final drainages and slope patterns fit into the area's general visual resources. This assessment will be made through the period of liability.

* The recreational resources will be assessed. This process will include a review of postmining hunting, camping, hiking and recreational land use. If it is found, during the liability period, that any of these activities have significantly decreased because of the mining operation, corrective actions may be taken.

* The mineral resources contained within the permit area will be assessed. The abandonment assessment will ensure that oil and gas development will be possible at the conclusion of mining. Measures taken to protect the unmined coal, such as portal sealing, will also be assessed. No other mineral resources are known to be present in commercial quantities.

4.5.6 Compatibility with Land Use Policies and Plans

Letters have been sent out to each surface owner for comments regarding postmining land use policies and plan [Appendix 4A]. This permit application will address all concerns voiced therein.

Ground Water

Management Objective. "Improve and maintain watershed conditions to reduce overland flows and to recharge the underground aquifer. Reduce soil losses from the unit where feasible. Protect perennial springs

and ground water and maintain or improve water quality to meet the standards for existing or possible future uses of water."

ects

Approximately 6.4 acres of soil will be disturbed within the permit area, including the loadout area, offices, shops, bath house, substations, roads, portal area and the topsoil storage area.

Soil disturbance over most of these areas would be complete during the life of the mine, resulting in increased onsite runoff and soil erosion. Though onsite erosion will increase, it will not reach Bear Creek and significantly impact the water quality due to required sediment control measures. Therefore, the water quality of this creek will not be degraded.

Vegetation, Range Management and Soils

Vegetation Management Objective. "Improve desirable vegetative cover to protect watershed, decrease erosion and maintain soil stability."

and ground water and maintain or improve water quality to meet the standards for existing or possible future uses of water."

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Impacts

Approximately 10 acres of soil will be disturbed within the permit area, including the loadout area, offices, shops, bath house, substations, roads, portal area and the topsoil storage area.

Soil disturbance over most of these areas would be complete during the life of the mine, resulting in increased onsite runoff and soil erosion. Though onsite erosion will increase, it will not reach Bear Creek and significantly impact the water quality due to required sediment control measures. Therefore, the water quality of this creek will not be degraded.

Vegetation, Range Management and Soils

Vegetation Management Objective. "Improve desirable vegetative cover to protect watershed, decrease erosion and maintain soil stability."

Range Management Objective. "Improve desirable plant species composition and increase forage production on suitable livestock range. Maintain livestock numbers and capacities at a level which is compatible with watershed values, wildlife uses and other resource uses."

Soil Management Objective. "Maintain soil productivity and minimize soil loss through sound resource management."

Impacts

Vegetation has been removed from portions of the mine portals and access roads. This has increased onsite erosion during the life of the mine.

The reduction in desirable plant species will reduce forage production and livestock capacities.

Though the short-term effect from coal mining activities will degrade vegetation and reduce soil stability, the long-term effect will enhance the management objectives. Revegetative measures after mining activities will improve desirable vegetative cover, resulting in improved soil stability, decreased erosion and increased forage production over the entire disturbed area, including the portion currently disturbed.

Minerals

Management Objective. "Provide for mineral activities within the role of responsibility that is compatible with other resource uses and national and local needs."

Impacts

As noted in Section 4.4.2.5.2, coal is the only known mineral of value within the permit boundaries. The production of gas and oil, which have been found in adjacent areas, would be compatible with coal mining [See Section 4.4.3.1].

Archeology and Paleontology

Management Objectives. "Manage and protect important archeological, historical and paleontological resources to preserve scientific and interpretive values in accordance with applicable laws and regulations."

Impacts

There are no archeological sites within the proposed disturbed areas as discussed in Chapter 5.

Timber, Fire and Roads

Tiber Management Objective. "Harvest timber and forest products on a sustained yield basis where environmental effects to resource uses and activities are acceptable and where regeneration can be assured. Improve timber growth and yield on productive sites."

Fire Management Objective. "Provide fire management and other protective measures that will complement ecologic and economic values."

Transportation Management Objective. "Manage and coordinate transportation systems compatible with various uses and activities to provide for feasible, safe movement of goods and services."

Impacts

A few pinyon and juniper would be removed by the proposed surface operation facilities of the mine. These areas are limited to a portal area which would disturb very little surface area. No timber would be affected by surface disturbance.

Mining activities have provided improved access roads for fire protection and have removed some deadfall timber, thereby decreasing fire hazard.

Recreation and Scenic Resources

Recreation Management Objective. "Provide for a broad range of quality recreation opportunities in coordination with federal, state and local agencies. Manage off-road vehicle use to the extent needed to prevent environmental damage."

Scenic Resources Management Objective. "Plan resource activities to add variety and minimize adverse impacts on scenic resources."

Impacts

The surface operation facilities of the mine impose industrial modifications and intrusions and conflict with the scenic resources management objectives. Proposed surface operation facilities will furthur impair scenic resources during the life of the mine. However, reclamation of these areas will restore the scenic resources to their approximate existing condition.

Wildlife in the area will adapt to the operation of existing surface facilities due to the relative small area involved. Proposed construction may disrupt wildlife if human disturbance is not kept to a minimum. These topics are discussed in detail in Chapter 10.

Revegetative measures after the life of the mine will restore wildlife habitats to a condition improved over their existing condition.

Fish habitats will not be affected, as discusses in Chapter 10.

Short-term effects on wildlife habitats will be detrimental to a small degree. However, long-term impacts will be to improve the habitats and restore unreclaimed lands to usable wildlife habitats.

Wilderness Roadless Areas

Management Objective. "Determine the future status of inventoried roadless areas."

Impacts

There are no inventoried roadless areas within the Bear Canyon Mine permit area.

4.5.7 Safety, Environmental Protection and Pollution Control Compliances

Upon expiration of the responsibility period and

at the time of bond release, compliance documentation will be presented by the applicant. This would apply to air quality, especially particulates; storm water runoff; ground water protection and revegetation.

4.6 SOCIOECONOMIC CONSIDERATIONS

A community infrastructure survey was conducted for another permit application in the area to determine the capabilities of local communities to provide permanent employees for the mine, to accept new residents [workers] and to provide new residents with the necessary infrastructure, i.e., community services such as water, sewage systems, housing, schools and medical care. The purpose of the investigation was to identify those communities that have shortages or deficiencies in necessary infrastructure and to suggest ways for rectifying the shortages before they adversely affect the mine operations or the communities. This section summarizes the report of that survey in the communities around the Bear Canyon Coal Mine in Emery County in Utah. The investigations included both field surveys and the collection and review of existing published information.

4.6.1 Service Area

The service area of the Bear Canyon Mine is limited by the distance to the source of supply. Conceptually,

the service area can be viewed as two concentric circles. The inner circle is primary to the mine; the outer is secondary.

The primary area contains those communities that lie within a 45 minute commute of the mine and are therefore most likely to recieve new residents seeking employment at the mine. The secondary service area consists of those communities requiring over 45 minutes to commute to the mine. These communities are shown in Table 4-2 by service area category.

Although some permanent residents from the secondary service area communities will probably commute to the Bear Canyon Mine for employment, newcomers are not expected to settle so far from the mine. Experience with other mines in similar areas has shown that a 30 to 40 minute commute over 40 miles or less represents the maximum that miners can commute and still maintain a high degree of reliabaility. If the time/distance factor is greater, experience demonstrates that the miners will either move closer to the mine or seek work elsewhere.

4.6.2 Growth Capability

The ability of various communities to accept additional

population is important in terms of water and sewage systems and the availability of land for expansion of schools, hospitals, housing and commercial facilities. Infrastructure aspects of the primary service area communities are summarized in Table 4-3.

4.6.3 Labor Force

Demographically, there is a shortage of miners in the 30 to 50 year age bracket. A dormant period in the mining industry from the early 1950's to the early 1970's resulted in few new miners coming into the field for those 20 years. Consequently, the present miners tend to be either in their 50's approaching retirement or in their 20's, embarking on their first job.

The older miners are well settled in the existing towns and for the most part are located reasonably close to their present employment. They are not likely to change jobs or communities. The younger miners, who are still learning mining skills, frequently change jobs to gain additional experience and/or to improve their earning power. It is anticipated that about 5 new employees would be needed if the mine expands to 400,000 tons/year. This would not affect the socioeconomics of the area.

TABLE 4-1

PROPOSED POSTMINING LAND USE

A. Land Use in Relation to Mine Features

Area	Present Ownership	Premining Use	Proposed Postmining Use	Alternate Use
Mine Site and Exploratory Excavations	Private	Wildlife/Grazing	Wildlife/Grazing	Picnic Area
Conveyor, Pipeline and Powerline Route	Private	Grazing	Grazing	Wildlife Habitat
Main Access	Private	Service Road	Service Road	Wildlife Habitat

B. Land Use in Relation to Physical Features

Area	Proposed Postmining Use	Ability to Support Proposed Postmining Use
Flatlands	Wildlife/Grazing Habitat	Adequate
Canyons	Wildlife/Grazing Habitat	Adequate
Moderate Elevation: North and East Slopes	Wildlife/Grazing Habitat	Adequate
High Elevations; Steep land North and East Slpoes	Wildlife Habitat	Adequate
South and West Slopes	Wildlife Habitat	Moderate - because of harsh Natural Conditions

TABLE 4-2

Communities in the Co-Op Mine Service Area

Primary Service Area		Secondary Service Area	
Carbon County	(min.) Commute Time	Carbon County	(min.) Commute Time
Price	45	East Carbon City	90
Helper	50	Sunnyside	90
Wellington	45		
Hiawatha*	35		
Emery County		Emery County	
Huntington	15	Ferron	50
Cleveland	30	Emery	65
Castle Dale	30		
Orangeville	30		

* Hiawatha would be virtually eliminated from labor force projection because it is mainly associated with the U.S. Fuel Company.

TABLE 4-3

Summary of Growth Capability

Community	Water	Sewer	Schools	Hospital	Housing	Commercial Facilities	Land for Expansion
Price	Adequate	Adequate	Adequate	Yes	Acute Shortage	Full Convenience	Yes
Helper	Adequate	Adequate	Adequate	None	Shortage	Partial	Yes
Wellington	Adequate	Adequate	Adequate	None	Shortage	Partial	Yes
Huntington	Adequate	Adequate	Adequate	None	Shortage	Partial	Yes
Cleveland	Adequate	Adequate	Adequate	None	Shortage	Partial	Yes
Castle Dale	Adequate	Adequate	Adequate	None	Shortage	Partial	Yes
Orangeville	Adequate	Adequate	Adequate	None	Shortage	Partial	Yes

TABLE 4-4

Mines Projected to Open on Federal Land Prior to 1985

Mine Name Operator Location	Millon Tons Per Year (1990)	*Employment
"B" Canyon U.S. Steel Near Sunnyside	1.0	280
Fish Creek and Dugout Canyon PG&E Near Wellington	3.2	896
Deadman's Mine AmCA Resource 10 mi east of Kennilworth	1.0	280
Skyline Mines Coastal State Near Scofield	4.0**	800**
Belina #2 & O'Connor Valley Camp Near Scofield	2.4	672
Mine #1 Mt. States Resources 20 miles south of Emery	.5	140
Skumpah Canyon Energy Resource Group 20 miles east of Emery	1.0	280
		3,348

*Employment based on 15 tons per man/shift, 480 production shifts per year.

**Applicant corrected values to current mine plan.

SOURCE: Adapted from Table I-1 on page I-3 of U.S. Department of the Interior (1978).

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Salt Lake City, Utah
November 15, 1982

TO WHOM IT MAY CONCERN:

Co-op Mining Co. asked us, as land owners, to describe our intended future use of the property currently being mined by Co-op Mining Co. in Emery County, Utah.

Co-op Mining Co. now occupies the premises pursuant to a written lease agreement, authorizing the removal and sale by Co-op, of coal from the property. Our best current information indicates that there exists sufficient coal reserves on the property to support a mining operation for in excess of fifty years, at the current rate of coal removal. Upon the expiration of the Co-op Mining Co. lease, and assuming sufficient coal reserves remain, we will re-lease the property, either to Co-op or to some other company interested in mining the coal.

Upon the cessation of coal mining activity, assuming we still own the property and no more beneficial use of the land becomes apparent, the land will most likely be used for grazing cattle or other livestock.

Very truly yours,

Ronald Tucker

COP Development Co.

CHAPTER 5

HISTORICAL AND CULTURAL RESOURCES

CHAPTER 5

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5.1 SCOPE

The project area is situated in the Blackhawk Mining area, approximately 15 miles west-southwest of Huntington, Utah USGS 7.5 Minute topographic quads of the project area include those and adjacent areas.

Surfaces within the large intensive survey area include privately owned, state, and Bureau of Land Managment (BLM) administered lands, and U.S. Forest Service.

5.1.1 Environment and Locality

The Co-Op Mining Company project area is located on the east flank of the Wasatch Mountain Range. The highland locations are situated above the 8,000-ft. elevation adjacent to the Manti-LaSal National Forest while the larger mine facility in Bear Canyon lies at the base of the Wasatch Plateau between the 6,800 and 8,000-ft. elevations.

The survey area contains a wide variation of associated vegetation communities because of variations in soil, slope, elevation, and subsurface moisture retention. The rolling ridges and arroyos of the 680 acre survey unit incorporate pinyon and juniper communities within the broken arroyo drainage system; these plants gradu-

ally reduce their dominance upon the high flats where sagebrush vegetation exists. Serviceberry, rabbitbrush, and scattered saltbush plants also exist along these drainages. The steeper areas ascending the plateau contain mountain shrub communities, which include live oak and mountain mahogany. North-facing slopes contain Douglas fir in the drainages above the upper juniper zone.

Precipitation rates relative to the different elevations within the mine permit area vary. The nearest weather monitoring station, 1 mile southeast, records an annual average of 13 inches, with 6 occurring between May and September. The annual freeze-free season is relatively short, but varies depending on elevation and exposure.

5. History of Land Use

Prior to the beginning of the Holocene Epoch (about 10,000 years ago), the pluvial conditions of the Pleistocene in the eastern Great Basin and in the Wasatch Range began to decrease. The gradual heating and drying trend of the Anathermal (about 10,000 to 7,500 years ago) was accelerated until about 4,000 years ago, although this occurrance varied in different

localities throughout the West relative to local conditions. The ecosystems of the project area were influenced by these climatic changes from cool and wet through a period of increasing desiccation. About 4,000 years ago, the climate in the Intermountain West became cooler and wetter than at present with a subsequent remigration of floral and faunal species from the upper elevations back into the lower basins. These fluctuations in climate affected prehistoric human occupation patterns in the West, as shall be noted in a later section.

Land use techniques employed in the project area have ranged from hunting-gathering activities, which began during the Pleistocene, to primitive farming technology practiced along the river bottoms by the Fremont peoples as early as 1,500 years ago. With the introduction of the Euro-American settlers in the 19th century, modern farming technology, including horticulture and livestock production, became established in the Castle Valley area. From the historic period to the present, the general project area has been primarily utilized as livestock grazing land. Some horticulture related to the livestock industry has developed along the alluvial creek bottoms that extend to the east along the drainages. In addition, some coal mining has occurred during the 19th and 20th

centuries at the Wattis mines to the North and at the site of the existing mine.

5.2 METHODOLOGY

A literature search, and a review of State Historical Society documents were utilized to compile a general history.

5.3 RESEARCH DESIGN

Not applicable - History Review

[The following 25 pages are extrapolated from a historical inventory conducted for another mine in the immediate area.]

The Prehistoric Period

The prehistoric period within the project region can be subdivided into four main temporal phases: Paleo Indian, Archaic, Fremont and Shoshonean.

Paleo Indian Phase

The Paleo Indian phase began approximately 12,000 years ago and terminated about 7,000 years ago; it is generally divided into three subphases, known as the Llano, Folsom and Plano cultures (Jennings 1974:81).

The Llano culture was characterized by the hunting of mammoth 10,000 to 12,000 years ago. Since the Llano culture has been defined primarily from the excavation of mammoth kill sites, very little is known about the overall subsistence activities of this culture.

Evidence of the Llano culture has been found over a widespread area in the Intermountain West and Southwest. The Clovis point, a large, lanceolate, fluted spear point is the only artifact which can be used confidently to infer the presence of the Llano hunters. Clovis points, in association with mammoth remains, have been found in New Mexico, Oklahoma, Colorado, Arizona and Wyoming.

Based on these sites, which are characterized by mammoth-Clovis point association, the core area of the Llano culture is limited to eastern Colorado, most of New Mexico, and eastern Arizona. However, the Clovis point by itself has a much larger distribution. Clovis points, or very similar fluted points, have been found throughout the entire United States.

Within Utah, no characteristic Llano sites have been found, although several isolated Clovis points and one fluted point site have been reported. An isolated Clovis point was reported

from Sevier County, Utah (Tripp 1966). Gunnerson (1956) performed a test excavation on a small rockshelter in Emery County (permanent site number 42Em8) from which a local collector had obtained a Clovis point. The test excavation did not, however, recover any additional Clovis points. An unusual fluted point, which very closely resembled the Cumberland fluted points that are commonly found east of the Mississippi River, was found by an amateur collector in the San Rafael Swell and reported by Hauck (42Em677).

The Folsom culture (circa 11,000 to 9,000 years ago) immediately followed the Llano culture, but several differences in subsistence and artifacts allow a clear distinction to be drawn. Although primary evidence of the Folsom culture is also derived from kill sites, fauna hunted and projectile points used are different from the Llano culture. The Folsom point is a lanceolate, fluted and usually eared projectile point that is generally smaller and thinner than the Clovis point. In addition, the Folsom point is associated at kill sites of the extinct bison.

Folsom kill sites are found predominantly within the same region as the Llano core area but isolated Folsom points are not as widely distributed as Clovis points. Isolated Folsom points are almost entirely limited to the High Plains immediately east of the Rocky Mountains. Eleven Folsom points have been found in Utah but only one of these, found by an amateur collector somewhere in the San Rafael Swell, is known to be from the general area of the project (Tripp 1967).

The Plano subphase of the Paleo Indian phase extends from circa 9,000 to 7,000 years ago. The Plano culture, like the Llano and Folsom cultures before it, was partially economically dependent on large game, particularly bison. However, the Plano culture is characterized by a great diversity of projectile point types. Plano culture projectile points are typically lanceolate, precisely flaked, and nonfluted.

Evidence of Plano culture habitation is predominantly limited to the High Plains east of the Rocky Mountains. The presence of Plano culture hunters in Utah is not widely acknowledged.

The presence of Paleo Indian cultures within Utah was minimal even during the Llano subphase and tended to decrease with time. The slight Paleo Indian utilization of Utah might be tied to the relative scarcity of large game species in Utah compared to the Great Plains east of the Rocky Mountains. The widespread increase in aridity following the end of the Pleistocene was more acute west of the Rocky Mountains than on the eastern side. As a result, the large herbivorous animals utilized by the Paleo Indian cultures were present on the Great Plains in considerably greater numbers.

Archaic Phase

Because of the relatively arid conditions of Utah and the Great Basin, large mammal hunting was not a viable subsistence technique in that area. The Great Basin and adjacent Colorado Plateau of eastern Utah were occupied at an early date by Indian groups who were engaged in a subsistence pattern that was dependent on smaller game animals and gathering wild plant foods.

The utilization of caves and rockshelters by Archaic cultures in Utah has resulted in good temporal sequences for the entire Archaic phase. Radiocarbon dates from Danger Cave (Jennings 1957) verify human habitation of the Great Basin as early as 10,000 years ago, but the artifacts retrieved from the lowest levels of Danger Cave are not diagnostic of any recognized culture group.

In addition to Danger Cave, Hogup Cave (Aikens 1970) in the Great Basin, Sudden Shelter (Jennings et al. 1980a) in the southern Wasatch Mountains, and Cowboy Cave (Jennings et al. 1980) in southeastern Utah, have all supplied important data that is pertinent to development of a cultural sequence for the Archaic inhabitants of

Utah. The Archaic phase has been divided into three periods - Early, Middle, and Late - based on changes in projectile point types.

The Early Archaic period began approximately 8,500 years ago and continued until about 6,000 years ago. Subsistence during this period was based on generalized gathering and hunting techniques. A large variety of plant, animal and insect resources was utilized. Hunting was primarily limited to deer and mountain sheep, although antelope and bison were also sought. Rabbit and small rodent trapping provided an important source of protein.

The habitation of caves and rockshelters in conjunction with the aridity of the area has resulted in conditions suited to preservation of normally perishable materials. Due to excellent preservation, it is known that the spear thrower (atlatl) was the tool used for hunting. The atlatl was used with a two- or three-component shaft and stone dart point throughout the Archaic phase. The Early Archaic period was characterized by four types of dart points: Pinto, Humboldt, Elko and Northern Side-notch (Holmer 1978). During this time period, the Elko point type had a limited areal extent confined primarily to the northeastern Great Basin and the northern Colorado Plateau. Pinto and Humboldt points, generally found in close association in archeological contexts, had the same distribution as Elko points, but are also found in sites in southern and central Idaho. The Northern Side-notch point had a very wide distribution during the Early Archaic period encompassing the northern Great Basin, Columbia Plateau, Northern Colorado Plateau and Great Plains.

The Middle Archaic period began about 6,000 years ago and ended about 4,500 years ago. Subsistence techniques and utilization of caves were the same as during the Early Archaic, but dart point styles diversified; dart points such as the Rocker Side-notched, Sudden Side-notched, McKean Lanceolate and San Rafael Side-notched were characteristic (Holmer 1978). The Elko point continued to be

used in the same areas as it had been used during the Early Archaic period. Although Rocker Side-notched and Sudden Side-notched points were limited in their distribution to central Utah, McKean Lanceolate and San Rafael Side-notched styles had wider distributions, including the Great Plains, at this time. Another point style, the Gypsum point, made its appearance during the Middle Archaic (Holmer 1978). This point style was very common in the southern Great Basin and northern Colorado Plateau and continued to be utilized through the end of the Late Archaic period.

The Late Archaic period began about 4,500 years ago and ended roughly 1,700 years ago. Subsistence techniques were essentially unchanged from the earlier Archaic periods and the utilization of Elko and Gypsum points styles was continued, although the latter style is generally limited in its occurrence to the southern half of Utah. At the end of the Late Archaic period, two new technological developments occurred which mark a significant change in prehistoric subsistence patterns: the introduction of corn and the bow and arrow.

Evidence of corn horticulture in the latter part of the Late Archaic period has been found at several locations: Cowboy Cave (Jennings et al. 1980), Cottonwood Cave in western Colorado (Hurst 1948), and Clyde's Cavern in central Utah (Winter 1973, Winter and Wylie 1974). At all three locations, corn caches found which were dated between 1,600 and 2,000 years ago. The very late portion of the Late Archaic period also witnessed the advent of the bow and arrow. At Cowboy Cave (Jennings et al. 1980), Rose Spring arrowheads were recovered from the uppermost level and were dated about 1,700 years ago.

The entire Archaic phase is characterized by a gathering and hunting subsistence mode and a sequence of dart point styles that have been defined through the analysis of excavated cave and rock shelter sites. Transient habitation of these caves during the annual

migratory round is the most widely accepted interpretation of the Archaic subsistence pattern.

The atlatl was the universal Archaic hunting tool until the very last centuries of the Late Archaic period. However, the advent of the bow and arrow around 1,700 years ago does not seem to have eliminated the utilization of the atlatl during the late Archaic. Gypsum dart points continued to be manufactured even after the appearance of Rose Spring arrowheads at Cowboy Cave (Holmer in Jennings et al. 1980b).

Fremont Period

The Fremont culture of Utah has traditionally been divided into five regional variants: Parowan, Sevier, Great Salt Lake, Uintah and San Rafael. However, a recent re-evaluation has resulted in a three-fold division. The Sevier culture now includes the Sevier, Great Salt Lake and Parowan variants; the Uintah variant is replaced by an as yet unnamed northeastern Utah culture; and the San Rafael variant is designated as the Fremont culture. No cultural entity has been defined that can take into account the variation present between these three groups or areas. The differences are ascribed to separate origins (Madsen and Lindsay 1977).

All of these Utah cultures are characterized by utilization of permanent dwellings, ceramics and some degree of corn horticulture. According to Madsen, the Sevier culture (circa 1,300 to 650 years ago) can be distinguished from the Fremont culture because of the former's primary dependence on wild foods collected from marshland environments west of the Wasatch Plateau. Madsen notes that Sevier villages are normally located near marshland or riverine biomes and consist of deep semi-subterranean dwellings which are frequently clay lined. In addition, adobe surface storage structures are prevalent.

The Fremont culture is found east of the Wasatch Plateau and north of the Colorado River and dates from between 1,500 to 700 years ago. The Fremont culture relied heavily on corn horticulture and is characterized by a settlement pattern which is also distinctly different from the Sevier culture (Madsen and Lindsay 1977). Fremont culture villages are relatively small and are located adjacent to permanent streams such as Ivie Creek, Muddy Creek, Ferron Creek, Cottonwood Creek and Huntington Creek. Fremont culture architecture also differs from that of the Sevier; rock-lined semi-subterranean dwellings and coarse masonry surface storage structures predominate. In addition, Anasazi tradewares are considerably more prevalent in the Fremont culture sites than in the Sevier culture sites.

The unnamed plains-derived culture of northern and northeastern Utah existed from about 1,300 to 650 years ago (Madsen and Lindsay 1977). This culture was dependent upon hunting of bison and the collecting of wild plants. The dwellings are normally shallow basin structures without any clear evidence of the type of superstructure utilized. Unlike the coiled pottery of the Sevier, Fremont and Anasazi cultures, the unnamed culture produced pottery by the paddle and anvil techniques. It is important to note that there is a considerable spatial overlap of the unnamed culture and Fremont culture traits in the northern portion of the latter's distribution. There is currently insufficient data to determine whether the spatial trait overlap is due to alternate occupation, simultaneous occupation by the two cultures or a combination of these two possibilities.

Hunting activities among Sevier, Fremont and unnamed cultures are evident from the many varieties of small arrowheads that have been recovered from excavations. Small stemmed, corner-notched (Rose Spring) arrowpoints are present in the earlier phases of all three cultures, but after about 1,100 years ago, numerous regional variants developed. Side-notch arrowpoint styles (Bear River Side-

notched and Uinta side-notched) were common in the northern part of Utah while Parowan Basal-notched and Bull Creek arrowpoint styles were common in southwestern and south-central portions of Utah, respectively. The Bull Creek points are of particular interest because they are found in high frequencies at both Kayenta Anasazi sites in southern Utah and Fremont sites along the east side of the Wasatch Mountains (Coombs Village, Bull Creek sites, Snake Rock Village, Old Woman, and Poplar Knob) and probably indicate the reciprocal exchange of males for matrimonial purposes (Holmer and Weder 1980).

Dart points, the Elko series and Gypsum in particular, are also found in association with Fremont sites. This association has been used by Schroedl (1976) to verify the indigenous development of the Fremont culture from Archaic antecedents. Dart points, during the Archaic, were used as both projectile points and knives (Weder in Jennings et al. n.d.) but their function in the Fremont context has not yet been evaluated.

In reference to Utah, Mesa Verde and Kayenta variants of the Anasazi culture are of particular importance. The San Juan Anasazi culture was centered around the Four Corners area where Colorado, New Mexico, Arizona and Utah meet. The Kayenta Anasazi inhabited the extreme southern periphery of Utah from the San Juan River west to central Utah. As has already been noted, Kayenta influence is particularly evident in a narrow band of sites running from Coombs Village northward past the Henry Mountains to the Snake Rock Village site adjacent to Interstate 70 on the east side of the Wasatch Plateau.

Shoshonean Phase

The Shoshonean populations, who were the sole inhabitants of Utah at the time of Euro-American contact, have been in the northeastern

Great Basin region since approximately 650 years ago. Their origin has been the subject of considerable controversy, however, and several hypotheses have been expressed.

One hypothesis maintains that the Shoshoneans came from the southwest of the Great Basin at about the time of the dispersal of the Sevier, Fremont and Anasazi agriculturalists (Madsen 1975b and Lamb 1958). Gunnerson's hypothesis (1962) states that Fremont, Sevier and Virgin cultures were Shoshonean peoples who had taken up horticultural and ceramic techniques diffused from the Anasazi, but later reverted to an Archaic subsistence style after a climatic change which made agricultural subsistence techniques unproductive.

Regardless of which hypothesis is correct, Shoshonean groups (Ute, Paiute, Shoshone, and Bannock) were inhabiting the Great Basin into eastern Utah (circa 1300, A.D.) roughly coincident with the disappearance of the Fremont and Sevier cultures.

The Shoshonean subsistence pattern was quite similar to the Archaic adaptation. Small familial bands were engaged in a gathering and hunting subsistence that utilized a wide variety of nondomesticated plant, mammal and insect species.

Very little archeological evidence is available for this time period. Two characteristic artifact types can generally be associated with the Shoshonean occupation of Utah. The bow and arrow was utilized for hunting and a type of arrowhead, the Desert side-notch point, has been correlated with Shoshonean occupation (Holmer and Weder 1980). Shoshoneans also utilized ceramics to a small degree. Shoshonean ceramics are easily distinguished from Sevier, Fremont and Anasazi wares by the former's relative crudeness. Shoshonean ceramics are typically thick-walled, have large temper particles, are poorly smoothed, exhibit little decoration, and have been fired in an uncontrolled or oxidizing atmosphere.

5.4 HISTORICAL INVENTORY

5.4.1 The Prehistoric Period

The prehistoric Shoshonean occupation of the Intermountain West continued up to and through the period of Euro-American contact. Indian groups inhabiting the area of eastern Utah within which the project locality is situated came to be called the Utes.

Precontact

Utes are a group belonging to the Shoshonean (Uto-Aztecan) linguistic family of which there are three branches: Ute-Chemehuevi, Shoshoni, and Mono-Paviotso. The Ute-Chemehuevi branch includes those groups which came to be known as the Utes, Southern Paiutes, and Chemehuevi. Although there is little archeological evidence, the Utes probably were characterized by a social organization and subsistence mode quite similar to all of the other aboriginal groups in the Great Basin and Colorado Plateau, i.e., Utes were pedestrian gatherers and hunters who utilized a relatively large area of western Colorado and eastern Utah (Steward 1974).

Utes were grouped into loosely organized bands consisting of extended families. Leadership was present only for subsistence task groups. They could be reliably distinguished from other contemporary aboriginal groups only in terms of linguistic differences.

Group territoriality was developed only in a statistical sense. A particular Ute band might consider a certain area as a home, but the seasonal round of each band was highly variable from year to year. The area with which any band was most familiar was not exclusively utilized by that band. Intermarriage among various Ute bands tended to maintain linguistic unity but blurred the definition of a territorial homeland for any particular band. Except for those Utes who were utilizing aquatic resources around Utah Lake, local populations were small and mobile (Steward 1974).

Early Contact

The presence of the Spanish colony at Santa Fe by 1598 resulted in the first contact between Utes and Euro-American groups. The relationship which developed between the Utes and the Spaniards was consistently friendly and resulted in the spread of the horse among the Ute bands. When the Utes obtained the horse, a change in their subsistence occurred. The equestrian Ute was able to travel more widely and more effectively and concentrate on bison hunting (O'Neill 1973).

Utilization of the horse was strongly mitigated by environmental factors, however. The maintenance of an extensive horse herd required substantial supplies of grass which generally limited the advantage of the horse to those areas where grass was plentiful such as western Colorado, the Uintah Basin, and along the western slopes of the Wasatch Mountains. The supply of grass also determined distribution of bison. The horse, therefore, was not equally valuable to all Ute bands. Bands in Colorado were able to support their horses whereas those bands in Utah, eastern Utah in particular, were unable to utilize the horse effectively and were more likely to eat it than to ride it.

Considerable trading activity with Utes was occurring during the 17th and 18th centuries. Of particular importance was the slave trade (O'Neill 1973). Utes were able to conduct slave raids on neighboring tribes (especially Navajo) because of their equestrian status. The slaves were then exchanged for horses and other Spanish goods. Whether slaves were exchanged with traders traveling into Ute territory or were driven by Utes to Spanish settlements is unknown because of the lack of documentation.

Until the 1770s, there was little official Spanish interest in the territory of the Utes. However, at that time, King Charles III of Spain decided that an exploration of areas north of Santa Fe would

be beneficial to Spanish control. His developing interest was a reaction to the growing influence and explorations by the British and French in the west. Charles III felt that it was important to ensure control of trade by the Spaniards since he considered British and French traders a threat to Spanish rule (O'Neill 1973).

The first documented Spanish exploration of the area north of Santa Fe was the Dominguez-Escalante Expedition of 1776-1777. The purpose of this first officially sponsored exploration was to find a route between Santa Fe and the Spanish settlements in California. Although the expedition was unsuccessful in reaching its goal, it did extensively explore the territory occupied by Utes who, in all recorded instances, welcomed the Spaniards.

A trail was eventually established between Santa Fe and California which came to be known as the Spanish Trail. Origins of the Spanish Trail are obscure; however, this trail was probably utilized in prehistoric times as evidenced by its association with archeological sites.

Late Contact

Beginning in the early 1800s, the fur trade became active in Utah. The Arze-Garcia expedition traded for furs with Utes at Utah Lake in 1813 and soon thereafter trappers began to actively exploit the area. Etienne Provost was a member of the Choteau-DeMun exploration from 1815 to 1817 and, subsequently, founded his own trapping company which operated primarily within Ute territory. He was later killed by Utes near the site of the city which now bears his name (O'Neill 1973).

During this time, more detailed information on the Shoshonean people was recorded. In particular, specific Ute bands are mentioned with reference to their respective territories. Within the project area, the Weeminuche band conducted its yearly rounds (O'Neill 1973).

The Adams-Onis treaty of 1819, which gave New Mexico its independence, resulted in an influx of Americans to Santa Fe, mostly to engage in trapping. The newly arrived trappers caused a considerable increase in traffic along the Spanish Trail and an increase in competition for available fur resources. This competition was not welcome by Utes who were no longer consistently friendly with Euro-Americans.

Although there were a large number of independent trappers operating in Utah, their activities have not been well documented. Antoine Robidoux was an important trapper who, by 1824, was operating primarily in the Uintah Mountains. William Ashley and Peter Skene Ogden were trapping in the northern Ute territory during the summer of 1824 and, about the same time, Jedediah Smith was exploring eastern Ute territories to evaluate their trapping potential (O'Neill 1973).

The growing traffic along the Spanish Trail had an important effect on local Ute bands. Wakara, a Tumpanuwache leader, became quite powerful in the 1820s by conducting horse raids in southern California and returning to Utah by way of the Spanish Trail (Lyman and Denver 1970). He enhanced his power and wealth by exacting tribute from travelers along the trail and by trading stolen horses and Pahvant and Paiute slaves (O'Neill 1973). In addition, Wakara and his band actively engaged in fur trapping.

By the late 1830s, there was considerable competition for fur resources in Utah and western Colorado. Robidoux established a permanent fort and trading center in 1837 near White Rocks in the Uintah Basin to capitalize on beaver-laden streams of the Uintah Mountains.

Prosperity of the fur trade was not destined to last very long, however. Fierce competition over trapping areas led to widespread disruptive conflicts; most important, the demand for furs used to

make beaver skin hats, fashionable in Europe and the eastern United States, declined rapidly about 1840 as fashions changed. Fort Robidoux was burned in 1844 by Utes, who apparently blamed the trappers for the declining value of their furs (O'Neill 1973; Lyman and Denver 1970).

The decline of the fur trade had a serious impact on the Ute bands of Utah. The entire economic base of the Utes began to disintegrate after 1840. Trading activities with Santa Fe began to dwindle with the decline of the horse and slave trade. Termination of Mexican control over the area in 1846 and the subsequent loss of contact for slave trade into Mexico (Lyman and Denver 1970) was very disruptive to the relationships existing between Utah and Santa Fe.

During the declining years of the fur trade, the largest invasion of Ute territory occurred. Beginning in 1847, Mormon pioneers began to move into Utah and rapidly swelled their numbers through immigration. At first, there was little conflict with the Utes because the major Mormon settlement, Salt Lake City, was on the periphery of Ute territory and the earliest Mormon expansion was to the north. In 1849, Fort Utah (later to become the town of Provo) was founded near Utah Lake on the traditional campsite of the Tumpanuwache band. Since the Tumpanuwache band, still under the leadership of Wakara, had been forced to revert to their earlier mode of subsistence due to the decline of the fur trade, their utilization of the resources around Utah Lake became of vital importance. Conflicting interests in the Utah Lake vicinity escalated into a series of raids and counterraids during the 1850s which became known as the Walker War. In the end, the Utes were forced to leave the valley and moved east across the Wasatch Mountains (O'Neill 1973).

The next few years were difficult for the Utes, who were being gradually forced to split up into small bands and resume a sub-

sistence mode similar to the Precontact Period. Some bands, however, chose to raid Mormon settlements and farms to obtain cattle so that they could avoid starvation. These raids became more prevalent during the 1860s. Raids were conducted on Mormon settlers west of the Wasatch and Utes returned to the unsettled areas east of the Wasatch with the stolen cattle (O'Neill 1973). Although several bands were responsible for these raids, one man by the name of Black Hawk became the focus of the blame for all the raiding.

The areas east of the Wasatch Mountains remained under Ute domination for several years. A Mormon attempt to colonize at Moab was undertaken in 1855, but the Mormon settlers were harassed by Utes and forced to return to Salt Lake City. It was not until 1877, by which time the Utes had been removed to the Uintah Reservations, that Mormon colonists were able to safely settle east of the Wasatch Mountains (O'Neill 1973).

5.4.2 The Historic Period

The history of the east-central coal areas of Utah begins with the exploration and colonization efforts of the Spanish during the last quarter of the 18th Century. East-central Utah was first explored and mapped by the Dominguez-Escalante Expedition of 1776-1777 in its efforts to establish a line of communication between the Spanish settlements of New Mexico and Monterey, California (Miller 1968).

Although the Dominguez-Escalante Expedition failed to achieve this end, subsequent attempts from the New Mexico settlements and the travelings of Spanish and American fur trappers, traders, and frontiersmen resulted in a connecting route known as the Old Spanish Trail (Miller 1968:Map 20). Thousands of horses and numerous trading, trapping, and Indian slave trade expeditions passed through this route which lead from Santa Fe through the San Juan country,

across the Colorado River at Moab, over the Green River at the present site of Green River, across the San Rafael Desert into Castle Valley, then wound south through Salina Canyon to southwestern Utah and southern California (Miller 1968).

By the 1830s, the trail was well established; portions of its route were being followed in 1853 by explorer, John C. Fremont and government surveyor, John W. Gunnison, who reported several sets of well-worn tracks near Green River where Interstate 70 presently runs. Other sections of the trail still remain near the Big Hole Wash in Emery County. The primary route of the Old Spanish Trail, plus divergent trails to Utah Lake, Fort Robidoux and Fort Kit Carson, brought the first extended contact into the project area (Miller 1968:Map 20).

Although forts and trading posts were scattered sparsely through southern and central Utah, the first attempts at organized settlement were undertaken by the Mormon Church. In 1855, the Elk Mountain Mission passed southward through Castle Valley to the area of Moab with the intent of establishing permanent settlement, but Indian hostility forced a quick retreat. The combination of hostile Indians, the desolate appearance of the region, the hardships involved in securing sufficient water for irrigation, and doubts about the quality of the soil caused further attempts at colonizing the eastern area of what was then Sanpete County to be dropped for over 20 years (McElprang et al. 1949:16).

At a priesthood meeting at Mt. Pleasant on September 22, 1877, encouragement was given to settle Castle Valley; soon after, 75 men from Sanpete Stake were called with Christian G. Larsen as leader. Very few responded, however, because of the aforementioned reasons. Orange Seely was subsequently given the responsibility of superintending the founding of settlements and another call for colonizers was issued by the Church in the fall of 1878. Some of the earliest settlers of the area who dwelt in dugouts in hills or washes until

log houses could be erected were Elias and John Cox, Ben Jones, William Avery and Anthony Humbel. By the fall of 1878, the crops were sufficient and the situation stable enough for the families of these men to join them, a sure sign of an intent to remain (McElprang et al. 1949).

Work progressed on the agricultural settlements of Castle Valley and roads were built through the Wasatch Mountains to the more stable areas of western Sanpete County. Additionally, in the fall of 1878, the "Star-Mail Route" was opened between Salina and Ouray, Colorado; it followed the paths of the Old Spanish Trail and the "Gunnison" Trail of years before (McElprang et al. 1949:19-21). Within three years, the towns of Castle Dale, Wilsonville, Ferron, Greenriver (Blake), Huntington, Lawrence, Molen and Orangewill had been established; in February 1880, the Legislative Assembly was created in Emery County which embraced all of present-day Carbon, Emery, and Grand Counties (Lever 1898:593).

Although the project region was established for its agricultural and grazing possibilities, it was the area that inspired active settlement and the mining-dominated industrial base that central and eastern Utah retain today.

The first recorded discovery of coal in eastern Utah was by the Gunnison Expedition of 1853 (Powell 1976:13) when they located coal deposits approximately 3 miles east of present-day Emery. The isolated location of the Gunnison find coupled with the hope that deposits already discovered at Coalville and Wales would prove sufficient for the territory's needs caused Gunnison's discovery to be forgotten. The subsequent failure of the efforts at Wales to produce good coking coal and the Union Pacific Railroad's monopolization and price-fixing on deposits at Coalville caused a re-evaluation of the potential coal producing areas east of the Sanpete settlements (Powell 1976:13).

As a result, the first effort to exploit the newly found eastern coal deposits was undertaken in 1875 at Connellsville in the upper reaches of Huntington Canyon. The Fairview Coal Mining and Coke Company was organized by men from New York, Salt Lake City, and Fairview. Eleven coke ovens were constructed and the coke was hauled by wagon into Springville. The expense involved with the hauling and the questionable quality of the coke produced caused the failure and abandonment of Connellsville by 1878 after only 3 years of operation (Powell 1976:13).

The next development of coal resources was begun in the Pleasant Valley area, also in 1875. The Pleasant Valley Coal Company constructed a wagon road from Springville up Spanish Fork Canyon to Pleasant Valley coal lands in 1876; 1877 saw the opening of the No.1 Mine in Winter Quarters Canyon (Powell 1976:14). A narrow gauge rail line was completed from Springville through Spanish Fork Canyon in October 1879 by the Pleasant Valley Railroad Company since the haul to Springville by the wagon road occupied 4 days in good weather while in winter the road was impassable. This Pleasant Valley area proved to be extremely productive. The first three large-scale mines in eastern Utah were established in this area when the Mud Creek Mine was re-opened in 1882; this was followed by the 1884 opening of the Union Pacific Mine at Scofield just east of Winter Quarters Canyon (Powell 1976:15).

From the earliest times, the railroads sought to control the supply of coal in the territory, e.g., the Coalville resources and Union Pacific Railroad's control over that source. During the early 1880s, the Denver and Rio Grande Railroad was extending its lines from Colorado through Utah. Although originally graded through Castle Valley and Salina Canyon, the route was altered to pass through Price and Spanish Fork Canyon, thus taking in the rich coal areas of what was to become Carbon County (McElprang et al. 1949:22).

Further expressing its interest in eastern Utah coal, the Denver and Rio Grande Western (Denver and Rio Grande's Utah holdings) pur-

chased the independently owned Pleasant Valley Railroad Company and Pleasant Valley Coal Company in 1882. Shortly thereafter, Union Pacific Railroad Company (UPRR) penetrated the Pleasant Valley area in order to protect its threatened monopoly on Utah coal (Powell 1976:16). UPRR formed the Utah Central Coal Company in 1882 and opened the Union Pacific Mine near Scofield in 1884. With the Denver and Rio Grande's Pleasant Valley Coal development (1882), the establishment of Utah Fuel Company in 1887, and the creation of Utah Central Coal of Union Pacific, the railroad companies almost totally dominated the ownership and production of the Utah mines until the early 1900s (Reynolds et al. 1948:195).

In 1888, a mine was opened at Castle Gate on the Price River near the mouth of Price Canyon. In about 1899, a new mine began operations at Sunnyside just 24 miles east of present-day Price at the base of Book Cliffs. The Sunnyside No. 2 Mine also began its production in 1899 with the coal obtained there utilized for coking purposes and at Castle Gate (Powell 1976:17-18).

In 1906, the first coal operations which would remain free from railroad control began production at Kenilworth, 3 miles east of Helper and was called the Independent Coal and Coke Company because of its unique ownership status. A mine was opened on the middle fork of Miller Creek in 1908 and the camp was named Hiawatha (Reynolds et al. 1948:213). This locality at the foot of Gentry Mountain, about 18 miles southeast of Price, was the scene of further coal mining development when Black Hawk Mine was opened in 1911. Just a few miles to the south in northern Emery County, a small wagon mine was purchased by the Castle Valley Fuel Company and the town Mohrland was begun. The last development in this area was undertaken in 1916 at Wattis, several miles north of Hiawatha on the flank of Castle Valley Mountain.

The decade from 1911 to 1920 saw an increase in activity in the coal regions of east-central Utah with many new mines being opened in hitherto undeveloped areas within the Utah coal producing regions.

The region around Panther Canyon on the Price River was prospected in 1911, and in 1914, the first coal was shipped out by the Utah Fuel Company which had leased the properties out for development. A small camp at the base of Castle Rock, about 5 miles northwest of Helper was also developed and opened. Located directly on the main line of the Denver and Rio Grande Western Railroad, the camp's name was changed many times, as was its ownership. Originally known as Bear Canyon, it soon was called Cameron for its developer, then Rolapp, and finally, Royal (Reynolds et al. 1948:244).

In 1912, 1,600 acres of coal land west of Helper was bought to provide coal for smelting operations in the Tintic District. The mine, at what eventually became known as Spring Canyon, began production in 1913 and was the first of many mines in the Spring Canyon District, one of the most prolific coal producing areas in eastern Utah. Soon after the establishment of Storrs (Spring Canyon), another mine was opened in Spring Canyon at Standardville, so called because it was considered to be the standard for the development of future mining camps. The year 1914 saw the opening of the Latuda Mine and camp by Liberty Fuel Company while mines were opened in 1916 at Peerless and Rains. The last mining development undertaken in the Spring Canyon District was Mutual Coal Company's Mutual and Little Standard operations, begun in 1921 and 1925, respectively.

The final major coal producing area to be opened in east-central Utah was the Gordon Creek District. This region had first been prospected in 1908, but was really brought to prominence in 1920 at the Spring Canyon Mine. Mines were developed in this area until 1925 by Consumers Mutual Coal Company, National Coal Company, and Sweet Coal Company. The operations of all three companies ceased by 1950 (Carr 1972:81).

After the development of the Gordon Creek area, further work on the coal regions was undertaken in areas that had been opened pre-

viously. In 1922, Columbia Steel Company opened a mine at Columbia near the location of Sunnyside to further exploit the excellent coking coal obtainable from that region. One very late development of these coal veins was initiated in Horse Canyon in 1942 by the United States Government to aid steel production at its Geneva plant (Reynolds et al. 1948:252). Both the mine and steel plant were taken over by U.S. Steel after World War II and continue in operation today.

Most of the mines in east-central Utah continued production through the heavy demand years of World War I and the years of prosperity that followed; however, a combination of overdevelopment, the increased use of other natural fuels, rising costs associated with expensive underground haulage, and the Depression caused several camps to be abandoned. Among the first mines to succumb were the long exploited Pleasant Valley mines. Winter Quarters, near Scofield, was closed down in 1928 while operations decreased at Scofield and Clearcreek during the early 1920s and 1930s, respectively. Despite these setbacks, 22 coal mines were operating in Carbon, Emery, and Grand counties as of 1929. The production of these mines provided 98% of the state's output (Sutton 1949:852).

Economic and production difficulties continued to plague Utah's coal industry during the 1930s, forcing the closure of the Mutual and Mohrland mines in 1938. World War II brought a temporary respite to the general downward trend with many mines achieving their highest production levels during the war years and immediately thereafter.

The 1950s signaled the end for a great number of the eastern Utah coal mining operations. The increasing use of natural gas for heating homes and for heavy industrial use, as well as the railroad's switch to diesel power were among the developments that severely hurt the coal industry. This situation has drastically changed with the advent of America's "energy shortage" and new technologies

for coal use in the future have caused an upswing in coal production in east-central Utah. Mines which were closed or were operated with skeleton crews have begun to increase operations during the last decade and the possibility of a new sustained burst of coal mining activity definitely exists (Alexander 1963:244-247).

Previous Investigations in the Region

Archeological research in the Castle Valley locality began with the Claflin Emerson Expedition. In 1929, explorations and limited test excavations were conducted along the Fremont River and as far north as the Muddy River in Emery County. The work resulted in the original definition of the Fremont cultural entity (Morss 1931, Gunnerson 1969). The description of Fremont sites north of the Colorado River was an important contribution to the understanding of the prehistoric horticultural adaptation in the American Southwest.

With the exception of the description of the large petroglyph panel in Buckhorn Draw (Reagan 1935), there were no archeological investigations in the Castle Valley region for the next 15 years. Between 1952 and 1957, the University of Utah conducted a series of surveys to better define the nature of the Fremont occupation in Utah. Many Fremont sites were located along the east side of the Wasatch Plateau, several of which were subjected to limited test excavations, including site 42Em5, the Emery Site (42Em47), and Snake Rock Village (42Sv5). These three sites were each Fremont habitations (Gunnerson 1957). In addition to these Fremont sites, Gunnerson also tested a shallow rock shelter on Silverhorn Wash (42Em8) as a result of a local collector's report that a fluted projectile point resembling the Clovis style had been found eroding from the shelter deposits. Little additional information was obtained by the excavation, however (Gunnerson 1956).

In the 1970s, there was a significant upsurge in archeological activity in the Castle Valley region. In 1970, three sites endangered

by vandalism were excavated by the University of Utah. These sites, Windy Ridge Village (42Em73), Crescent Ridge (42Em74), and Power Pole Knoll (42Em75), all proved to be Fremont habitation sites (Madsen 1975a) dating between about 980 and 1,260 years ago.

During the following year, the University of Utah conducted excavations at Clyde's Cavern (42Em177). Clyde's Cavern was a locus of summer plant gathering activities during the Late Archaic Period, but the majority of the cultural deposits were shown to be the result of summer maize cultivation and wild plant harvesting activities during the subsequent Fremont Period (Wylie 1972, Winter and Wylie 1974).

The next site to be excavated in the study area was Joe's Valley Alcove (42Em693). During the summer of 1974, the United States Forest Service excavated this site which had cultural strata, dated by both radiocarbon and typological means, from the Early Archaic, Late Archaic, and Fremont Periods (E. DeBloois, personal communication). That same summer, a University of Utah field school excavated the Innocents Ridge site, which proved to be yet another Fremont habitation locus (Schroedl and Hogan 1975).

During the early fall of 1975, the Antiquities Section, Division of State History (Utah) conducted an excavation of a small rockshelter as a part of the cultural resource mitigation program for Consolidation Coal Company of Denver, Colorado. This site, known as Pint Size Shelter (42Em625), had two main cultural strata, one dated to the Late Archaic and the other dated to the early Fremont Period. Both of these occupations were evidently the result of wild plant procurement activities (Lindsay and Lund 1976).

Other Fremont habitation sites, located further to the south, have been excavated. These sites include Snake Rock Village (Aikens 1967), Old Woman and Poplar Knob (Taylor 1957), and the Old Road Site and Ivie Ridge Site (Wilson and Smith 1976). These five

sites were all Fremont period habitations although Kayenta and Mesa Verde Anasazi ceramics were recovered at low frequencies, indicating that there was contact with other cultural groups located further south.

In addition to these Fremont sites, a deeply stratified rockshelter (Sudden Shelter, 42Sv6) was found to contain occupational strata spanning the entire Archaic period, circa 8,000 to 3,000 years ago (Jennings et al. 1980). When it was originally documented, the site report indicated that Fremont diagnostics were present; however, these artifacts were no longer present when the excavations were begun. The Sudden Shelter site is of particular importance to the local prehistory and to the prehistory of the eastern Great Basin and of the northern Colorado Plateau because of its numerous well-defined occupational strata which has allowed a fine-grain correlation between certain diagnostic projectile point types and the temporal phases of the Archaic period.

A test excavation of two heavily vandalized rockshelter sites (42Em959 and 42Em960) in Cottonwood Canyon conducted by AERC in 1979 seem to mirror the results of the excavations at the nearby Joe's Valley Alcove. Radiocarbon analyses have not yet been completed but projectile point correlations indicate that these two sites were occupied during the Early Archaic period, Late Archaic, and most heavily, during the Fremont Period (Weder and Hauck, n.d.).

Since 1970, the level of survey intensity has increased drastically. The various cultural resource inventories conducted during the 1970s have generally been the result of natural resource development programs and are too numerous to summarize in the present context. Summaries of the inventories performed before 1978 can be found in Sargent (1977) and Hauck (1977a). The combined inventory results as of 1977 indicate that the majority of culturally identifiable sites in the general area are Fremont although Archaic sites are also well represented. Protohistoric Numic sites are present but rare (Hauck 1979a:110).

5.5 EFFECTS OF MINING ON ARCHEOLOGICAL AND HISTORICAL RESOURCES

On two occasions the Division of State History was contacted in reference to that portion of ground in T16S, R7E, Sec. 22 and 23 that has been or may be disturbed. It was the conclusion, in both conversations, that:

[1] There are no known sites of any significance existing in the area in question,

and [2] That the majority of the land in question has been previously disturbed due to earlier mining activities,

and [3] That a survey of areas of future disturbance may be advantages but to survey ground which is disturbed serves no purpose.

However, in the event that Co-Op Mining is in a position to permit new facilities on disturbed ground, it has committed to a thorough Paleo - Archo Survey prior to any new disturbances. Also, should any evidence of Paleo - Archo finds be discovered in the course of present construction, the site will be roped off and construction halted until the Historical Division is contacted. However, a survey will be conducted the summer of 1984 for that area which may be adversely impacted by subsidence. This information will be submitted as Appendix 5-1.

5.5.1 National Register Criteria of Eligibility

Application of the National Register Criteria of Eligibility, as defined under 36 CFR 60.6, indicate that there are no sites within the permit area which would be considered candidates.

5.5.2 Discussion of Impact Potential on Cultural Resource Sites

No known sites exist, therefore, there would be no impacts anticipated at this time.

5.5.3 Mitigation of Potential Adverse Effects

A variety of archeological and historic techniques are available for use in avoiding and protecting sites, or for mitigating potential adverse affect to significant cultural resouces. Such actions, once proposed, are contingent upon comments from relevant Department of Interior agencies and Utah State Preservation offices.

Avoidance procedures are the most effective means of preserving cultural resources and will be implemented in the event that a site is uncovered.

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5.6 PALEONTOLOGIC

A literature search was made for paleontologic date within the general area. The purpose of the search was to:

[1] identify all known paleontologic sites within the designated area;

[2] identify stratigraphic horizons which are potential producers of paleontologic resources;

[3] evaluate the uniqueness of known or potential fossil sites compared to similar or duplicate faunas from the same stratigrapic horizon in other nearby areas.

Stratigraphy

Most of the ground surface within the general area is composed of the Masuk Member of the Cretaceous Mancos Shale. The Masuk is the uppermost shale member of the marine Mancos, overlying the Emery Sandstone Member and underlying the Star Point Sandstone. The lithology of the Masuk is silt, mudstone, and shale. It is about 1,000 ft. (305 m) thick in the permit area, and covers most of the area in question. Above the Masuk Member is the Star Point Sandstone, a transitional marine-nonmarine sandstone bed which is approximately 500 ft. (152 m) thick.

Paleontologic Resources

The marine Masuk Shale contains a widespread fauna consisting of abundant foraminifera (Maxfield, 1976). Ammonoids, bivalves, gastropods, fish and turtle teeth (Fisher, 1960), and probably also ostracodes (Lessard, 1973).

The Star Point Sandstone, a deltaic sequence, has produced only trace fossils from the general area. Burrowing remains of two generic types have been described from the Star Point Sandstone by Howard (1972) and Marley it al. (1979).

In every case these fossils have been reported over broad areas surrounding the study site; therefore, it is almost certain that the Masuk Shale and the Star Point Sandstone within the study area contain similar fossils.

Conclusions and Recommendations

Although no specific paleontologic sites within the designated study area are reported in published literature, there are many occurrences in the surrounding areas, strongly indicating the presence of these same fossils at the study site.

Previous paleontologic investigations demonstrate widespread occurrences of the faunas within Late Cretaceous marine and nonmarine strata in this area. Therefore, all fossils which likely occur within the study site are almost certainly

duplicated in surrounding outcrops of Masuk Shale and Star Point Sandstone.

The paleontologic resources within the permit area are neither particularly abundant nor unique compared to their counterparts in similar stratigraphic horizon within the general area. Based upon present knowledge, development of this site would not pose a threat to the paleontologic resources of the area.

5.7 PUBLIC PARKS

There are no Public Parks within the permit area.

5.8 PALEO-ARCHAEOLOGICAL INVENTORY

Co-Op Mining Company has counselled with the Utah Division of State Historical Preservation Office and has agreed to an on-site survey. The survey will be conducted by an approved archaeologist from BYU (Brigham Young Univ.) as soon as weather permits, (June or July, 1984). The survey and results will be submitted at that time as Appendix 5-1. Co-Op is committed to take all necessary steps to protect any sites deamed necessary in the event any are located.

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CHAPTER 6

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6.1 SCOPE

The geology section of this report describes the general geological conditions of the Co-Op Mining permit area and adjacent areas and identifies whether the conditions are acceptable for recovery of the coal by underground methods. The following major topics are covered: methodology, regional geologic framework, stratigraphy and structure of the project vacinity, extent of coal reserves, coal quality and characteristics, characteristics of the adjacent units, and the geologic hazards and impacts of mining.

6.2 METHODOLOGY

The information used in preparing the geology section of this report includes available literature from surrounding mines, and up-to-date mapping and reserve estimates by the Co-Op Mining Company personnel. Physical and chemical analyses were performed in a certified laboratory.

6.3 REGIONAL GEOLOGIC FRAMEWORK

The mining site lies at the base of an erosional escarpment that forms the eastern face of the Wasatch Plateau, a subdivision of the Colorado Plateau pysiographic province. East of the Wasatch Plateau is Castle Valley, a relatively

flat area over 80 miles long and 10 miles wide trending northeast-southwest. East of Castle Valley lies the San Rafael Swell, a great upfold marked by rings of hogback hills and intervening valleys.

The Wasatch Plateau is a high, broad, flat area dissected by numerous streams. The high plateaus of Utah, which include the Wasatch Plateau, are thought to be a transition zone containing geologic structures common to both the Colorado Plateau Province and the Basin and Range Province to the west.

The Co-Op Mining Company site is located near the east central edge of what is known as the Wasatch Plateau coal field. The plateau edge is a steep cliff with a maximum relief of about 1,000 ft. Coal outcrops appear in the canyon walls and along the cliffs. Rock types at the site are late Cretaceous in age and are generally composed of gray sandstone of fine to medium grain, interbedded with subordinate gray and dark gray carbonaceous shale and coal seams. These represent continental and/or transitional sediments. Marine sediments occur below the sequence and are exposed to the east of the escarpment in Castle Valley.

Table 6-1 gives the generalized stratigraphic sequence and unit description for the Wasatch Plateau. The oldest rocks

are of early Upper Cretaceous age. The major commercial coal seams occur in the Blackhawk Formation and are of Companion age.

Structurally, strata in the eastern Wasatch Plateau generally dip southerly (sometimes slightly southeast or southwest) at low angles of 1 to 3 degrees. Locally, near faults, the dip increases to about 20 degrees. Three major north-south trrending fault zones have been defined in the Wasatch Plateau Coal Field (see Fig. 6-1). Each zone is the product of a high angle block fault with extensive minor fracturing within the graben. The Joes Valley Fault is the largest zone. As shown in Fig. 6-1, the zone lies several miles west of the Co-Op permit area. The Pleasant Valley Fault Zone is approximately 3 to 5 miles wide. In most areas the fault planes of the Pleasant Valley Zone are vertical with between a few feet to 100 feet displacement (Doelling, 1972), although greater displacement occurs locally. The North Gordon Fault Zone, which occurs near the eastern boundary of the Wasatch Plateau field, is the least extensive of the zones. The trends of the faults have a complex pattern. Displacement is generally less than 800 feet (See Plate 2-1 for a larger scale view of faults within the permit area.)

6.4 GEOLOGY OF THE PROJECT VICINITY

Plates 2-3, and 3-1 show the topography of the area. The permit area is generally rugged, with elevations varying from 7,000 to about 10,000 feet above sea level. Slopes within the permit area vary from more than 210% (65 degrees) east of Star Point to less than 4% (2 degrees) on Gentry Ridge.

6.4.1 Stratigraphy

All of the geologic formations exposed on or adjacent to the permit area are Cretaceous members of the Mesaverde group, with the exception of the North Horn Formation, which is Tertiary (See Table 6-1 & Figure 6-2). The minable coal seams are located in the Upper Cretaceous Blackhawk Formation.

Star Point Sandstone

The Star Point Sandstone, the basal formation of the Meseverde group (Doelling, 1972), is a light-colored, fairly well-sorted marine sandstone of medium to fine grain (Spieker, 1931). North of the Wattis

Canyon area, the Star Point Sandstone divides into three tongues. In the project vicinity, the tongues are essentially fused into one massive cliff-forming unit. The Star Point becomes thicker to the southeast, ranging from 400 to 460 feet near the eastern edge of the lease area to 600 feet or more near the central part of Huntington Canyon (Spieker, 1931).

Blackhawk Formation

Overlying the Star Point Sandstone is the coal-bearing Blackhawk Formation, the middle division of the Mesaverde group. The Blackhawk consists of alternating sandstone, shale, and coal beds, with thin beds of argillaceous freshwater limestone occurring occasionally. The sequence represents deposition alterations between littoral and lagoonal sediments. The formation is approximately 1,000 feet thick, with the valuable coal seams located within the lower 400 feet (Doelling, 1972).

The sandstone beds are fine to medium-grained (Spieker, 1931) and yellow-gray to tan in color (Doelling, 1972). The sands of the Blackhawk are generally cemented by calcium carbonate or silica, with the exception of a few localized areas in which the cement is almost entirely clay. Iron is also present in the cement of all but the pure white sandstone (Spieker,

1931). An exception to above mentioned sandstone is the Aberdeen Sandstone, a coarse-grained, white sand that is traceable from the northern part of theWasatch Plateau coal field southward to the northwestern slopes of Gentry Mountain (Spieker, 1931). The generally discontinuous nature of the Balckhawk and apparent low specific water yield (Cordova, 1964) indicates that the water yielding capabilities of the Blackhawk are only of local importance.

Three general types of shale, all continental in origin, have been identified in the Blackhawk Formation (Spieker, 1931): ordinary clay shale, carbonaceous shale, and smoke-gray shale. The ordinary clay shale is gray or green, granular, and normally soft at the outcrop; the carbonaceous shale is brown to black, massive, and laminated; and the smoke-gray shale is tough and leathery, and in its unweathered state is hard and homogeneous (Spieker, 1931). Shale acts as an effective barrier to the vertical movement of water within the Blackhawk Formation. Therefore, a significant portion of the water that reaches the Blackhawk probably percolates downward until it reaches a shale layer, which causes horizontal movement to the surface or another "drain" (i.e. sandstone finger) within the formation.

Castlegate Sandstone

The Castlegate Sandstone, generally considered the basal member of the Price River Formation (Spieker, 1931) consists of massive, highly resistant medium to coarse-grained sandstone beds containing, in places, conglomerate with a matrix of grit (Doelling, 1972). It is thought to be of marine origin (Paul Wier Company, 1977). Although the Castlegate overlies the Blackhawk Formation, it appears barren of coal in the Plateau lease area.

Price River Formation

The lithologic characteristics of the Price River Formation and the underlying Castlegate Sandstone are similar; however, the Castlegate member is differentiated from the Price River by its cliff-forming characteristic (Spieker, 1931). Like the Castlegate, the Price River Formation consists of medium to coarse-grained sandstone beds with occasional lenses of shale. Although the unit has a high porosity, its apparent low permeability (Cordova, 1964) reduces its water yielding capabilities except through fractures.

North Horn Formation

The youngest geologic formation within the lease area is the North Horn Formation, which caps the Price River Formation on Gentry Mountain (Doelling, 1972). The North Horn, the lowest member of the Wasatch Group, consists of variegated shales, irregular beds of gray, brown, or cream colored sandstone of various textures, and thin beds of steel-gray and cream colored limestone (Spieker, 1931).

Surficial Deposits

A few small areas in the eastermost permit area are covered with Quaternary gravel. There are no alluvial deposits within the area to be affected by the mining. Likewise, the permit area is not prone to slides.

6.4.2 Structure

Structurally the strata in the Wasatch Plateau generally dip southerly (slightly southeast or southwest) at angles of 1 to 3 degrees. Three major north-south trending fault zones have been defined in the Wasatch

Plateau Coal Field. Each zone is the product of a high block fault with extensive minor fracturing within the graben. The Bear Canyon Mine is located in the Pleasant Valley Fault Zone. The vertical displacement between a few feet and 200 feet plus. A major fault separates the Bear Canyon Mine from the Trail Canyon Mine. (Note: Geotechnical section and the mine map for Bear Canyon are located in the appendix.) Displacement on this particular fault is estimated to be 220 feet. During the mining of the Bear Canyon Seam several minor faults were discovered in the Trail Canyon Mine. These faults may effect the mining of other seams.

6.5 GEOLOGY OF THE COAL BEDS AND ADJACENT UNITS

Stratigraphy

All of the geologic formation exposed on or adjacent to the permit area are Cretaceous members of the Mesaverde group, with the exception of the North Horn Formation, which is Tertiary. The minable coal seams are located in the Upper Cretaceous Blackhalwk Formation.

6.5.1 Exploration and Drilling

6.5.1.1 Test Borings

Co-Op has not done any test borings. A request was made to Northwest Carbon for the information from Northwest Carbon concerning drilling North of the permit boundary which would be incorporated into the plan, but the request was not granted.

The applicant respectfully requests that the division supply the applicant with the Utah Geological and Mineral Survey reports referred to in the ACR. See Appendix G1.

6.5.2 GEOLOGY

General Stratigraphy

The exposed geologic column, in ascending order, consists of the Mancos Shale, the Star Point Sandstone, the coal-bearing Blackhawk Formation and the Castlegate Sandstone Member of the Price River Formation. All of these geologic units are Cretaceous in age. The Star Point Sandstone through the Price River Formation

composes the Mesaverde Group in this locality.

The Mancos Shale forms the initial steep slopes rising from the washes which in turn is overlain by the initial cliff-forming Star Point Sandstone (".... thick-bedded to massive beds separated by subordinate Mancos-like shale".)[1]

The Blackhawk Formation is composed of alternating sandstones, shales, mudstones and coal representing marine, transitional and terrestrial varieties of sedimentation. Depositional environments of the Blackhawk Formation include littoral, lagoonal, estaurine and swamp type environments. The Blackhawk outcrops to form a step and slope topography slightly less resistant than the Star Point below and the Castlegate above. Multiple coal seams are found within the lower 350 feet of the Blackhawk.

The Castlegate Member of the Price River Formation makes up a massive, resistent cliff-former above the Blackhawk.

---

[1] 1972, Central Utah Coal Fields: Sevier-Sanpete, Wasatch Plateau, Book Cliffs and Emery, Monograph Series No. 3, U.G.M.S., H.H. Doelling.

Structure

The Bear Canyon fault, which is part of the north-south trending Pleasant Valley fault zone, is the only major structural feature in the study area which has any effect on the mineability and continuity of the coal. Displacement on this particular fault is estimated by the author to be 200'+ in the vicinity of Bear Creek Campground on the north side of State Highway 31. The west side of the fault is down relative to the east side. In the vicinity of the Bear Canyon Mine, Section 24, Township 16 South, Range 7 East, the fault is buried by alluvium, however, the fault trace expresses itself in the falls in the NW¼, NW¼ of Section 24, Township 16 South, Range 7 East and displacement at this point is apparently less than five feet. Strata immediately bordering the fault is disturbed and inconsistent in spatial attitude with equivalent strata in the study area east of the Bear Canyon fault. This will no doubt have a limiting effect on the extent to which coal can be mined in the immediate vicinity of the fault. The Bear Canyon fault marks the western boundary of the study area.

Strata east of the fault are nearly horizontal in attitude providing excellent mining conditions.

Coal outcrops slightly lower in elevation in the southern portion of the area than in the northern portion.

Small faults noted in the field along outcrop were interpreted to be largely of non-tectonic origin (e.g. landslide and slump) by the author. Other faults observed did not express displacement of sufficient magnitude to be prohibitive to mining.

Coal

Multiple coal seams are found in the lower 350 feet of the Blackhawk Formation as was previously mentioned. In ascending order the seams are as follows: Hiawatha, Blind Canyon, Bear Canyon and the upper beds,[1] (see Table 1 - following).

None of the coal lies at depths of more than 1,800 in the study area. Depth should not be a limiting factor in mining.

It was noted in the field that strata situated at elevations consistent with the upper beds structual horizon were badly burned and not of economic importance.

LOWER HUNTINGTON CANYON	FEET
Upper beds	0-6
Interval	200
Bear Canyon bed	0-10
Interval	40-60
Blind Canyon bed	0-10
Interval	40-60
Hiawatha	5-8
Star Point Sandstone	

Author's Note: Hiawatha to Blind Canyon interval can be as great as 110 feet.

TABLE 1 (AFTER DOELLING, 1972)

The Blind Canyon and Bear Canyon seams were measured and observed at various points in the study area by the author, however, these seams were traceable only locally in Bear Canyon. Limited traceability of these two seams is attributed to the lenticular nature of the seams, the extent of slope debris acting as cover and/or depositional irregularities.[2] H.H. doelling indicates the Bear Canyon seam is present in Left Fork of Fish Creek Canyon (east of Bear Creek Canyon) with a thickness of 6.5 feet, however, this measurement was not verified.[1] Doelling also has a 17.3 foot measurement in the Bear Canyon seam in Bear Canyon that was not verified in the field possibly because this particular exposure has since been covered by slope debris.

A small adit approximately 50 feet in length and interpreted as penetrating the Bear Canyon seam (measurement M-5), and a longer adit approximately 300 feet in length and interpreted as penetrating the Blind Canyon seam (measurement M-7), were discovered in Bear Creek Canyon, Section 24, Township 16 South, Range 7 East. The full extent and history of these workings is not known. The fact that these two seams

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[2] 1931, The Wasatch Plateau Coal Field, Utah, U.S.G.S. Bulletin 819, E.M. Spieker.

are not traceable for any significant area beyond these old workings indicates the subordinate nature of the Bear and Blind Canyon seams.

In the SW¼, SW¼ of Section 24, Township 16 South, Range 7 East the Bear Canyon Mine is located. Two seams were worked there, the upper of which is the Bear Canyon seam (elevation 7,420 feet) and the lower of which is the Hiawatha seam (elevation 7,340 feet). This interpretation is based on the seams stratigraphic position above the Star Point Sandstone. The Blind Canyon seam apparently has pinched out or been replaced in this locality. The mine lies on the west side of the Bear Canyon fault. The presence of the Hiawatha and Bear Canyon seams at the mine lend credence to the author's opinion that these seams are probably present across canyon to the east where they were not traceable nor measurable due to slope cover.

The Hiawatha seam was identified throughout the majority of the study area based on its stratigraphic relationship with the underlying Star Point Sandstone. The Star Point Sandstone is continuous and conspicuous within the area covered by this report. While the Hiawatha seam was not measured in Left Fork of Fish

Creek Canyon by this author or previous investigators (i.e. E.M. Spieker, H.H. Doelling), the presence of the Reichert Mine (Hiawatha seam - after Doelling) in Section 20, Township 16 South, Range 8 East suggests the interstitial presence of the Hiawatha seam in Left Fork. Where identified and measured, the Hiawatha seam achieved mineable thickness in all but one instance (3.3 feet - measurement M-2). However, coal thickness at outcrop is invariably thinner than the subsurface thickness. The Hiawatha seam averages 5.96 feet in thickness in the area inspected. Specific work accomplished is shown on the geologic map (Enclosure 1) and columnar outcrop sections (Figure 2 - following pages).

Well consolidated sandstone forms the roof and floor of the Hiawatha seam in the majority of locations inspected along outcrop. This situation provides excellent mining conditions and high coal recovery percentages as is demonstrated by 90 to 96 percent recovery of the Hiawatha seam at the King Mine approximately five miles NNE of the study area.[1]

Doelling states that "extensive mining under Gentry Mountain (a short distance due north of Bear Creek Canyon) reveals that the Hiawatha is continuous in the anticipated thickness".[1]

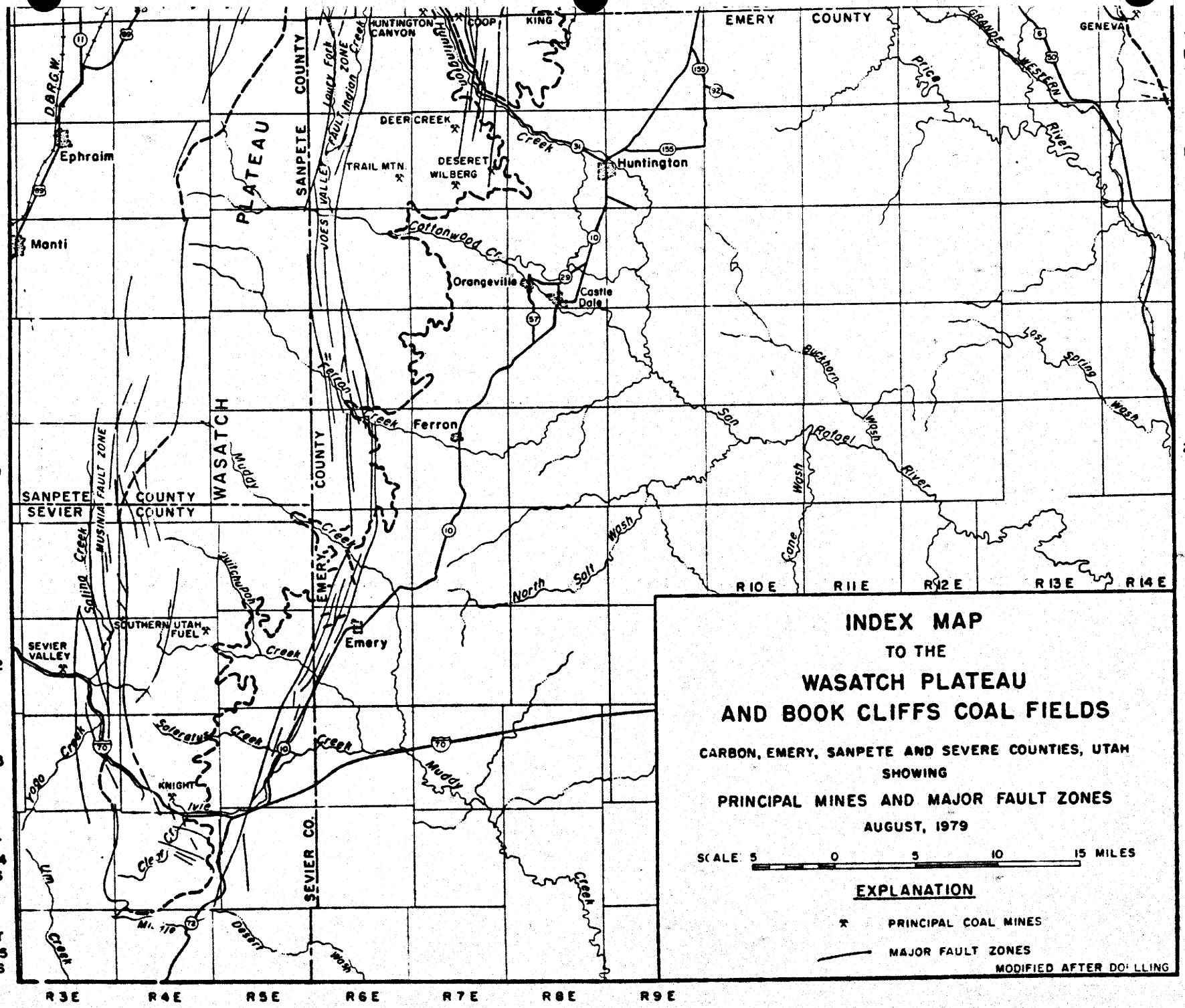
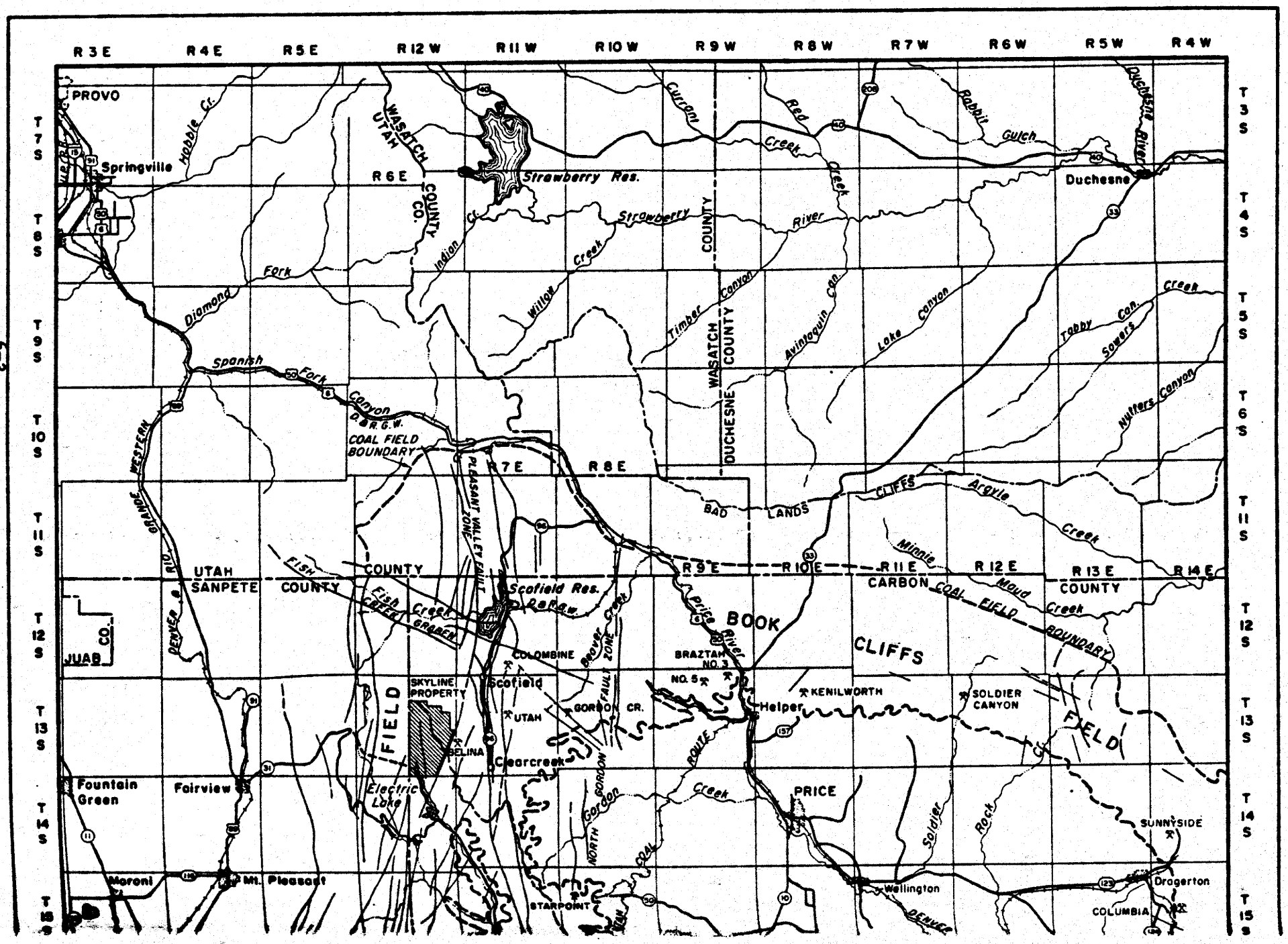
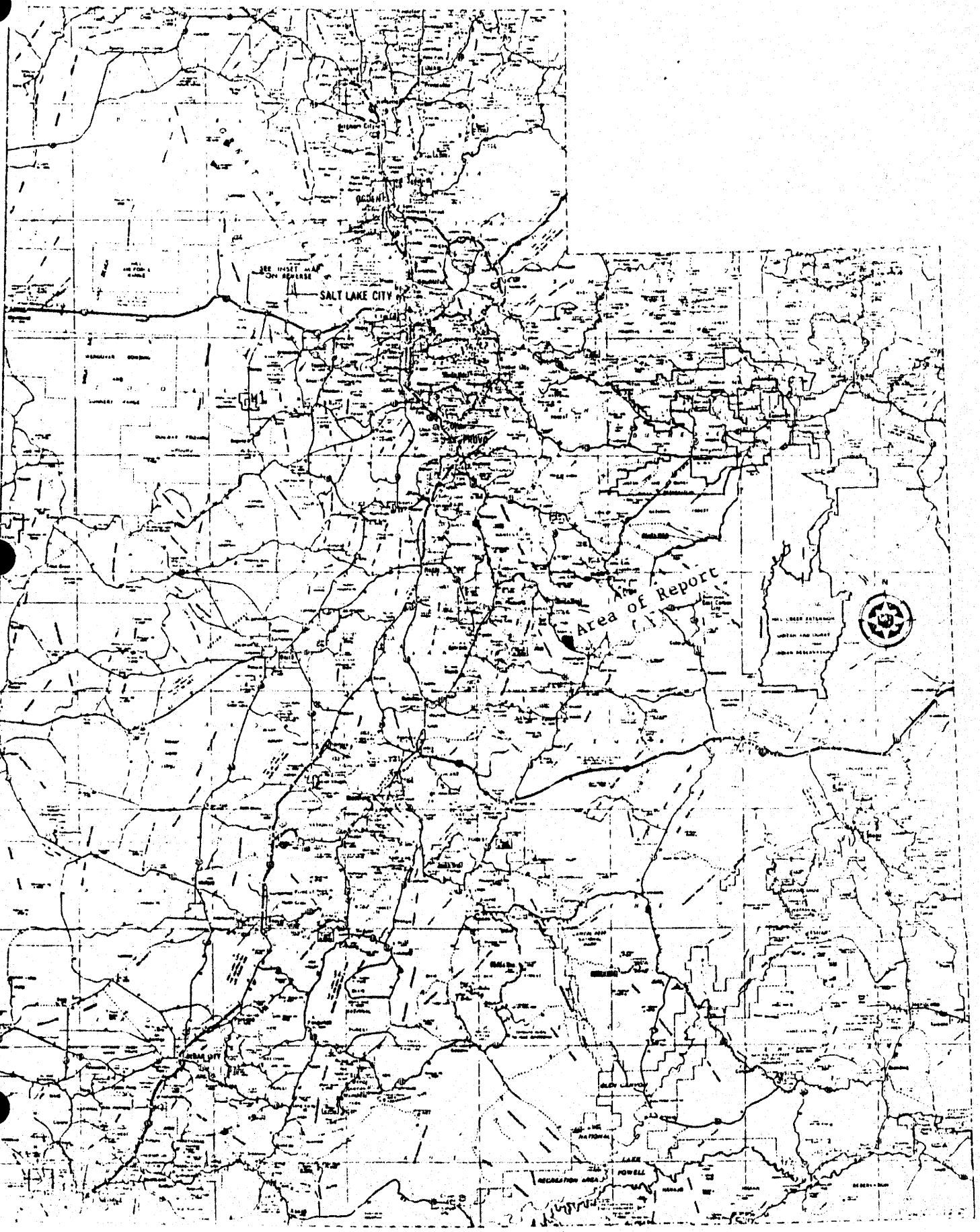

INDEX MAP
TO THE
WASATCH PLATEAU
AND BOOK CLIFFS COAL FIELDS
CARBON, EMERY, SANPETE AND SEVERE COUNTIES, UTAH
SHOWING
PRINCIPAL MINES AND MAJOR FAULT ZONES
AUGUST, 1979
SCALE 5 0 5 10 15 MILES
EXPLANATION
PRINCIPAL COAL MINES
MAJOR FAULT ZONES
MODIFIED AFTER DOLLING
EMERY COUNTY
SANPETE COUNTY
SEVIER COUNTY
WASATCH PLATEAU
Ephraim
Manti
Huntington
Orangeville
Castle Dale
Ferron
Emery
GENEVA
HUNTINGTON CANYON
COOP
KING
DEER CREEK
TRAIL MTN.
DESERET
WILBERG
SOUTHERN UTAH FUEL
SEVIER VALLEY
KNIGHT
D.&R.G.W.
GRANDE WESTERN
Price River
Cottonwood Cr.
Huntington Creek
Lowry Fork
Joes Valley Fault Zone
Muddy Creek
Cottonwood Creek
Buckhorn Wash
Lost Spring Wash
San Rafael River
Cane Wash
North Salt Wash
Muddy Creek
Hiawatha Creek
Musinia Fault Zone
Salina Creek
Sevier Co.
Emery Co.
Sanpete Co.
Solomon Creek
Ivie Creek
Cleveland Creek
Lion Creek
Desert Wash
Mt. 116
T 16 S
T 17 S
T 18 S
T 19 S
T 20 S
T 21 S
T 22 S
T 23 S
T 24 S
T 25 S
R 3 E
R 4 E
R 5 E
R 6 E
R 7 E
R 8 E
R 9 E
R 10 E
R 11 E
R 12 E
R 13 E
R 14 E

FIGURE 6-1


R 3 E
R 4 E
R 5 E
R 12 W
R 11 W
R 10 W
R 9 W
R 8 W
R 7 W
R 6 W
R 5 W
R 4 W
T 7 S
T 8 S
T 9 S
T 10 S
T 11 S
T 12 S
T 13 S
T 14 S
T 15 S
T 3 S
T 4 S
T 5 S
T 6 S
T 11 S
T 12 S
T 13 S
T 14 S
T 15 S
PROVO
Springville
Hobble Cr.
WASATCH COUNTY
UTAH CO.
R 6 E
Strawberry Res.
Currant Creek
Red Creek
Rabbit Gulch
Duchesne River
Duchesne
Strawberry River
Indian Cr.
Willow Creek
Diamond Fork
Spanish Fork
Canyon
D. & R.G.W.
COAL FIELD BOUNDARY
Timber Canyon
Avintaquin Can.
Lake Canyon
Tabby Can.
Sowers Creek
Nutters Canyon
WASATCH COUNTY
DUCHESNE
R 7 E
R 8 E
BAD LANDS
CLIFFS
Argyle Creek
Minnie Maud Creek
WESTERN
Gulf
Denver &
PLEASANT VALLEY FAULT ZONE
UTAH COUNTY
SANPETE COUNTY
Fish Creek
Fish Creek Branch
Scofield Res.
D.&R.G.W.
Price River
R 9 E
R 10 E
R 11 E
R 12 E
R 13 E
R 14 E
CARBON COUNTY
COAL FIELD BOUNDARY
BOOK CLIFFS
JUAB CO.
COLOMBINE
Grover Creek
FAULT ZONE
BRAZTAN NO. 3
NO. 5
SKYLINE PROPERTY
Scofield
UTAH
GORDON CR.
Helper
KENILWORTH
SOLDIER CANYON
FIELD
BELINA
Clearcreek
Electric Lake
Fountain Green
Fairview
Gordon
NORTH GORDON
COAL
ROUTE
Creek
PRICE
Soldier
Rock
SUNNYSIDE
Moroni
Mt. Pleasant
STARPOINT
Wellington
DENVER
Dragerton
COLUMBIA


SEE INSET MAP ON REVERSE
SALT LAKE CITY
PROVO
Area of Report
N
CEDAR CITY
LAKE POWELL
RECREATION AREA

6.5.4 Columns and Cross-Sections (Appendix 6-A)

6.5.5 Coal Reserves (See page 1-3)

6.5.5.2 Coal characteristics (App. 6-B)

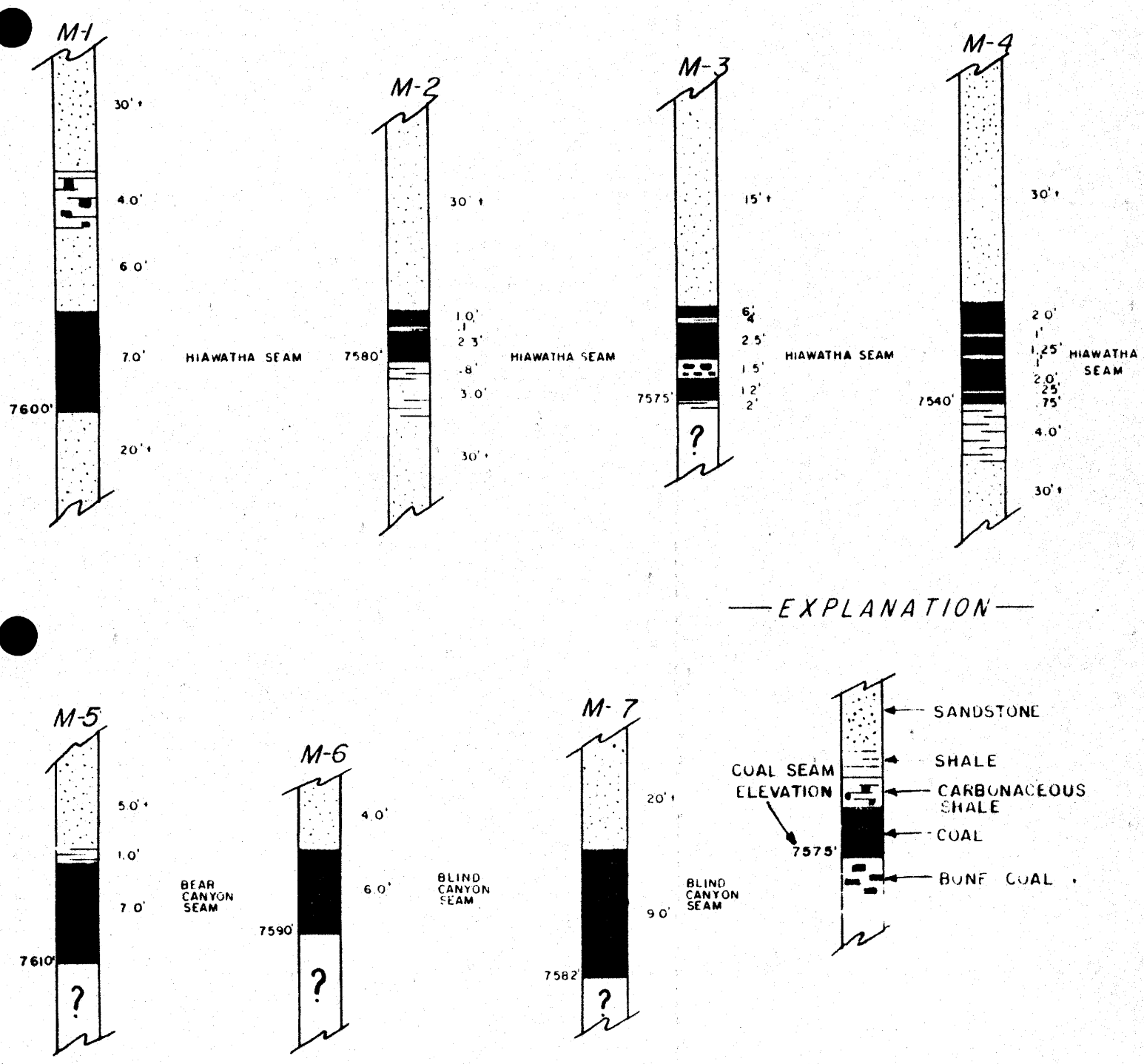
6.5.6 Coal and rock sample sites (See Plate 2-2)

6.5.6.1 Rock characteristics (App. 6.C)

6.6.1 Mining hazards (See Appendix 3-B)

6.6.2 Surface hazards (See Sec. 3.5.8)

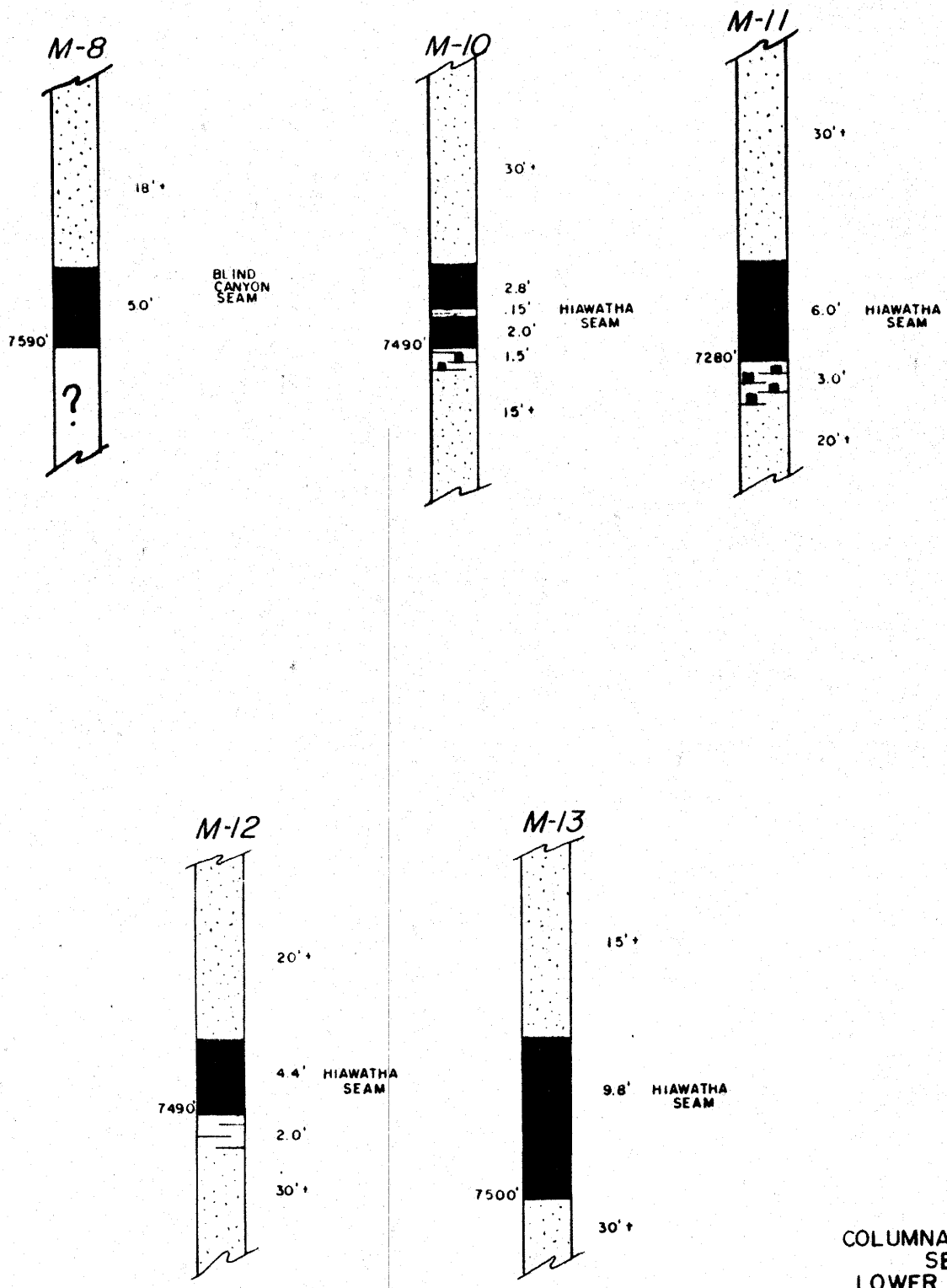
6.6.3 Impacts of mining (See Sec. 3.5)



COLUMNAR OUTCROP SECTIONS LOWER HUNTINGTON CANYON EMERY COUNTY, UTAH

Figure 2

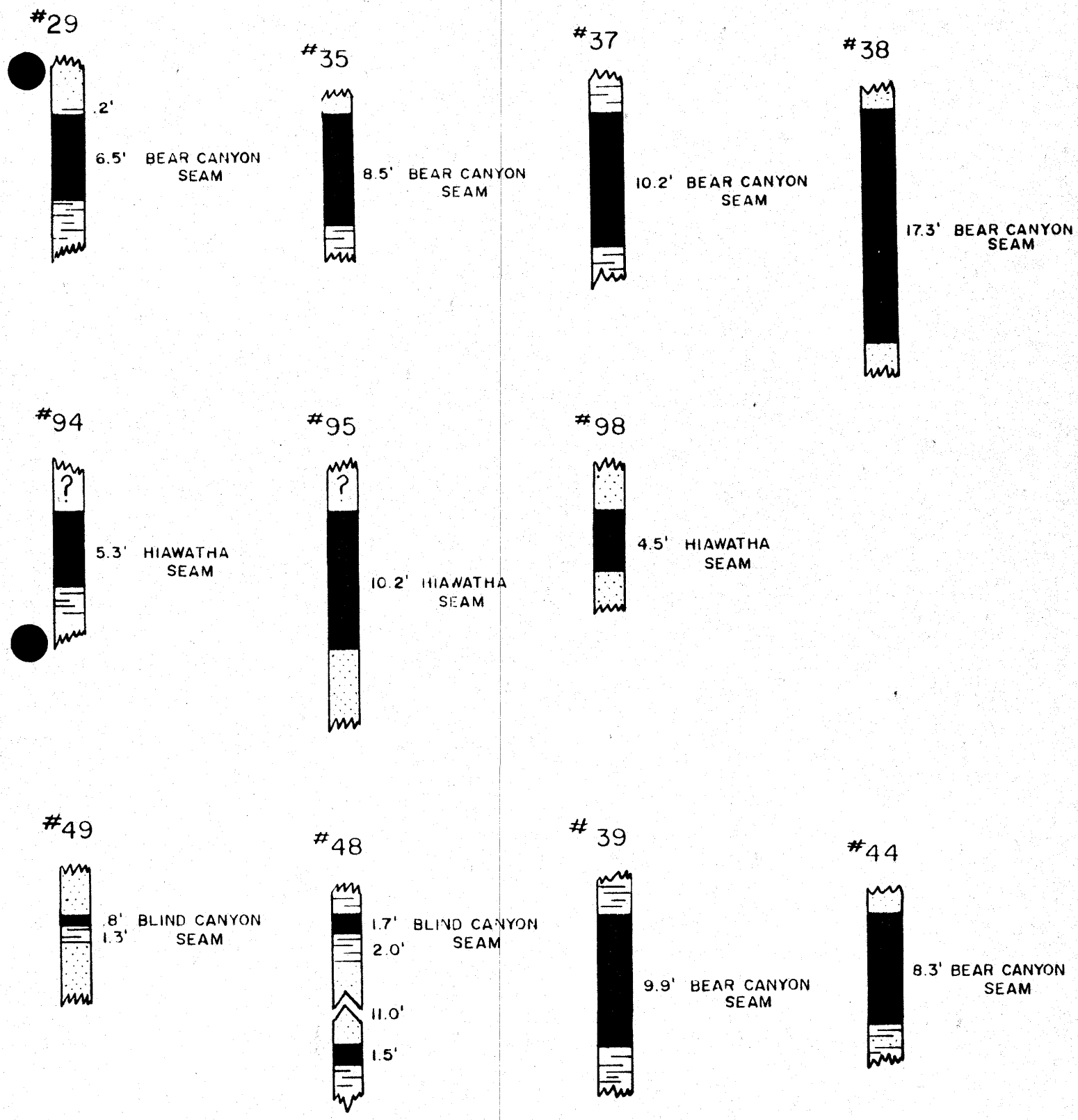
Vertical Scale 1" = 10'



COLUMNAR OUTCROP SECTIONS LOWER HUNTINGTON CANYON EMERY COUNTY, UTAH

Figure 2

Vertical Scale 1"=10'



Vertical Scale 1" = 10'

COLUMNAR OUTCROP SECTIONS
(after Doelling, 1972)
LOWER HUNTINGTON CANYON
EMERY COUNTY, UTAH

Figure 2

System	Series	Stratigraphic Unit		Thickness (feet)	Description
TERTIARY	Eocene	Green River Formation		–	Chiefly greenish lacustrine shale and siltstone.
		Wasatch Group	Colton Formation	300-1,500	Varicolored shale with sandstone and limestone lenses, thickest to the north.
	Paleocene		Flagstaff Limestone	200-1,500	Dark yellow-gray to cream limestone, evenly bedded with minor amounts of sandstone, shale and volcanic ash, ledge former.
			North Horn Formation (Lower Wasatch)	500-2,500	Variegated shales with subordinate sandstone, conglomerate and freshwater limestone, thickens to north, slope former.
CRETACEOUS	?				
	Maestrichthian	Mesaverde Group	Price River Formation	600-1,000	Gray to white gritty sandstone interbedded with subordinate shale and conglomerate, ledge and slope former.
	Campanian		Castlegate Sandstone	150- 500	White to gray, coarse-grained often conglomeratic sandstone, cliff former, weathers to shades of brown.
			Blackhawk Formation *MAJOR COAL SEAMS*	700-1,000	Yellow to gray, fine- to medium-grained sandstone, interbedded with subordinate gray and carbonaceous shale, several thick *coal* seams.
			Star Point Sandstone	90-1,000	Yellow-gray massive cliff-forming sandstone, often in several tongues separated by Masuk Shale, thickens westward.
	Santonian	Mancos Shale	Masuk Shale	300-1,300	Yellow to blue-gray sandy shale, slope former, thick in north and central plateau area, thins southward.
			Emery Sandstone *COAL (?)*	50- 800	Yellow-gray friable sandstone tongue or tongues, cliff former, may contain *coal* (?) in south part of plateau if mapping is correct, thickens to west and south. *Coal* may be present in subsurface to west.
	Coniacian		Blue Gate Member	1,500-2,400	Pale blue-gray, nodular and irregularly bedded marine mudstone and siltstone with several arenaceous beds, weathers into low rolling hills and badlands, thickens northerly.
	Turonian		Ferron Sandstone Member *MAJOR COAL SEAMS*	50- 950	Alternating yellow-gray sandstone, sandy shale and gray shale with important *coal* beds of Emery coal field, resistant cliff former, thickens to the south.
	Cenomanian		Tununk Shale Member	400- 650	Blue-gray to black sandy marine slope forming mudstone.
	Albian	Dakota Sandstone *MINOR COAL*		0- 60	Variable assemblages of yellow-gray sandstone, conglomerate shale and *coal*. Beds lenticular and discontinuous.

Figure 5. Generalized section of rock formations, Wasatch Plateau coal field.

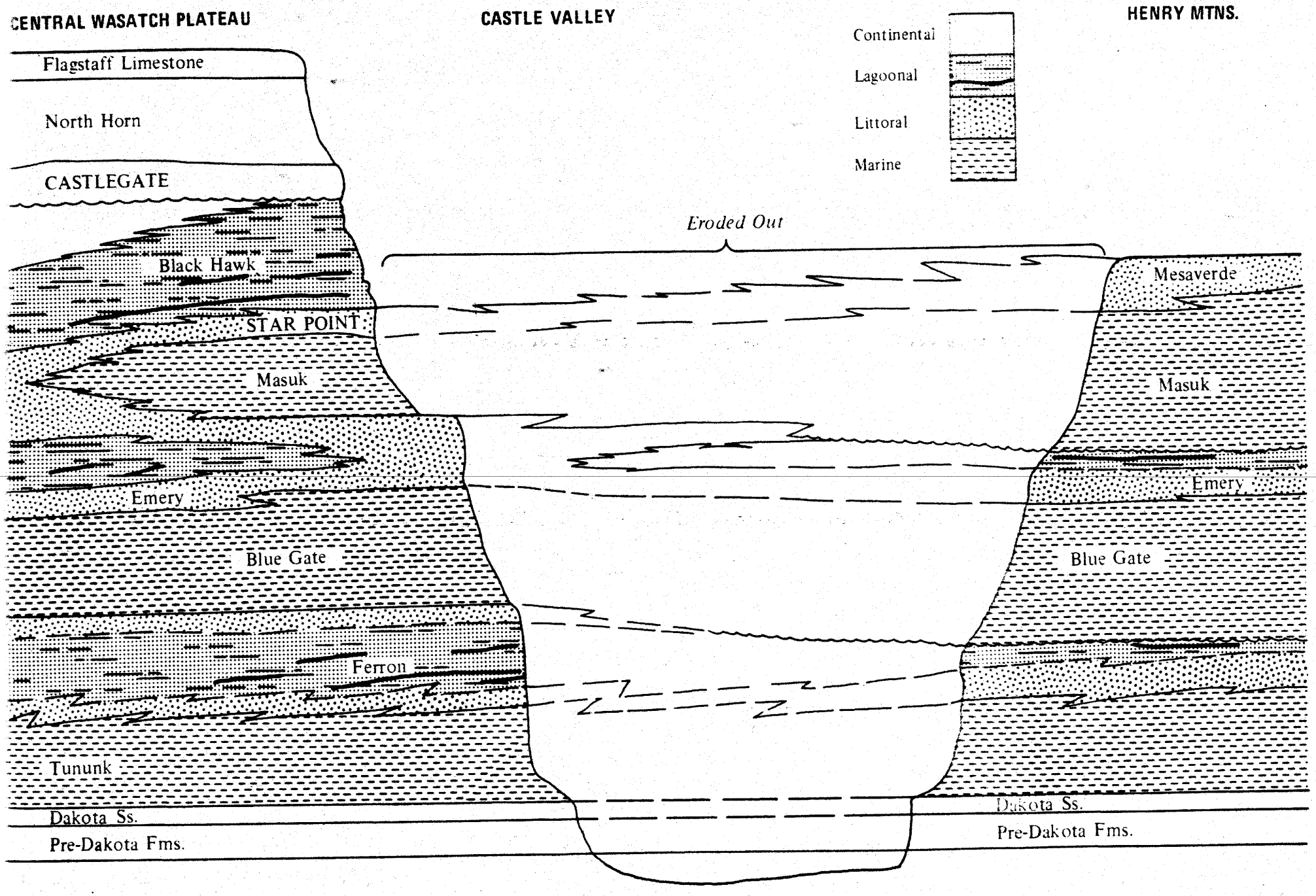


Figure 13. Stratigraphic correlation diagram from [illegible]tral Wasatch Plateau to the Henry Mountains.

Blackhawk Formation

The Blackhawk in the Mesaverde Group of the Wasatch Plateau contains important coal seams in the lower half of the formation. The 700- to 1,000-foot unit, less resistant than the units that contain it, consists of alternating slope- and cliff-forming units (figure 6). The cliff-forming sandstones are generally yellow-gray or white-gray on fresh surfaces and weather to shades of tan, yellow or brown. In places they are reddened by the natural burning of nearby coal seams. Sands are fine- to medium-grained and cemented by either calcite or silica. In a few places they are argillaceous. Iron colors the cement. Occasionally the iron has been leached by organic acids from covering swamps and the sandstone is white.

Slopes of the formation are made of various types of shale and coal. The shales, continental in origin, consist of three kinds: clay shale—soft, granular, gray to green in color and the most common; carbonaceous shale in various shades of brown and black; and smoke gray shale usually associated with the coal.

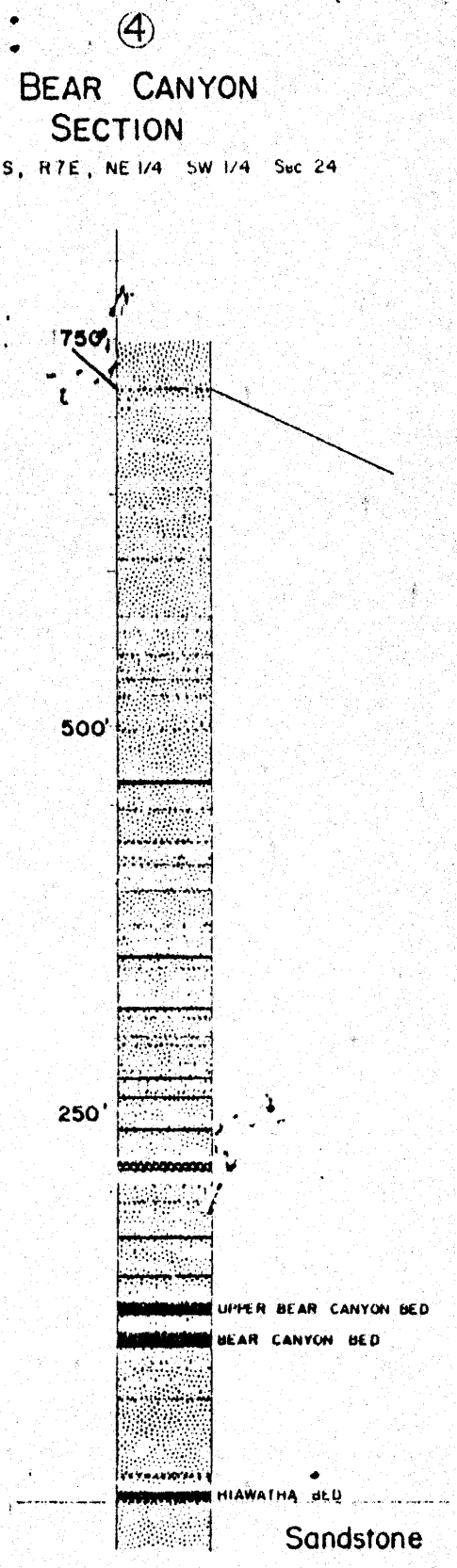
Other strata include friable shaley sandstones, usually thin and platy, that are cemented loosely by calcium carbonate. In some places the rock grades into an impure limestone.

The proportion of shale to sandstone is greater in the north part of the field as compared to the south, but total change in character of the formation is slight. In a section measured by Spieker (1931, p. 30-33) the unit consists of one-third shale and two-thirds sandstone. Key beds are local in extent and each area has its own grouping. An exception is the Aberdeen Sandstone Member. It underlies the Castlegate "A" coal bed and can be traced from the Gordon Creek area southward to Gentry Ridge near Wattis.

The lower contact of the Blackhawk was defined by Spieker (1931, p. 35) as "the clear-cut upper surface of the Star Point Sandstone," but Young (1955, p. 183) redefined the base as the bottom of the Spring Canyon Tongue. Young's work concentrated on the Book Cliffs coal field to the east, but his reports add to the understanding of the Blackhawk in the Wasatch Plateau field. Excerpts from his report follow:

> The redefined Blackhawk formation consists of some prominent littoral marine sandstone tongues and many lesser ones, all projecting eastward into the Mancos, where they lose their identity by grading into shale. Above each of them and below the next succeeding littoral marine sandstone, lagoonal deposits of sandstone, shale and coal were developed behind barrier bars, and where these deposits occur the underlying sandstone is almost everywhere white-capped. . .Division (of six members) is possible only where the basal littoral marine sandstones are developed at the extreme western end of the Book Cliffs at Storrs, Utah (simultaneously the northern end of the Wasatch Plateau field); only the basal sandstones of the Spring Canyon and Aberdeen members are present and between them is about 60 feet of coal-bearing rocks of the Spring Canyon Member. Above the basal sandstone of the Aberdeen Member are about 800 feet of undifferentiated coal measures of the Blackhawk, which are largely lagoonal but may include some inland floodplain deposits in the upper portion.

The commercial coal beds lie in the lower 250 to 350 feet of the formation; some thin units are in the upper part. Two of the more important coal beds are the Hiawatha and Castlegate "A" bed.



F-464

COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES: 228 NORTH LA SALLE STREET, CHICAGO, ILLINOIS 60601 · AREA CODE 312 726-8434

WESTERN DIVISION MANAGER
GAIL D. PALMER

PLEASE ADDRESS ALL CORRESPONDENCE TO
224 South Carbon Avenue
Price, Utah 84501
Phone: (801) 637-7540

SINCE 1908

CO-OP MINING CO
P.O. Box 300
Huntington, Utah 84528

March 2, 1982

Sample identification by
Co-op Mining Co.
#2

Kind of sample reported to us	Coal
Sample taken at	xxxx
Sample taken by	Co-op Mining Co.
Date sampled	xxxx
Date received	2-26-82

Analysis report no. 57-8990

SHORT PROXIMATE ANALYSIS

	As Received	Dry Basis
% Moisture	4.70	xxxxx
% Ash	7.49	7.86
Btu/lb	12937	13575
% Sulfur	0.41	0.43

% Air Dry Loss = 3.07
Moisture, Ash-free Btu = 14733
Pounds of SO2 per 10^6 Btu = 0.63
Moist, Mineral matter free Btu * = 14088
(Based on as rec'd moisture)*
Pounds of Sulfur per 10^6 Btu = 0.32

JB/dt

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Jack Blair

JACK D. BLAIR, Manager, Price Laboratory

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For Your Protection

AMERICAN COUNCIL OF INDEPENDENT LABORATORIES, INC.
Charter Member

Sample No. WP-8-75

U.S.G.S. Serial No. D174679

Location Co-op Mine

Face channel Sample

Sec. 22, T. 16 S., R. 7 E.

Seam Bear Canyon Seam

Formation Blackhawk

Thickness Sampled 7'

Date Sampled May 8, 1975

Proximate Analysis

	AD	AR	Dry	MAF
M	4.4	6.1		
VM	45.6	44.8	47.7	50.8
FC	44.1	43.3	46.2	49.2
Ash	5.9	5.8	6.1	
Btu/lb.	13140	12910	13740	14640

Ultimate Analysis

	AD	AR	Dry	MAF
H	5.9	5.9	5.6	6.0
C	72.6	71.4	76.0	80.9
N	1.3	1.3	1.4	1.5
O	13.8	15.1	10.4	11.1
S	0.5	0.5	0.5	0.5

FORMS OF SULFUR:	Sulfate	Pyritic	Organic
As-received	0.02	0.16	0.30
Moist.-free	0.02	0.17	0.32
M. and ash-free	0.02	0.18	0.35

Free-swelling index No. 2 1/2

TRACE ELEMENTS BY VARIOUS DETERMINATIONS (Coal as received)

As (ppm) 1 F (ppm) <20 Hg (ppm) ~~0.03~~ Sb (ppm) ~~0.1~~ Se (ppm) 1.3

TRACE ELEMENTS, MOSTLY ATOMIC ABSORPTION ON ASH

MgO % 2.33 Cu (ppm) 97 Zn (ppm) 19

Na_2O % 2.96 Li (ppm) 84 Mn (ppm) 200

[illegible] (ppm) <1 Pb (ppm) 25

DELAYED NEUTRON DETERMINATION OF URANIUM AND THORIUM

ppm Th 5.0247 ppm U

SEMIQUANTITATIVE 6-STEP SPECTROGRAPHIC ANALYSIS OF THE ASH

G=Greater than 10%; N=Not detected; L=Detected, but below limit of determination

Fe %	5.0	Be (ppm)	N	Pb (ppm)	30	W (ppm)	N	Ag	N
Mg %	1.5	Bi	N	Pd	N	Y	30	La	N
Ca %	G	Cd	N	Pt	N	Zn	N	Th	N
Ti %	0.3	Co	10	Sb	N	Zr	200	Tl	N
Si %	---	Cr	70	Sc	15	Ce	N	Yb	3
Mn (ppm)	150	Cu	70	Sn	N	Ga	20	Zn	N

As (ppm)	N	La (ppm)	N	Sr (ppm)	500	Ge (ppm)	20	Al %	7.0
Au	N	Mo	15	Te	N	Hf	N	Na %	---
B	1500	Nb	L20	U	N	In	N	K %	N
Ba	1500	Ni	20	V	70	Li	N	P %	N

LOOKED FOR ONLY WHEN La OR Ce FOUND:

Pr		Fusibility of ash temp. °F.
Nd		Initial Deform. ------2190
Sm		Softening ----------2250
Eu	N	Fliud ----------2300

Ash Composition

AL2O3	11.0%	
SO3	~~1.9%~~	8.4%
CL	0.10%	
CAO	24.0%	
SIO2	~~25.0%~~	24.0%
P2O5	0.74%	
TIO2	0.71%	
MnO	0.020%	
FE2O3	7.6%	
K2O	0.17%	

% Ash determined gravimetrically ashed at 525° C. -6.8%

AVERAGE COAL ANALYSES, HIAWATHA NE QUADRANGLE

	No. Analyses	As-received (percent)	
		Average	Range
BEAR CANYON BED			
Moisture	6	6.8	4.5-10.9
Volatile matter	6	43.8	37.4-46.0
Fixed carbon	6	45.7	44.9-46.0
Ash	6	4.5	3.8- 5.8
Sulfur	6	0.53	0.5- 0.6
Btu/lb	6	13,014	10,840-13,530
BLIND CANYON BED			
Moisture	10	4.8	3.8- 5.3
Volatile matter	9	41.7	40.2-44.7
Fixed carbon	9	44.3	39.2-48.3
Ash	10	8.9	5.8-12.4
Sulfur	8	0.58	0.5- 0.6
Btu/lb	9	12,492	11,700-13,080
HIAWATHA BED			
Moisture	370	5.6	0.7 -11.0
Volatile matter	357	42.3	36.3 -46.4
Fixed carbon	357	45.7	38.3 -52.7
Ash	359	6.2	3.3 -11.2
Sulfur	330	0.61	0.29- 1.1
Btu/lb	365	12,719	11,521-13,600

TABLE 2 (AFTER DOELLING, 1972)

COMMERCIAL TESTING & ENGINEERING CO.

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WESTERN DIVISION MANAGER
LLOYD W. TAYLOR, JR.

SINCE 1908

PLEASE ADDRESS ALL CORRESPONDENCE TO:
10775 EAST 51st AVE., DENVER, COLO. 80239
OFFICE TEL. (303) 373-4772

CO-OP MINING COMPANY
Box No. 300
Huntington, Utah 84528

June 25, 1979

Sample identification by

Kind of sample reported to us	Floor Rock	CO-OP Mining Co.
Sample taken at	xxxxx	Sample No. 57-2162 (CT&E Helper) CO-OP Mine No. 2 Huntington Canyon
Sample taken by	CO-OP Mining Co.	
Date sampled	xxxxx	
Date received	5-24-79	

Analysis report no. 72-82660

SOIL ANALYSIS

pH	8.4
Sodium	5.4
Calcium	.61
Mangesium	4.4
Sodium Adsorption Ratio	6.4
Pyrite (as S-$CaCO_3$ eq t/1000T	0.0
Sand %	65
Silt %	26
Clay %	9

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Gail D. Palmer

G. D. PALMER, Manager, Denver Laboratory

GDP/vt

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AMERICAN COUNCIL OF INDEPENDENT LABORATORIES, INC.
Charter Member

F-404

COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES: 228 NORTH LA SALLE STREET, CHICAGO, ILLINOIS 60601 · AREA CODE 312 726-8434

WESTERN DIVISION MANAGER
LLOYD W. TAYLOR, JR.

SINCE 1908

PLEASE ADDRESS ALL CORRESPONDENCE TO
10775 EAST 51st AVE., DENVER, COLO. 80239
OFFICE TEL. (303) 373-4772

CO-OP MINING COMPANY
Box No. 300
Huntington, Utah

June 25, 1979

		Sample identification by
Kind of sample reported to us	Roof Rock	CO-OP Mining Co.
Sample taken at	xxxxx	Sample No. 57-2163 (CT&E Helper) CO-OP Mine No. 2 Huntington Canyon
Sample taken by	CO-OP Mining Co.	
Date sampled	xxxxx	
Date received	5-24-79	

Analysis report no. 72-82661

SOIL ANALYSIS

pH	8.7
Sodium	12.5
Calcium	.34
Magnesium	.76
Sodium Adsorption Ratio	16.9
Pyrite (as S-$CaCO_3$ eq t/1000T)	0.0
Sand %	
Silt %	
Clay %	

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Gail D Palmer

G. D. PALMER, Manager, Denver Laboratory

GDP/vt

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COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210 B, LOMBARD, ILLINOIS 60148 • (312) 953-9300

DAVE SELDON
MANAGER
SOUTHWEST DIVISION

PLEASE ADDRESS ALL CORRESPONDENCE TO:
224 S. CARBON AVE., PRICE, UT 84501
OFFICE TEL. (801) 637-7540

SINCE 1908

CO-OP MINING COMPANY
P.O.Box 300
Huntington, Utah 84528

November 10, 1983

Sample identification by

CO-OP Mining

Bear Canyon
Hiawatha Seam

Kind of sample reported to us	Coal
Sample taken at	Bear Canyon
Sample taken by	Co-op Mining Co.
Date sampled	xxxx
Date received	11-4-83

Analysis report no.57-14270

SHORT PROXIMATE ANALYSIS

	As Received	Dry Basis
% Moisture	7.95	xxxxx
% Ash	9.55	10.37
Btu/lb	11641	12646
% Sulfur	0.50	0.54

% Air Dry Loss =	5.03
Moisture, Ash-free Btu =	14109
Pounds of SO2 per 10^6 Btu =	0.85
Moist, Mineral matter free Btu * =	12992
(Based on as rec'd moisture)*	
Pounds of Sulfur per 10^6 Btu =	0.43
% Residual moisture =	3.07

JB/cj

RECEIVED
NOV 18 1983
DIVISION OF
OIL, GAS & MINING

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Price Laboratory

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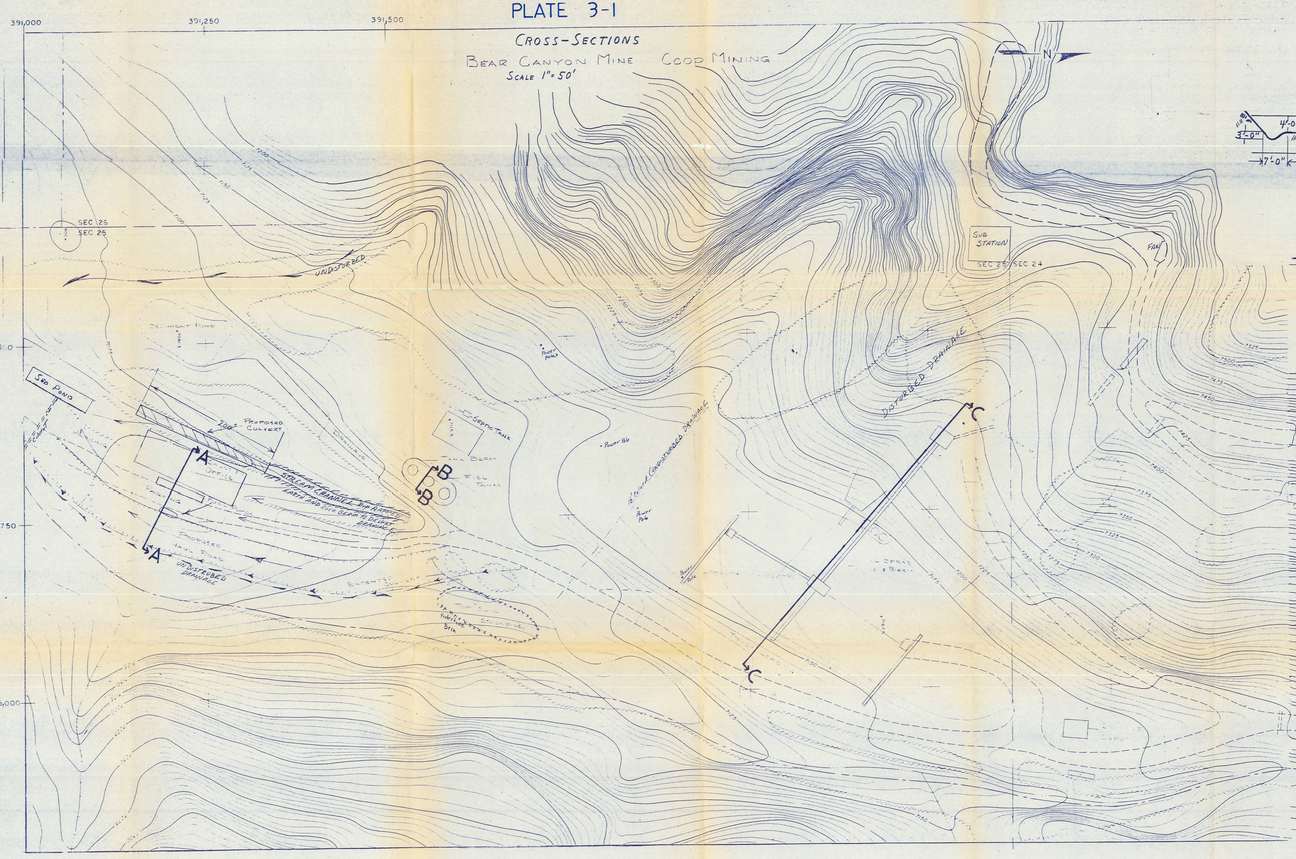
Charter Member

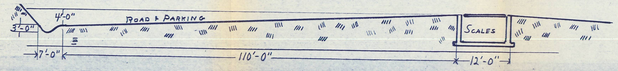
PLATE 3-1

CROSS-SECTIONS

BEAR CANYON MINE COOP MINING

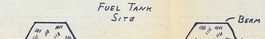
SCALE 1" = 50'





SECTION A-A

NOT SCALED

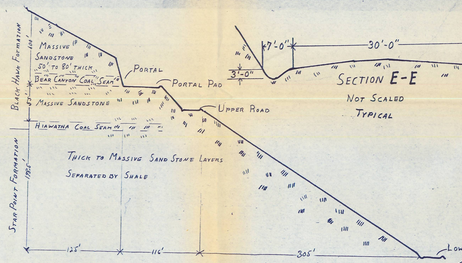


SECTION B-B

TYPICAL

SECTION C-C

NOT SCALED



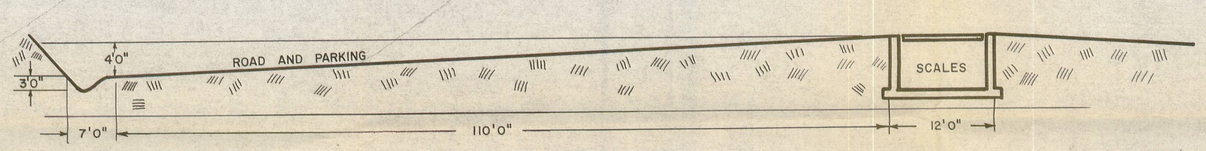
SECTION D-D

1" = 50'

SECTION E-E

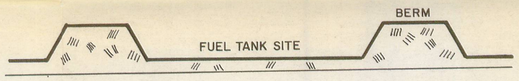
NOT SCALED

TYPICAL



SECTION A-A

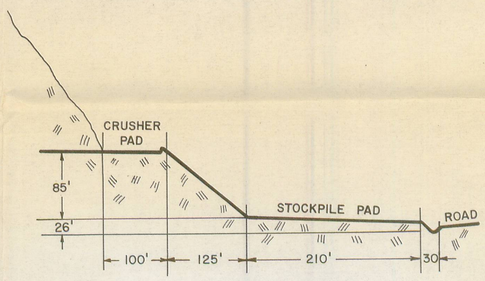
NOT TO SCALE



SECTION B-B

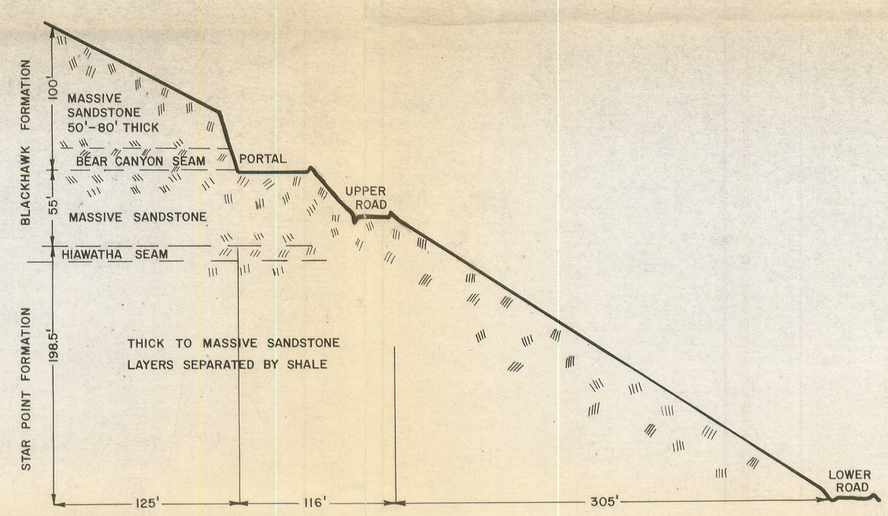
TYPICAL

NOT TO SCALE



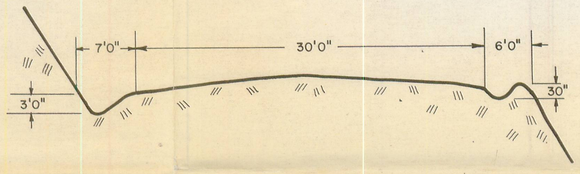
SECTION C-C

NOT TO SCALE



SECTION D-D

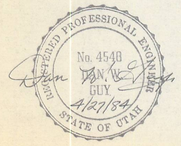
1" = 50'



SECTION E-E

TYPICAL SECTION

NOT TO SCALE



CO-OP MINING CO. HUNTINGTON, UTAH		
CROSS SECTIONS		
SCALE: AS SHOWN	DRAWN BY: D. GUY	DATE: 4/27/84
BEAR CANYON	PLATE 3-1	