

ANALEX RESOURCES, INC.

APPLICATION FOR PERMIT RENEWAL

ACT 007/019

Volume I



ANDALEX
RESOURCES, INC.

Tower Division

P.O. BOX 902
PRICE, UTAH 84501
PHONE (801) 637-5385
TELEX 381 530 ANDALEX PRIC

October 15, 1986

RECEIVED
OCT 15 1986

**DIVISION OF
OIL, GAS & MINING**

State of Utah
Department of Natural Resources
Division of Oil, Gas, and Mining
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203

Attention: Dianne Nielson, Director

Re: Permit Renewal ACT 007/019

Dear Ms. Nielson:

Andalex Resources, Inc. is hereby requesting that the Division review the attached Application for Permit Renewal. It is being submitted under the provisions of the Permanent Regulatory Program for the State of Utah and Title 30 of the Code of Federal Regulations.

There are no changes incorporated into the contents of the text since Andalex's most recent approvals with the exception that information pertaining to our Federal Coal Lease Modifications has been included. All redundancies in Volume II, the Plates, have been removed and only those plates which pertain to current, as constructed facilities, as well as those which are still proposed including final reclamation, have been left in. They have been cross referenced in the Table of Contents for your convenience.

Should any questions arise, please call me and I will take immediate steps to resolve any issues. We sincerely appreciate your expeditious review of the enclosed, and apologize for its belated arrival.

Respectfully submitted,
ANDALEX RESOURCES, INC.
Tower Division

Michael W. Glasson
Senior Geologist

cc: Ken May, DOGM
Lowell Braxton, DOGM
Sue Linner, DOGM
Holland Shepherd, DOGM, Price

TABLE OF CONTENTS

I.	Introduction and Overview of Project and Permit Application	1
A.	Introduction	1
B.	Overview and Summary of Project	1
C.	Organization of Application	5
D.	Verification Statement	6
II.	Legal, Financial, Compliance, and Related Information	7
A.	Identification of Interests	7
1.	Applicant	7
1.1	Name, Address, and Telephone No.	7
1.2	Business Entity Information	7
1.3	Names and Addresses of Officers, Partners, Directors of Applicant	7
1.4	Names and Addresses of Principal Shareholders of Applicant	7
1.5	Resident Agent for Service of Process	7
1.6	Operator	8
1.7	Other Operating Names	8
1.8	Previous Coal Mining Permits and Permit Applications	8
2.	Mine Name and MSHA Identification	8
3.	Land Ownership	8
3.1	Surface	8
3.1-1	Areas to be Affected by Surface Facilities	8
3.1-2	Other Areas within Proposed Permit Area	11
3.1-3	Areas Contiguous to Proposed Permit Area	11
3.2	Subsurface - Minerals	11
3.2-1	Coal to be Mined	11
3.2-2	Other Minerals within Proposed Permit Area	12
3.2-3	Subsurface Contiguous to Proposed Permit Area	12
3.3	Applicant's Pending Interests in Contiguous Lands	12
B.	Compliance Information	13
1.	Revocation or Suspension of Mining Permits	13
2.	Forfeiture of Mining Bond or Surety	13
3.	History of Violations	13
C.	Right of Entry	14
1.	Federal Coal Leases	14
1.1	Date of Execution	14
1.2	Property Description	14
1.3	History of Ownership	14
1.4	Legal Rights Granted	17
2.	Private Fee Leases	17
2.1	Lessor and Date of Execution	17
2.2	Property Description	17
2.3	History of Ownership	17
2.4	Legal Rights Granted	18

3.	Rights of Way	18
3.1	Grantor and Date of Execution	18
3.2	Property Description	18
3.3	History of Ownership	18
3.4	Legal Rights	18
D.	Surface Operation Information - Associated Surface Mining	19
E.	Relationship to Areas Unsuitable for Mining	19
1.	Designated Areas and Areas Under Study	19
2.	Exemption for Valid Existing Rights	19
3.	Occupied Dwellings - Waiver	19
4.	Public Roads	19
5.	Public Buildings, Schools, Churches, Community or Institutional Buildings and Public Parks	19
6.	Cemeteries	19
F.	Permit Term Information	19
1.	Proposed Permit Term	19
2.	Proposed Life of Mine	20
3.	Starting and Termination Date of each Phase of Operation	20
4.	Number of Acres of Surface to be Affected in each Phase	20
5.	Horizontal and Vertical Extent of Underground Workings in each Phase	20
G.	Personal Injury and Property Damage Insurance Information	20
H.	Other Licenses and Permits	21
I.	Public Office for Filing Application	23
J.	Newspaper Advertisement and Proof of Publication	23
III.	Operation and Reclamation Plan	24
A.	Overview of Project	24
1.	Type of Mine	24
2.	Area of Operations	24
2.1	Mine Plan Area	24
2.2	Proposed Permit Area	24
2.3	Surface Area to be Disturbed	24
3.	Reserves, Production, and Life of Mine	25
4.	Schedule of Construction, Mine Development, Mining and Reclamation	25
B.	Construction and Design of Surface Facilities	25
1.	Existing Structures	25
2.	Construction Schedule	26
3.	Construction Methods	26
3.1	Major Equipment	26
3.2	Blasting	26
4.	Removal and Storage of Topsoil and Subsoils	26
5.	Portal Facilities	27
5.1	Mine Pads	27
5.2	Support Structures and Buildings	27
5.3	Parking Areas	27
5.4	Storage Areas	27

6.	Coal Handling Facilities	27
6.1	Conveyors	27
6.2	Stockpiles	28
6.3	Load-out	28
6.4	Preparation Plant	28
7.	Transportation Facilities	28
7.1	Roads	28
7.1-1	Class I	28
7.1-2	Class II	29
7.1-3	Class III	29
7.2	Railroad	29
8.	Dams, Embankments, Ponds, and Other Impoundments	29
9.	Power Supply and Communication Facilities	29
10.	Solid Waste Disposal and Handling Facilities	30
10.1	Underground Development Waste and Excess Spoil	30
10.2	Coal Waste	30
10.2-1	Coal Processing Waste	30
10.2-2	Coal Refuse	30
10.3	Acid and Toxic-Forming Materials	30
10.4	Non-Coal Waste	30
11.	Water Supply	30
12.	Hydrologic Protection Facilities	31
12.1	Sewage System	31
12.2	Water Treatment	31
12.3	Drainage Control - Diversions, etc.	31
12.4	Sediment Control	31
13.	Exploration and Development Drill Sites	31
14.	Monitoring Facilities	31
14.1	Subsidence	31
14.2	Hydrologic	32
14.3	Other	32
15.	Landscaping	32
16.	Signs, Markers, Fence and Gates	32
C.	Mine Operations	32
1.	Introduction	32
1.1	Mine Property	32
1.2	Economic Geology	33
1.3	Exploration	33
1.4	Reserves	33
1.5	Production Rate	33
1.6	Life of Mine	34
2.	Underground Operations and Facilities	34
2.1	Mine Layout	34
2.1-1	Multiple Seam Considerations	34
2.1-2	Portals	34
2.1-3	Mains, Submains, Slopes	35
2.1-4	Shafts and Interconnection of Slopes	35
2.1-5	Mining Panels	35
2.1-6	Barrier Pillars	35
2.1-7	Bleeder System	35
2.2	Mine Safety	35
2.2-1	Ventilation	35
2.2-2	Roof Control	36
2.2-3	Explosives	36
2.2-4	General Safety Measures	36

2.3	Mine Development	37
2.3-1	Room and Pillar	37
2.3-2	Pillar Extraction	37
2.3-3	Long Wall	37
2.3-4	Cycle and Sequence of Mining	37
2.4	Recovery and Conservation of Coal Resources	38
2.5	Underground Equipment	38
2.5-1	Production Units	38
2.5-2	Belt Conveyors	38
2.5-3	Water System	38
2.5-4	Power System	39
2.5-5	Other Equipment	39
2.6	Return of Coal Processing Waste to Underground Workings	39
3.	Surface Equipment	39
4.	Employment	39
5.	Schedule of Development and Mining	40
D.	Environmental Protection	42
1.	Protection of Hydrologic Balance and Compliance with Water Quality Laws	42
2.	Subsidence Control Plan	42
2.1	Survey of Structures and Renewable Resource Lands	42
2.2	Mining Method	42
2.3	Geologic Factors	42
2.4	Preventive Measures	43
2.5	Mitigative Measures	43
2.6	Monitoring	43
3.	Fish and Wildlife Plan	44
4.	Air Pollution Control Plan and Compliance with Air Quality Laws	44
4.1	Existing Environment	44
4.2	Air Quality Impact Analysis	44
4.3	Emission Estimates	44
4.4	Proposed Controls	44
4.5	PSD Permit and Compliance with Air Quality Laws	44
5.	Waste Disposal	45
5.1	Facilities	45
5.2	Special Measures	45
5.2-1	Acid and Toxic-Forming Materials	45
5.2-2	Combustible Materials	45
5.2-3	Contingency Plans to Prevent Sustained Combustion	45
6.	Protection of Cultural and Historic Values	45
7.	Public Roads	45
8.	Prime Farmlands	45
9.	Alluvial Valley Floors	45
E.	Reclamation	46
1.	Post-Mining Land Use	46
2.	Timetable of Major Reclamation Steps	46
3.	Major Reclamation Steps	46
3.1	Removal of Surface Structures	46
3.2	Abandonment of Portals and Underground Workings	47
3.3	Casing and Sealing of Drill Holes	47
3.4	Backfilling, Grading, and Soil Replacement and Stabilization	47
3.5	Revegetation	47

4.	Reclamation Cost and Bonding	48
4.1	Cost of Reclamation	48
4.1-1	Detailed Estimate	48
4.1-2	Calculations	48
4.2	Bond or Surety Arrangement	48
IV.	Environmental Resources	49
A.	Geology	49
1.	Introduction	49
2.	Geologic Description of the General Area	49
2.1	Tectonic Setting	49
2.2	Geologic History	49
2.3	Stratigraphy	50
2.4	Structure	50
2.5	History of Mining	51
2.6	Geologic Hazard	51
3.	Geologic Description of the Mine Plan and Adjacent Areas	51
3.1	General Description	51
3.1-1	Stratigraphy	52
3.1-2	Structure	52
3.1-3	History of Mining	52
3.2	Detailed Description of Strata to be Disturbed by Surface Operations	56
3.2-1	Identification of Strata	56
3.2-2	Statement of Borings and Samplings	56
3.2-2.1	Design of Boring and Sampling Program ...	56
3.2-2.1-1	Sites - number, location and relationship to disturbed area	56
3.2-2.1-2	Methodology - sample collec- tion, compositing of samples for each strata, laboratory analyses	56
3.2-2.2	Data	56
3.2-2.2-1	Field Log and Description of Samples - lithologic classi- fication, description, and hydrologic aspects	56
3.2-2.2-2	Laboratory Analyses - chemical acidity, toxicity, alkalinity and physical (erodibility and compaction) properties	59
3.2-2.2-3	Identification of Potential Acid, Toxic or Alkaline Pro- ducing Horizons	59
3.2-2.2-4	Location of Subsurface Water at Face-up Areas	59
3.3	Description of Coal Seams and Overburden - Mine Plan Area	59
3.3-1	General Description	59
3.3-1.1	Stratigraphy	59
3.3-1.2	Structure	61
3.3-1.3	Hydrologic Aspects	61
3.3-1.4	Location of Subsurface Water	61

3.3-2	Detailed Analysis of Coal Seams and Surrounding Strata	62
3.3-2.1	Source of Data	62
3.3-2.2	Coal Seams	62
3.3-2.2-1	Pyritic, Marcasitic Content ...	62
3.3-2.2-2	Total Sulfur Content	62
3.3-2.2-3	Other Characteristics	62
3.3-2.3	Stratum Immediately Overlying Each Coal Seam to be Mined	62
3.3-2.3-1	Lithology	62
3.3-2.3-2	Pyritic Content	63
3.3-2.3-3	Potential Alkalinity	63
3.3-2.4	Stratum Immediately Underlying Each Coal Seam to be Mined	63
3.3-2.4-1	Lithology	63
3.3-2.4-2	Pyritic Content	63
3.3-2.4-3	Potential Alkalinity	63
3.3-2.4-4	Clay Content	63

B.	Hydrology	64
1.	Introduction	64
2.	Description of Hydrology	64
2.1	Groundwater Information	64
2.1-1	General Area	64
2.1-1.1	Source of Data	64
2.1-1.2	Geologic Control	64
2.1-1.3	Occurrence	64
2.1-1.4	Water Table	65
2.1-1.5	Aquifers	65
2.1-1.6	Characteristics	65
2.1-1.7	Use	65
2.1-2	Mine Plan and Adjacent Areas	65
2.1-2.1	Source of Data	65
2.1-2.2	Climatological Factors	65
2.1-2.3	Geological Control	66
2.1-2.4	Occurrence	66
2.1-2.5	Water Table	66
2.1-2.5-1	Depth Below Surface	66
2.1-2.5-2	Quality of Water	66
2.1-2.5-3	Use	66
2.1-2.6	Aquifers	66
2.1-2.6-1	Depth and horizontal Extent ...	67
2.1-2.6-2	Lithology and Thickness	67
2.1-2.6-3	Recharge	67
2.1-2.6-4	Movement	67
2.1-2.6-5	Storage	67
2.1-2.6-6	Discharge	67
2.1-2.6-7	Quality and Quantity	67
2.1-2.6-8	Use	68
2.2	Surface Water Information	68
2.2-1	General Area	68
2.2-1.1	Source of Information	68
2.2-1.2	Geologic and Topographic Control	68
2.2-1.3	Occurrence	68
2.2-1.4	Characteristics	68
2.2-1.5	Quality and Quantity	69
2.2-1.6	Use	69

2.2-2	Mine Plan and Adjacent Areas	69
2.2-2.1	Source of Information	69
2.2-2.2	Climatological Factors	69
2.2-2.3	Receiving Watershed	69
2.2-2.4	Geologic and Topographic Control	70
2.2-2.5	Surface Water Bodies and Springs	70
2.2-2.6	Surface Drainage System	70
2.2-2.7	Discharge Conditions	70
2.2-2.8	Quality	70
2.2-2.9	Use	71
2.3	Alternative Supplies	71
3.	Probable Hydrologic Consequences of Operations	71
3.1	Groundwater Quality and Quantity	71
3.1-1	Use	71
3.1-2	Surface Operations	71
3.1-3	Underground Operations	71
3.2	Surface Water Quality and Quantity	71
3.2-1	Use	71
3.2-2	Surface Operations	71
3.2-2.1	Discharges	72
3.2-2.2	Runoff from Disturbed Areas	72
3.2-3	Underground Operations	72
3.2-3.1	Interpretation or Diminution of Supply	72
3.2-3.2	Mine Drainage	72
4.	Protection of Hydrologic Balance	72
4.1	Water Quality	72
4.1-1	Drainage Control Plan	72
4.1-1.1	Drainage System	72
4.1-1.2	Diversions - Overland Flow and Streams	73
4.1-1.3	Prevention of Gravity Discharge from Mine	73
4.1-1.4	Flow Velocity	73
4.1-1.5	Discharge Structures	73
4.1-2	Pollution Control	73
4.1-2.1	Compliance with Water Quality Laws	73
4.1-2.2	Sediment Control	74
4.1-2.2-1	Minimization of Disturbed Surface Area	74
4.1-2.2-2	Drainage Control	74
4.1-2.2-3	Soil Loss Analysis	74
4.1-2.2-4	Ponds	74
4.1-2.2-5	Other Measures	74
4.1-2.3	Control of Other Pollutants	74
4.1-2.3-1	Sealing and Placing of Acid and Toxic-Forming Materials	74
4.1-2.3-2	Casing and Sealing of Drill Holes	74
4.1-2.3-3	Sewage Disposal System	75
4.1-2.3-4	Treatment Facilities	75
4.1-2.3-5	Discharges into Underground Workings	75
4.1-2.4	Stream Buffer Zones	75

4.2	Water Quantity	75
4.2-1	Subsidence Control	75
4.2-2	Water Use	75
4.3	Existing Rights	75
4.3-1	Protection	75
4.3-2	Alternative Supplies	76
4.4	Monitoring	76
4.4-1	Groundwater	76
4.4-1.1	Existing Data	76
4.4-1.2	Selection of Monitoring Sites	76
4.4-1.3	Selection of Parameters	76
4.4-1.4	Frequency and Duration of Data Collection	77
4.4-1.5	Methodology of Data Collection and Analysis	77
4.4-2	Surface Water	77
4.4-2.1	Existing Data	77
4.4-2.2	Selection of Monitoring Sites	77
4.4-2.3	Selection of Parameters	78
4.4-2.4	Frequency and Duration of Data Collection	78
4.4-2.5	Methodology of Data Collection and Analysis	78
C.	Climatological Information	79
1.	Introduction	79
2.	Source of Data	79
3.	Climatological Factors	79
3.1	Precipitation	79
3.2	Temperature	85
3.3	Winds	89
D.	Vegetation Information and Revegetation Plan	89
1.	Introduction	89
2.	Source of Data	89
3.	Description	89
3.1	Vegetative Types	89
3.2	Threatened or Endangered Species	89
3.3	Plant Communities	90
3.4	Extent of Cover	92
3.5	Shrub Height	92
4.	Areas to be Disturbed	92
5.	Revegetation Plan	92
5.1	Schedule of Revegetation	92
5.2	Soil Testing Plan and Soil Preparation	92
5.3	Species and Amounts of Seeds and Seedlings	93
5.4	Planting and Seeding Methods	93
5.5	Mulching Techniques	93
5.6	Management Practices, e.g., Irrigation, Pest, and Disease Control	93
5.7	Measures to Determine Success	93
E.	Fish and Wildlife Resources and Plan	94
1.	Introduction	94
2.	Source of Data	94
3.	Habitats	94
4.	Species	94

4.1	Mammals	94
4.2	Birds	96
4.2-1	Raptors	96
4.2-2	Other	96
4.3	Reptiles and Amphibians	96
4.4	Fish	96
4.5	Threatened or Endangered Species	96
5.	Impacts of Operations	96
6.	Fish and Wildlife Plan	96
F.	Soil Resources	97
1.	Introduction	97
2.	Soil Survey	97
2.1	Soil Map	97
2.2	Soil Identification and Description	98
2.3	Soil Testing Plan	98
2.4	Present and Potential Soil Productivity	98
3.	Prime Farmland Investigation	98
3.1	Survey of Lands to be Affected by Surface Operations	98
3.2	Factors	98
3.2-1	Historic Use as Cropland	98
3.2-2	Slope of Land	98
3.2-3	Water Supply and Precipitation	99
3.2-4	Rockiness of Surface	99
3.2-5	Absence of Soil Map Units Designated as Prime Farmland	99
3.3	Request for Negative Determination	99
4.	Topsoil Supplements and Substitute	99
4.1	Identification and Description	99
4.2	Productivity	100
5.	Topsoil Handling during Operations	100
5.1	Removal	100
5.2	Storage	100
6.	Reclamation of Topsoil and Substitute	100
G.	Alluvial Valley Floors - Survey	100
H.	Land Use Information and Post-Mining Land Use	100
1.	Introduction	100
2.	Condition, Capability, and Productivity of Land	100
3.	Past Mining	101
4.	Existing Use	101
5.	Impacts of Operations	102
5.1	Socioeconomic Impacts	102
5.2	Land Use Changes	102
6.	Post-Mining Land Use	103
6.1	Comments of Owners of Surface Disturbed Areas and State and Local Agencies	103
6.2	Consideration given to Comments	103
6.3	Methods to Achieve Post-Mining Land Use	103
I.	Cultural and Historic Resources	103
1.	Identification and Description of Resources	103
1.1	Archaeology	103
1.2	Paleontology	104
1.3	Public Parks	104
1.4	Other	104
2.	Protection	104

V.	Maps and Plans	105
VI.	Preparation of Application	107
	A. Persons and Consultants Involved	107
	B. Coordination and Consultation with Governmental Agencies	107
	C. References	108
VII.	Cross Reference Table - Regulations in 30 CFR, Chapter VII	109
	A. Subchapter G	109
	1. Part 782 - Legal, Financial, Compliance and Related Information	109
	2. Part 783 - Environmental Resources	109
	3. Part 784 - Reclamation and Operation Plan	109
	4. Part 785 - Special Mining Categories	110
	B. Subchapter J (Parts 800-806) - Bonding and Insurance	110
	C. Subchapter K (Parts 817-828) - Performance Standards	110
VIII.	Appendices	112
IX.	Addendum A	
	A. Introduction	
	B. Lab Analysis of Roof and Floor	
	C. Newspaper Advertisement	
	D. Hydrologic Inventory - Vaughn Hansen	
	E. Violation History	
X.	Completeness Reviews	
	A. Apparent Completeness Review	
	B. Response to Apparent Completeness Review (Addendum B)	
	C. Response to Review of Apparent Completeness Review Response	
	D. Determination of Apparent Completeness	
XI.	Application for Modification of Federal Leases	
	A. U-010581	
	B. U-027304	
	C. SL-063058	

XII. Application for the Addition of Federal Emergency Lease U-52341

Chapter I. Introduction

Chapter II. Scope

Chapter III. Verification of Application

Chapter IV. UMC 782

Chapter V. UMC 783

Chapter VI. UMC 784

Chapter VII. UMC 817

Chapter VIII. Appendix A

XIII. Permits

A. State of Utah

B. OSM

C. EPA - NPDES

D. Name Change

XIV. Minor Modifications to ACT 007/019

A. Response to Permit Stipulations

B. NOV Remedial Action

C. Minor Modifications

XV. Loadout Facility

A. Coal Preparation and Loadout Reclamation Permit Application

FIGURES

I-1 General Location Map 2

I-2 Lease Boundaries 3

II-1 Federal and Fee Lease Boundaries 15

IV-1 Stratigraphic Sections 53

IV-2 Geologic Column (Deadman Canyon) 54

IV-3 Blackhawk Formation (Measured Section) 55

IV-4 Climatological Summary 86

TABLES

II-1 Mining Permits 9

II-2 Description of Federal Leases 16

III-1 Organization Chart 41

IV-1 Centennial Drill Holes 57

IV-2 Tower Drill Holes 58

IV-3 North American Drill Holes 60

IV-4 Maximum and Minimum Monthly Precipitation 80

IV-5 Estimation Return Periods (Short Duration Precipitation) 81

IV-6 Total Precipitation 82

IV-7 Climatological Summary 84

IV-8 Occurrence of Various Temperatures 85

IV-9 Average Temperatures 87

IV-10 Vegetation Possibly Occurring 91

IV-11 Animal Species Possibly Occurring 95

APPENDICES

Appendix A Exhibit II-A
..... Exhibit II-B
..... Exhibit II-C

Appendix B Exhibit III-A
..... Exhibit III-B
..... Exhibit III-C
..... Exhibit III-D
..... Exhibit III-E
..... Exhibit III-F

Appendix C Exhibit IV-A
..... Exhibit IV-B
..... Exhibit IV-C
..... Exhibit IV-D
..... Exhibit IV-E

EXHIBITS

II-A	B.L.M. Right-of-Way Grants Approval of Plans and Programs Permit Grants	Appendix A
II-B	Certificate of Insurance	Appendix A
II-C	Proof of Publication	Appendix A
III-A	Sedimentation and Drainage Control Plan	Appendix B
III-B	Electrical Specifications	Appendix B
III-C	Water Wells	Appendix B
III-D	Wastewater Disposal Systems	Appendix B
III-E	Emission Inventory	Appendix B
III-F	Reclamation Cost Projection	Appendix B
IV-A	Drill Hole Logs	Appendix C
IV-B	Coal Seam Analysis	Appendix C
IV-C	Soil and Vegetation Survey	Appendix C
IV-D	Raptor Survey	Appendix C
IV-E	Archaeological Survey	Appendix C

I. Introduction and Overview of Project and Permit Application

A. Introduction

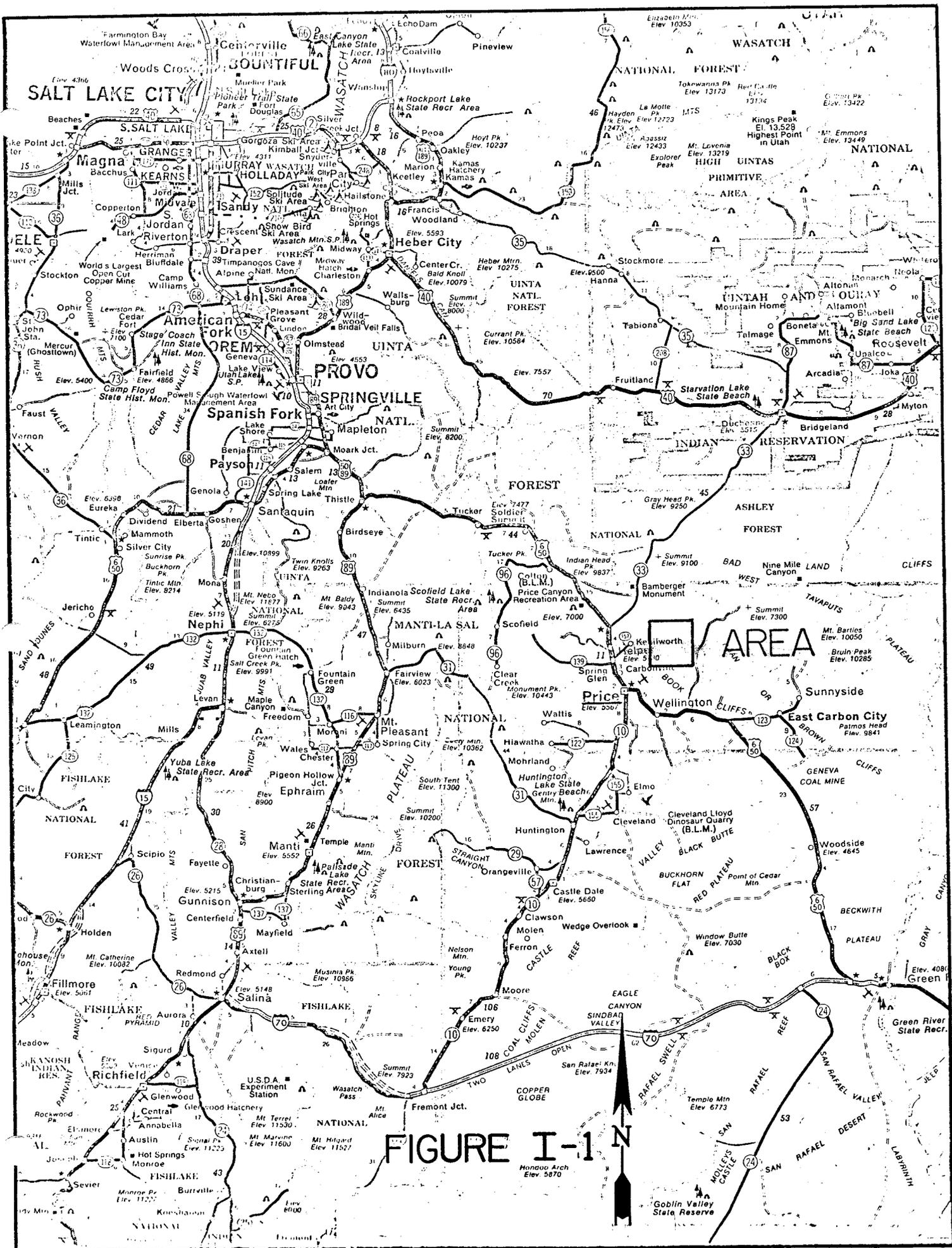
This underground mining permit application is being submitted by ~~Tower Resources~~, Inc., in order that coal might be mined from Federal mining leases located within the proposed mine plan area and property boundaries. This proposed mine plan area is known as the Centennial Project. Tower Resources, a corporation organized and existing under the laws of Delaware and qualified to do business in Utah, has opened an underground mine known as the Pinnacle Mine. This mine is located on fee land in Carbon County, Utah. Tower, the designated operator, along with AMCA Coal Leasing, Inc., its land acquisition and development branch, control all Federal and fee mining leases within the proposed mine plan area. This underground mining permit application has been prepared by Tower Resources and is being submitted for review and approval by the appropriate regulatory authorities.

B. Overview and Summary of Project

Mining operations at the Pinnacle Mine began on October 3, 1980, according to the Mining and Reclamation Plan approved by the State of Utah, Department of Natural Resources, Division of Oil, Gas, and Mining. The Pinnacle Mine is located and operating on the Zion's fee lease. Mine plans call for advancement of operations onto Federal leases contained within the proposed mine plan area and the simultaneous operation of a mine in each of the three mineable coal seams present, the Lower Sunnyside Seam, the Gilson Seam, and the Aberdeen Seam. Current mining activity is occurring in the Gilson Seam. The coal is classified as High-volatile B bituminous in both the Lower Sunnyside and Gilson Seams and as High-volatile A bituminous in the Aberdeen Seam.

The proposed mine plan area is located approximately 10 miles north-northeast of Price, Utah in Carbon County in T13S and R11E (See Figure I-1 and Plate I). The property contains approximately 2,240 acres. Two hundred acres is fee surface and coal leased from the Zion Security Corporation. The remaining 2,040 acres is Federal lease consisting of SL-027304 (120 acres), SL-063058 (240 acres), and U-010581 (1,682.39 acres). See Figure I-2 and Plate II.

This property is located in the Book Cliffs coal field and includes the Deadman Canyon, Starpoint Canyon, and Straight Canyon areas with coal outcropping along the cliffs between 7,000 feet and 7,700 feet elevations. The topography is very rugged, the Book Cliffs being dissected by box canyons created by ephemeral streams. Large sandstone boulders eroded from the cliffs are scattered along the sides of the canyons. The land is undeveloped, used primarily for grazing, and there are no areas of national importance in the region. Mountain-Brush vegetative type covers most of the area.



There are no perennial streams or bodies of water on the property. Ground water recharge is from precipitation in the vicinity. Water supply for mine development and culinary usage is supplied by wells that have been drilled.

Historically, coal mining has been the only industry in the permit area and there are several abandoned mines located on the property. No oil or gas wells exist in the area as geologic conditions are not appropriate.

Access to the mine plan area is by an existing graveled county road which has been upgraded and is maintained by Tower. It is used as an access road as well as a haul road. All surface and support facilities necessary for present operations have been completed and are located on the Zion's fee or on right-of-ways granted by the Bureau of Land Management. All proposed facilities are indicated in this application. Tower has acquired all applicable state and Federal licenses, permits, and right-of-ways necessary to conduct mining activities on the Zion's fee property.

Estimated coal reserves in the three beds of mineable thickness totals 50 million tons, with recoverable coal estimated at 29 million tons. Production schedule projects an increase from 200,000 tons the first year to full production of about 1,200,000 tons in the fourth and fifth years. At this rate, the life of the mine is estimated to be about 30 years, with a theoretical life of about 40 years due to the existence of additional unleased Federal coal economically accessible only through Tower's operation.

The initial mining method being employed is pillar development utilizing one continuous miner section of equipment with final pillar extraction planned. An additional 5 mining units will be added, according to production schedule, with mining development occurring simultaneously in each of the three seams. Longwall mining may be introduced later if conditions prove adaptable; however, the basic overall mine plan will not be changed.

Upon cessation of mining activities, reclamation activities will commence as soon as is practicable, according to the plans outlined in this application. The land will be restored according to available technology to as nearly its original condition as is possible.

This operation does not face any of the mining complications caused by faults, intrusives, excessive water, large quantities of gas or considerably deep cover. The mine plan area is located in a region where mining has been the major industry; therefore, the nearby communities are geared for coal operations. The labor supply is excellent and well trained. With these considerations, and Tower's prudent management, the Centennial Project will be a model mining operation in the Carbon County area with very minimal environmental and socioeconomic impact.

C. Organization of Application

This underground mining permit application has been organized in accordance with the general requirements for format and contents as outlined in Section 771.23 of Title 30 of the Code of Federal Regulations. The text has been organized into eight chapters to fulfill the requirements of Subchapter G of 30 CFR. A summary of the table of contents is listed below.

Summary of Table of Contents

Chapter I	Introduction and Overview of Project and Permit Application
Chapter II	Legal, Financial, Compliance and Related Information
Chapter III	Operation and Reclamation Plan
Chapter IV	Environmental Resources
Chapter V	Maps, Cross Sections and Plans
Chapter VI	Preparation of Application
Chapter VII	Cross-Reference Table to Regulations in 30 CFR, Chapter VII
Chapter VIII	Appendices

To facilitate review of the application, each chapter listed above has been further divided into specific parts and sections. These can be found listed in the detailed table of contents appearing at the beginning of this text along with the page numbers on which they appear. This table of contents also contains lists of figures, tables, plates, exhibits, and appendices to facilitate cross referencing between chapters.

Exhibits include appropriate supporting documents, reports and publications and are included as appendices.

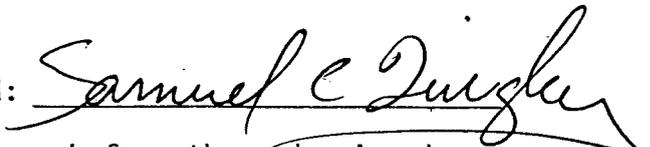
Maps which were not reduced to fit into the text are included in a separate volume as plates. All maps and plans are submitted in accordance with the requirements of Section 771.23(e) 30 CFR.

D. Verification Statement

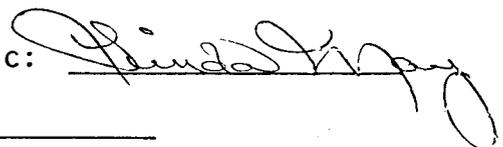
STATE OF Utah

COUNTY OF Carbon

I, Samuel C. Quigley, having been duly sworn depose and attest that all of the representations contained in the foregoing application are true to the best of my knowledge; that I am authorized to complete and file this application on behalf of the Applicant and this application has been executed as required by law.

Signed: 

Taken, subscribed and sworn to me before the undersigned authority in my said county, this 13th day of January, 19 81.

Notary Public: 

My Commission Expires: 1983

1.6 Operator

Tower Resources, Inc., is and will be the operator on the subject properties.

1.7 Other Operating Names

Other names under which the principal shareholder, Cada Am Holding N.V. (owning and controlling 100 percent of the capital stock), has or is operating mining operations in the United States within the last 5 years preceding the date of this application are listed below:

Don Bow Mine
Cimarron Coal Corporation
Badgett Mine Stripping Corporation
West Ken Coal Corporation
AMCA Processing, Inc.
AMCA Resources, Inc.

Refer to Table II-1 for further information.

1.8 Previous Coal Mining Permits and Permit Applications

Previous and present permits are listed in Table II-1.

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

The mine name is the Pinnacle Mine. The Mine Safety and Health Administration identification number for this mine and all sections is 42-01474.

3. Land Ownership

3.1 Surface (See Plates I and III).

3.1-1 Areas to be affected by Surface Facilities

Surface disturbances will be minimal and limited to the previously permitted Zion Securities Corp. property or Federal land. No other private or state land will be impacted by surface facilities. The names and addresses of surface owners where land will be impacted are listed below:

Name: Bureau of Land Management, Utah State Office
Address: 136 East South Temple Street
Salt Lake City, Utah 84111

Name: Zion Securities Corporation
Address: 10 East South Temple Street
Salt Lake City, Utah

(1) (a) Name of permittee
or applicant:

(6) Name of permit or application
and permit or application number:

(c) Regulatory Authority

(1) (a) Name of permittee or applicant:	(6) Name of permit or application and permit or application number:	(c) Regulatory Authority
		Bureau of Surface Mining and Reclamation Enforcement Ky. Dept. for Natural Resources and Environmental Protection
Tower Resources, Inc.	054-0009	Surface Disturbance Mining Permit
"	054-0010	"
"	054-0059	"
DonBow Mine	3721-74	"
"	6342-77	"
"	6695-77	"
Cimarron Coal Corp.	1169-67 thru 75	"
"	254-0062	"
"	254-0328	"
"	254-7000	"
"	254-0291	"
"	054-0073	"
"	054-0066	"
"	054-0046	"
"	254-0367	"
"	254-0297	"
"	254-0304	"
"	254-0362	"
Badgett Mine Stripping Corp.	407-72	"
"	2211-70	"
"	2211-71	"
"	289-0227	"
"	5418-76S#1	"
"	289-0355	"
"	289-0354	"
"	407-74R	"
"	407-72S#1	"
"	407-73	"
"	407-73-S#1	"
"	407-74S#1	"
"	407-73R	"
"	407-74R	"
"	5151-76R	"
"	254-0329	"

(1) (a) Name of permittee
or applicant:

(6) Name of permit or application
and permit or application number:

(c) Regulatory Authority:

(1) (a) Name of permittee or applicant:	(6) Name of permit or application and permit or application number:	(c) Regulatory Authority:
Badgett Mine Stripping Corp.	2237-72	Bureau of Surface Mining and Reclamation Enforcement Ky. Dept. for Natural Resources and Environmental Protection
"	2237-71	"
"	2437-71S#1	"
"	2437-71S#2	"
"	2437-71S#3	"
"	2437-74R	"
"	2437-70	"
West Ken Coal Corp.	275-0028	"
"	089-0033	"
"	275-7000	"
"	289-0320	"
"	289-0354	"
"	289-0133	"
"	289-0226	"
"	092-0054	"
"	089-0026	"
AMCA Processing, Inc.	5778-76	"
Tower Resources, Inc.	251	State of Maryland Bureau of Mines
"	259	"
"	284	"

3.1-2 Other areas within the proposed permit area (mining property)

Name: John and Sophia Critchlow
Address: Route #1, Box 331
Price, Utah 84501

3.1-3 Areas contiguous to proposed permit area

Owners of property contiguous to the permit area are listed below:

Name: Bureau of Land Management
Address: Utah State Office
136 East South Temple Street
Salt Lake City, Utah 84111

Name: Gladys R. Artman
Address: P.O. Box 1200
Lakeland, Florida 33802

Name: F. and D. Shimmin
Address: 711 North 5th East
Price, Utah 84501

Name: R. and E. Nelson
Address: 583 Sundial Drive
Moab, Utah 84532

Name: D. Mathis
Address: Sunnyside Star Route
Price, Utah 84501

Name: State of Utah
Address: 1588 West North Temple Street
Salt Lake City, Utah

3.2 Subsurface - Minerals (See Plate IV).

3.2-1 Coal to be Mined

Owners of the coal to be mined on the permit area are listed below:

Name: Bureau of Land Management
Address: Utah State Office
136 East South Temple Street
Salt Lake City, Utah 84111

Name: Zion Securities Corporation
Address: 10 East South Temple Street
Salt Lake City, Utah 84111

3.2-2 Other Minerals within the Proposed Permit Area

No oil or gas tests have been drilled on the permit area. However, rocks above and below the coal-bearing section that have produced oil and gas elsewhere in eastern Utah are present on the property. A few test wells have been drilled south of the property, as near as one mile from the boundary, however, these have been unsuccessful. (U.S. Department of the Interior, Final Environmental Statement, Site Specific Analysis, 1979). It should be noted that the intraburden between these oil and gas bearing rocks and the coal bearing rocks is large enough that coal mining could not impact potential oil and/or gas recovery.

3.2-3 Subsurface contiguous to Proposed Permit Area

Owners of the contiguous subsurface rights are listed below:

Name: Bureau of Land Management
Address: Utah State Office
136 East South Temple Street
Salt Lake City, Utah 84111

Name: Pacific Gas and Electric (Eureka Energy)
Address: 1010 Kearns Building
136 South Main Street
Salt Lake City, Utah 84101

Name: Franklin Real Estate Company
Address: #2 Broadway
New York, New York

3.3 Applicants Pending Interest in Contiguous Lands

At this time, Tower Resources, Inc., has no interests in lands, options, or pending bids for lands which are contiguous to the proposed permit area with the exception of approximately 600 acres of unleased Federally owned coal lands directly south of our leases. Our primary property offers the only logical, economic access to these areas. If not for Tower Resources, it is very unlikely these areas would ever be mined.

B. Compliance Information

1. Revocation or Suspension of Mining Permits

The applicant, any subsidiary, affiliate, or persons controlled by or under common control with the applicant has not had a mining permit suspended or revoked.

2. Forfeiture of Mining Bond or Surety

The applicant, any subsidiary, affiliate or persons controlled by or under common control with the applicant has not forfeited a mining bond or similar security deposited in lieu of bond.

3. History of Violation

The following violations were issued by the State of Utah, Department of Natural Resources, Division of Oil, Gas, and Mining on October 3, 1980.

MC 717.14(c) - Placing material on a downslope.

MC 717.17(a) - Failure to pass surface drainage from the disturbed area through a sediment pond.

MC 717.20(a) - Failure to protect topsoil concerning these violations.

A conference to discuss the facts of these violations was held between Tower Resources and D.O.G.M. on November 12, 1980. As a result of this conference, violation MC 717.14(c) was vacated, a civil penalty of 90 dollars was assessed for violation MC 717.17(a), and a civil penalty of 30 dollars was assessed for violation MC 717.20(a). Tower has taken all actions required by the D.O.G.M. to abate these violations.

The following violations were issued by the Division of Oil, Gas, and Mining on December 16, 1980.

MC 717.14(a)(1) - Failure to retain non-waste material.

MC 717.717(h)(3) - Failure to monitor groundwater.

Presently, Tower is awaiting a conference with the D.O.G.M. concerning these violations.

C. Right of Entry

1. Federal Coal Leases

Federal leases held by Tower Resources, Inc., in sublease agreement with AMCA Coal Leasing, Inc., comprise 2,042.39 acres of land in Sections 5, 6, 7, 8, 9, 17, and 18, T13S, R11E, SLBM, Carbon County, Utah. These leases are described below and are shown on Figure II-1 and Plate II.

1.1 Date of Execution

SL-027304 - September 1, 1925
(Readjusted August 1, 1979)

SL-063058 - August 3, 1942

U-010581 - February 1, 1956
(Readjusted August 1, 1979)

1.2 Property Description

See Table II-2.

1.3 History of Ownership

SL-027304 - This lease was originally assigned to W.F. Olsen on September 1, 1925. On May 1, 1959, the lease was assigned to C.D. Sutton. On May 1, 1970, the lease was posted to F.H. Larson from whom Centennial Coal Associates was subsequently assigned the lease on February 1, 1973.

SL-063058 - The original lease of 80 acres was assigned to C.D. Sutton, August 3, 1942. On July 27, 1950, the lease was amended to embrace 200 acres. An additional 40 acres was added December 13, 1951, to make the total lease 240 acres. Subsequently, the leases were posted to F.H. Larson on May 1, 1970 and to Centennial Coal Associates on February 1, 1973.

U-010581 - This lease was assigned to C.D. Sutton, February 1, 1956. On May 1, 1970, the lease was assigned to F.H. Larson who subsequently assigned it to Centennial Coal Associates effective February 1, 1973.

All three of the leases were assigned to Centennial Resources Company and acquired from them by AMCA Coal Leasing, Inc., in February, 1977.

Centennial Coal Associates submitted a mining and Reclamation Plan under then current Federal 211 regulations. The permit was to have been approved pending the completion of the Central Utah Environmental Impact Statement. This having been completed, it was then set aside due to the

TABLE II-2

Description of Federal Leases

<u>USBLM Lease No.</u>	<u>Acres</u>	<u>Description</u>
SL-027304	120	S $\frac{1}{2}$ SE $\frac{1}{4}$ Section 7 NW $\frac{1}{4}$ NE $\frac{1}{4}$ Section 18
SL-063058	240	S $\frac{1}{2}$ SW $\frac{1}{4}$ Section 8 NE $\frac{1}{4}$ NW $\frac{1}{4}$, NW $\frac{1}{4}$ NW $\frac{1}{4}$ SE $\frac{1}{4}$ NW $\frac{1}{4}$ Section 17 NE $\frac{1}{4}$ NE $\frac{1}{4}$ Section 18
U-010581	1,682.39	All Section 5 All Section 6 NE $\frac{1}{4}$ N $\frac{1}{2}$ NW $\frac{1}{4}$, N $\frac{1}{2}$ SE $\frac{1}{4}$ Section 7 N $\frac{1}{2}$, N $\frac{1}{2}$ SW $\frac{1}{4}$, SE $\frac{1}{4}$ Section 8 W $\frac{1}{2}$ SW $\frac{1}{4}$ Section 9 N $\frac{1}{2}$ NE $\frac{1}{4}$ Section 17

existence of the new Title 30 OSM regulations. This permit application then is similar to the original 211 Mining and Reclamation Plan with updates to meet current standards and new regulations.

1.4 Legal Rights Granted

Each lease grants the same legal rights as stated in the lease agreements between the U.S. Department of the Interior, Bureau of Land Management and AMCA Coal Leasing, Inc. These legal rights are listed below:

"The lessor, in consideration of the rents and royalty and other conditions hereinafter set forth, hereby grants to the lessee the exclusive right and privilege to mine and dispose of all coal...together with the right to construct all work, buildings, structures, equipment, and appliances which may be necessary and convenient for the mining and preparation of the coal for market, and subject to the conditions herein provided, to use so much of the surface as may reasonably be required in the exercise of the rights and privileges herein granted for so long as this lease remains in full force and effect under any provisions of the law and the applicable regulations thereunder."

2. Private Fee Leases

In addition to the previously described Federal leases, Tower Resources, Inc., in sublease agreement with AMCA Coal Leasing, Inc., holds 200 acres of leased fee land from Zion's Securities Corp., also shown on Figure II-1 and Plate II.

2.1 Lessor and Date of Execution

Zion Securities Corporation
10 East South Temple Street
Salt Lake City, Utah
Executed August 1, 1972

2.2 Property Description

T13S, R11E, SLBM, Carbon County, Utah
Sec. 7: S $\frac{1}{2}$ NW $\frac{1}{4}$
 N $\frac{1}{2}$ SW $\frac{1}{4}$
 SE $\frac{1}{4}$ SW $\frac{1}{4}$
containing 200 acres.

2.3 History of Ownership

This lease was originally made and entered into between Zion's and Centennial Coal Associates on August 1, 1972. The lease was later assigned to Centennial Resources and subsequently assigned to AMCA Coal Leasing, Inc., in February of 1977.

2.4 Legal Rights Granted

Rights granted to Tower as stated in the mining lease agreement with the Zion's Securities Corporation are listed below:

"During the life of the lease, so long as Tower is not in default hereunder, it may freely prospect, mine, and develop the leased premises, extract, and sell such coal therefrom as it may elect, and use the surface and underground thereof for all lawful purposes including the exploration and mining to be conducted therein and thereon. It may also use the leased lands in connection with the mining and development of other lands which it may own, lease, or acquire as a part of its general mining operations in the area."

3. Rights of Way

3.1 Grantor and Date of Execution

Tower Resources has been granted four Rights-of-Way by the Bureau of Land Management. These are listed below along with dates of execution.

U-45966 - Access road - September 11, 1980
U-36739 - Telephone line - November 20, 1978
U-36741 - Power line - November 20, 1978
U-45965 - Material storage - September 11, 1980

In addition, Tower Resources has filed application for a haul road right-of-way, serial number U-36738. This right-of-way has not yet been granted.

Copies of the "Decisions for Right-of-Way Grant", along with a letter of authorization for changes in right-of-way U-45965 are attached as Exhibit II-A. Also, the location of these rights-of-way are shown on Plate I.

3.2 Property Description

See Exhibit II-A and Plate I.

3.3 History of Ownership

These rights-of-way are new grants issued to Tower Resources. The access road, power line, telephone line, and office building have all been constructed according to the right-of-way grants.

3.4 Legal Rights

See Exhibit II-A.

D. Surface Operation Information - Associated Surface Mining

As this is an underground mine, there will be no associated surface mining. All surface facilities and disturbed areas will be removed and reclaimed according to the reclamation plan outlined in Chapter III, Section E, re Reclamation.

E. Relationship to Areas Unsuitable for Mining

1. Designated Areas and Areas under Study

The proposed permit area is not within an area designated unsuitable for underground mining activities under 30 CFR 764 and 765 or under study for designation in an administrative proceeding initiated under those Parts.

2. Exemption for Valid Existing Rights

No exemption is claimed.

3. Occupied Dwellings - Waiver

There are no occupied dwellings within 300 feet of the proposed permit area.

4. Public Roads

There is no mining (underground or surface) to occur within 100 feet measuring horizontally of the outside right-of-way of any public road.

5. Public Buildings, Schools, Churches, Community or Institutional Buildings, and Public Parks

There are none of the above within 300 feet measured horizontally of the proposed permit area.

6. Cemeteries

There are no cemeteries within 100 feet measured horizontally of the proposed permit area.

F. Permit Term Information

1. Proposed Permit Term

The requested term of the permit is for 5 years. However, due to the substantial capital investment and commitments involved, Tower will apply for 5-year extensions to the permit over the life of the mine, approximately 40 years.

2. Proposed Life of Mine

The mining operation has begun on the Zion's fee lease and including the Federal leases there is an estimated 29 million tons of recoverable coal. If the extraction rate of one million tons per year is accomplished, the project life will be 28 years. However, the theoretical life is much greater, approximately 40 years, due to the existence of unleased Federal coal economically accessible only through Tower's operation.

3. Starting and Termination Date of Each Phase of Operation

Initial production began on the Zion's fee lease in the Gilson seam on October 3, 1980, according to the mine plan approved by the State of Utah, Division of Oil, Gas, and Mining. Mining plans call for advancement in this seam onto Federal leases. As mining progresses in the Gilson seam, mining will also begin in the Aberdeen seam and in the Lower Sunnyside seam, according to overall mine plan. During this initial period of mining and development actual starting and termination dates of each phase cannot be accurately predicted, as they are dependent on the coal market and approval of the permit application. Refer to Chapter III, Part C re Mine Operations and to Plates V, VI, and VII for more information.

4. Number of Acres of Surface to be Affected on each Phase

As this is an underground mine, surface disturbances are minimal and limited to those structures and facilities needed to support and facilitate underground mining activities. All structures and disturbances are located in areas previously impacted by mining.

The total disturbed acreage is approximately seven acres, of which one-third had been previously impacted. (See Plates I and II). Proposed facilities will disturb approximately twenty acres. See Plates I and II.

5. Horizontal and Vertical Extent of Underground Workings in each Phase

For specific horizontal and vertical extent, see Plates V, VI, and VII, and refer to Chapter III, re Operation and Reclamation Plan.

G. Personal Injury and Property Damage Insurance Information

Tower is insured for liability coverage with the Old Republic Insurance Company of Greensburg, Pennsylvania. The primary liability coverage is for \$1,000,000 Bodily Injury Liability and Property Damage Liability.

A copy of certificate of liability insurance is attached as Exhibit II-B.

H. Other Licenses and Permits

The following licenses and permits are currently in effect or pending approval:

State of Utah:

1. State of Utah, Department of Natural Resources
Division of Oil, Gas, and Mining
1588 West North Temple
Salt Lake City, Utah 84116

-Mining and Reclamation Plan for the "Zion's Fee Mine" (Pinnacle)

Permit I.D. Number ACT/007/019
Approved September 5, 1980
2. State of Utah, Department of Health
Division of Environmental Health
150 West North Temple
P.O. Box 2500
Salt Lake City, Utah 84110

-Air Quality Construction and Operation Permit
Approved June 13, 1980

-Water Quality - Sediment and Drainage
Approved May 14, 1980

-Septic and Culinary Plan (2)
Approved September 17, 1980 (Office Site)
Approved May 8, 1980 (Bathhouse Facility)

Federal:

1. Environmental Protection Agency
Region VIII
1860 Lincoln Street
Denver, Colorado 80295

-National Pollutant Discharge Elimination
System (NPDES)
Permit I.D. Number UT-0023507
Approved May 30, 1980

-Prevention of Significant Deterioration of Air
Quality (PSD)
Unissued: determined by the E.P.A. to be
unnecessary.
2. Bureau of Land Management
Utah State Office
136 East South Temple Street
Salt Lake City, Utah 84111

- Access Road Right-of-Way
Permit Number U-45966
Granted September 11, 1980
 - Buried Telephone Cable Right-of-Way
Permit Number U-36739
Granted November 20, 1978
 - Power Transmission Line Right-of-Way
Permit Number U-36741
Granted November 20, 1978
 - Material Storage Site Right-of-Way
Permit Number U-45965
Granted September 11, 1980
 - Haul Road Right-of-Way
Permit Number U-36738
Pending Approval
3. Mining Safety and Health Administration (MSHA)
P.O. Box 25367
Denver, Colorado 80225
(District 9)
- Roof Control Plan
Mine I.D. Number 42-01474
Approved June 30, 1980
Reviewed and approved every six months
 - Ventilation System and Methane and Dust Control Plan
Mine I.D. Number 42-01474
Approved July 9, 1980
Reviewed and approved every six months
 - Fan Stoppage Plan
Mine I.D. Number 42-01474
Approved September 21, 1978
 - Smoking Prohibition Plan
Mine I.D. Number 42-01474
Approved September 21, 1978
 - Training Plan
Mine I.D. Number 42-01474
Approved August 19, 1980
 - Instruction Program: Firefighting and Evacuation Plan
Mine I.D. Number 42-01474
Approved November 5, 1980
 - Medical Program
Mine I.D. Number 42-01474
Approved September 6, 1978

Copies of the permits, right-of-way grants, or letters of approval for each of the above plans or programs are attached as Exhibit II-A.

I. Public Office for Filing Application

A copy of this permit application will be filed simultaneously for public inspection with the County Recorder of Carbon County, Carbon County Courthouse, Price, Utah.

J. Newspaper Advertisement and Proof of Publication

A copy of the newspaper advertisement of this application and proof of publication of the advertisement will be filed, and made part of this complete application not later than four weeks after the last date of publication required under 30 CFR 786.11 (a).

A copy of the newspaper advertisement for the current approved Mining and Reclamation Plan submitted to the State of Utah, Department of Natural Resources, Division of Oil, Gas, and Mining is included in Exhibit II-C.

III. Operation and Reclamation Plan

A. Overview of Project

1. Type of Mine

The initial underground mining operation known as the Pinnacle Mine, located on the Zion's fee property, began production on October 3, 1980. It consists of a single unit's production with an output projected to be approximately 200,000 tons per year and with 20 employees. Upon approval of this permit application, the mine will move onto the Federal leases and expand to two or three units with an annual production of approximately 500,000 tons. As there are three mineable seams present, the Aberdeen, Gilson, and Lower Sunnyside, in ascending order, mining plans call for simultaneous operation of a mine in each seam. The existing operation is in the Gilson seam.

Mining will consist of the underground method of coal extraction using continuous miners, shuttle cars, and conveyor haulage. Room and pillar development will be employed with final extraction estimated to be about 65 percent of the reserve, after pillar extraction.

Coal is presently being loaded into 28 and 40 ton coal trucks and hauled to various sidings of the Denver and Rio Grande Western Railroad. The coal is loaded and shipped to several consumers. Ultimately Tower will use its railsiding located near Wellington, Utah, which has been approved by the State of Utah DOGM, as the project grows.

2. Area of Operations

2.1 Mine Plan Area

The mine plan area is limited to and contained within the proposed permit area. Mine plans for each of the mineable seams are included as Plates V, VI, and VII.

2.2 Proposed Permit Area

The proposed permit area consists of three Federal leases and one fee lease, all controlled by Tower Resources. Presently, mining operations are taking place on Tower's Zion fee lease. Federal leases are U-010581, SL-27304, and SL-063058. These leases are shown on Figure II-1 and Plate II.

2.3 Surface Area to be Disturbed

Surface disturbances are and will be minimal due to the nature of the mining activities. The proposed permit area has been previously impacted by mining. Surface disturbances will be limited to the existing facilities which have been constructed on the Zion's

fee area and the new facilities will be located in previously disturbed areas. These pre-existing surface facilities are shown on Plates VIII and IX. The total existing surface area disturbed is approximately 7 acres. Proposed facilities are indicated on Plates I and II.

3. Reserves, Production, and Life of Mine

Total reserves of all three seams (in place) are estimated at 50 million tons, of which 29 million tons is expected recoverable.

Production schedule estimates 200,000 tons during the first year of operation. This will be systematically increased to approximately 1 million tons in the fourth or fifth year.

If the extraction rate of 1 million tons is accomplished according to schedule, the project life will be about 28 years. The theoretical life is closer to 40 years however due to the existence of unleased Federal coal logically accessible through only the existing and future Tower mine workings.

4. Schedule of Construction, Mine Development, Mining and Reclamation

All surface facilities have been constructed for the Pinnacle Mine. Mining in the Gilson seam began in October, 1980 with a single unit's production. As mining progresses, additional units will be added with 5 production units scheduled to be operating by February 1985. A systematic mining plan will be followed to assure maximum recovery. All planning and scheduled production, however, will be contingent upon the coal market and approval of this permit application. Upon the conclusion of mining activities in the area, the scheduled reclamation phase will begin immediately. Refer to Part E of this Chapter re Reclamation.

B. Construction and Design of Surface Facilities

1. Existing Structures

All existing structures are situated on the Zion's fee land or on Federal lease SL-027304 within BLM ROW U-45966 and are shown on Plates VIII and IX. All structures are complete and include the following:

Bathhouse	14' x 60'
Mine Water Storage Tanks	12' x 16'
Warehouse	14' x 60'
Superintendent's Office	16' x 70'
Substation	60' x 100'
Office Building	28' x 60'
Mine Fan	88"
Portals	6' x 20' (4 ea.)
Culinary Water Tanks	12' x 10'
Sediment Ponds	.737 acres

Upon completion of mining activities, the portals will be sealed according to existing state and Federal regulations and all buildings and structures not being utilized as part of the reclamation sequence, will be removed, according to the Reclamation Plan outlined in Part E of this Chapter.

2. Construction Schedule

All of the above structures have been completed. Additional construction of structures or facilities including additional warehouse and shop facilities, is anticipated for the existing mine (Pinnacle Mine). Construction has been located and carried out so as to prevent and control erosion, siltation, water pollution, and damage to property. All facilities have been designed and constructed and will be maintained and used in a manner which prevents damage to wildlife and related environmental values. Any future construction will be conducted in a similar manner according to regulations regarding protection of the hydrologic system, etc. All additional structures to be located on the Zion's fee have been approved by DOGM.

3. Construction Methods

3.1 Major Equipment

The portal and building sites were leveled using dozers, trucks, and loaders. At the building sites, the topsoil was removed and transported to a nearby area for storage.

All surface pads have been graveled and all other disturbed areas (pond embankments, etc.) have been reseeded according to recommendations by the U.S. Department of Agriculture, Soil Conservation Service.

3.2 Blasting

All surface blasting activities necessary for present operations have been completed in compliance with sections 817.61 through 817.68 of Chapter VIII of Title 30 of the Code of Federal Regulations. Blasting consisted of portal highwall construction for purposes of stability. Future surface blasting, if necessary, would be very limited and would consist of highwall preparation for similar portal facilities.

4. Removal and Storage of Topsoil and Subsoils

The area from which topsoil was removed is approximately 5 acres and includes poorly developed soils. Using dozers and front end loaders, the soil was scraped from the surface and dumped at a site on facility location. The topsoil storage area is shown on Plate VII. The

topsoil was removed as a separate operation from areas to be disturbed by surface installations, such as roads and areas upon which support facilities are sited. Topsoil has been segregated, stockpiled, and protected from wind and water erosion and contaminants through revegetation. Disturbed areas no longer required for the conduct of mining operations have been graded and revegetated. Once the topsoil was removed, the canyon bottom was leveled and culverts installed to prepare the area for building construction. For further information about topsoil see Chapter IV, Part F re Soil Resources.

5. Portal Facilities (See Plate VIII)

5.1 Mine Pads

The portal mine pad consists of approximately .922 acres. Located on this pad are the fan, conveyor portal, air intake portals, mine water storage tank, warehouse and superintendents office.

5.2 Support Structures and Buildings

Support structures and buildings are listed in Part B, Section 1 of this chapter and shown on Plates VIII and IX.

5.3 Parking Areas

Parking lots have been covered with gravel and magnesium chloride and will be maintained. These are shown on Plates VIII and IX.

5.4 Storage Areas

There are several storage areas at the site. These include: Material Storage Area No. 1 (1.482 acres), Raw Coal Pile Area (1.393 acres), Material Storage Area No. 2 (1.075 acres), and the Topsoil Storage Area (.0638 acres). The bathhouse and parking area and a water storage tank are located on Material Storage Area No. 2. All areas are shown on Plate VIII. B.L.M. ROW U-45965 has also been designated a material storage area as well as an office site and parking area (See Plate IX).

6. Coal Handling Facilities

6.1 Conveyors

Coal is discharged from a shuttle car onto a conveyor belt for transportation to the outside. Location of this conveyor is shown on Plate VIII.

6.2 Stockpiles

Coal is discharged from the conveyor onto a coal stockpile in the Raw Coal Stockpile Area indicated on Plate VIII. This is a live stockpile as opposed to a storage pile.

6.3 Loadout

Coal is loaded from the stockpile by a front end loader into 28 and 40 ton coal trucks and hauled to various sidings on the D&RGW and Utah Railroad. Once approval has been granted through the OSM, construction will commence on Tower's loadout facility southeast of Wellington, Utah. See Plates I, X, and X-A.

6.4 Preparation Plant

Depending on the coal market in the future, a preparation plant (wash plant) may be used. However, it is not anticipated in the very near future.

7. Transportation Facilities

7.1 Roads

7.1-1 Class I

The previously existing road, which runs approximately 10 miles from Price, Utah to the Zion's fee area, can be classified from a hard surfaced secondary highway to an all-weather gravel road. The first 4 miles to just past the Price Airport, is hard surfaced (paved). The road is then maintained as an all-weather gravel road to the minesite. This road was an existing county road and has been upgraded with new surface gravel, culverts, and drainage ditches. The grade of this road ranges from less than 1 percent to approximately 5 percent in the canyon areas. At no time does this road exceed 10 percent grade hence minimizing erosion and other effects on the hydrologic system.

During its life, this road will be constantly maintained. All necessary repairs will be made in a timely manner. The road has been chemically treated with a magnesium chloride solution to control dust. In winter months, snow will be removed, the road graded and kept open. Signs have been posted at strategic points along the road to warn of any possible hazards which might exist.

This road is shown on Plate I and is presently being used as both an access road and a haul road. Currently, Tower has an application pending with the Bureau of Land Management for a right-of-way to construct a haul road. This road would connect the existing Deadman Canyon road with the Coal Creek road. See Plate I. This haul road application was made to reduce the haulage distance and reduce the adverse effects of transporting coal through both Price and Wellington.

7.1-2 Class II

The above described road is the only road presently being used in association with mining activities.

7.1-3 Class III

The above described road is the only road presently being used in association with mining activities.

7.2 Railroad

There are no existing or proposed railroad spurs on the property.

8. Dams, Embankments, Ponds, and Other Impoundments

Two sedimentation ponds have been constructed as shown on Plate VIII. A copy of the "Sedimentation and Drainage Control Plan" according to which the ponds were constructed is attached as Exhibit III-A. The sedimentation and drainage control plan has been designed according to OSM regulations and the design and construction certified by a Utah Registered Professional Engineer. No other embankments, or other impoundments have been built nor are any proposed excepting similar sedimentation control structures at new surface facility sites.

9. Power Supply and Communication Facilities

A 4160 volt, 3 phase, 60 hertz power distribution system has been taken underground from a 2500 KW substation located on the surface plant area. The primary feed into the substation is 46,000 volts from the Utah Power and Light Company transmission system located approximately 6 miles south, adjacent to the airport. This 46 KV line taps Utah Power and Light's Helper - Columbia 46 KV line, at structure #89. The power line was designed according to Utah Power and Light's specifications. After approval by Utah Power and Light, it was installed by a private local contractor at the expense of Tower Resources. Within the mine site area, the power is reduced to 4160 volts for the primary underground usage. This is fracture reduced to 480 volts for equipment operation. Surface power is on a 480 volt system. Electrical Specifications for the

Deadman Canyon Mine Substation are included as Exhibit III-B.

A 25 pair telephone communications cable is buried along the existing Deadman Canyon road, with its origin at Carbon County Airport approximately 7.5 miles from the minesite. Currently, 8 pairs are in use with additional capacity to add as the mine facilities expand. This cable was designed, supplied and installed by Mountain Bell telephone at the expense of Tower Resources.

10. Solid-Waste Disposal and Handling Facilities

10.1 Underground Development Waste and Excess Spoil

There has been no development waste or excess spoil and there will be none.

10.2 Coal Waste

10.2-1 Coal Processing Waste

As coal is hauled from the area in the form of raw coal, there is no processing waste.

10.2-2 Coal Refuse

As stated above, the raw coal is hauled from the area, therefore, there is no coal refuse.

10.3 Acid and Toxic-Forming Materials

Because there is no refuse of any kind, there will be no acid or toxic-forming materials deposited or stored in the area.

10.4 Non-Coal Waste

During the construction of the minesite facilities, a small amount of cuts were made in forming pads and access, etc. As is outlined in the approved Mining & Reclamation Plan, all cut material was used in fill situations, therefore, there was no disposal of non coal material in the form of waste.

11. Water Supply

Water for use in the mine is from Water Well No. 1 and stored in the Mine Water Tank as shown on Plate VIII. Water for culinary use will be from Water Well No. 2 or proposed Water Well No. 4 and stored in the Water Tank on the Material Storage Area No. 2. This is also shown on Plate VIII. Culinary water will also be from proposed Water Well No. 4 indicated on Plate VIII-A. Also, Water Well No. 3 shown on Plate VIII will be utilized if the need arises. There will also be a sump cut in the mine from which water can be reclaimed as all available water

will be needed. Since all mining is down dip from the portals, no water will exit from the mine. Information concerning the wells and water analysis is presented as Exhibit III-C.

12. Hydrologic Protection Facilities

12.1 Sewage System

The nature of the overburden in the area offers excellent drainage. As a result, a septic system with drain fields conforming to the state codes has been established to handle the waste water disposal from the bathhouse and office facilities. Enclosed as Exhibit III-D are the two septic system plans as designed by a Utah Registered Professional Engineer and approved by the State of Utah Department of Health.

12.2 Water Treatment

Based on the State of Utah, Department of Health review of the septic systems, water treatment is not needed. (Personal communication, Mr. Gerald Story, Utah Department of Health, Price, Utah).

12.3 Drainage Control - Diversions, etc.

The drainage control plan is presented as Exhibit III-A.

12.4 Sediment Control

The sedimentation plan is presented as Exhibit III-A.

13. Exploration and Development Drill Sites

A five hole drilling program was conducted by Centennial Coal Associates in 1971. A seven hole drilling program was conducted by Tower in 1977. These programs were supplemented by mine samples, outcrop information, and information obtained from two holes drilled west of the property by North American Coal Company in 1948. All drill sites are shown on Plates V, VI, and VII. Refer to Chapter IV, Part A, Section 3.2-2.2 re Data.

14. Monitoring Facilities

14.1 Subsidence

Subsidence monitoring facilities will be set up with provisions for regular inspection and recordation of data as technology dictates. Proposed facilities are shown on Plate I.

14.2 Hydrologic

Water quality monitoring stations will be set up at the wells as shown on Plate XI and also at the sedimentation pond discharge structures. Refer to Chapter IV, Part B, Section 4.4 re Monitoring.

14.3 Other

No other monitoring facilities are anticipated at this time.

15. Landscaping

All disturbed areas have been graded to the most moderate slope possible to assure stability. Vegetative cover has been promptly re-established to stabilize erosion. Revegetation was accomplished by Tower under the recommendations of the U.S. Department of Agriculture, Soil Conservation Service.

16. Signs, Markers, Fences, and Gates

Signs of a uniform design, showing the company name, business address, and telephone number as well as the identification number of the current regulatory program permit authorizing the underground mining activities, have been placed at all access points to the permit area. These signs have been placed to be easily seen, are made of a durable material, and conform to local laws and regulations. The topsoil storage area is clearly marked.

As this is an underground mine, there will be no blasting conducted on the surface with the exception of highwall construction. When blasting for highwall construction does occur, conspicuous signs and flagging will be posted as required by 30 CFR Parts 817.11 (f) and 817.65 (e).

As there are no perennial streams or a stream with a biological community on the permit area, buffer zone markers will not be necessary. The perimeters of all areas affected by surface operations and facilities will be clearly marked. These signs and markers shall be maintained during all activities and retained and maintained until after the release of all bonds for the permit area.

C. Mine Operations

1. Introduction

1.1 Mine Property

The coal leases owned by Tower Resources are located in the Deadman Canyon area of the Book Cliffs coal field. The property is located about 10 miles north-northeast of Price, Utah in Carbon County. Mining has begun in the Gilson seam on the Zion's fee lease and mining plans call for development to progress onto

Tower's Federal leases upon approval of this permit application. Mining plans also call for the development and operation of mines in the Aberdeen and Lower Sunnyside Seams. As is shown on the enclosed Plate II, development into the other seams will involve separate surface facilities which will be located in adjacent canyons to the east of Deadman or north of the existing facilities in Deadman.

1.2 Economic Geology

This project is located in a region where coal mining has historically been the only industry. The main coal-bearing rocks occur in the Blackhawk Formation of the Upper Cretaceous Mesaverde Group. Several small operations have mined coal in the Deadman Canyon area over the past 70 years. These mines, however, merely scratched the surface of the estimated reserve. There are no other economically recoverable replenishable or non-replenishable resources within this property.

1.3 Exploration

All exploration and drilling programs have been completed. The drilling and exploration activities were supplemented by mine samples and outcrop information, and the results used to estimate the coal reserves of the lease area. Numerous samples were taken from the outcrops of the Lower Sunnyside, Gilson, and Aberdeen seams, as well as from mine faces in the Hileman, Zion's, Star Point, and Blue Flame No. 1 mines.

1.4 Reserves

By U.S. Geological Survey definition, approximately 30% of the entire reserve is classified as "measured". The remainder is classified as indicated, based on all available measurements.

Total coal reserves in the three seams have been estimated at 50 million tons. Recoverable coal has been estimated at 29 million tons. Tower expects an initial recovery rate of about 35 percent and upon final pillar extraction, total recovery is expected to be more than 65 percent. Cover ranges from 0 feet to more than 2,400 feet on the northern end of the property.

1.5 Production Rate

Mining has begun in the Gilson seam and the production schedule projects approximately 200,000 tons of coal to be mined during the first year of operation. Production will be systematically increased until an

approximate rate of about 1,200,000 tons is reached during the fourth and fifth years.

1.6 Life of Mine

Including the Zion's fee area and Federal leases, there is an estimated 29 million tons of recoverable coal. If the extraction rate of one million tons per year is accomplished according to schedule, the project life will be about 28 years. Theoretically, however, the life is much greater, or approximately 40 years.

2. Underground Operation and Facilities

2.1 Mine Layout (Refer to Plates V, VI, and VII).

2.1-1 Multiple Seam Considerations

There are three economic seams present on the property. The uppermost seam is the Lower Sunnyside which varies from four to six feet thick. The middle seam is the Gilson seam which varies from four to eight feet thick. The lowermost seam is the Aberdeen which varies from four to thirteen feet in thickness. These seams are generally separated by a 200 foot interval which includes a massive sandstone in each case. Mining plans are based on simultaneously operating a mine in each of these seams. The mine plans for each seam are shown on Plates V, VI, and VII. Mining began in the Gilson seam in October 1980 on the Zion's fee property. Mining plans call for advancement onto the Federal leases in the near future. Initial start-up of mining in the Lower Sunnyside and Aberdeen will be dependent upon the coal market and approval of this application. When mining is progressing concurrently in two seams, the upper seam mine plan will in effect be a "mirror image" of the lower seam. This will assure that maximum roof support is accomplished.

2.1-2 Portals

Portals for the present mining operations in the Gilson seam are located on the west side of Deadman Canyon as shown on Plates VI and VIII. The portal area consists of a conveyor portal, two air intake portals, and an 88' fan portal.

Portals have been enlarged above the coal seam to facilitate men and equipment at the mine opening. Steel sets have been used to support mine roof in the portal area. All new portals will be constructed in a similar fashion, facilitating air intake, conveyor, and an exhaust fan.

The portals are generally 6' high and 20' wide.

2.1-3 Mains, Submains, Slopes

Initial mining has begun from portals on the west side of Deadman Canyon on the Zion's fee. A five entry system is being used (two intake portals) and using a continuous miner, the entries are being driven to the property line. Entries on 80 foot centers with crosscuts every 80 feet are being driven on the strike and dip of the coal seam. Refer to Plate VI. There exists only one return air portal on the surface, however, 2 exist underground making the five entry system.

2.1-4 Shafts and Interconnecting of Slopes

Mining plans call for no shafts or interconnections of slopes.

2.1-5 Mining Panels

The mining sequence calls for the development of panel entries. The panels formed will either be further developed for pillar extraction, or will be mined out using a longwall system.

2.1-6 Barrier Pillars

A barrier pillar will be left between the bleeders and the production panels. A barrier will also be left wherever old mine workings are skirted such as the Olsen Mine on the east side of Deadman Canyon in the Gilson seam.

2.1-7 Bleeder System

A bleeder system will be maintained and pillars left to provide for ventilation, eventually extending around all mined out areas.

2.2 Mine Safety

2.2-1 Ventilation

The ventilation plan calls for a fan of sufficient capacity to provide air to each working section to control methane and dust; there has been no methane found to date in any of the old works or new faces. The working faces will be ventilated with a live brattice system consisting of a line curtain. The conveyor systems will be isolated from intake and return. All ventilation requirements of the Coal Mine Health and Safety Act will be met. Plate XII shows a schematic representation of the plan which has been approved by M.S.H.A. This ventilation plan will be strictly adhered to, in order to insure safety of all personnel.

2.2-2 Roof Control

The Pinnacle Mine is operating under an approved M.S.H.A. roof support plan which calls for bolting on five foot centers with a minimum 42" bolt length. The roof in this mine, as well as in the other two seams is a massive sandstone (60'+) and offers excellent support in itself. The old mine workings which were rehabilitated for the Pinnacle Mine main entries had stood unsupported for the past 40 years. This roof control plan will be strictly adhered to, in order to insure the safety of all personnel.

2.2-3 Explosives

All blasting performed underground will conform to both state and Federal regulations governing explosives and blasting in underground coal mines. There may be a small amount of blasting conducted on the surface. This would consist of highwall preparation, if necessary, for purposes of stability.

A powder magazine will be set up on one of the surface pads, located in a remote area. It will be a small concrete block structure conforming to all regulations, such as segregation, regarding such a structure (See Plate VIII). All blasting operations shall be conducted by experienced, trained, and competent persons who understand the hazards involved and who possess a valid certificate as required by Title 30 of the Code of Federal Regulations.

2.2-4 General Safety Measures

A great emphasis will be put on assuring a safe mine operation; therefore, the mine and surface facilities will be operated within prudent standards to insure the health and safety of all employees. The facilities will be carefully inspected by company-trained safety engineers and State and Federal mine inspectors.

The operation will abide by Utah State Coal Mine Regulations and the 1969 Federal Coal Mine Health and Safety Act. In addition, these regulations will be supplemented by a company safety policy. Various training programs will be utilized such as the following:

- Methane Measurements
- Roof and Rib Control
- Oxygen Deficiency Testing
- Ventilation
- First Aid
- Mine Rescue
- Mine Electrical Certification
- Self Rescue Training
- Use of Personal Protective Equipment
- Recognition of Electrical Hazards
- General Accident Prevention
- Mine Communications
- Job Safety Training

Many of the training programs will run continuously, such as those involving roof control and ventilation. Other programs are held annually with many oriented toward new employees.

2.3 Mine Development (Refer to Plates V, VI, and VII).

2.3-1 Room and Pillar

Room and pillar design will be employed with development extraction estimated at 35 percent of the reserve.

2.3-2 Pillar Extraction

Once development is completed, pillar extraction will commence. Final pillar extraction will result in a total recovery rate of approximately 65 percent.

2.3-3 Longwall

This mining method will be looked at during the initial mine development and production. Should mining conditions in any of the seams prove adaptable to longwall mining, it is likely that one or more longwall units would be installed. Initial mining, as well as all development work, however, will be done by a continuous miner unit. A mining plan that can readily be converted to longwall mining will be followed.

2.3-4 Cycle and Sequence of Mining

Initial portals have been installed on the west side of the canyon. Mining began in October, 1980 utilizing one continuous miner section of equipment. As mining progresses, the following equipment will be added to start up additional mining areas and increase production:

2nd Mining Unit - February, 1981
3rd Mining Unit - September, 1981
4th Mining Unit - August, 1982
5th Mining Unit - August, 1983
6th Mining Unit - February, 1984

This, of course, is theoretical, depending on coal market conditions.

As there are three coal seams of mineable thickness on the leases, a systematic plan of mining will be followed to assure maximum recovery of the coal reserves. When mining is progressing concurrently in two seams, the upper seam will be mined in such a fashion that room and pillar design and layout will be a "mirror image" of the lower seams so pillars are on top of one another to assure maximum roof support.

2.4 Recovery and Conservation of Coal Resources

As there are three coal seams in mineable thickness on the leases, a systematic plan (as outlined in this chapter), employing the most advanced technology will be followed to assure maximum recovery of the coal reserves. An overall recovery rate during development of about 35 percent is anticipated. After pillar extraction, the total recovery rate will be approximately 65 percent. This recovery rate is the maximum possible using present technology. The topography of the area as well as amount of cover precludes any future surface mining activities.

2.5 Underground Equipment

2.5-1 Production Units

In each mine, the entry systems, as well as in the panel areas, coal will be mined with a drum-type continuous miner similar to the Joy 12CM. Presently, a Joy 12 CM-11 is being used in the operation on the Zion fee area. Coal will be transported by shuttle car (Joy) to a loading point consisting of a Long Airdox Feeder Breaker or similar machine, which will discharge onto a 36" panel conveyor or a 42" main conveyor. Roofbolting is and will be accomplished by a Lee Norse Top Dog Single Boom Roof Bolter or a similar type machine. Additional production units will be added as previously outlined in this Chapter, Part C, Section 2.3-4, re Cycle and Sequence of Mining.

2.5-2 Belt Conveyors

The coal will be discharged from the shuttle car into a feeder breaker. The feeder breaker will discharge the coal onto either a 36" panel conveyor or a 42" main conveyor. The conveyor will transport the coal to the outside, where it will be discharged to a live stockpile, (see Plate VIII). Currently, a Long Airdox conveyor belt drive is being used. For future installations, the same, or similar drives will be employed.

2.5-3 Water System

Water for mining use, such as for providing face fire protection and dust suppression, will be obtained from Water Well No. 1, shown on Plate VIII. This water will be pumped to the Mine Water Storage Tank and from there into the mine using a high pressure pump. A sump will be cut in the mine for the purpose of reclaiming water as all available water will be needed. For this reason, no water will exit from the mine. Eventually, old worked out areas in the mine will provide a catch basin from which water can be reclaimed.

2.5-4 Power System

Incoming 46 KV, 3 phase, 60 hertz power supply from Utah Power and Light Company is stepped down by a substation to a distribution voltage of 4160 volts, 3 phase, 60 hertz for primary underground usage. The entire substation secondary and mine power distribution system has been designed, installed, and insulated in accordance with 8 KV specifications to facilitate the future conversion to a 7200 volt mine power distribution system. See Exhibit III-B. Other surface power (office, bathhouse, etc.), is supplied from the substation with a 480 volt system.

2.5-5 Other Equipment

Other equipment being utilized or to be utilized includes mantrips, rock dusters, tractors, rubber tired scoops, electricians, power cables, pipe and signal equipment, communication equipment, and miscellaneous section tools. The mine is also equipped with emergency tools and necessary supplies in the unlikely event that a fire or explosion should occur, in accordance with M.S.H.A. regulations.

2.6 Return of Coal Processing Waste to Underground Workings

As raw coal is hauled from the permit area, there will be no processing waste and no return of waste to underground workings. If in the future it is decided that a processing facility is to be incorporated, waste or reject will be taken to an approved refuse disposal site, however, no "reject" will be taken back into the mine.

3. Surface Equipment

Surface equipment includes a Cat 980-B front end loader for loading 28 ton trailers and diesel tractors for coal haulage. Also, there will be a grader for road maintenance. Other equipment such as diesel scoops and tractors will be utilized on the surface from time to time for material haulage. However, these pieces of equipment are generally for underground use.

4. Employment

Tower Resources is an Equal Employment Opportunity Employer.

The type of hourly employees to be hired include various skill levels ranging from the unskilled laborer to the highly skilled personnel, including miner operators, shuttle car operators, roof bolters, mechanics, and electricians. All hourly employees will be properly trained and certified where necessary

in accordance with M.S.H.A. regulations. Currently, Tower Resources' Pinnacle Mine employs 18 hourly wage earners. Naturally, as the mine expands, the personnel will expand proportionately at the rate of approximately 10 employees per unit shift. The Pinnacle Mine, as well as Tower's future operations are located in Carbon County near the town of Price. Since this area is supported to a large degree by coal mining and other related industries, it is anticipated that a labor force will always be readily available.

Management and other salaried employees will consist of the Manager of Mines, the General Superintendent, the Mine Superintendents, the Mine Foreman, Safety Personnel, Secretarial and Clerical, Geologists, and Engineers. (See Table III-1).

5. Schedule of Development and Mining

As there are three economic seams present on the property, mining plans are based on simultaneously operating a mine in each seam. Initial mining began in October, 1980 in the Gilson seam, the middle seam, stratigraphically, on the Zion's fee property, using one continuous miner section of equipment. The production schedule projects an increase from 200,000 tons the first year to the full production rate of about 1,200,000 tons in the fourth and fifth years. The planned incremental increases are listed below:

<u>Year</u>	<u>Production Rate Tons/Year</u>
1st year	200,000
2nd year	600,000
3rd year	800,000
4th year	1,000,000
5th year	1,200,000

At this rate, the life of the mine would be more than thirty years. As the initial phases of mining progress, additional equipment will be added to increase production as described in this Chapter, Part C, Section 2.3-4 re Cycle and Sequence of Mining. However, it should be realized that final coal production is dependent upon the market for coal and the approval of the permit application. Plates V, VI, and VII show the mining plans. Subsequent years will be planned on the basis of the experience gained; however, the basic mining plan as outlined in this chapter will not be changed.

ORGANIZATION CHART

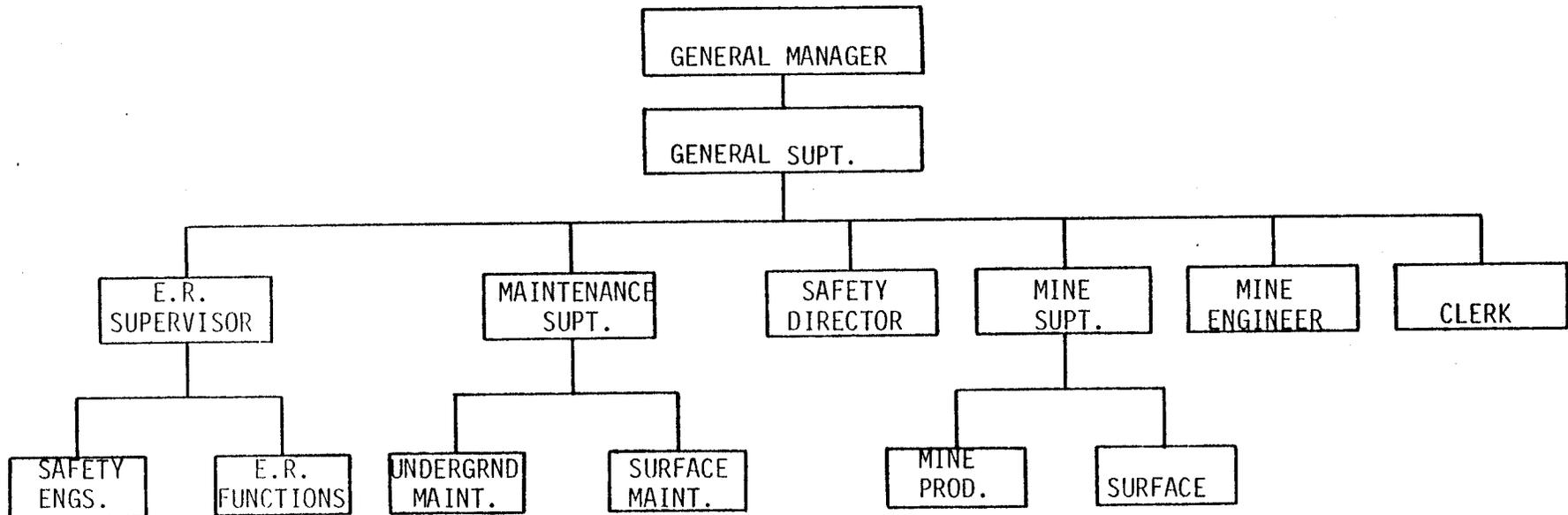


TABLE III-1

D. Environmental Protection

1. Protection of Hydrologic Balance and Compliance with Water Quality Laws

Tower will follow its approved "Sedimentation and Drainage Control Plan" (See Exhibit III-A) and comply with the N.P.D.E.S. Permit No. UT-0023501 issued May 30, 1980 (See Exhibit II-A).

A gauging station will be maintained in the drainage to record future natural flows.

Tower will comply with the Clean Water Act (33 U.S.C. Sec. 1251 et seq.) and all other applicable water quality laws and health and safety standards.

2. Subsidence Control Plan

2.1 Survey of Structures and Renewable Resource Lands

There are no structures present other than those constructed for mining operations, on the proposed permit area. The land is presently used for grazing and wildlife habitat and does not constitute a renewable resource area. *

2.2 Mining Method

Mining will consist of the underground method of coal extraction using continuous miners, shuttle cars, and conveyor haulage. Room and pillar design will be employed with pillar extraction completing the operation. For more information on the mining method see Chapter III, Part C, Section 2.3, re Mine Development.

2.3 Geologic Factors

The Pinnacle Mine is located within the Blackhawk formation of the upper Cretaceous Meseverde Group. As is the case with all the active mines in the Book Cliffs coal field, the Pinnacle Mine drifts in from the outcrop and immediately the cover drastically increases as there are very steep sided cliff-like canyons. Naturally, the same factors are present in the Lower Sunnyside and the Aberdeen Seams. Therefore, from a geologic standpoint, the following conclusion can be drawn: it is assumed, as mining progresses, that as pillars are pulled, the roof will cave in behind the crews as they retreat. This is the normal scheme of mining in this type of development. In fact, if the cave does not occur as planned, serious mining problems can result. However, in a case such as ours, where the average cover over the coal seams is 1,000 feet or more, these caves will appear on the surface as minor cracks if at all. In other words, a solid block of overburden 1,000 feet thick will not drop into the 6 or 7 foot void resulting from pillar extraction. In fact, the

rock will bridge off very quickly and result in minimal disturbance of the overlying country rock.

2.4 Preventive Measures

Stations will be set up as required for constant monitoring of subsidence movements. However, several facts should be pointed out. First and foremost, major subsidence is not expected to occur. Second, even if subsidence were to occur, no adverse impacts would result due to the current and future land use status. Third, due to the nature of this mine development, after pillar extraction, cave-ins are a necessity and therefore, preventive measures would serve only to decrease coal recovery and decrease the safety of the employees.

2.5 Mitigative Measures

As previously pointed out no major subsidence is expected to occur. However, if subsidence would occur there would be no material damage or diminution of valuable or foreseeable use of lands.

2.6 Monitoring

There are no structures or surface features which would be affected adversely by subsidence if it does occur. Monitoring stations, however, will be set up at the locations shown on Plate I as required under 30 CFR.

3. Fish and Wildlife Plan

A specific Fish and Wildlife Plan is not practicable as this is an underground coal mine with very little surface disturbance, limited to areas previously impacted by mining and with no change in land use. However, Tower will make every possible effort to minimize disturbances to wildlife habitat in the area and where possible enhance that habitat during reclamation. Refer to Chapter IV, Part E, re Fish and Wildlife Resources and Plan. It should be noted that there is no aquatic life in the permit area as these canyons are dry except as a result of direct precipitation (ephemeral streams).

4. Air Pollution Control Plan and Compliance with Air Quality Laws

4.1 Existing Environment

The permit area is located in a Class II air quality area.

4.2 Air Quality Impact Analysis

See the following section, section 4.3 re Emission Estimates.

4.3 Emission Estimates

Emission estimates are included as Exhibit III-E in the form of an emission inventory. This inventory has been reviewed and approved by the Utah Bureau of Air Quality and the E.P.A.

4.4 Proposed Controls

Since this is an underground operation, no air quality problems are anticipated. The only changes in air quality will be attributable to minor road dust and exhaust mine dust. Methods of control are spray systems, chemical treatment, enclosures, and other fugitive dust control practices outlined in 30 CFR 817.95.

4.5 PSD Permit and Compliance with Air Quality Laws

The Environmental Protection Agency has determined that this project does not need a PSD air quality permit. This is based on our fugitive and non fugitive dust emissions inventory which assumes facilities necessary for 1 mm tons per year production. Further, the mine is not subject to the PSD regulations because of the new definition of a major source. (Refer to letter dated March 21, 1980 in Exhibit II-A). All applicable air quality laws will be complied with and fugitive dust control practices, as required under 30 CFR 817.95, will be followed.

5. Waste Disposal

5.1 Facilities

No waste disposal facilities will be needed for the existing operations. (Refer to Part B, section 10 of this chapter re Solid Waste Disposal and Handling Facilities). However, if at some point in the future Tower decides that the preparation plant is to be added, all waste material will be disposed of in a designated, approved waste disposal site.

5.2 Special Measures (Refer to Part B, section 10 of this Chapter re Solid Waste Disposal and Handling Facilities).

5.2-1 Acid and Toxic-Forming Materials

No special measures are required due to the lack of acid and toxic-forming materials.

5.2-2 Combustible Materials

No special measures are required. All combustibles (paper, etc.), are collected in trash containers and hauled to local city and land fill areas.

5.2-3 Contingency Plans to Prevent Sustained Combustion

All which could burn would be small in quantity and consist of mine trash. The trash facility is segregated and if ignited accidentally, could be extinguished using either water or fire extinguishers.

6. Protection of Cultural and Historic Values

There are no public parks or historic places on the proposed permit area. Refer to Chapter IV, Part I, re Cultural and Historic Values.

7. Public Roads

There will be no underground mining activities within 100 feet of the right-of-way line of any public road, nor has any public road been relocated or are there any plans for such relocation.

8. Prime Farmlands

There are no lands identified as prime farmland within or adjacent to the proposed permit area. Refer to Chapter IV, Part E, re Soil Resources.

9. Alluvial Valley Floors

No part of the proposed permit area or any adjacent area is located on an alluvial valley floor. Refer to Chapter IV, Part G, re Alluvial Valley Floors.

E. Reclamation

1. Post Mining Land Use

Upon completion of Tower Resources' mining operation the land will continue to be used for grazing and hunting. The limited resources, both physical and scenic, will dictate no future change in the land status. The nature of an underground mine of this size requires minimal surface disturbance. All disturbed areas shall be restored in a timely manner to conditions that are capable of supporting the uses which they were capable of supporting before any mining.

2. Timetable of Major Reclamation Steps

As this is an underground mine there will be a limited amount of surface disturbance, consequently, reclamation will be uncomplicated.

All disturbed areas no longer required for the conduct of mining operations were immediately revegetated. In the future, any areas no longer required for operations will also be immediately reclaimed and revegetated.

When buildings and final site preparation had been completed, the soil was revegetated to prevent erosion.

When the project is expired, all buildings and extraneous material will be removed, all mine openings will be covered and sealed, roads will be regraded and using the most advanced technology at the time, Tower will re-establish the terrain to as nearly the original as practical. The area will be reseeded and vegetation re-established in accordance with recommendations from the regulatory authorities.

3. Major Reclamation Steps

3.1 Removal of Surface Structures

Upon completion of mining activities, all surface facilities will be removed. The coal pile area, will be filled, the slope contoured, compacted, topsoil replaced, regraded, and revegetated. In the materials storage and building areas, all structures and foundations including the office building, bathhouse, substation, and water storage tanks, will be removed, recontoured, compacted, topsoil replaced and graded, and revegetated according to revegetation procedures described in Chapter IV, Part D, section 5 re Revegetation Plan.

3.2 Abandonment of Portals and Underground Workings

Upon completion of mining activities, the portals will be sealed according to existing state and Federal regulations. Conveyors will be removed and pads filled. The slope will be contoured, compacted, and topsoil replaced and graded. Revegetation will be carried out according to the revegetation plan outlined in Chapter IV, Part D, section 5 re Revegetation Plan.

3.3 Casing and Sealing of Drill Holes

All exploratory drill holes have been sealed with cement and all water wells have been cased with steel casing and will be maintained. After mining is completed, the water wells and monitoring wells will be sealed.

3.4 Backfilling, Grading, and Soil Replacement and Stabilization

All disturbed areas will be backfilled and graded to as near as possible the approximate original contour, and to the most moderate slope possible. Slopes shall not exceed the angle of repose or such lessor slopes as required by the regulatory authority to maintain stability. Fill material will be compacted to assure stability.

Areas to be regraded include the portal site surface facility site and roads. Because of the diversity of these areas all regrading will conform to the specific site.

Where possible all final grading and placement of topsoil will be done along the contour to minimize erosion. In all cases, grading will be conducted in a manner which minimizes erosion and provides a stable surface for the placement of topsoils.

Upon reclamation, topsoil will be hauled to the area by end dump trucks, piled and spread using a grader. Where possible the soil will be distributed along the contour. The thickness of the re-established soil will be consistent with soils in the vicinity and will be sufficient to support vegetation equal to or superior to pre-mining history.

3.5 Revegetation

✓ Revegetation will be accomplished by Tower or under Tower's direct supervision and under the recommendations of the regulatory authority as outlined in Chapter IV, Part D, section 5, re Revegetation Plan.

4. Reclamation Cost and Bonding

4.1 Cost of Reclamation

4.1-1 Detailed Estimate

A detailed cost projection is included as Exhibit III-F.

4.1-2 Calculations

Calculations of the estimate are included in Exhibit III-F.

4.2 Bond or Surety Arrangement

Tower Resources, Inc., has entered into a mined lands reclamation agreement with the State of Utah, Department of Natural Resources, Board of Oil, Gas, and Mining; whereby an escrow fund has been set up. Tower has deposited \$28,717.50 in this fund. This is referred to as the Escrow Fund. This agreement was made and entered into May 13, 1980. All interests earned shall accumulate to the benefit of the fund. According to the agreement Tower promises to reclaim the land affected in accordance with the approved mining and reclamation plan.

IV. Environmental Resources

A. Geology

1. Introduction

The proposed permit area is in Book Cliffs which is the major physiographic feature in the region. The cliffs rise from a base at approximately 5,500 feet in elevation, to over 8,500 feet. Numerous canyons dissect the Book Cliffs. Soldier Creek and Coal Creek are the major area drainages. The permit area exhibits extreme topographic relief and is mountainous with steep cliffs and deeply incised drainages. With the exception of the Mancos Shale Formation, Fiasco, Deadman, and Straight Canyons exhibit similar stratigraphic and topographic characteristics.

2. Geologic Description of the General Area

2.1 Tectonic Setting

The major coal seams of the Book Cliffs Coal Field lie within the Cretaceous Mesa Verde group which overlies the thick shales of the Cretaceous Mancos formation. The Mesa Verde group consists of the Star Point Sandstone, Blackhawk formation and Price River formation. The major coal seams lie within the Blackhawk formation.

The Tertiary Wasatch and Green River formations, along with the Price River formation, form the Roan Cliffs, the Tavaputs Plateau and the southern rim of the Uintah Basin. Lithologies present include fluvial, deltaic, and marine sandstones, mudstones, and shales.

2.2 Geologic History

During the Triassic and Jurassic periods, the area of the Book Cliffs was relatively stable, but gradually subsided and received sediments. The area, assumed to have been a relatively flat lowland, was occasionally covered by a shallow sea of short geologic duration. A thick red bed sequence suggests tropical conditions and the great thickness of sand accumulation suggests arid conditions. During Triassic times, the sediments probably came from all directions but, during the Jurassic time, the major source areas lay to the south and west.

During the early Cretaceous time, a trough developed in the Colorado Rockies area and the sea invaded. Gradually the sea crept westward as the trough continued to subside, reaching the east edge of the Colorado Plateau by the beginning of the Upper Cretaceous age.

Unconformities and thinning of various members indicate that volcanic activity to the west caused sediments to fill the basin faster than it could subside, causing the shoreline to be pushed eastward. When lulls in this activity developed, the incoming sediments diminished and the sea moved westward once more. With each pulse, the boundaries of the depositional environments moved eastward and then returned westward. The sandstone tongues of the Mesa Verde, which project into the Mancos, were deposited at these times.

After the sea retreated, the area continued to receive sediments under continental conditions which lasted well into Eocene time. In Oligocene time the area began to rise in earnest. Erosion attacked the newly formed formation creating the present mountain ranges and cliffs.

2.3 Stratigraphy

The main coal bearing beds in the region occur in the Blackhawk formation. There are various more or less distinct coal beds or zones as listed below from top to bottom according to stratigraphic position.

Upper Sunnyside Bed
Lower Sunnyside Bed
Rock Canyon Bed
Fishcreek Bed
Gilson Bed
Kenilworth Bed
Castlegate "B" Bed
Castlegate "A" Bed

These zones are lenticular and reach mineable thickness only in certain areas. The Lower Sunnyside Bed is the major bed in the area.

2.4 Structure

The Book Cliffs are basically a homocline (dip slope) dipping into the Uintah Basin with the cliff front roughly paralleling the strike of the feature. The strike of the beds is generally parallel to the face of the Book Cliffs. The beds are mostly uniform with dips of from 3° to 8° to the north and northeast toward the Uintah Basin.

Occasional faults cut the coal measures but are of small displacement and have been of little consequence in mining. The most serious group of faults lies in the Sunnyside area. These faults, which have a maximum separation of 200 feet, effect mining, but, fortunately, are not closely spaced.

2.5 History of Mining

Mining has been the major industry in the region for many years.

Coal was discovered in the Wasatch Plateau in 1874 and exploration soon spread to the Book Cliffs. Mines began operating in the area in 1889. The Castlegate and Sunnyside area was first developed, the areas in between being developed later. Coal was usually discovered away from settled areas and towns were built for employees by the companies.

Production from mines generally increased until 1920, but began to decline in the 1920's and 1930's. World War II brought production back to the 1920 levels and production continued to increase until 1957 when production again declined.

Book Cliff mines to present have produced about 75 percent of Utah's coal annually. Well over 200 million tons of coal have been extracted from the coal measures of the area. Much coal remains and numerous mines are presently operating in the area.

2.6 Geologic Hazard

There are occasional faults cutting the coal measures of the area. They are of relatively small displacement. The most serious faults occur in the Sunnyside area. There is no indication of faulting within our lease area.

Faults in the Sunnyside district of the Book Cliffs field have been thought, by some, to have a causative relationship to the bounces experienced there. The outcrops on the lease premises and our own aerial photos have been carefully studied. In our judgement, no faults cut the lease area. The bulk of the tonnage to be mined is under less than 1,500 feet of cover, with only a very limited amount of coal under cover, up to 2,200 feet. The Fence diagram, Plate XVIII, shows the seam separation to be adequate over the leases to insure safe mining. Water inflows have never been a problem in the Book Cliffs field. The dip of the coal measures prevents entrapment of personnel, in any event.

3. Geologic Description of the Mine Plan and Adjacent Areas

3.1 General Description

3.1-1 Stratigraphy

The coal seams in the Blackhawk formation are listed stratigraphically:

Upper Sunnyside Bed
Lower Sunnyside Bed
Rock Canyon Bed
Fishcreek Bed
Gilson Bed
Kenilworth Bed
Castlegate "B" Bed
Castlegate "A" Bed (Aberdeen)

Only the Lower Sunnyside, Gilson, and Castlegate "A" beds are formed in commercial thickness on the Centennial Property.

Stratigraphic sections of the coal beds are shown in Figures IV-1, IV-2, and IV-3. Seam Isopachs are shown on Plates XV, XVI, and XVII.

3.1-2 Structure

The structure between Deadman and Soldier Canyons is relatively simple. Structure contours are aligned basically east-west. The coal beds dip northward at approximately six degrees. No faults are thought to exist in the Deadman Canyon area.

3.1-3 History of Mining

Several small operations have mined a considerable amount of coal over the past 70 years in the Deadman Canyon Area. Mining ceased in the area in 1964. These mines, however, merely scratched the surface of the reserve. The remaining recoverable reserve is estimated to be greater than twenty-eight million tons and ranging in cover from 0 to 2,200 feet. Also refer to Part H, Section 3, re Past Mining.

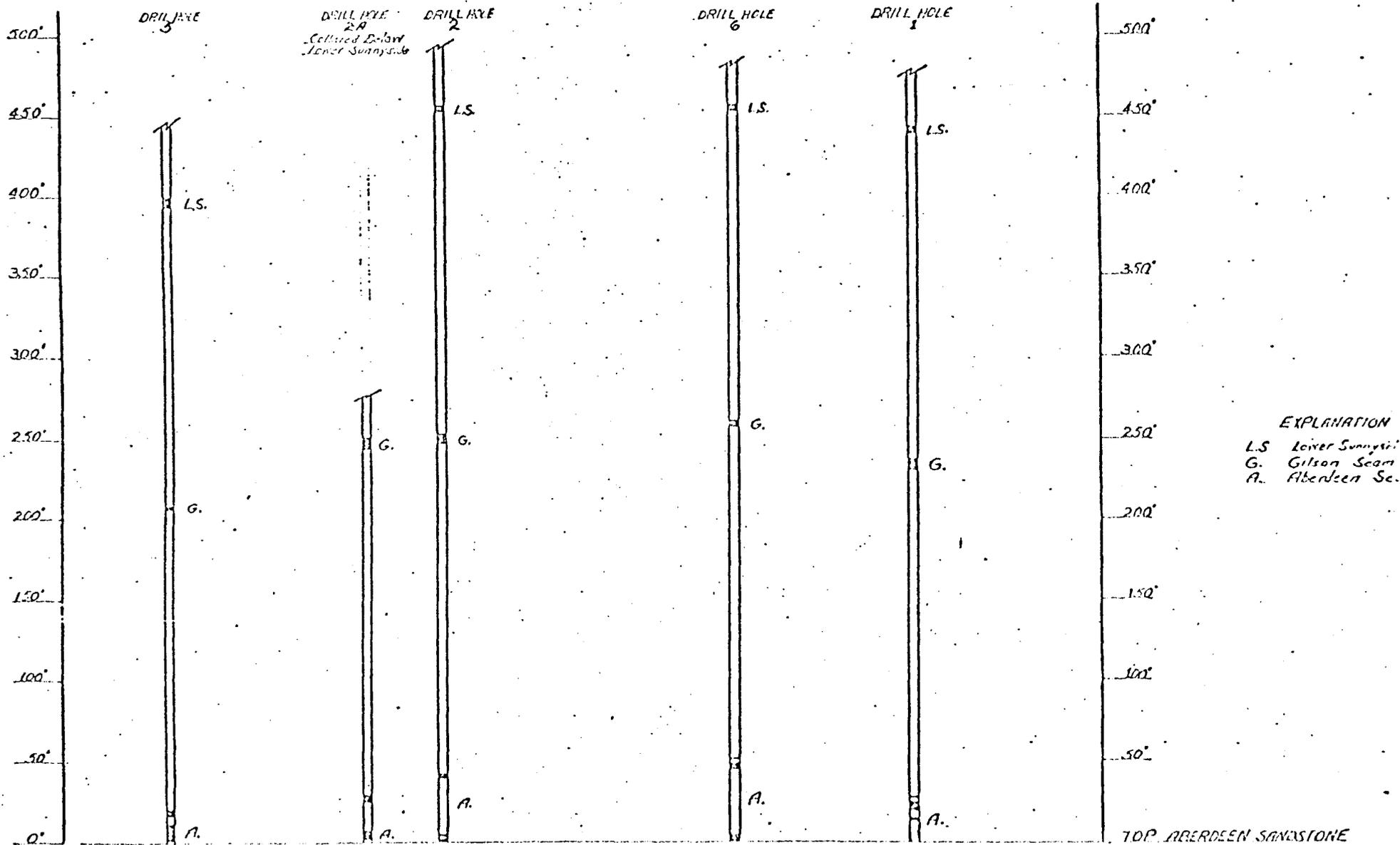


Figure IV-1
 Stratigraphic Sections

GEOLOGIC COLUMN OF DEADMAN CANYON

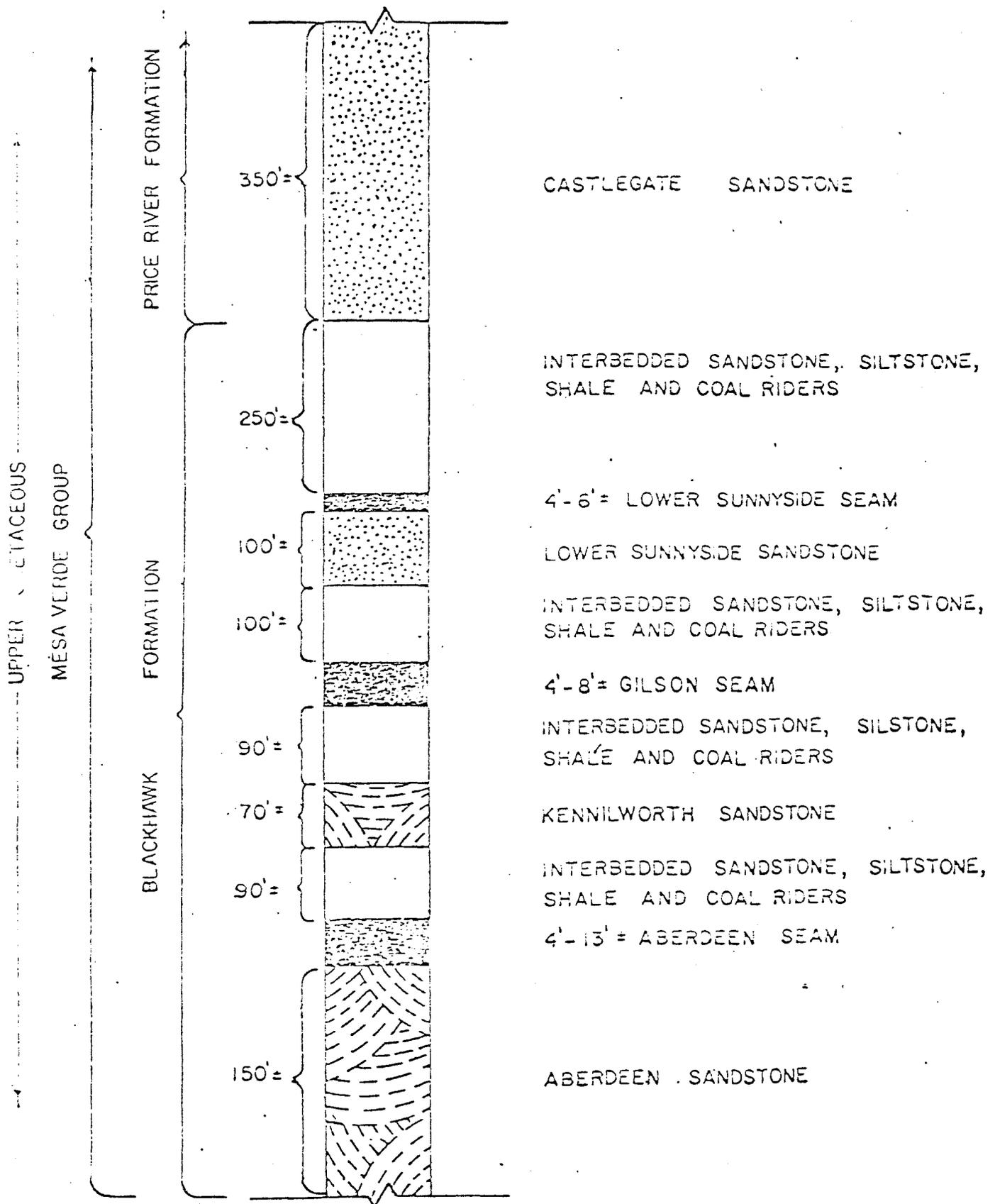
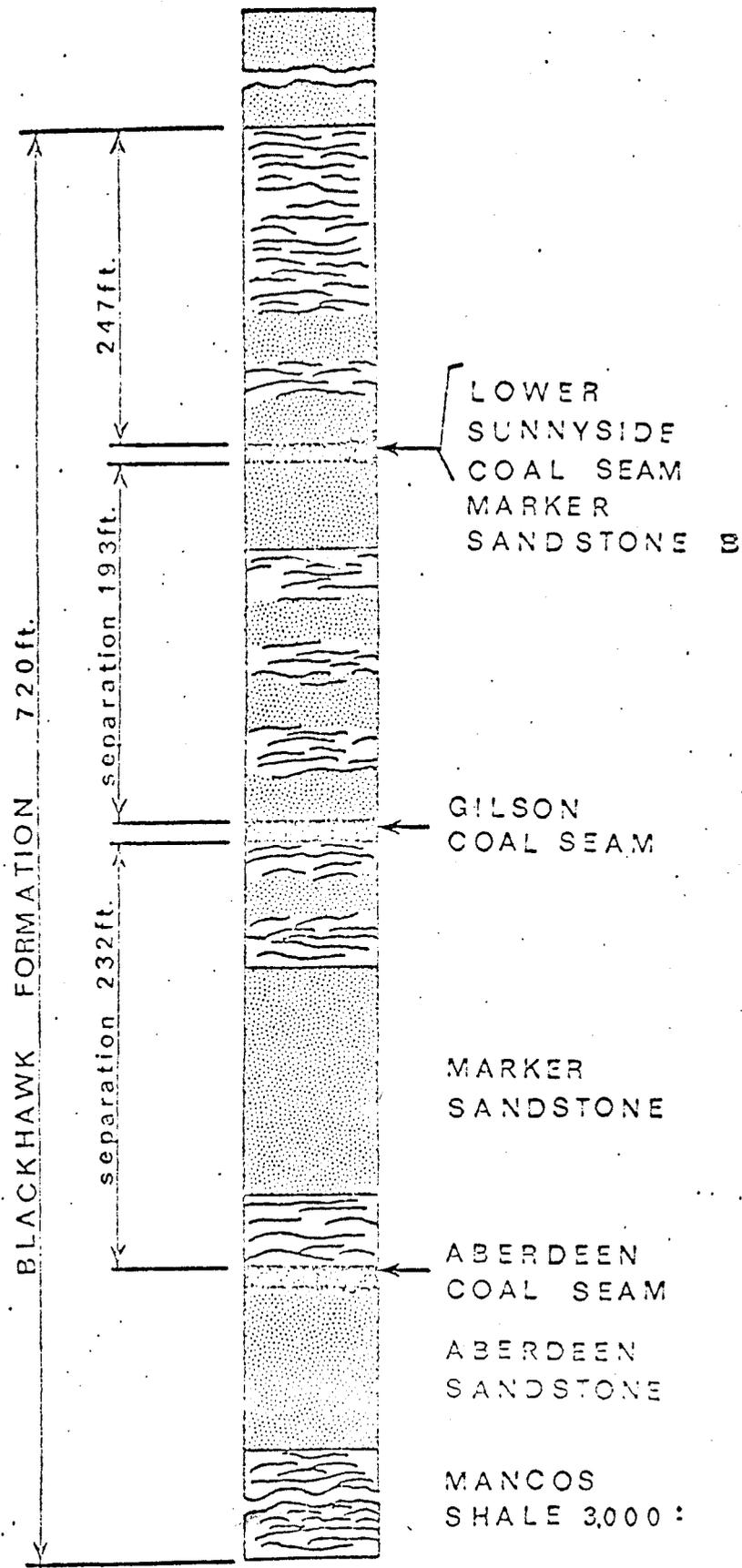


FIGURE IV-2



MEASURED SECTION OF THE
 BLACKHAWK FORMATION
 DEADMAN CANYON NO SCALE

Figure IV-3

3.2 Detailed Description of Strata to be Disturbed by Surface Operations

3.2-1 Identification of Strata

- Strata disturbed by surface operations consist of sandstone and siltstone of a colluvial nature.

3.2-2 Design of Boring and Sampling Program

3.2-2.1-1 Sites - Numbers, Location and Relationship to Disturbed Area

The number, locations, and relationship of drill holes and sampling are indicated on Plates V, VI, and VII.

3.2-2.1-2 Methodology - Sample Collection, Compositing of Samples for Each Strata, Laboratory Analysis

Samples of the immediate floor and roof below and above each seam was sampled using conventional core drilling equipment. Also, samples of the overburden which was disturbed in surface operation has been sampled by "grab" methods, as well as auger drilling.

3.2-2.2 Data:

3.2-2.2-1 Field Log and Description of Samples - Lithologic Classification, Description, and Hydrologic Aspects

In November and December, 1971, a five-hole drilling program was conducted by Centennial Coal Associates, supplemented by mine samples and outcrop information, and the results used to estimate the coal reserves of the leases. Pertinent information on these drill holes is given in Table IV-1 and Exhibit IV-A. Complete lithologic logs of each drill hole are included in Exhibit IV-A. Numerous samples were taken from the outcrops of the Lower Sunnyside, Gilson, and Aberdeen seams, as well as from mine faces in the Hileman, Olsen, Star Point, and Blue Flame No. 1 mines. Information from those samples as well as the location of the drill holes is shown on Plates V, VI, and VII.

In October and November, 1977, a seven-hole drilling program was conducted by Tower in order to better define the coal reserves for mine planning on the Zion's fee. Pertinent information on these drill holes is presented in Table IV-2. Complete lithologic logs of each drill hole are included in Exhibit IV-A. Locations are indicated on Plates V, VI, and VII.

TABLE IV-1

Centennial Drill Holes

<u>Number</u>	<u>Location</u>	<u>Total Depth</u>	<u>Coal Seams</u>
DH-1	NW $\frac{1}{4}$ NW $\frac{1}{4}$ SE $\frac{1}{4}$ Sec. 8 T13S, R11E, SLBM Elevation - 7230 ft.	516 ft.	Lower Sunnyside Gilson Aberdeen
DH-2	SW $\frac{1}{4}$ NW $\frac{1}{4}$ NW $\frac{1}{4}$ Sec. 7 T13S, R11E, SLBM Elevation - 7275 ft.	580 ft.	Lower Sunnyside Gilson Aberdeen
DH-2-A	SW $\frac{1}{4}$ NW $\frac{1}{4}$ SE $\frac{1}{4}$ Sec. 7 T13S, R11E, SLBM Elevation - 7165 ft.	303 ft.	Gilson Aberdeen
DH-5	SE $\frac{1}{4}$ SW $\frac{1}{4}$ NE $\frac{1}{4}$ Sec. 7 T13S, R11E, SLBM Elevation - 7275 ft.	832 ft.	Lower Sunnyside Gilson Aberdeen
DH-6	NW $\frac{1}{4}$ SE $\frac{1}{4}$ SW $\frac{1}{4}$ Sec. 5 T13S, R11E, SLBM Elevation - 8558 ft.	2275 ft.	Lower Sunnyside Gilson Aberdeen

TABLE IV-2

Tower Drill Holes

<u>Number</u>	<u>Location</u>	<u>Total Depth</u>	<u>Coal Seams</u>
77-1-CP	NE $\frac{1}{4}$ SE $\frac{1}{4}$ SW $\frac{1}{4}$ Sec. 7 T13S, R11E, SLBM Elevation - 7555 ft.	675 ft.	Gilson Aberdeen
77-2-CP	SE $\frac{1}{4}$ NE $\frac{1}{4}$ SW $\frac{1}{4}$ Sec. 7 T13S, R11E, SLBM Elevation - 7520 ft.	690 ft.	Gilson Aberdeen
77-3-CP	SE $\frac{1}{4}$ SE $\frac{1}{4}$ NW $\frac{1}{4}$ Sec. 7 T13S, R11E, SLBM Elevation - 7425 ft.	868 ft.	Lower Sunnyside Gilson Aberdeen
77-4-CP	SE $\frac{1}{4}$ SE $\frac{1}{4}$ SW $\frac{1}{4}$ Sec. 7 T13S, R11E, SLBM Elevation - 7070 ft.	105 ft.	Aberdeen
77-5-CP	SE $\frac{1}{4}$ SE $\frac{1}{4}$ SW $\frac{1}{4}$ Sec. 7 T13S, R11E, SLBM Elevation - 7085 ft.	85 ft.	Aberdeen
77-6-CP	NE $\frac{1}{4}$ NE $\frac{1}{4}$ NW $\frac{1}{4}$ Sec. 18 T13S, R11E, SLBM Elevation - 7080 ft.	80 ft.	Aberdeen
77-7-CP	NE $\frac{1}{4}$ NE $\frac{1}{4}$ NW $\frac{1}{4}$ Sec. 18 T13S, R11E, SLBM Elevation - 7010 ft.	45 ft.	Aberdeen

Tower has also acquired lithologic logs of two drill holes completed by North American Coal Corp., in 1948. Although these holes are not located within the permit area, but to the west of its boundary, the information has been utilized in estimating reserves. Pertinent information is given in Table IV-3. Complete lithologic logs are included in Exhibit IV-A and their location is indicated on Plates V, VI, and VII.

3.2-2.2-2 Laboratory Analysis - Chemical Acidity, Toxicity, Alkalinity, and Physical (Erodibility and Compaction) Properties

Complete laboratory analysis will be included as an addendum.

3.2-2.2-3 Identification of Potential Acid, Toxic or Alkaline Producing Horizons

Refer to Exhibit IV-A and the laboratory analysis to be included as an addendum.

3.2-2.2-4 Location of Subsurface Water at Face-Up Areas

No water was encountered at face-up areas.

3.3 Description of Coal Seams and Overburden Mine Plan

3.3-1 General Description

3.3-1.1 Stratigraphy

There are three coal seams of mineable thickness in the mine plan area. All three are part of the Blackhawk Formation of the Cretaceous Mesa Verde Group. The Blackhawk consists of three members. Stratigraphically, from bottom to top, they are the Aberdeen Member, the Kenilworth Member, and the Sunnyside Member. See Figure IV-2.

The bottom coal seam is the Aberdeen (also known as the Castlegate "A" Seam). It is found in the Aberdeen Member of the Blackhawk. This coal seam rests directly on approximately 150 feet of basal sandstone. This sandstone is of littoral marine origin and is known as the Aberdeen Sandstone. The coal seam ranges from 4 feet to 13 feet in thickness over the property. Above the seam is approximately 90 feet of interbedded sandstone, siltstone, and carbonaceous shale containing coal riders.

TABLE IV-3

North American Drill Holes

<u>Number</u>	<u>Location</u>	<u>Total Depth</u>	<u>Coal Seams</u>
DH-NACC-6	SE $\frac{1}{4}$ SE $\frac{1}{4}$ SE $\frac{1}{4}$ Sec. 1 T13S, R10E, SLBM Elevation - 7460 ft.	Approx. 1020 ft.	Lower Sunnyside Gilson Aberdeen
DH-NACC-7	SW $\frac{1}{4}$ NE $\frac{1}{4}$ SE $\frac{1}{4}$ Sec. 12 T13S, R10E, SLBM Elevation - 7192 ft.		Gilson Aberdeen

The middle seam is the Gilson Seam and ranges in thickness from 4 feet to 8 feet over the property. The Gilson is part of the Kenilworth Member of the Blackhawk. Directly below the Gilson is approximately 90 feet of interbedded sandstone, siltstone, and carbonaceous shale with coal riders. Below this is approximately 70 feet of barrier beach sandstone known as the Kenilworth Sandstone. Above the Gilson is approximately 100 feet of interbedded sandstone, siltstone, shale, and coal riders.

The top seam in the Lower Sunnyside Seam, ranging from 4 feet to 6 feet in thickness. The Lower Sunnyside is part of the Sunnyside Member of the Blackhawk. Below the coal seam is approximately 100 feet of barrier beach sandstone known as the Lower Sunnyside Sandstone. Above the coal seam is about 250 feet of interbedded sandstone, siltstone, shale, and coal riders.

Above the Blackhawk, the Castlegate Sandstone and Price River Formation of the Mesa Verde Group can be found over various parts of the property. The North Horn Formation is also present in certain areas of the property. Total overburden on the mine plan area ranges from 0 to 2,400 feet.

3.3-1.2 Structure

Structure contours are aligned basically east-west. The coal beds dip northward at approximately six degrees. No faults are known to exist in the mine plan area. Overburden ranges from 0 to 2,400 feet.

3.3-1.3 Hydrologic Aspects

All groundwater exists as perched aquifers in the mine plan area. Due to the lenticular nature of the geology in the area, any groundwater is isolated and very limited. Refer to Part B of this Chapter re Hydrology.

3.3-1.4 Location of Subsurface Water

Some of the sandstone beds of the Blackhawk Formation are water bearing in the mine plan area. Most of the beds are dry however, and partially drained of water near the cliff faces. Groundwater is perched due to the lenticular geology and any groundwater is isolated. Also, any water bearing units are small in areal extent. Refer to Part B of this Chapter re Hydrology.

3.3-2 Detailed Analysis of Coal Seams and Surrounding Strata

3.3-2.1 Source of Data

Analysis was performed on rib samples and core samples obtained during the exploration activities described in section 3.2, re Geologic Description of the Mine Plan and Adjacent Areas, of this part and Chapter. Results of these analyses are listed according to seam in Exhibit IV-B.

Analysis was performed by: Commercial Testing and Engineering Company, 10775 East 51st Avenue, Denver, Colorado 80239, and other commercial testing laboratories.

3.3-2.2 Coal Seams

3.3-2.2-1 Pyritic, Marcasitic Content

To be included as an addendum.

3.3-2.2-2 Total Sulfur Content

See Exhibit IV-B.

3.3-2.2-3 Other Characteristics

See Exhibit IV-B.

3.3-2.3 Stratum Immediately Overlying each Coal Seam to be Mined

3.3-2.3-1 Lithology (See Figures IV-2 and IV-3)

Aberdeen Coal Seam (Castlegate "A") -----
overlying this seam is interbedded sandstone, siltstone, and carbonaceous shales of the Aberdeen Member of the Blackhawk.

Gilson Coal Seam ----- overlying this seam is interbedded sandstone, siltstone, and shale with coal riders of the Kenilworth Member of the Blackhawk.

Lower Sunnyside Seam ----- overlying this seam is interbedded sandstone, siltstone, shale, and coal riders of the Sunnyside Member of the Blackhawk.

It should be noted however, that the immediate "roof" over each seam is a sandstone unit, over which is found the silts, shales, and various coal riders.

3.3-2.3-2 Pyritic Content

Complete analysis of these strata will be included as an addendum.

3.3-2.3-3 Potential Alkalinity

Complete analysis of these strata will be included as an addendum.

3.3-2.4 Stratum Immediately Underlying Each Coal Seam

3.3-2.4-1 Lithology (See Figure IV-2 and IV-3)

Aberdeen (Castlegate "A" Seam) -----
underlying this seam is basal sandstone of littoral marine sandstone, the Aberdeen Sandstone of the Aberdeen Member.

Gilson Seam ----- underlying this seam is interbedded sandstone, siltstone, shale, and coal riders of the Kenilworth Member.

Lower Sunnyside Seam ----- underlying this seam is barrier beach sandstone, the Lower Sunnyside Sandstone of the Sunnyside Member.

It should be noted however, that the immediate "floor" below the seams is sandstone in the case of the Lower Sunnyside and Aberdeen; and beneath the Gilson Siltstone.

3.3-2.4-2 Pyritic Content

Complete analysis of these strata will be included as an addendum.

3.3-2.4-3 Potential Alkalinity

Complete analysis of these strata will be included as an addendum.

3.3-2.4-4 Clay Content

Complete analysis of these strata will be included as an addendum.

B. Hydrology

1. Introduction

Ground and surface water are both utilized in the region, with surface water being the more important source. Relatively large amounts of surface water are diverted annually for irrigation and for use by coal-fired power plants. Ground water is used to a limited extent for irrigation. It is also used for domestic and stock purposes and for public supply. Ground water is also important in that it is the principal source of water for the small communities in the region.

2. Description of Hydrology

2.1 Ground Water Information

2.1-1 General Area

2.1-1.1 Source of Data

U.S.D.I., 1979. Final Environmental Statement - Development of Coal Resources in Central Utah, Regional Analysis, Part I.

Also to be submitted as an addendum to this application, will be a detailed hydrologic study as performed by Vaughn Hansen & Assoc., Salt Lake City, by March 1, 1980.

2.1-1.2 Geologic Control

The Book Cliffs are the main structural element of the area. Occurrence and availability of ground water in the area is controlled by the geology. There are numerous subsidiary folds, faults, and intrusions in the region. Upper formations are deeply cut by drainage systems, which drain exposed bedrock in some areas. Upper water-bearing beds near cliff faces are discontinuous and partially void of water.

2.1-1.3 Occurrence

In flat-lying sedimentary rocks and in shallow alluvium along larger streams, water-table conditions are common in the region. Flowing wells occur only in a few places. Due to the presence of confining layers of rock with relatively low permeability in some areas, ground water is usually perched.

Recharge is principally in the higher plateaus by direct infiltration of precipitation. These higher plateaus receive the most precipitation and produce the most runoff. Infiltration from perennial streams that flow into the Mancos Shale lowlands also occurs.

To a limited extent recharge occurs due to infiltration in outcrops of the more permeable and stratigraphically lower formations.

Fluctuation in ground water level occurs primarily because of changes in area precipitation.

2.1-1.4 Water Table

Water table conditions are common in flat-lying sedimentary rocks and in shallow alluvium along larger streams. Depth to ground water ranges from 50 feet to over 1,000 feet in the region.

2.1-1.5 Aquifers

The most extensive bedrock aquifers are found in sandstone strata of Jurassic, Cretaceous, and Tertiary age. The most permeable water bearing formations are unconsolidated deposits of Quaternary age in parts of the region such as along the Price River.

2.1-1.6 Characteristics

Changes in levels of ground-water are a result of changes in precipitation and recharge is by direct infiltration of precipitation.

Chemical quality of ground water in the area varies because variations in geology, physiography, and climates. Generally water in the region is highly alkaline.

2.1-1.7 Use

Ground water is used for irrigation, domestic and stock purposes, and public supply. The total amount of ground water used however, is small. Springs provide the greatest quantity of water.

2.1-2 Mine Plan and Adjacent Areas

2.1-2.1 Source of Data

U.S.D.I., 1979. Final Environmental Statement - Development of Coal Resources in Central Utah, Site Specific Analysis, Part 2.

Also to be included as an addendum will be the Vaughn Hansen detailed study.

2.1-2.2 Climatological Factors

Recharge is from precipitation in the area and is no more than 30 to 35 acre-feet per year per square mile. Refer to Chapter IV, Part C, re Climatology.

2.1-2.3 Geologic Control

Some of the sandstone beds from above the Mancos Shale to the top of the Castlegate sandstone are water bearing in the mine area. Many of the beds however, are dry and partially drained of water near the cliff faces. Ground water is perched due to one or more layers of rock having low permeability. Ground water movement is down dip. The beds are very lenticular and therefore any water bearing units are small in areal extent.

2.1-2.4 Occurrence

Occurrence of ground water in the permit area is isolated and very limited due to the nature of area geology (lenticularity). There are no springs on the property. The nearest spring is located north of the property boundary.

Several wells have been drilled by Tower. Their location is shown on Plate VIII. Pump test results on Well #1 and Well #2 are listed below (See Exhibit III-C).

Well #1

Depth 130 feet. Static water level 58 feet. Drawdown to 67 feet after 4 hours at 50 GPM.

Well #2

Depth 155 feet. Static water level 57 feet. Drawdown to 88 feet after 2 hours at 30 GPM.

Depth 280 feet. Static water level 57 feet. Drawdown to 100 feet after 1 hour at 30 GPM. Was pumping 25 GPM at end of test.

2.1-2.5 Water Table

2.1-2.5-1 Depth Below Surface

Water table conditions exist in the area, however, because of the lenticular nature of the porous and permeable sandstone, ground water exists as perched aquifers.

2.1-2.5-2 Quality of Water

(See Exhibit III-C).

2.1-2.5-3 Use

Water is used for mining purposes as well as vegetation and wildlife.

2.1-2.6 Aquifers

2.1-2.6-1 Depth and Horizontal Extent

Some sandstone beds above and within the Mancos Shale are water bearing in the mine area; however, they are very lenticular in nature. Due to this lenticular nature of an interbedded sandstone and siltstone sequence of the Blackhawk Formation, the extent of these zones as aquifers is unknown.

2.1-2.6-2 Lithology and Thickness

Due to the lenticular nature of these aquifers, lithology and thickness are generally unknown.

2.1-2.6-3 Recharge

Recharge in the area is from precipitation in the vicinity. Interbedded relationships of permeable and non-permeable zones restrict the downward movement of water eliminating groundwater recharging from higher elevations. There is no definable fracturing or faulting associated with the area. Therefore, ground water recharging would come from the face of the escarpment or that area on the cliffs where the lenticular reservoir outcrops. Also, because of the lenticular nature of the sandstones, the lateral extent along the cliff face where a reservoir would be recharged is limited to only a few miles, at most.

2.1-2.6-4 Movement

Movement is down-dip, generally north-northeastward, with the downward movement of water limited over most of the area.

2.1-2.6-5 Storage

Due to the existing conditions of perched ground water and lenticular nature of the water bearing sandstone, extent of storage is unknown.

2.1-2.6-6 Discharge

There are no springs on the actual lease area, the nearest one being north of the property boundary. Tower has drilled several wells on the property. Pump test results on these wells are included in Exhibit III-C and wells are shown on Plate XI.

2.1-2.6-7 Quality and Quantity

The only quality and quantity information known is from water wells drilled by Tower. This information is included in Exhibit III-C.

2.1-2.6-8 Use

Use is limited to water obtained from Tower's wells for mining and related activities, as there are no other points of discharge on the property.

2.2 Surface Water Information

2.2-1 General Area

2.2-1.1 Source of Information

U.S.D.I., 1979. Final Environmental Statement - Development of Coal Reserves in Central, Utah, Regional Analysis, Part I.

Also to be included as an addendum is the detailed study as performed by Vaughn Hansen & Associates.

2.2-1.2 Geologic and Topographic Control

The area is drained by the Price River which is a tributary of the Green River. It originates in the Wasatch Plateau to the west and flows southeasterly through the Book Cliffs in a deep canyon until it emerges near the town of Helper. As precipitation is highest in the higher mountains, flow is perennial, mainly in small streams in the mountains and in larger streams that head in the higher mountains. Many streams in the area are ephemeral.

2.2-1.3 Occurrence

The major contributor to streamflow is snowmelt. Snow accumulates at higher altitudes through most of the winter and melts gradually during spring and early summer. Another contributor to streamflow is groundwater which provides base flow in the perennial streams. It also provides limited seasonal flow to intermittent streams. Summer precipitation is generally insignificant in producing runoff, however, intense rainfall may cause flooding occasionally. The areas affected by this flooding are small; therefore, total runoff is small. The many ephemeral streams in the area flow only in direct response to precipitation or snowmelt. The 100-year 6-hour precipitation in the area ranges from 1.8 inches at lower elevations to 2.5 inches in the mountains.

2.2-1.4 Characteristics

As stated in the previous section, surface water flow is primarily dependent on precipitation or snowmelt. Refer to Part C of this Chapter re Climatological Information.

2.2-1.5 Quality and Quantity

Generally, the chemical quality of the area surface water is good in head water areas but deteriorates downstream. Dissolved solid concentrations range from about 1,000 to 5,000 mg/L to about 1,000 to 5,000 mg/L in most area streams. Suspended sediment concentrations range from zero to a few thousand mg/L, occasionally increasing to more than 200,000 mg/L.

Flow of surface water is dependent upon precipitation or snowmelt. Major area streams including the Price River have occasionally been dry in their lower reaches and records show that the minimum flow of many of the streams in the area is zero.

Flow of major streams and rivers is also affected by diversion of water to farms for irrigation and etc.

2.2-1.6 Use

Large amounts of surface water are diverted annually for irrigation, about 90,000 acre feet in the Price River basin. About 62,000 acre-feet will be used by coalfired electric powerplants.

2.2-2 Mine Plan and Adjacent Areas

2.2-2.1 Source of Information

U.S.D.I., 1979. Final Environmental Statement - Development of Coal Resources in Central Utah, Site Specific Analysis, Part 2.

Also refer to study performed by Vaughn Hansen & Associates.

2.2-2.2 Climatological Factors

Streams existing in the lease area are ephemeral and flow only in response to rainfall and snowmelt. The area is semi-arid, precipitation being sparse at lower elevations with higher elevations receiving substantially more. Refer to Part C of this Chapter re Climatological Information.

2.2-2.3 Receiving Watershed

Drainage in the lease area is by the Right Fork of Deadman Canyon, Straight Canyon, and the Starpoint fork of Deadman Canyon. Stream drainages off the face of the Book Cliffs are very small watersheds of only one or two square miles and flow

only during spring runoff or at times of summer thunderstorms. All drainages are tributaries to the Price River.

2.2-2.4 Geologic and Topographic Control

Stream drainages off the face of the Book Cliffs, such as Deadman Canyon, are very small watersheds of only one or two square miles, being completely dependent on precipitation. Consequently, they flow only during the spring runoff or at times of summer thunderstorms. There is no discharge from the strata onto the surface.

2.2-2.5 Surface Water Bodies and Springs

There are no surface water bodies in the area. The nearest spring is located north of the property boundary.

2.2-2.6 Surface Drainage System

Lease area drainage is by Right Fork of Deadman and Straight Canyon, all of which drain into the Price River.

Emma Park, which is an area on the back slope of the Book Cliffs, lies at a higher elevation and catches more rainfall. From here two perennial streams, Coal Creek, 2.5 miles east of Deadman Canyon, and Willow Creek, 6.0 miles northwest of Deadman Canyon, cut through the Book Cliffs. These streams have water the year-round because of continuous groundwater inflow coming partially from porous sandstones in the "dry" canyons on the face of the Book Cliffs. Willow Creek has an average annual discharge of 6,900 acre feet just below its confluence with Summit Creek (USGS Water Resource Data for Utah, 1969). Coal Creek is believed to discharge 2,000 acre feet per year.

2.2-2.7 Discharge Conditions

Surface runoff in the lease area averages less than an inch or about 180-acre feet per year. Runoff is completely dependent on precipitation or snowmelt. Refer to Part C of this Chapter re Climatological Information.

2.2-2.8 Quality

Flow data from nearby streams indicates concentrations of less than 500 mg/L of dissolved solids. Chemical quality of surface water on the lease area is probably as good, with the exception of suspended solids due to the rapid flows when they occur.

2.2-2.9 Use

The only use of this water is for wildlife and streamside vegetation.

2.3 Alternative Supplies

The proposed underground activities will not result in contamination, diminution, or interruptions of ground or surface sources of water within the proposed mine plan or adjacent area. Also, there is no present use of ground or surface water on the property other than for mining activities. Therefore, no alternative water supplies need be developed.

3. Probable Hydrologic Consequences of Operations

3.1 Ground Water Quality and Quantity

3.1-1 Use

Water from Well No. 1 (See Plate VIII and VIII-A) will be for use in the mine and will be stored in the Mine Water Tank. Water for culinary use will be from Well No. 2 or proposed Well No. 4. Also, water from Well No. 3 will be utilized if the need arises. Specific information concerning these wells is included in Exhibit III-C. Water requirements for mining operations will not exceed 0.5 sec.-ft.

3.1-2 Surface Operations

Water from Well No. 2 or proposed Well No. 4 will be used for culinary purposes and any other surface need.

3.1-3 Underground Operations

Water for underground use will be from Well No. 1 and stored in the Mine Water Tank. A sump will also be cut in the mine from which water can be reclaimed as all available water will be needed.

3.2 Surface Water Quality and Quantity

3.2-1 Use

There is no available surface water in the permit area.

3.2-2 Surface Operations

3.2-2.1 Discharges

There will be no discharges from any activities. The only discharge will be from runoff caused by precipitation and this will only occur at such time as sufficient precipitation falls to fill the ponds, which to date, has not occurred. Any runoff from disturbed areas will be channeled into sedimentation ponds according to the approved "Sedimentation and Drainage Control Plan" included as Exhibit III-A.

3.2-2.2 Runoff from Disturbed Areas

Any runoff in the area is ephemeral drainage, flowing only from direct runoff resulting from snowmelt or rain. Major drainages are allowed to by-pass the minesite area via natural channels which are culverted through the disturbed areas. Runoff from disturbed areas is collected and passes into two separate sedimentation ponds to minimize additional sediment loading to the main drainage. Refer to Exhibit III-A "Sedimentation and Drainage Control Plan" and Plate XI.

3.2-3 Underground Operations

3.2-3.1 Interruption or Diminution of Supply

Water needed for underground operations will be supplied by Water Well No. 1 and stored in the Mine Water Storage Tank (shown on Plate VIII). A sump will also be cut in the mine from which water can be reclaimed as all available water will be needed. No diminution of surface water should occur.

3.2-3.2 Mine Drainage

All mining is down dip from the portals; therefore, no water will exit from the mine. If water is encountered, it will be stored underground and used underground.

4. Protection of Hydrologic Balance

4.1 Water Quality

4.1-1 Drainage Control Plan

4.1-1.1 Drainage System

The complete drainage control plan is included as Exhibit III-A. Area drainage is ephemeral. Major drainages are allowed to by-pass the site in natural channels which are culverted through the disturbed areas. Drainage from disturbed areas

passes into two sedimentation ponds. Berms have been placed on the lower edge of all disturbed areas to prevent runoff from reaching natural drainages before it has passed through these ponds. See Plate XI.

4.1-1.2 Diversions - Overland Flow and Streams

All area drainage is ephemeral and major drainages all allowed to by-pass to minesite in natural channels which are culverted through the disturbed areas. All diversions have been designed to minimize additional loading to the main drainage. All drainage control structures will be removed upon completion of mining activities according to reclamation plans. Refer to Exhibit III-A and Plate XI.

4.1-1.3 Prevention of Gravity Discharge from Mine

As all mining is down dip from the portals, no water will exit from the mine. A sump will be cut in the mine in order to reclaim any available water.

4.1-1.4 Flow Velocity

There will be no discharge of water from the mine.

4.1-1.5 Discharge Structure

There will be no water discharge from the mine hence no water pollution. Therefore, no discharge structures or water treatment facilities are necessary.

4.1-2 Pollution Control

4.1-2.1 Compliance with Water Quality Laws

Tower will comply with its approved "Sedimentation and Drainage Control Plan" (see Exhibit III-A) and comply with the N.P.D.E.S. Permit No. UT-0023501 (see Exhibit II-A). Tower will also comply with the Clean Water Act (33 U.S.C. Sec. 1251 et seq.) and all other applicable water quality laws and health and safety standards.

4.1-2.2 Sediment Control

4.1-2.2-1 Minimization of Disturbed Surface Area

The smallest practicable area needed for mining activities has been disturbed. Areas no longer needed have been revegetated. Reduction of erosion and sediment control measures are described in detail in the "Sedimentation and Drainage Control Plan" included as Exhibit III-A.

4.1-2.2-2 Drainage Control

Drainage control is discussed in detail in the "Sedimentation and Drainage Control Plan" included as Exhibit III-A.

4.1-2.2-3 Soil Loss Analysis

Refer to Exhibit III-A.

4.1-2.2-4 Ponds

There are two sedimentation ponds located in the minesite area as shown on Plates VIII and XI. Refer to Exhibit III-A for detailed information about these ponds.

4.1-2.2-5 Other Measures

Refer to Exhibit III-A.

4.1-2.3 Control of Other Pollutants

4.1-2.3-1 Sealing and Placing of Acid and Toxic-Forming Materials

There will be no refuse of any kind, hence no acid or toxic-forming materials deposited or stored in the area. Refer to Chapter III, Part 10 re Solid-Waste Disposal and Handling Facilities.

4.1-2.3-2 Casing and Sealing of Drill Holes

All exploratory drill holes have been sealed with cement. All water wells have been cased with steel and will be maintained. The water wells will be sealed upon completion of mining unless otherwise requested.

4.1-2.3-3 Sewage Disposal System

A septic system with drain fields conforming to the state codes has been established to handle the waste water disposal from the bathhouse and office facilities. The two approved septic system plans are enclosed as Exhibit III-D.

4.1-2.3-4 Treatment Facilities

The sedimentation and drainage control plans as well as the septic system plans have been approved and conform to State and Federal codes. As there will be no acid or toxic-forming materials deposited or stored in the area or discharge from the mine, no other water treatment facilities are needed.

4.1-2.3-5 Discharges into Underground Workings

There will be no water from the surface diverted or discharged into other underground workings except that water necessary for mining activities.

4.1-2.4 Stream Buffer Zones

There are no perennial streams on the permit area or nearby vicinity.

4.2 Water Quantity

4.2-1 Subsidence Control

Subsidence, if it does occur, will be very minimal and therefore effect on water quantity will be negligible. Refer to Chapter III, Part D, section 2, re Subsidence Control Plan.

4.2-2 Water Use

Water for mining and culinary use will be supplied by the three water wells shown on Plate VIII and from proposed Well No. 4 as shown on Plate VIII-A. Presently, there is no other use of the ground or surface water on the property.

4.3 Existing Rights

4.3-1 Protection

Quantity or quality of surface or ground water will not be affected by the mining operations on the permit area or on adjacent areas. There will be no adverse affects from the proposed mining activities.

4.3-2 Alternative Supplies

No underground or surface source of water supply will be affected by contamination, diminution, or interruption resulting from the proposed activities.

4.4 Monitoring

4.4-1 Ground Water

4.4-1.1 Existing Data

Ground water records in the Deadman Canyon area are relatively non-existent. The only available information is from water wells drilled by Tower on the Zion's fee property. These wells are shown on Plate VIII and information obtained from them is included as Exhibit III-C. Also refer to Part 2.1 of this Chapter re Ground Water Information.

The closest use of ground water is in the lower valleys or farmland areas. These wells are few in number and produce water of a saline nature from river gravels of the Price River.

Drilling which has been done in the canyon was for coal exploration; however, the following facts concerning ground water have been determined as a result. All the potential aquifers are local, lenticular, low pressure, low volume, and domestically of no importance. These units are not known or recognized aquifers and any disruption would be minor in extent and impact.

4.4-1.2 Selection of Monitoring Sites

As a guide to test the quality and the quantity of ground water in the area, two wells will be drilled. The location of these wells is shown on Plate XI.

These well sites were chosen on the basis of a central location throughout the overall lease boundary and have been approved by the State of Utah, Division of Oil, Gas, and Mining. As present mining operations will progress onto the Federal leases upon approval of this permit application, and since the major portion of the reserves will be extracted adjacent to the fee land, the test wells were spaced to include the entire area of concern.

4.4-1.3 Selection of Parameters

Site 1 will be drilled to a depth 5 feet above the middle coal horizon (currently being mined). The well will be cased and capped. The water level along with a quality test will be measured

and recorded according to the monitoring program approved by the State of Utah, Department of Natural Resources, Division of Oil, Gas, and Mining.

Site 2 will be drilled to a depth of 5 feet above the middle coal horizon (currently being mined). This site will be established approximately two years from the date of commencement of mining activities. This will allow time for the active workings of the mine to approach the eastern area of the lease area and hence create the possibility of ground water disturbance. Water level along with a quality test will also be measured and recorded for this well.

Additional sites will be added as required to monitor hydrology in relation to the other two seams.

4.4-1.4 Frequency and Duration of Data Collection

These wells will be monitored and tested at least on a quarterly basis, or more frequently if required by the regulatory authorities.

These wells will be maintained and testing will continue at least until cessation of mining activities, or longer if required by the regulatory authorities.

4.4-1.5 Methodology of Data Collection and Analysis

Data from these wells will be collected and analysed in a competent manner as specified and approved by the regulatory authorities.

4.4-2 Surface Water

4.4-2.1 Existing Data

The only present use of surface water in the area is for wildlife and streamside vegetation. Average surface runoff from the entire lease area is probably less than 180 acre-feet per year and chemical quality would be expected to contain less than 500 mg/l of dissolved solids. (U.S.D.I., 1979. Final Environmental Statement - Development of Coal Resources in Central Utah, Site Specific Analysis). Also refer to Part 2.2 of this Chapter re Surface Water Information.

4.4-2.2 Selection of Monitoring Sites

Water monitoring stations have been established at the outlet of the sedimentation ponds as per specifications of the N.P.D.E.S. permit. Refer to Exhibit II-A and III-A and Plates VIII and XI.

4.4-2.3 Selection of Parameters

Sample parameters will be as per specification of the N.P.D.E.S. permit. These parameters include flow, total suspended solids, total iron, total dissolved solids, oil and grease, and pH.

4.4-2.4 Frequency and Duration of Data Collection

Frequency and duration of data of collection shall be as per specification of the N.P.D.E.S. permit. Normal sampling days are the second and fourth Wednesdays of each month; unless sufficient rainfall occurs so as to cause a discharge before the fourth Wednesday, in which case one sample must be taken within 12 hours following the rainfall event. It should be noted that to date no discharge has occurred.

4.4-2.5 Methodology of Data Collection and Analysis

Methodology of data collection and analysis shall be accomplished in a competent manner as per specification of the N.P.D.E.S. permit and as specified and approved by the regulatory authority.

3.3 Winds

Winds are light to moderate, although strong winds may occur. The average velocity of the prevailing southwest winds is below 20 mph with peak wind velocities occurring in June and July.

D. Vegetation Information and Revegetation Plan

1. Introduction

Mountain-Brush, Desert Shrub, Pinyon-Juniper Woodland, Sagebrush-Grass, Conifer-Aspen, and minor streamside vegetative types cover the total mine plan area. Most of the area is covered by the Mountain-Brush type while the Pinyon-Juniper Woodland type is predominant in the mine mouth area as well as the access routes and utility corridors; this area has been reseeded with a mixture as recommended by the U.S.D.A. S.C.S. (Also refer to Exhibit IV-C re Soil and Vegetation Survey).

2. Source of Data

Department of the Interior, 1979. Final Environmental Statement, Development of Coal Resources in Central Utah; Part 1 Regional Analysis, Part 2 Site Specific Analysis.

United States Department of Agriculture, Soil Conservation Service, May, 1980. Soil Survey and Interpretations, Vegetation Survey.

Centennial Coal Associates, May, 1976 Mining Application. Submitted to the United States Geologic Survey, Conservation Branch.

A.M.C.A. Coal Leasing, June, 1978 Mining and Reclamation Plan (Zion's fee). Submitted to the State of Utah, Department of Natural Resources, Division of Oil, Gas, and Mining.

3. Description

3.1 Vegetative Types

The vegetative types include Mountain Brush, Pinyon-Juniper Woodland, Sagebrush-Grass, and Conifer-Aspen.

3.2 Threatened or Endangered Species

There have been no known threatened or endangered species observed in the lease area (Welsh 1977).

3.3 Plant Communities

The Mountain Brush type is the largest in the area. It is found predominately at elevations of about 7,500 feet. This community consists of sage, mountain mahogany, serviceberry, snowberry, squaw apple, gambels oak, and maple. Minor amounts of rabbitbrush, cliffrose, and bitterbrush can be found. Associated grass species are wildrye, Indian ricegrass, wheat grass, bull grass, and blue grass.

The Sagebrush-Grass group is present from 7,200 to 9,000 feet on and in the low benches below the cliffs. Sage and rabbit brush appear associated with the common grasses occurring in other communities such as curly grass, indian rice grass, and bull grass. Four-wing and saltbrush is found on better drained soils. Shad scale and curly grass associations are found on the heavier clay soils.

The Pinyon-Juniper Woodland community occurs in the area from an elevation of 5,600 to 8,000 feet and dominates the area below the excarpment of the Book Cliffs. Pinyon pine and Utah juniper are the dominant species with bull grass, indian rice grass, and birch leaf mahogany as associated species.

The Conifer-Aspen becomes fairly extensive in the more moist sites and at higher elevations. Elevations range from about 7,000 to 9,000 feet. Aspen predominates at the lower elevations with associated species being serviceberry, snowberry, Oregon grape, mountain brome, and peavine. Douglas fir is scattered throughout the area above 7,500 feet elevation. A few big red pine, white pine, and fir are found in the upper canyon bottoms. Understory grasses present include curly grass, indian rice grass, shadscale, black sage, and crested wheat grass.

Identified species of noxious or poisonous weeds in the area are halogeton, cockleburr, loco, and copperweed. There are no concentrated areas or serious problems from these poisonous plants.

Some of the most important vegetation species are listed in Table IV-7.

TABLE IV-10

Vegetation Possibly Occuring in Area

<u>Common Name</u>	<u>Scientific Name</u>
<u>Grasses:</u>	
curly grass	Hilaria jamesii
indian rice grass	Oryzopsis hymenoides
squirreltail	Sitanian hystix
Needle and thread grass	Stipa commata
no eatum grass	Aristida fendleriana
western wheat grass	Agropyron smithii
bull grass	Elymus salinus
<u>Shrubs:</u>	
nuttal saltbush	Atriplex nuttallii
mat saltbush	Atriplex corrugata
shadscale	Atriplex confertifolia
fourwing saltbush	Atriplex canescens
big sagebrush	Artemisia tridentate
black sagebrush	Artemisia arbuscula nova
greasewood	Sarobatus vermiculatus
small rabbitbrush	Chrysothamnus viscidiflorus
big rabbitbrush	Chrysothamnus nauseosus
mountain-mahogany	Cercocarpus montanus
serviceberry	Amelanchief alnifolia
curleaf mahogany	Cercocarpus ledifolius
squaw apple	Peraphyllum ramosissimum
snowberry	Symphoricarpos oreophilus
<u>Trees:</u>	
juniper	Juniperus osteosperma
pinion	Pinus edulis
ponderosa pine	Pinus ponderosa
aspen	Populus temuloides
limber pine	Pinus flexilis
douglas fir	Pseudotsuga menziesii
gambel oak	Quercus gambelii

3.4 Extent of Cover

Since the elevations and terrain varies drastically from steep walled canyons to high ridges, vegetation density also varies. Percent cover is greater at the higher elevations and on the gentler topography. The Bureau of Land Management estimates cover of 25 to 30 percent at the higher elevations and 10 to 12 percent on the lower canyon sides and bottoms.

3.5 Shrub Height

Shrub height varies over the lease area. Topography, aspect, elevation, and soil cause these modifications.

4. Area to be Disturbed

The surface area disturbed is very minimal, approximately 7 acres as shown on Plate II . Site of the present surface facilities is located in an area that has been previously impacted by mining activities. Actual plant communities which have been disturbed are the Pinyon-Juniper and associated species and similar impact is foreseen on vegetation overlying the remainder of the lease area at the proposed surface facilities' sites. Extreme care will be taken however, to disturb as little vegetation as possible and revegetation has been immediately carried out on all disturbed areas no longer needed for the mining operation.

5. Revegetation Plan

5.1 Schedule of Revegetation

The seeding of native flora (consisting where possible of deer browse species), will commence as soon as is practical following shutdown and abandonment to stabilize erosion. Agencies such as the B.L.M., O.S.M., and Utah Department of Natural Resources will be consulted at the time for recommendations on recontouring, soil reconditioning, and revegetation. Revegetation will be accomplished by Tower or under Tower's direct supervision and under the recommendations of the regulatory authorities.

5.2 Soil Testing Plan and Soil Preparation

Where possible the soil will be distributed along the contour. The thickness of the re-established soil will be sufficient to support vegetation equal to or superior to pre-mining history. Soils will be tested according to the most advanced technology. Samples will be taken to determine any deficiencies which would effect the growth of newly revegetated areas. Any deficiencies will be corrected by adding to the soil chemical fertilizers, organic mulch, or any other substances recommended by the regulatory authority.

5.3 Species and Amounts of Seeds and Seedling

At the recommendation of the Bureau of Land Mangement, the following species and rates couldbe used:

Ladak Affalfa - 2 lbs./ac.
Yellow Sweetclover - 2 lbs./ac.
Indian Ricegrass - 4 lbs./ac.
Antelope Bitterbrush - 3 lbs./ac.
Western Wheatgrass - 3 lbs./ac.

5.4 Planting and Seeding Methods

Where possible the areas will be disced using conventional farm equipment. The seed will spread using a rangeland drill where possible. Areas which cannot be seeded mechanically will be hand seeded. Steeper slopes will be raked to provide a slight soil cover for the seed.

5.5 Mulching Techniques

Vegetative cover will be promptly re-established following cessation of mining activities to stabilize erosion. Mulch will be used and re-seeding will occur during the first normal period for favorable growth following regrading.

5.6 Management Practices, e.g., Irrigation, Pest, and Disease Control

No mechanical irrigation will be used because of the lack of water in the area. Vegetative growth will be subject to normal rainfall and winter snowfall. Vegetation will be protected from both wildlife and livestock by drift-fences until the reclaimed areas have been adequately re-established. Upon approval the fences will be removed.

5.7 Measures to Determine Success

Revegetation will be closely monitored. Areas which fail to support sufficient growth to stabilize conditions will be tested and reseeded until a proper cover is established. Physical examinations will be conducted to note any species which are not thriving or regenerating. If this occurs, species will be substituted at the recommendation of the regulatory authority. Any other species will be added at the time of reclamation upon recommendation of the regulatory authority. The company will maintain close contact with the Bureau of Land Management in all of its revegetation efforts, and incorporate their suggestions into its over all plan. All reclaimed areas will be monitored and maintained by the constant observation of Tower until the surety release is granted.

E. Fish and Wildlife Resources and Plan

1. Introduction

The mine plan area is located in the West Tavaputs Plateau, a region which supports about 360 vertebrate wildlife species. The abundance and distribution of wildlife in the lease area is directly related to present land use activities and capabilities. Use of this area by certain species is limited to lack of perennial water. Wildlife species possibly occurring in the lease area are listed in Table IV-11.

2. Source of Data

Department of the Interior, 1979. Final Environmental Statement - Development of Coal Resources in Central Utah, Parts 1 and 2.

Utah Department of Natural Resources, Division of Fish and Wildlife.

3. Habitats

Previously described vegetation provides fair to excellent habitat for a variety of wildlife species.

4. Species (See Table IV-11).

4.1 Mammals

Mammals occurring in the area can be divided into two groups, game species and non-game species.

The main game species include mule deer, mountain lion, black bear, elk, and cottontail rabbits. Mule deer, however, are the most important wildlife resource in the area. Mountain lion are present but little information is available due to their ranging habits. Generally, their movement coincides with the migration of deer. Black bear may occasionally be found in the vegetated canyons, usually along the cliff face. They normally inhabit the Book Cliffs to the north but little data is available on their populations. The permit area is within the lower limits of the elk range, however, elk are generally found north of the mine plan area at higher elevations. Cottontail rabbits are distributed throughout the area.

Non-game mammals include several species of small animals inhabiting the area. Predator species such as coyote and bobcat occasionally are found in the area and depend on small rodents and rabbits for their source of food. Information on non-game species is generally unavailable.

TABLE IV-11

List of Animals Possibly Occurring in Lease Area

<u>Common Name</u>	<u>Scientific Name</u>
<u>Mammals</u>	
Badger	Taxidea taxus
Black Bear	Ursus americanus
Bobcat	Lynx rufus
Coyote	Canis latrans
Deer mouse	Peromyscus maniculatus
Desert Cottontail	Sylvilagus audubonni
Elk	Cervus elaphus
Ground Squirrel	Spermophilus tridecelineatus
Least Chipmunk	Eutamias minimus
Mountain Lion	Felis concolor
Mule Deer	Odocoileus hemionus
Porcupine	Erethizon dorsatum
Striped skunk	Mephitis mephitis
White-tailed Jackrabbit	Lepus townsendii
<u>Birds</u>	
Brewers Sparrow	Spizella breweri
Blue Grouse	Dendragapus obscurus
Common Nighthawk	Chordeiles minor
House Sparrow	Passer Domesticus
Lark Sparrow	Chondestes grammacus
Magpie	Pica pica
Mourning Dove	Zenaidura macroura
Pinyon Jay	Gymnorhinus cyanocephala
Red-tailed Hawk	Buteo jamaicensis
Robin	Turdus migratorius
Ruffed Grouse	Bonasa umbellus
Sage Grouse	Centrocercus urophasianus
Sparrow Hawk	Falco sparverius
Turkey Vulture	Cathartes aura
Vesper Sparrow	Poocetes gramineus

4.2 Birds

4.2-1 Raptors

The turkey vulture and red-tailed hawk frequent the area. A variety of other raptors breed in the Price area, however, there is a poor density of raptors throughout the mine plan area. A raptor survey performed for Tower Resources of the proposed permit area by Clayton M. White of Brigham Young University is attached as Exhibit IV-D.

4.2-2 Other

Sage grouse inhabit the sagebrush flats at the foot of the cliffs. Blue and ruffed grouse may occasionally be found in the vegetated canyons of the area. Chukars can be found around the cliffs. Mourning doves are generally distributed throughout the area, however, the lack of perennial water limits dove nesting habitat in the area. Other representative birds include the magpie, bluebird, robin, and several species of sparrow.

4.3 Reptiles and Amphibians

The most prominent species of reptiles include the rattlesnake and sagebrush lizard. No aquatic fauna are present in the area.

4.4 Fish

There are no active fisheries as there are no permanent bodies of water or perennial streams in the area. No aquatic fauna are found.

4.5 Threatened or Endangered Species

There have been no known threatened or endangered species on or near the lease area according to a survey conducted by the Utah Division of Wildlife Resources (Boner 1977).

5. Impacts of Operations

Construction of all roads, powerlines, and surface facilities has been completed and mining operations have commenced. Therefore, no additional impact of operations on wildlife is anticipated.

6. Fish and Wildlife Plan

Since this is an underground coal mine, surface disturbances will be minimal with no change in present land use. There are no threatened or endangered species of plant or animals, a poor density of raptors with no

currently active nests, no gamefish or aquatic fauna, and no habitats of unusually high value for wildlife except as winter range for deer. However, a very minimal portion of the surface area will be impacted. Therefore, it is not deemed practicable to achieve a formal fish and wildlife plan. However, Tower Resources will make every effort to minimize disturbances to wildlife habitat in the area and where possible, enhance that habitat during reclamation.

F. Soil Resources

1. Introduction

Soils on top of the high plateau are dark and light mountain soils. The soils which are classified as cryoborolls and argiborolls are derived from the Green River Formation and tend to erode easily due to the presence of calcium salts in the formation.

In the mine area the soils of this rough topography are classified as Badland and Rockland.

The soils at the foot of the canyons are derived from the Mancos shale and are consequently high in dissolved salts and highly erodible. These soils, which are light colored and dry more than 75% of the year, have been classified as mainly Torrifrivents, Torriorthents, Calciorthents, and Natrargids.

This underground mining operation will not alter the pH of the existing soils.

2. Soil Survey

A soil survey and vegetation survey has been conducted for Tower by George Cook, Range Conservationist, Earl Jensen, Soil Scientist, and Gary Moreau, District Conservationist of the U.S.D.A. Soil Conservation Service in May, 1980. This survey included as Exhibit IV-C, covers approximately 15 acres in Deadman Canyon, in Section 7, T13S, R11E, S.B.L.M. Although this survey includes only a small portion of the lease area, it contains the area to be impacted by surface facilities and in the expert opinion of the U.S.D.A. Soil Conservation Service, identical soils and conditions will be encountered on the remainder of the permit area.

2.1 Soil Map

Refer to Plate XIII.

2.2 Soil Identification and Description

Several types of soil are present in the area and include Brycan bouldery loam, Datino bouldery fine sandy loam, Datino extremely bouldery fine sandy loam, and mine dumps. For further information and description, refer to Exhibit IV-C.

2.3 Soil Testing Plan

A soil testing plan will be established whereby soils will be tested according to the most advanced technology available. Samples will be taken to determine any deficiencies which would effect the growth of newly revegetated areas. Any deficiencies will be corrected by adding to the soil chemical fertilizers, organic mulch, or any other substances recommended by the regulatory authority.

2.4 Present and Potential Soil Productivity

Present and potential soil productivity is outlined in Exhibit IV-C and part D re Vegetation Information and Revegetation Plan.

3. Prime Farmland Investigation

3.1 Survey of Lands to be affected by Surface Operations

No lands within the permit area are considered prime farmland. Refer to Exhibit IV-C. H of this Chapter re Land Use Information and Post-Mining Land Use.

3.2 Factors

3.2-1 Historic Use as a Cropland

The land within and contiguous to the proposed permit area has never been used as a cropland. Historically, this land has only been used for hunting and grazing. Refer to Part H of this Chapter re Land Use Information and Post-Mining Land Use.

3.2-2 Slope of Land

The topography of the area is such that the elevation and terrain varies drastically from steep walled canyons to high ridges. The slope ranges from 15 percent to over 70 percent.

3.2-3 Water Supply and Precipitation

The area is not irrigated or naturally subirrigated. There are no perennial streams or bodies of water on the area and no developed water supply. Refer to Part B of this Chapter re Hydrology.

The average annual precipitation varies and is largely controlled by elevation. It ranges from five to 20 inches. However, at the portal site the average is approximately 12 inches or less. Refer to Part C, Section 3.1 of this Chapter re Precipitation for further information.

3.2-4 Rockiness of Surface

In the mine areas, the topography is very rough, the soils being classified as Badland and Rockland. These areas can be covered by as much as 70 percent stones, boulders, and outcrops of shale and sandstone.

("Soil Survey and Interpretations of the Coal Creek - Emery Portion of the Price River and Emery County Areas, Carbon and Emery Counties, Utah. Published by the Soil Conservation Service, U.S. Department of Agriculture, January, 1978.")

3.2-5 Absence of Soil Map Units Designated as Prime Farmland

On the basis of the soil survey included as Exhibit and the expert opinion of the Soil Conservation Service, U.S.D.A., that identical soils and conditions will be encountered on the remainder of the permit area, there are no soil map units that have been or will be designated as prime farmland.

3.3 Request for Negative Determination

On the basis of the information presented in this section under the heading of Factors, Sections 3.2-1 to 3.2-5 and because the area meets all of the criteria in paragraph (b) Section 783.27 30 CFR, Tower Resources, Inc., hereby requests negative determination for the area included in this permit application.

4. Topsoil Supplement and Substitute

4.1 Identification and Description

Tower's reclamation plan, as outlined in Chapter III, Part E re Reclamation, proposes no use of overburden materials as substitutes or supplements for topsoil. Where necessary, topsoil will be hauled into the reclamation area.

4.2 Productivity

Only topsoil will be used, according to the reclamation plan outlined in Chapter III, Part E re Reclamation.

5. Topsoil Handling During Operations

5.1 Removal

The area from which topsoil was removed is approximately five acres and includes poorly developed soils. Using dozers and front end loaders, the soil was scraped from the surface and dumped at a site near the facility location. The topsoil was removed as a separate operation from areas to be disturbed by surface installations such as roads and areas upon which support facilities are sited.

5.2 Storage

The topsoil storage area is shown on Plate VIII. The topsoil has been segregated, stockpiled, and protected from wind and water erosion and contaminants through revegetation and the use of berms.

6. Reclamation of Topsoil and Substitute

Disturbed areas no longer required for the conduct of mining operations have been revegetated. Upon completion of mining activities, topsoil will be distributed and reclamation will commence as outlined in Chapter III, Part E re Reclamation.

G. Alluvial Valley Floors - Survey

The proposed permit area or any contiguous area is not located in the presence of an alluvial valley floor. Refer to Parts A, B, C, D, F, and H of this Chapter.

H. Land Use Information and Post-Mining Land Use

1. Introduction

Due to the rugged topography and sparse rainfall, the land area is presently used only for grazing, wildlife habitat, and outdoor recreation. Historically, the land has also been used for coal mining.

2. Condition, Capability, and Productivity of the Land

Livestock grazing has been the most intense use of the lease area. However, due to the expansive cliff formations and the roughness of the canyon walls, grazing has been principally limited to the canyon bottoms and extreme tops to the north of the lease boundary.

Mule deer are found within the lease area as well as the usual small mammals, predators, and passerine and raptorial birds.

Outdoor recreation in the lease area is limited and usually related to enjoyment of the open space and associated scenic facilities and hunting for wild animals. The number of people using the area is small due to the rough terrain, poor roads, and lack of water.

3. Past Mining

The initial development of the Book Cliffs Coal Field was started in the early 1890's. By the early 1900's practically the entire field had been prospected. Mines in the lease area were not active until the 1920's because the cliffs were less accessible and the coal beds were thinner.

The Knight-Ideal mines, now held by Eureka Energy Corp., are located approximately two miles east of the lease area. Initial prospecting took place at this location in 1906 and extensive mining began in 1948 and ceased in 1958. During this period, 1,680,000 tons of coal were produced from the Gilson seam.

Three mines on or adjacent to the lease area in Deadman Canyon were the Zion, Olsen, and Sutton (Blue Flame) mines. The Zion was located on the Zion's fee lease and the Olsen and Sutton were on SL-027304. The first two produced from the Gilson seam and the last produced from the Aberdeen or Castlegate "A" seam. Production figures are not reliable but it is estimated that between 216,000 tons and 720,000 tons may have been produced from the Sutton mines. The Olsen mines produced about 18,000 tons and the Zion mine around 240,000 tons, between 1924 and 1944.

There was also a prospect entry driven in the Lower Sunnyside Seam (the Hileman) on lease U-010581 from which production was insignificant, approximately 1,400 tons. Mining ceased in the area in 1964.

4. Existing Use

The Deadman Canyon area would fall into two land use categories: 1) Fish and Wildlife habitat and recreation lands, and 2) Range lands. County zoning regulations (1974) indicate all lands involved in the lease application area are within zone M and G1 which is for mining and grazing. Current land use consists of grazing and deer hunting. For recreational purposes the land is suitable only for deer hunting. The snow cover is too light and slopes too steep for snowmobiling, cross-country skiing, and snow shoeing. The lack of water prevents the establishment of a chukkar/partridge population. Usually there are no elk in the area although an animal or two may occasionally wander onto the area.

There are no oil and gas wells or water wells other than those water wells drilled by Tower for use in mining activities, on the lease area.

The area is eight air miles from Price, but the unavailability of water precludes any development for residential or summer homes.

5. Impacts of Operations

5.1 Socioeconomic Impacts

The proposed project is located in an area where coal mining is the major industry, therefore, the community is geared for coal operations. The labor supply is excellent, well-trained, and available. Most people in this area have a very favorable attitude towards the increased coal activity. They look forward to growth in the area which will increase population, home construction, and provide other facilities for community use.

The need for development of additional housing, school space, and changes in present community services would be among the greatest impacts, due to the increase in population. Positive effects of the project will be to increase the number of jobs, payroll, and taxes thus helping to build the community.

5.2 Land Use Changes

The nature of an underground mine of this type and size requires minimal surface disturbance. The limited resources both physical and scenic will dictate no future change in land status. Considering the extent and nature of similar lands in the Book Cliffs, no uses other than those previously discussed can be forecast.

Deadman Canyon has been unsightly since the earliest mining began in the 1920's the new mine surface facility and portal site will be in the same area as the old mine tipples and waste dumps. These waste dumps are numerous and located throughout the canyon bottom and consist of coal fines which were unmarketable during the earlier mining history. This coal waste has been recovered, reprocessed, and cleaned up during the new operation. This new operation will actually be a significant reclamation phase to the canyon area.

During and after completion of mining operations, the land will continue to be used for grazing and hunting. No future change is dictated in the land status. Surface disturbances will be very minimal and all disturbed land will be restored in a timely manner, according to the Reclamation Plan outlined in Chapter III, to conditions that are capable of supporting the uses they were capable of supporting before mining.

6. Post-Mining Land Use

6.1 Comments of Owners of Surface Disturbed Areas and State and Local Agencies

As there are no proposed land use changes and minimal surface disturbance, there have been no negative comments from legal or equitable owners of record of surface areas to be affected or from any state or local agencies.

6.2 Consideration given to Comments

The proposed mining activities are consistent with surface owner plans and state and local land use plans. However, full consideration will be given to any future comments concerning this mining activity.

6.3 Methods to Achieve Post-Mining Land Use

As previously discussed, there will be minimal surface disturbances and no change in land use. As discussed in Part H, Section 5.2 of this Chapter re Land Use Changes, this operation will be a significant reclamation phase in the Deadman Canyon area. All disturbed areas shall be reclaimed and revegetated as described in Chapter III, Part E re Reclamation and Chapter IV, Part D, Section 5 re Revegetation Plan.

I. Cultural and Historic Resources

1. Identification and Description of Resources

1.1 Archaeology

To assure that no archaeological or historical sites existed in the proposed permit area, which would be impacted by the development of the coal resources, two reconnaissance surveys have been conducted.

The Department of Anthropology and Archaeology of Brigham Young University was employed to conduct a survey of the Deadman Canyon Area. A report of this survey by Terry Walker, prepared under the direction of Professor Ray T. Matheny of Brigham Young University is attached as Exhibit IV-E. A survey of Fiasco Canyon, Starpoint Canyon, and Straight Canyon was conducted by the Consulting Services Branch of the Antiquities Section, Division of State History, Salt Lake City, Utah. A report of this survey was prepared by Bruce Hawkins and Gregory S. Seward under the supervision of Asa S. Nielson and is also attached as Exhibit IV-E.

Authorization to conduct these surveys was granted by the Bureau of Land Management, as the majority of the surface described above is under the jurisdiction of the B.L.M.

Prior to these investigations, no recorded archaeological studies of any kind had ever been done in the survey area.

In the Deadman Canyon area study by Walker, no archaeological or historical sites were found. In the Fiasco-Straight Canyon study by Hawkins and Seward, six historic sites were encountered, early 20th century construction associated with mining, and a seventh site was historic graffiti. All were lacking National Register qualifications. In the opinion of the Archaeologists performing the studies, none of the sites encountered should impede development.

1.2 Paleontology

The project area has not been surveyed for paleontological resources. However, the mine plan area is located in a potential fossil-bearing area of slight value according to the United States Department of the Interior, Final Environmental Statement, Development of Coal Resources in Central Utah, Regional Analysis Part 1, Figure II-7 (Map of central Utah vertebrate and plant fossil bearing area.)

1.3 Public Parks

There are no public parks in the proposed permit area or nearby vicinity.

1.4 Other

No other cultural or historic resources are known to exist in the area.

2. Protection

Since there are no public parks or archaeological or historic sites which will be adversely affected by the proposed operation, no specific protection plan is deemed necessary.

V. Maps, Cross Sections, and Plans

Most of the maps, cross sections, and plans have been discussed and referenced in the preceding text. However, a list as required per parts 783.24, 783.25, and 783.23 of Title 30 CFR is presented below along with associated Plate numbers and comments. The Plates are included as a separate volume, Volume II. A list of Plates, Exhibits, and Figures can be found in the Table of Contents. These maps, cross sections, and plans will be updated as required by the regulatory authority. Exhibits are included as Appendices.

<u>Regulatory Paragraph</u>	<u>Plate Number</u>	<u>Comments</u>
783.24 a	III, IV	
b	I, II	
c	V, VI, VII	
d	I, II, VIII, IX	
e	I, II, VIII, IX	
f		Not applicable
g	XI	
h	I	
i		Locations of archaeological sites are shown in the archaeological reports included as Exhibit IV-E.
j		Not applicable
k		Not applicable
l		Appears throughout text

<u>Regulatory Paragraph</u>	<u>Plate Number</u>	<u>Comments</u>
783.25 a	V, VI, VII	
b	XI	
c	II, V, VI, VII, XV, XVI, XVII, XVIII	
d	V, VI, VII	
e	VI, VII, XVI, XVII	
f		Hydrologic Study performed by Vaughn Hansen and Assoc.
g	I, VIII, XI	
h		Not applicable
i	I, XI, VIII, Exhibit III-A, Exhibit III-D	
j	I, VIII	
k	VIII, VIII-A, IX	

<u>Regulatory Paragraph</u>	<u>Plate Number</u>	<u>Comments</u>
784.23 a	I, II, V, VI, VII, VIII, IX	
b-1	I, VIII, IX	
-2	I, II, V, VI, VII	
-3	VIII, IX	
-4	VIII, X	
-5	VIII	

<u>Regulatory Paragraph</u>	<u>Plate Number</u>	<u>Comments</u>
784.23 b-6	VIII,XI, Exhibit III-A, Exhibit III-D	
-7		Not applicable
-8		Not applicable
-9	VIII	
-10	I,II,VIII,XI, Exhibit III-A	
-11	VIII-A	
-12	I,XI	
-13		Not applicable

VI. Preparation of Application

A. Persons and Consultants Involved

The following persons and/or organizations were involved in collection and analysis of the technical data set forth in this application.

1. In House Consulting Services

- a) Tower Resources, Inc. - AMCA Coal Leasing, Inc.
Samuel C. Quigley - Western Project Manager
Michael W. Glasson - Senior Geologist
Allen D. Emmel - Environmental Planning Coordinator

2. Outside Consulting Services

- a) Dan W. Guy - Registered Professional Engineer
(State of Utah No. 4548)
Price, Utah
-Sedimentation and Drainage Control Plan (April 1980)
-Wastewater Disposal System; Pinnacle Mine (April 1980),
Office Building (September 1980)
- b) Bruce T.S. Ware - Registered Land Surveyor
Price, Utah
- c) A and W Surveying
Price, Utah
- d) Commercial Testing and Engineering Co.
Denver, Colorado
- e) Standard Laboratories
Huntington, Utah
- f) Western Testing and Engineering
Helper, Utah
- g) VanCott, Bagely, Cornwall and McCarthy
Attorneys at Law
Salt Lake City, Utah
- h) Rollins, Brown, and Gunnell
Provo, Utah
- i) Brigham Young University
Provo, Utah
Department of Zoology
Clayton M. White
(Raptor Study)
Department of Anthropology/Archaeology
Dr. Ray T. Matheny
(Archaeological Survey)

j) Vaughn Hansen Associates
Salt Lake City, Utah
(Hydrology Study)

B. Coordination and Consultation with Governmental Agencies

The following governmental agencies were consulted in the preparation of information set forth in this application.

U.S. Department of Agriculture
Soil Conservation Service
Price, Utah
(Soil and Vegetation Survey)

U.S. Department of the Interior
Bureau of Land Management
Price, Utah
Salt Lake City, Utah

Office of Surface Mining, Reclamation and Enforcement
Denver, Colorado

U.S. Geological Survey
Salt Lake City, Utah

State of Utah
Department of Natural Resources
Division of Oil, Gas, and Mining
Salt Lake City, Utah

Antiquities Section (Consulting Services Branch)
Salt Lake City, Utah
(Archaeological Survey)

Department of Natural Resources
Division of Fish and Wildlife
Salt Lake City, Utah

C. References

AMCA Coal Leasing, Inc., 1978. Mining and Reclamation Plan, Zion's Fee. Submitted to the State of Utah, Department of Natural Resources, D.O.G.M.

Centennial Coal Associates, 1976. Mining Application. Submitted to the U.S. Geological Survey.

Doelling, H.H., 1972. Central Utah Coal Fields. U.G.M.S. Monograph Series No. 3.

U.S.D.A., 1978. Soil Survey and Interpretations of the Coal Creek Emery Portion of the Price River and Emery County Areas, Carbon and Emery Counties, Utah. S.C.S.

U.S.D.I., 1979. Final Environmental Statement, Development of Coal Resources in Central Utah, Parts 1 and 2.

U.G.M.S., 1966. Central Utah Coals. U.G.M.S. Bulletin No. 80.

VII. Cross Reference Table - Regulation in 30 CFR, Chapter VII.

The cross reference tables appearing here are included to provide a rapid completeness check of this application by the reviewer.

A. Subchapter G

1. Part 782 - Legal, Financial, Compliance, and Related Information.

<u>Regulatory Paragraph</u>	<u>Text Reference</u>
782.13	II A (1-3)
782.14	II B (1-3)
782.15	II C (1-3)
	II D
782.16	II E (1-6)
782.17	II F
782.18	II G
782.19	II H
782.20	II I
782.21	II J

2. Part 783 - Environmental Resources

<u>Regulatory Paragraph</u>	<u>Text Reference</u>
783.12	IV I
783.13	IV A (1-3)
	IV B (1-2)
	II D (1)
783.14	IV A (1-3)
783.15	IV B (1-2)
783.16	IV B (1-2)
783.17	IV B (2)
783.18	IV C
783.19	IV D (1-3)
783.20	IV E (1-4)
783.21	IV F (1,2,4)
783.22	IV H (1-4)
783.24	V
783.25	V
783.27	IV F (3)

3. Part 784 - Reclamation and Operation Plan

<u>Regulatory Paragraph</u>	<u>Text Reference</u>
784.11	III A
	III B (1-12)
	III C
	III E (3)
784.12	III A
	III B (1-2)
784.13	III A
	III B (2,4,5)
	III E (2,3,4)

<u>Regulatory Paragraph</u>	<u>Text Reference</u>
	IV D (5)
	IV F (2,5,6)
784.14	III D (1)
	IV B (3,4)
784.15	III E (1)
	IV H (6)
784.16	II B (8) ← III B(8)
784.17	II D (6)
	IV I
784.18	II E (4)
	III D (7)
784.19	III B (10)
	III D (5)
784.20	III B (14)
	III D (2)
	IV B (2,4)
784.21	III D (3)
	IV E (5)
784.22	III B (12)
784.23	V
784.24	III B (7)
784.25	III B (10)
	III C (2)
784.26	III D (4)

4. Part 785 - Special Mining Categories

<u>Regulatory Paragraph</u>	<u>Text Reference</u>
785.11-16	Not Applicable
785.17	III D (8)
	IV F (3)
785.18	Not Applicable
785.19	III D (9)
	IV G
785.20	Not Applicable
785.21	III B (6)
785.22	Not Applicable

B. Subchapter J (Parts 800-806) - Bonding and Insurance

<u>Regulatory Paragraph</u>	<u>Text Reference</u>
800	III E (4)
	II G
805	III E (4)
806	III E (4)
	II G

C. Subchapter K (Parts 817-828) - Performance Standards

<u>Regulatory Paragraph</u>	<u>Text Reference</u>
817.11	III B (16)
817.13-15	III E (3)
817.21	III B (3)
	IV F (5,6)
817.22	III B (4)
	IV F (5)
817.23	III B (4)
	IV B (5)
817.24	III E (3)
	IV D (5)
	IV F (4,6)
817.41-50	III B (8,12,14)
	III D (1,2)
	IV B (3,4)
	IV D (5)
817.52	III B (14)
	III D (1)
	IV B (3,4)
817.53-55	Not Applicable
817.56	III E (2,3)
817.57	Not Applicable
817.59	III C (2)
817.61-68	III B (3)
817.71	III B (10)
817.72-93	Not Applicable
817.95	III D (4)
817.97	III D (3)
	IV E (5)
817.99	
817.100-117	III E
	IV D (5)
817.121-126	III B (14)
	III D (2)
817.131-132	III E (3,4)
817.133	III E (1)
	IV H
817.150-180	III B (7)
817.181	IV B (1-10)
818-825	Not Applicable
826	
827	III B (6)
828	Not Applicable

VIII. APPENDICES

APPENDIX A
(EXHIBITS II-A, B, AND C)

EXHIBIT II-A

B.L.M. RIGHT-OF-WAY GRANTS
APPROVAL OF PLANS AND PROGRAMS
PERMIT GRANTS



SCOTT M. MATHESON
Governor

OIL, GAS, AND MINING BOARD

GORDON E. HARMSTON
Executive Director,
NATURAL RESOURCES

STATE OF UTAH

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF OIL, GAS, AND MINING

1588 West North Temple
Salt Lake City, Utah 84116
(801) 533-5771

CHARLES R. HENDERSON
Chairman

JOHN L. BELL
C. RAY JUVELIN
THADIS W. BOX
CONSTANCE K. LUNDBERG
EDWARD T. BECK
E. STEELE McINTYRE

CLEON B. FEIGHT
Director

September 5, 1980



Mr. Sam Quigley
Tower Resources, Inc.
P.O. Box 1027
Price, Utah 84501

RE: Final Approval
Pinnacle Mine
ACT/007/019
Carbon County, Utah

Dear Mr. Quigley:

The Board of Oil, Gas and Mining, at its May, 1980 Executive Session, fully executed the Mined Lands Reclamation Escrow Agreement submitted by Tower Resources, Inc. for the Pinnacle Mine. A copy of this agreement is enclosed for your records.

Tower Resources, Inc. has now fulfilled all of the requirements under the Utah Mined Land Reclamation Act as well as the Interim Program Regulations for Coal Mining and Reclamation Operations for the Pinnacle Mine. Further, during the 30 day public comment period subsequent to publication of the Division's tentative approval of the Mining and Reclamation Plan for this operation, no adverse comments were received.

The Division therefore issues Final Approval to Tower Resources, Inc. for the Pinnacle Mine and operations may now lawfully commence. Please note however, that this approval is issued under the Interim Program Regulations only and that a Permanent Program Mining and Reclamation Plan will be required for the Pinnacle Mine within two months of the State's regulatory program approval.

Please notify the Division within 30 days of commencement of operations as required under Rule 40-8-15 of the Utah Mined Land Reclamation Act. Also under this Rule it is required that an annual Operations and Progress Report be submitted at the end of each calendar year for all active operations.

Mr. Sam Quigley
September 5, 1980
Page Two

Also, please be reminded that any modifications in Tower Resources, Inc.'s mining and reclamation plan as presently approved, must be submitted to the Division for approval prior to initiating the modification.

Should you have any questions relative to this Final Approval, please feel free to contact the Division.

Sincerely,



JAMES W. SMITH, JR.
COORDINATOR OF MINED LAND DEVELOPMENT

JWS/te
cc: Don Crane, O.S.M.



DEPARTMENT OF HEALTH
DIVISION OF ENVIRONMENTAL HEALTH
150 West North Temple, P.O. Box 2500, Salt Lake City, Utah 84110

Alvin E. Rickars, Acting Director
Room 426 801-533-6121

533-6108
June 13, 1980

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

Michael W. Glasson
Tower Resources, Inc.
P.O. Box 1027
Price, UT 84501

DIVISIONS
Community Health Services
Environmental Health
Family Health Services
Health Care Financing
and Standards

OFFICES
Administrative Services
Health Planning and
Policy Development
Medical Examiner
State Health Laboratory

Re: Air Quality Approval Order
for Construction and Operation
of the Centennial Coal Mine
and Loadout Operation near
Price, Carbon County

Dear Mr. Glasson:

On May 6, 1980 the Executive Secretary published a notice of intent to approve your proposed coal mine and loadout operation. The 30-day public comment period expired June 5, 1980 and no comments were received.

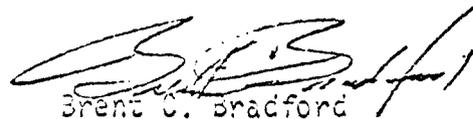
This air quality approval order authorizes the construction and operation of the Centennial Coal Mine and loadout operation in Carbon County as proposed in your notice of intent dated 2/15/80 and 4/22/80, with the following conditions:

1. Production shall be limited to 960,000 tons/year. Production proposed above this limit shall require a notice of intent, per Utah Air Conservation Regulations, Section 3, be submitted by the owner/operator.
2. All air pollution control facilities shall be installed and operated as proposed.
3. Primary crushing operation shall be enclosed underground with spraying (water and wetting agent) required on material entering the crusher and on exiting the crusher via the exit conveyor.
4. Storage piles shall be chemically stabilized to minimize fugitive dust emissions.
5. Conveyors shall be covered to minimize fugitive emissions.
6. Railroad car loadout area shall be sprayed to minimize fugitive dusts.
7. Visible emissions from all controlled process and fugitive emission sources shall not exceed 20% opacity.

8. Haul roads: 5.32 miles section from mine to paved Coal Creek Road and 2.59 miles section from U.S. 6/50 to loadout at Farnham Siding shall be chemically stabilized upon initial operation and be re-treated routinely as required by dry weather conditions or as determined necessary by the Executive Secretary to minimize fugitive dusts. Speed on these sections of road shall be limited to 35 mph.
9. Commuter road: 7 miles from Price to Mine site shall be chemically stabilized upon initial operation and be re-treated routinely as required by dry weather conditions or as determined necessary by the Executive Secretary to minimize fugitive dusts. Speed on this section of road shall be limited to 35 mph.
10. A record shall be kept of the spraying/stabilizing done on storage areas, loadout area, and haul/commuter roads, i.e., dates, time, type, amount and locations, and be available to the Executive Secretary.

An initial compliance inspection will be required. Please notify us when your construction is completed and you are operational, so an inspection can be performed.

Sincerely,



Brent C. Bradford
Executive Secretary
Utah Air Conservation Committee

MRK:js

cc: Southeastern District Health Dept.
EPA/Region VIII (Norman Huey)

DEPARTMENT OF HEALTH

DIVISION OF ENVIRONMENTAL HEALTH

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

Avin E. Rickars, Acting Director
Room 426 801-533-6121533-6746
May 14, 1980James O. Mason, M.D., Dr.P.H.
Executive Director
801-533-6111DIVISIONSCommunity Health Services
Environmental Health
Family Health Services
Health Care Financing
and StandardsOFFICESAdministration Services
Health Planning and
Policy Development
Medical Examiner
State Health LaboratorySamuel C. Quigley
Western Project Manager
Tower Resources, Inc.
P.O. Box 1027
Price, UT 84501

RE: Sediment ponds

Dear Mr. Quigley:

We have reviewed the April 3, 1980 sedimentation and drainage control plan and supporting information for the Pinnacle Mine of Tower Resources. These two ponds are to provide for the runoff from a ten year 24 hour 1.8 inch rainfall on the mine disturbed area.

As a result of our review, the plans for the Tower Resources Pinnacle mine sedimentation control ponds are approved and a construction permit as constituted by this letter is hereby issued provided:

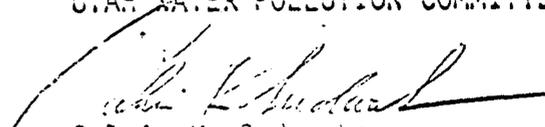
1. Sufficient riprap is provided on the outside toe of the pond dike to protect against erosion by the stream.
2. The sediment level is maintained at least 3 feet below the outlet.

The two ponds are to have a design capacity of 1 and 0.2 acre feet of sediment and runoff storage. The dikes are to have a top width of 10 feet with a side slope of 2 horizontal to 1 vertical. The outlet pipes are to have an inverted inlet one foot below the water level.

Additional treatment must be provided if the discharge from these ponds fails to meet state or federal discharge requirements.

Sincerely,

UTAH WATER POLLUTION COMMITTEE


Calvin K. Sudweeks
Executive Secretary
cc: Oil, Gas & Mining
EPA Salt Lake
Southeast 208
Southeastern District Health Dept.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VIII
1860 LINCOLN STREET
DENVER, COLORADO 80295

Ref: SE-WE

June 20, 1980

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Samuel C. Quigley
Manager, AXCA Coal Leasing, Inc.
P. O. Box 1027
Price, Utah 84501

Dear Mr. Quigley:

Herewith enclosed is the NPDES permit for AXCA Coal Leasing, Inc.,
UT-0023507. This permit shall become effective
and issued thirty (30) days following your receipt of this letter, unless
within thirty (30) days following the date of receipt you submit a request
for an evidentiary hearing in accordance with the provisions of 40 CFR
Section 124.74. Such request must be addressed to:

Roger L. Williams (SE-WE)
Regional Administrator
U.S. Environmental Protection Agency
Region VIII, Suite 103
1860 Lincoln Street
Denver, Colorado 80295

If you have any legal questions with regard to this matter, please
contact Mr. John J. Lepley of this Agency at (303) 837-4812. Questions
regarding monitoring requirements should be directed to Mr. Doug Skie of
this office at (303) 837-4335.

Sincerely yours,

Roger E. Frenette
Acting Director
Enforcement Division

Enclosures

- (1) NPDES Discharge Permit
- (2) EPA Form 3320-1 for reporting of self-monitoring

Permit No.: UT-0023507

AUTHORIZATION TO DISCHARGE UNDER THE
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Clean Water Act, as amended (33 U.S.C. 1251 et. seq.) (hereinafter referred to as "the Act"),

AMCA Coal Leasing, Inc.,

is authorized to discharge from a facility located at Section 7, Township 13 South, Range 11 East, Carbon County, Utah,

to receiving waters named Deadman Creek which is a tributary to the Price River,

in accordance with effluent limitations, monitoring requirements and other conditions set forth in Parts I, II, and III hereof.

This permit shall become effective on the date of issuance.*

This permit and the authorization to discharge shall expire at midnight, December 31, 1980.

Signed this 30th day of May, 1980.

Permit is complete



Lance C. Vinson
Director, Enforcement Division

*Thirty (30) days after the date of receipt of this permit by the Applicant.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VIII

1860 LINCOLN STREET

DENVER, COLORADO 80295

DEC 1 1980

Ref: 8E-WE

Mr. Samuel C. Quigley
AMAC Coal Leasing, Inc.
P. O. Box 1027
Price, Utah 84501

Re: NPDES No. UT-0023507

Dear Mr. Quigley:

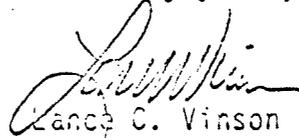
As you are aware, the NPDES permit previously issued to you by EPA expires by its own terms on December 31, 1980. Although you have applied for permit renewal, we will be unable to reissue the permit by that date. Consequently, there is an interim period between the expiration date contained in the previous permit and the time any renewal permit will be issued. Because you made a timely and sufficient application for permit renewal, under the provisions of EPA's May 19, 1980, Consolidated Permit Regulations (45 FR 33425, 40 CFR 122.5), there is an automatic continuation of the permit during the interim between expiration and renewal. You should be aware that, under the terms of this regulation, all of the requirements and conditions of your current permit will remain fully effective until the renewal permit is issued.

Any violations of the permit during the interim period are subject to enforcement action by the Agency. Additionally, at the discretion of the permit issuing official, your request for permit renewal can be denied on the basis of any failure to comply during the interim period. The denial would terminate the permit continuation and subject you to an enforcement action for discharge without a permit.

After we have completed an evaluation of the necessary information, including application Form 20 where applicable, a permit will be drafted and we will publish notice of our intent to reissue the permit. The draft permit will contain effluent limitations and other provisions reflecting the various requirements of the Clean Water Act. The public notice and related information will summarize the proposed permit and will allow thirty (30) days for public comments. A final permit will be issued sometime after the close of the public comment period.

The permit continuation, provided under the terms of 5 U.S.C. 558(c) and 40 CFR 122.5, will terminate upon issuance of the renewal permit.

Sincerely yours,



Lance C. Vinson
Director
Enforcement Division

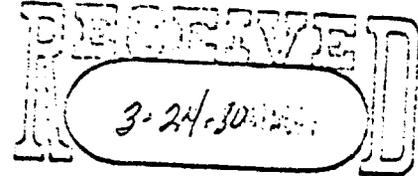
cc: Utah Dept. of Health
EPA, Utah State Engineer



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

1 1980

REGION VIII
1660 LINCOLN STREET
DENVER, COLORADO 80295



REF: 8AH-A

Mr. Michael Glasson
Geologist
Tower Resources, Inc.
Post Office Box 1027
Price, Utah 84501

Dear Mr. Glasson:

This office has received your February 13, 1980, PSD emission inventory of the proposed Pinnacle Mine near Price, Utah.

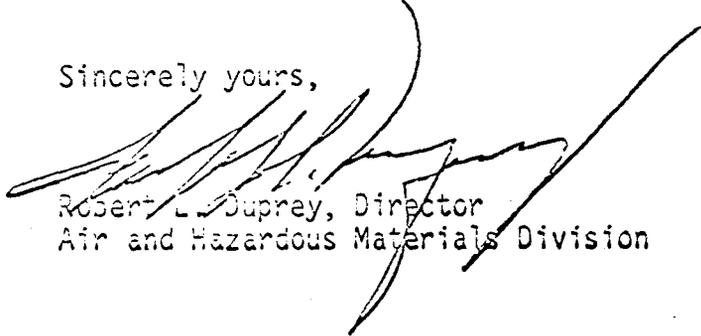
Because of the recent court decision in the case of Alabama Power Co. vs. Douglas M. Costle (D. C. Circuit 78-1005 and consolidated cases), EPA implemented a partial stay of its regulations (February 5, 1980, Federal Register, 45 FR 7800). In light of this stay, we have determined that your proposed mine does not need a PSD air quality permit. We believe your proposed mine is not now subject to the PSD regulations because of the new definition of a major source and the accompanying exclusion of fugitive emissions (including fugitive dust) as announced in the proposed PSD regulations of September 5, 1979 (44 FR 51924).

Nevertheless, you are advised that the decision in Alabama Power will have further significant impacts on EPA's PSD regulations and may affect permit actions taken under existing regulations.

It is our intent to work with OSM and the State to incorporate in their programs measures to control particulate emissions at mines. I have forwarded copies of your emission inventory to the Denver OSM office and the Utah Bureau of Air Quality. I have also included a copy of the Region VIII guideline document on air quality review of surface mining operations. This document was the basis for our determinations as to what constitutes acceptable control measures.

If you have any questions, please contact David Joseph of my staff at (303) 837-3763.

Sincerely yours,



Robert L. Duprey, Director
Air and Hazardous Materials Division

Enclosures

cc: F. Johnson, OSM, with enclosures
B. Bradford, Utah Bureau of Air Quality, with enclosures

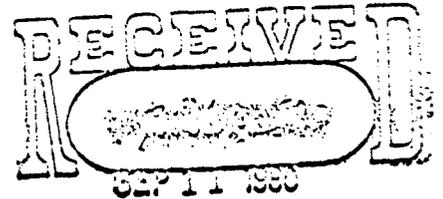


United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Moab District
P. O. Box 970
Moab, Utah 84532

IN REPLY REFER TO

2810
U-45966
(U-060)



CERTIFIED MAIL--RETURN RECEIPT REQUESTED
Certification No. 661144

DECISION

Tower Resources Incorporated : Right-of-Way U-45966
P. O. Box 1027 :
Price, Utah 84501 :

Right-of-Way Granted

Details of Grant

Serial number of grant: U-45966

Name of Grantee: Tower Resources Incorporated
P. O. Box 1027
Price, Utah 84501

Map showing the location
and dimensions of grant

Map designations: Right-of-way location map
Tower Resources Incorporated
access road.

Date filed: June 13, 1980

Right-of-way width: 50 feet

Permitted use: Construction, use and maintenance
of access road.

Authority: Section 501 (a)(6) of the Federal
Land Policy and Management Act of
1976, (90 Stat. 2776; 43 USC 1761).

Effective Date: Effective the date of this decision

Termination Date: 30 years from the date of this decision



United States Department of the Interior

BUREAU OF LAND MANAGEMENT
UTAH STATE OFFICE
University Club Building
136 East South Temple
Salt Lake City, Utah 84111

2800
F017
U-36739
(U-942)

DECISION

NOV 20 1978

Right-of-Way Granted

Details of Grant

Serial number of grant: Utah 36739

Name of Grantee: AMCA Coal Leasing, Inc.
Post Office Box 1027
Price, Utah 84501

Map showing the location and dimensions of grant

Map designations: Meiji Resource Consultants
Telephone Line Survey S.N. U-36739
AMCA Coal Leasing, Inc.

Date filed: March 31, 1978

Permitted use by grantee: Buried Telephone Cable
15 Feet in width

Authority for grant: Title V of the Federal Land Policy and Management Act of October 21, 1976 (90 Stat. 2776; 43 U.S.C. 1761)

Date of grant: NOV 20, 1978

Expiration date of grant: NOV 19, 2008

Rental

Amount: \$25.00

When payable by grantee: At the beginning of each 5-year rental period

Terms and conditions of the grant are set forth on the following pages.





United States Department of the Interior

BUREAU OF LAND MANAGEMENT
UTAH STATE OFFICE
University Club Building
136 East South Temple
Salt Lake City, Utah 84111

2000
F317
U-36741
(U-942)

DECISION

NOV 20 1978

:
:
:
:
:

Right-of-Way Granted

Details of Grant

Serial number of grant: Utah 36741

Name of Grantee: AMCA Coal Leasing, Inc.
Post Office Box 1027
Price, Utah 84501

Map showing the location and dimensions of grant

Map designations: A & W Surveying
Powerline Survey S.N. U-36741
AMCA Coal Leasing, Inc.

Date filed: August 15, 1978

Permitted use by grantee: 46 KV Electric Power Transmission
Line 100 feet in width

Authority for grant: Title V of the Federal Land Policy and
Management Act of October 21, 1976 (90
Stat. 2776; 43 U.S.C. 1761)

Date of grant: NOV 20 , 1978

Expiration date of grant: NOV 19 , 2008

Rental

Amount: \$100.00 rental deposit

When payable by grantee: Rental amount not yet determined

Terms and conditions of the grant are set forth on the following pages.



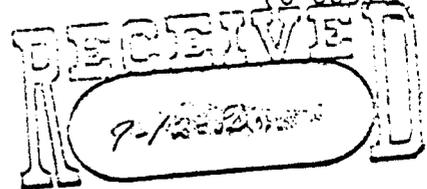


United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Moab District
P. O. Box 970
Moab, Utah 84532

IN REPLY REFER TO

2890
U-45965
(U-060)



SEP 11 1980

CERTIFIED MAIL--RETURN RECEIPT REQUESTED
Certification No. 661143

DECISION

Tower Resources Incorporated : Right-of-Way U-45965
P. O. Box 1027 :
Price, Utah 84501 :

Right-of-Way Granted

Details of Grant

Serial number of grant: U-45965
Name of Grantee: Tower Resources Incorporated
P. O. Box 1027
Price, Utah 84501
Map showing the location and dimensions of grant
Map designations: Right-of-Way location map
Tower Resources Incorporated
Material Storage Site
Right-of-way area: 10 acres
Date filed: June 13, 1980
Permitted use: Material Storage
Authority: Section 501 (a)(7) of the Federal Land Policy and Management Act of 1976, (90 Stat. 2776; 43 USC 1761).
Effective Date: Effective the date of this decision
Termination Date: 30 years from the date of this decision



United States Department of the Interior

BUREAU OF LAND MANAGEMENT

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

IN REPLY REFER TO

2890
U-45965
(U-601)

RECEIVED
8-27-80

August 27, 1980

Mr. Mike Glasson
Tower Resources Incorporated
P. O. Box 1027
Price, Utah 84501

Dear Mr. Glasson:

We have made the necessary changes in your right-of-way (U-45965), authorizing you to construct an office, shop or warehouse on the site should the need arise. We were able to make the adjustment without any additional information from you since the right-of-way had not been issued.

If you have any questions, please feel free to call.

Sincerely yours,

Leon E. Berggren
Area Manager



December 24, 1980

Mr. Samuel C. Quigley
Western Project Manager
Tower Resources, Inc.
P.O. Box 1027
Price, UT 84501

Re: Roof Control Plan
Pinnacle Mine
I.D. No. 42-01474

Dear Mr. Quigley:

The roof control plan consisting of 18 pages, received at this office on December 22, 1980, has been reviewed and is approved. This is a minimum roof control plan and will supercede all previously approved plans, supplements and addendums. As required by 30 CFR, 75.200, the plan must be reviewed by MSHA every six months.

Sincerely,

John W. Barton
John W. Barton
District Manager

Enclosure

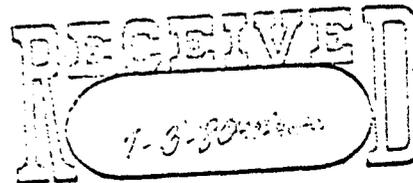
U. S. Department of Labor

Mine Safety and Health Administration
P O Box 25367
Denver, Colorado 80225



Coal Mine Safety and Health
District 9

June 30, 1980



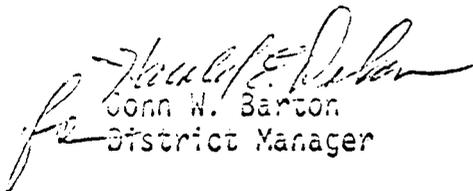
Samuel C. Quigley
Western Project Manager
Tower Resources, Incorporated
P. O. Box 1027
Price, Utah 84501

Re: Pinnacle Mine
I. D. No. 42-07474
Roof Control Plan

Dear Mr. Quigley:

The roof control plan for the subject mine, dated June 24, 1980, has been reviewed and is approved. This plan supercedes all previously approved plans, supplements and addendums. As required by 30 CFR, 75.200, the plan must be reviewed by MSHA every six months.

Sincerely,

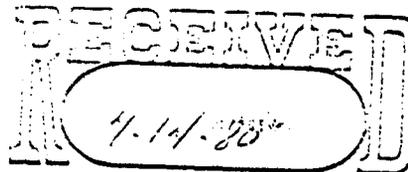

Donn W. Barton
District Manager

Enclosures

P O Box 25367
Denver, Colorado 80225
Coal Mine Safety and Health
District 9



July 9, 1980



Samuel C. Quigley
Manager
Tower Resources, Inc.
PO Box 1027
Price UT 84501

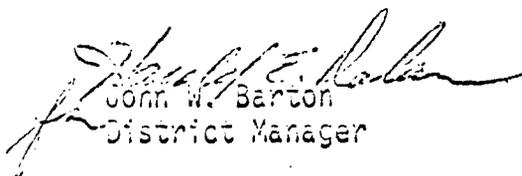
Re: Pinnacle Mine
I.D. No. 42-01474
Ventilation System and Methane
and Dust Control Plan

Dear Mr. Quigley:

The ventilation system and methane and dust control plan dated June 26, 1980, for the subject mine has been approved in accordance with Section 75.316, 30 CFR 75. The plan is subject to revision at any time and shall be reviewed by the operator and MSHA at least once every six months. Before any changes are made in the approved ventilation system, they shall be submitted to and approved by MSHA prior to implementation.

This plan supersedes any previously approved plans and a copy of this plan shall be made available to the miners.

Sincerely yours,


John W. Barton
District Manager

Enclosure

U.S. DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION
Mailing Address: P.O. Box 25367, DFC
Denver, Colorado 80225
Street Address: 730 Simms
Lakewood, Colorado



Coal Mine Health and Safety
District 9

September 21, 1978

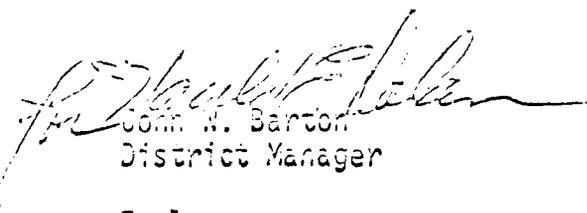
Samuel C. Quigley
Manager
A.M.C.A. Coal Leasing, Inc.
PO Box 1027
Price, Utah 84501

Re: Pinnacle Mine
I.D. No. 42-01474
Fan Stoppage Plan

Dear Mr. Quigley:

This is to acknowledge receipt of the Fan Stoppage Plan for the subject mine. It has been reviewed for compliance with Section 75.321, 30 CFR 75, and has been found adequate. Approval is hereby given.

Sincerely yours,


John W. Barton
District Manager

Enclosure

U.S. DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION
Mailing Address: P.O. Box 25367, DFC
Denver, Colorado 80225
Street Address: 730 Simms
Lakewood, Colorado
Coal Mine Health and Safety
District 9



September 21, 1978

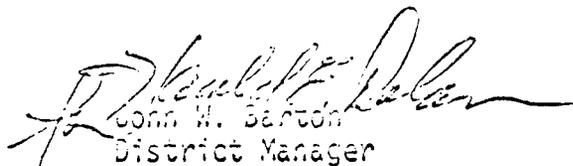
Samuel C. Quigley
Manager
A.M.C.A. Coal Leasing, Inc.
PO Box 1027
Price, Utah 84501

Re: Pinnacle Mine
I.D. No. 42-01474
Smoking Prohibition Plan

Dear Mr. Quigley:

This is to acknowledge receipt of the Smoking Prohibition Plan for the subject mine. It has been reviewed for compliance with Section 75.1702, 30 CFR 75, and is hereby approved.

Sincerely yours,

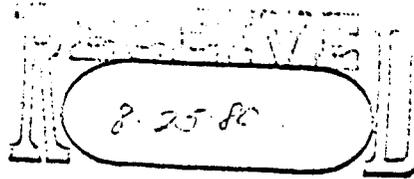

John W. Barton
District Manager

Enclosure



EDUCATION AND TRAINING
DENVER TRAINING CENTER

August 19, 1980



S. C. Quigley
Manager
Tower Resources, Inc.
P.O. Box 1027
Price, UT 84501

RE: 42-01474 Pinnacle
UNDERGROUND

Dear Mr. Quigley:

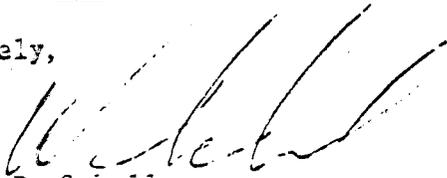
Your training plan submitted under the requirements of CFR Title 30, Part 48 is approved as of the date of this letter.

Any proposed revisions or changes to your approved plan must be submitted to the miner's representative and approved by the Training Center Chief.

Included is an initial supply of the 5000-23 form on which training must be recorded. A copy of this record must be given the employee at the completion of the training received (i.e. New Miner Training, Refresher Training, etc.) The other copy must be retained at the mine site. A copy of the 5000-23 should not be sent to this or any other MSHA office. Additional 5000-23 forms may be obtained from this office as needed.

Please do not record Part 48 training on the 5000-1 forms.

Sincerely,


Walter R. Scheil
Chief, Denver Training Center

cc: Representative of Miners

U. S. Department of Labor

Mine Safety and Health Administration
P. O. Box 26307
Denver, Colorado 80225
Coal Mine Safety and Health
District 9



November 5, 1980

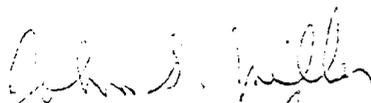
Thomas R. May
Safety Director
Tower Resources, Inc.
PO Box 1027
Price, UT 84501

Re: Pinnacle Mine
I.D. No. 42-01474
Firefighting & Evacuation Plan

Dear Mr. May:

The firefighting and evacuation plan for the subject mine has been approved in accordance with Section 75.1101-23, 30 CFR 75. The plan is subject to review and possible revision at any time and any changes proposed to the plan shall be approved by MSHA prior to implementation.

Sincerely yours,


John W. Barton
District Manager

Enclosure

U.S. DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION
Mailing Address: P.O. Box 25087, 1970
Denver, Colorado 80216
Business Address: 750 Illinois
Denver, Colorado



Coal Mine Health & Safety
District 9

September 6, 1978

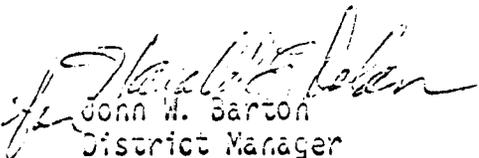
Mr. Samuel C. Quigley
AMCA Coal Leasing, Inc.
P.O. Box 1027
Price, Utah 84501

Re: Pinnacle Mine
I.D. #42-01474
Emergency Medical

Dear Mr. Quigley:

The information submitted to this office, required by Section 75.1713-2 of the Regulations, CFR 30, has been placed on file at the District Office.

Sincerely,


John W. Barton
District Manager

Enclosure

U.S. DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION
Mailing Address: P.O. Box 25367, DFC
Denver, Colorado 80225
Street Address: 730 Simms
Littlewood, Colorado
Coal Mine Health & Safety
District 9



September 6, 1978

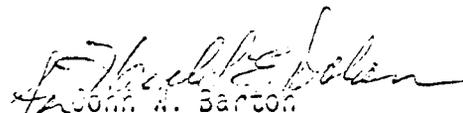
Mr. Samuel C. Quigley
AMCA Coal Leasing, Inc.
P.O. Box 1027
Price, Utah 84501

Re: Pinnacle Mine
I.D. #42-01474
Section 109(d)

Dear Mr. Quigley:

The information submitted to this office, required by Section
109(d) of the Act, has been placed on file at the District Office.

Sincerely,


John W. Barton
District Manager

Enclosure

EXHIBIT II-B
CERTIFICATE OF INSURANCE

NAME AND ADDRESS OF AGENCY

Anderson & Riddle Insurance
 P. O. Box 549
 Madisonville, KY 42431

COMPANIES AFFORDING COVERAGES

COMPANY LETTER **A** Old Republic Insurance Co.

COMPANY LETTER **B** First State Insurance Co.

NAME AND ADDRESS OF INSURED

Amca Resources, Inc., Tower Resources, etc.
 P. O. Box 711
 Madisonville, KY 42431

COMPANY LETTER **C**

COMPANY LETTER **D**

COMPANY LETTER **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
A	GENERAL LIABILITY	ZC-34668	7/1/81	BODILY INJURY	\$	\$
	<input checked="" type="checkbox"/> COMPREHENSIVE FORM			PROPERTY DAMAGE	\$	\$
	<input checked="" type="checkbox"/> PREMISES—OPERATIONS					
	* <input checked="" type="checkbox"/> EXPLOSION AND COLLAPSE HAZARD					
	<input checked="" type="checkbox"/> UNDERGROUND HAZARD					
	<input checked="" type="checkbox"/> PRODUCTS/COMPLETED OPERATIONS HAZARD					
	<input checked="" type="checkbox"/> CONTRACTUAL INSURANCE					
	<input checked="" type="checkbox"/> BPOAD FORM PROPERTY DAMAGE					
	<input checked="" type="checkbox"/> INDEPENDENT CONTRACTORS					
	<input checked="" type="checkbox"/> PERSONAL INJURY					
	AUTOMOBILE LIABILITY			BODILY INJURY (EACH PERSON)	\$	
	<input type="checkbox"/> COMPREHENSIVE FORM			BODILY INJURY (EACH ACCIDENT)	\$	
	<input type="checkbox"/> OWNED			PROPERTY DAMAGE	\$	
	<input type="checkbox"/> HIRED			BODILY INJURY AND PROPERTY DAMAGE COMBINED	\$	
	<input type="checkbox"/> NON-OWNED					
B**	EXCESS LIABILITY	945437	7/1/81	BODILY INJURY AND PROPERTY DAMAGE COMBINED	\$4,000	\$
	<input checked="" type="checkbox"/> UMBRELLA FORM					
	<input type="checkbox"/> OTHER THAN UMBRELLA FORM					
A	WORKERS' COMPENSATION and EMPLOYERS' LIABILITY	BC-44913	7/1/81	STATUTORY		\$1,000,000 PER ACCIDENT
	OTHER					

DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES

- * - explosion only
- ** - follows primary policy forms

Cancellation: Should any of the above described policies be cancelled before the expiration date thereof, the issuing company will endeavor to mail 10 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
 Division of Oil Gas & Mining
 1588 West North Temple
 Salt Lake City, Utah 84116

12/9/80

Chesley Riddle
 AUTHORIZED REPRESENTATIVE

NAME AND ADDRESS OF AGENCY

Anderson & Riddle Insurance
 P. O. Box 549
 Madisonville, KY 42431

COMPANIES AFFORDING COVERAGES

COMPANY LETTER **A** Old Republic Insurance Co.

COMPANY LETTER **B** First State Insurance Co.

COMPANY LETTER **C**

COMPANY LETTER **D**

COMPANY LETTER **E**

NAME AND ADDRESS OF INSURED

Amca Resources, Inc., Tower Resources, etc.
 P. O. Box 711
 Madisonville, KY 42431

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
A	GENERAL LIABILITY	ZC-34668	7/1/81	BODILY INJURY	\$	\$
	<input checked="" type="checkbox"/> COMPREHENSIVE FORM			PROPERTY DAMAGE	\$	\$
	<input checked="" type="checkbox"/> PREMISES—OPERATIONS					
	<input checked="" type="checkbox"/> EXPLOSION AND COLLAPSE HAZARD			BODILY INJURY AND PROPERTY DAMAGE COMBINED	\$ 1,000	\$
	<input checked="" type="checkbox"/> UNDERGROUND HAZARD			PERSONAL INJURY		\$
	AUTOMOBILE LIABILITY			BODILY INJURY (EACH PERSON)	\$	
	<input type="checkbox"/> COMPREHENSIVE FORM			BODILY INJURY (EACH ACCIDENT)	\$	
	<input type="checkbox"/> OWNED			PROPERTY DAMAGE	\$	
	<input type="checkbox"/> HIRED			BODILY INJURY AND PROPERTY DAMAGE COMBINED	\$	
	<input type="checkbox"/> NON-OWNED					
B**	EXCESS LIABILITY	945437	7/1/81	BODILY INJURY AND PROPERTY DAMAGE COMBINED	\$ 4,000	\$
	<input checked="" type="checkbox"/> UMBRELLA FORM					
	<input type="checkbox"/> OTHER THAN UMBRELLA FORM					
A	WORKERS' COMPENSATION and EMPLOYERS' LIABILITY	BC-44913	7/1/81	STATUTORY		\$ 1,000,000
	OTHER					

DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES

- * - explosion only
- ** - follows primary policy forms

Cancellation: Should any of the above described policies be cancelled before the expiration date thereof, the issuing company will endeavor to mail 10 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:
 Office of Surface Mng, Reclamation & Enforcement
 Brooks Tower, 1020 15th St.
 Denver Colorado 80202

DATE ISSUED 12/9/80

Charles Riddle
 AUTHORIZED REPRESENTATIVE

EXHIBIT II-C
PROOF OF PUBLICATION

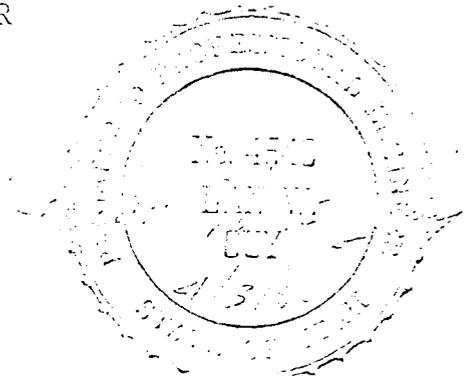
APPENDIX B

(EXHIBITS III-A, B, C, D, E, AND F)

EXHIBIT III-A
SEDIMENTATION AND DRAINAGE CONTROL PLAN

SEDIMENTATION
AND
DRAINAGE CONTROL PLAN
FOR THE
PINNACLE MINE

PREPARED FOR:
TOWER RESOURCES, INC.
BY
DAN W. GUY
REGISTERED PROFESSIONAL ENGINEER
STATE OF UTAH NO. 4548



PLAN FOR CONSTRUCTION AND MAINTENANCE
OF
SEDIMENTATION PONDS

General Description

The Pinnacle Mine is to be located in the Right Fork of Deadman Canyon. This is an ephemeral drainage, flowing only from direct runoff and eventually reaches the Price River some 12 miles to the south. The major drainages in the mine site area are allowed to by-pass the site in natural channels. The projected mine site will have a disturbed area of approximately 2.04 acres. In order to minimize additional sediment loading to the main drainage, it is proposed to collect the runoff from this disturbed area and pass it into 2 separate sedimentation ponds. The majority of the runoff from the undisturbed areas in the vicinity of the mine site will be unaltered and allowed to pass through the natural channels. One small area will be drained by a temporary diversion along the west side of the haul road, and another will be diverted along the west side of the office pad. Berms will be placed on the lower edge of all disturbed areas to prevent runoff from reaching natural drainages before it has passed through the sedimentation ponds.

Pinnacle Mine
Sedimentation Pond Specifications

Location

The proposed ponds are to be located just west of the main drainage of the Right Fork of Deadman Canyon. The sites are located downslope of the disturbed areas to simplify collection of runoff water. (See attached maps)

Design

The proposed ponds are designed to fully contain the expected runoff and sediment load from a 10 year - 24 hour precipitation event in this area. The design has been certified by a registered professional engineer.

Construction

The construction of the ponds will be as per the specifications set forth in the Construction Specifications sheet attached to this plan.

Environmental Considerations

The proposed sites have been chosen not only for effective control of sediment, but also to minimize environmental destruction. These sites will not require any disturbance of the established natural drainage channels in the area.

Capacity

Each pond is designed to contain the runoff and sediment load from a 10 year - 24 hour precipitation event in the area of drainage. In addition, each pond has an overflow capacity in excess of that required for a 25 year - 6 hour event.

Pond "A" will have a capacity at overflow of 1.05 acre-ft. and 1.51 acre-ft. at the spillway. Pond "B" will have a capacity of .15 acre-ft. at overflow and .19 acre-ft. at the emergency spillway.

Safety Precautions

The ponds will be built as per specifications and under supervision of a qualified, registered professional engineer. The structures will be regularly inspected by a licensed individual as required by law. Ponds will be cleaned at minimum when sediment reaches 60% of volume.

Monitoring

Water monitoring stations will be established at the outlet of the ponds. Sample parameters and frequencies shall be as per specification of the NPDES permit.

Maintenance

The ponds shall be inspected after each storm and the sediment cleaned as necessary. In no event shall sediment be allowed to build beyond 60% of pond capacity. Sediment removed shall be stored in an approved location. If the

material is of acceptable quality it will ultimately be used in final reclamation of the area.

Seeding

An approved seed mix will be applied to all feasible disturbed areas in an effort to minimize erosion and sediment loading to the ponds. The proper seed mixture for this area has been obtained through the local BLM.

Culverts

All culverts are shown on the attached maps. Calculations for sizing are also included. It should be noted that all culvert sizes were arrived at and approved through consultation with the DCGM hydrologic engineer.

Calculations

The following sheets reflect the calculations for sizing and details of each separate pond. Attached maps show pond locations and volumes as well as watershed areas.

Pond A

- *1. Use 1.82" for 10 year - 24 hour event
2. Disturbed Watershed = 1.48 acres.
- **3. Runoff Curve No.: CN = 90
4. Area Runoff: Q (in.) = $(P-0.2S)^2 / (P+0.8S)$; Where:
 $S = (1,000/CN) - 10$
 $P = 1.82"$
 Q (in.) = $\frac{[1.82-0.21(1.11)]^2}{[1.82+0.8(1.11)]} =$
 $\frac{2.553}{2.709} = .94$ in. = .0785 ft.
Volume = 1.48 acre x .0785 ft. = .116 acre-ft.
(Direct runoff)
5. Sediment Storage Volume
1.48 acre x 0.1 acre ft./acre = .148 acre-ft.
6. Direct Precipitation into Pond
Area of pond = 0.184 acres
0.184 acres x 1.82 in. x 1/12 ft./in. = .028 acre-ft.
7. Total Required Pond Volume
.116 + .148 + .028 acre-ft. = .292 or .29 acre-ft.
8. Pond Volume @ Outlet = 1.05 acre-ft.
60% Pond Volume (Cleaning Point) = .91 acre-ft.
9. Conclusion. Pond size is adequate to contain the runoff and sediment load from a 10 year - 24 hour precipitation event in the area of drainage to the pond.

- * Source: U.S. Weather Bureau Statistics, obtained through the Price Area BLM office.
- ** Based on Soil Group C (slow infiltration rate) on disturbed surface (equivalent to dirt road). Taken from "Design of Small Dams" by the Bureau of Reclamation, Appendix A, "Estimating Rainfall Runoff from Soil and Cover Data".

Pond B

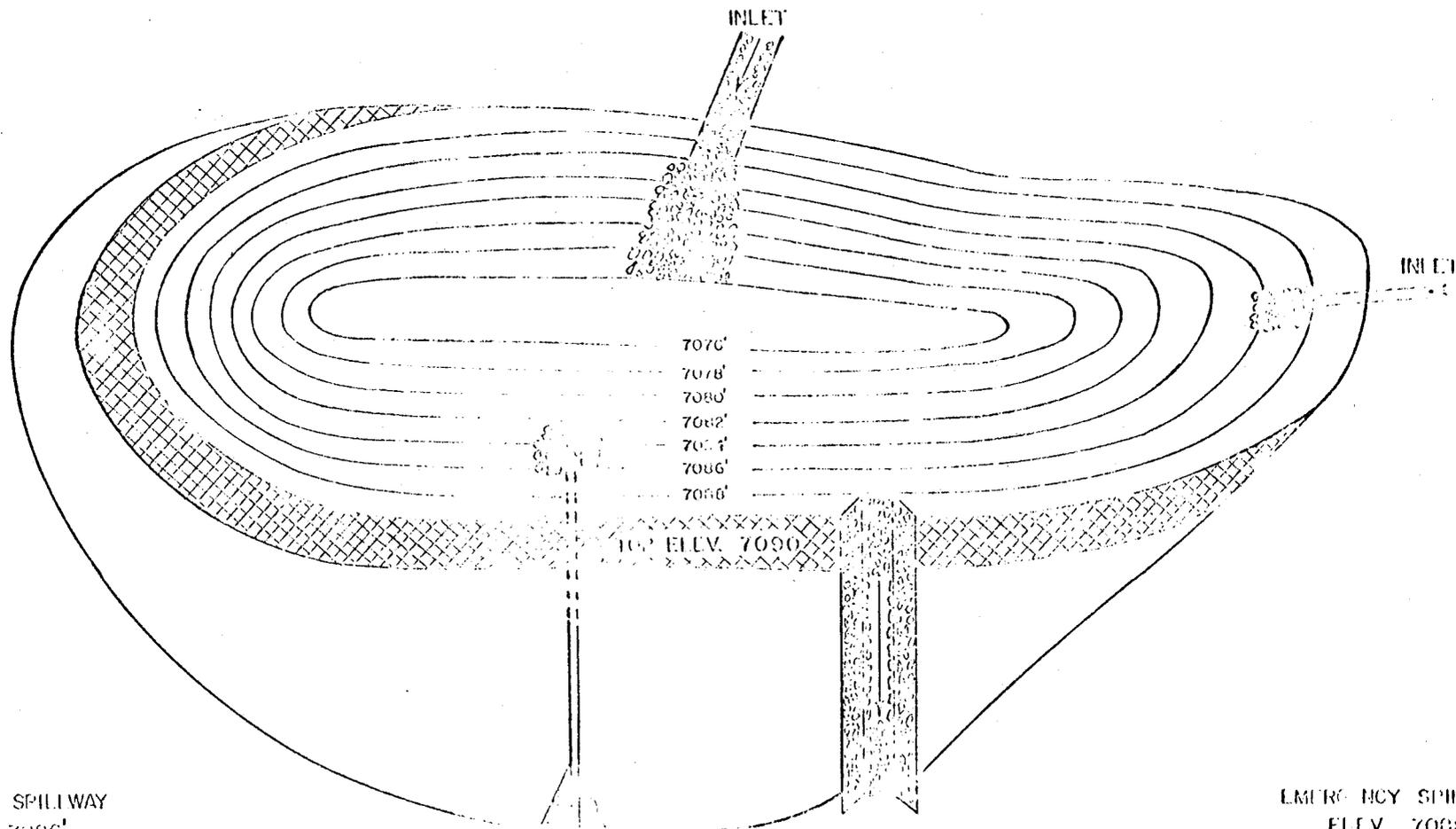
1. Use 1.82" for a 10 year - 24 hour event
 2. Disturbed Watershed = .557 acres
 - *3. Curve No.: CN = 90
 4. Area Runoff: $Q \text{ (in.)} = \frac{(P-0.2S)^2}{(P+0.8S)}$; Where:
 $S = (1,000/CN) - 10$
 $P = 1.82"$
 $Q \text{ (in.)} = \frac{[1.82-0.2(1.11)]^2}{[1.82+0.8(1.11)]} = \frac{2.553}{2,709} = .94 \text{ in.} = .0785 \text{ ft.}$
Volume = .557 acres x .0785 ft. = .044 acre-ft.
(Direct runoff)
 5. Sediment Storage Volume
.557 acres x 0.1 acre-ft./acre = .056 acre-ft.
 6. Direct Precipitation into Pond
Area of Pond = .069 acres
.069 acres x 1.82 in. x 1/12 ft./in. = .010 acre-ft.
 7. Total Required Pond Volume
.044 + .056 + .010 = 0.11 acre-ft.
 8. Pond Volume @ Outlet = .15 acre-ft.
60% Pond Volume = .11 acre-ft.
 9. Conclusion. Pond size is adequate to contain the runoff and sediment load from a 10 year - 24 hour precipitation event in the area of drainage to the pond.
- *Based on Soil Group C (slow infiltration rate) on

disturbed surface (equivalent to dirt road). Taken from
"Design of Small Dams" by the Bureau of Reclamation,
Appendix A, "Estimating Rainfall Runoff from Soil and
Cover Data".

TOWER ENGINEERS, INC.

PRICE, UTAH

DRAINAGE BASIN



PRINCIPAL SPILLWAY
ELEV. 7086'
45,600 CUBIC FT.
or
1.05 ACRE FT. VOLUME

EMERGENCY SPILLWAY
ELEV. 7088'
65,700 CUBIC FT.
or
1.51 ACRE FT. VOLUME

SEDIMENTATION POND 'A'

SCALE 1" = 30'

DATE 3-25-60

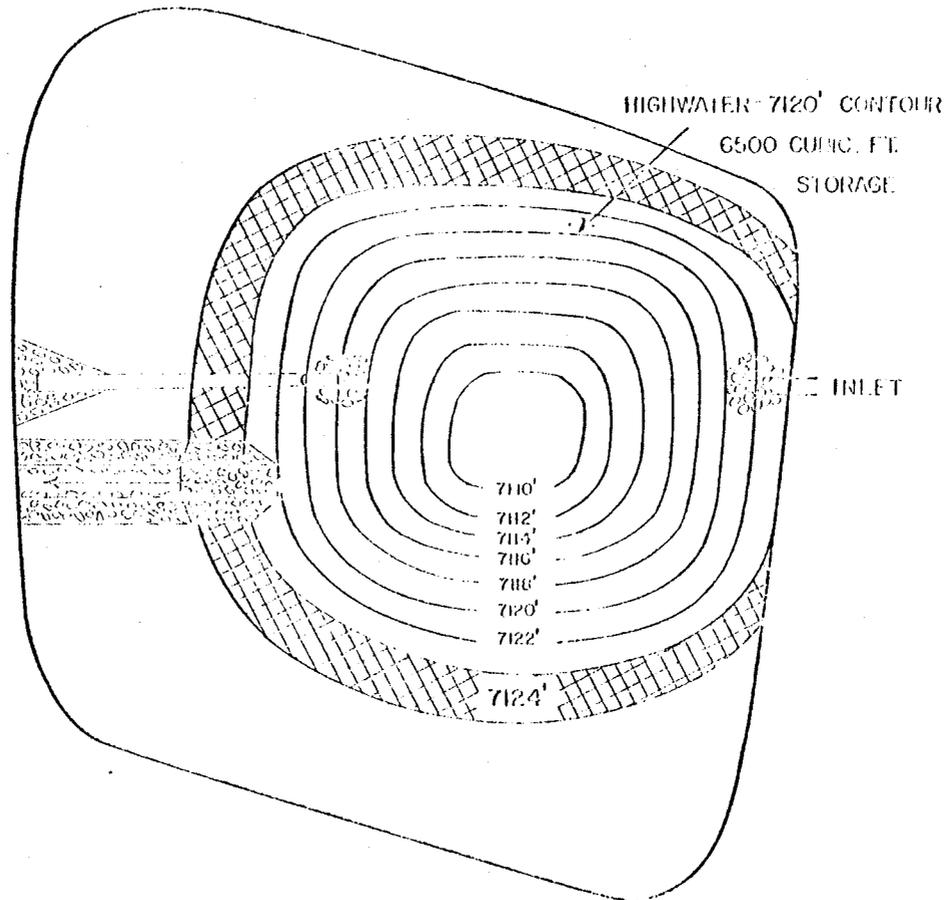
TOWER RESOURCES, INC.

PRICE, UTAH

PIREAGLE MINE

6500 CUBIC FT.
or
.15 ACRE FT.
STORAGE VOLUME
AT OUTLET

8500 CUBIC FT.
or
.19 ACRL. FT.
STORAGE VOLUME
AT OVERFLOW



SEDIMENTATION POND 'B'

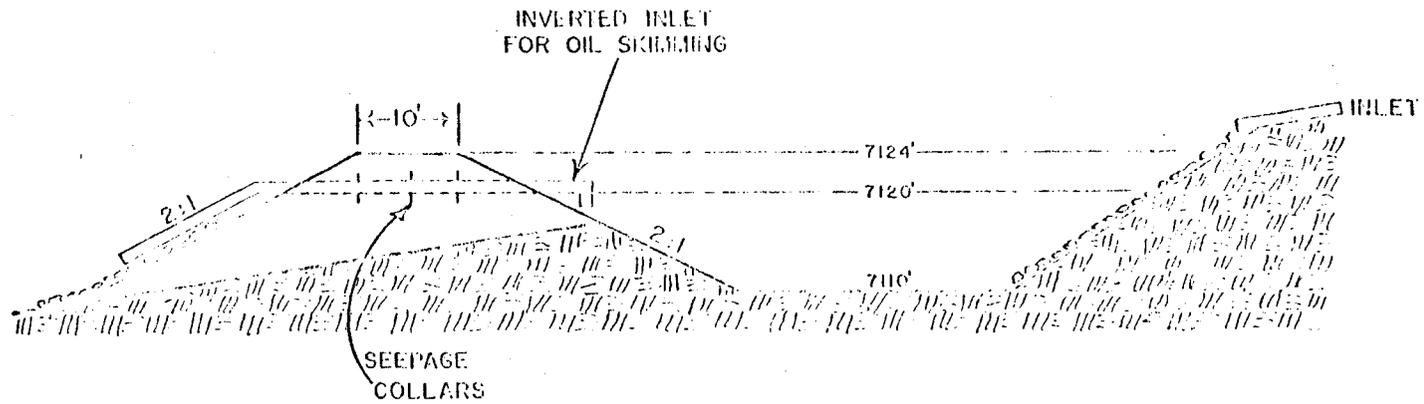
SCALE 1" = 30'

DATE 3-31-80

TOWER RESOURCES, INC.

PRICE, UTAH

PERMIT NO. 10033



POND 'B'

SECTION OF SEDIMENT BASIN

AND

DAM STRUCTURE

SCALE 1"=20'

DATE 7-14-78

TOWNE ENGINEERS, INC.

PRICE, UTAH

PREVIOUS EDITION

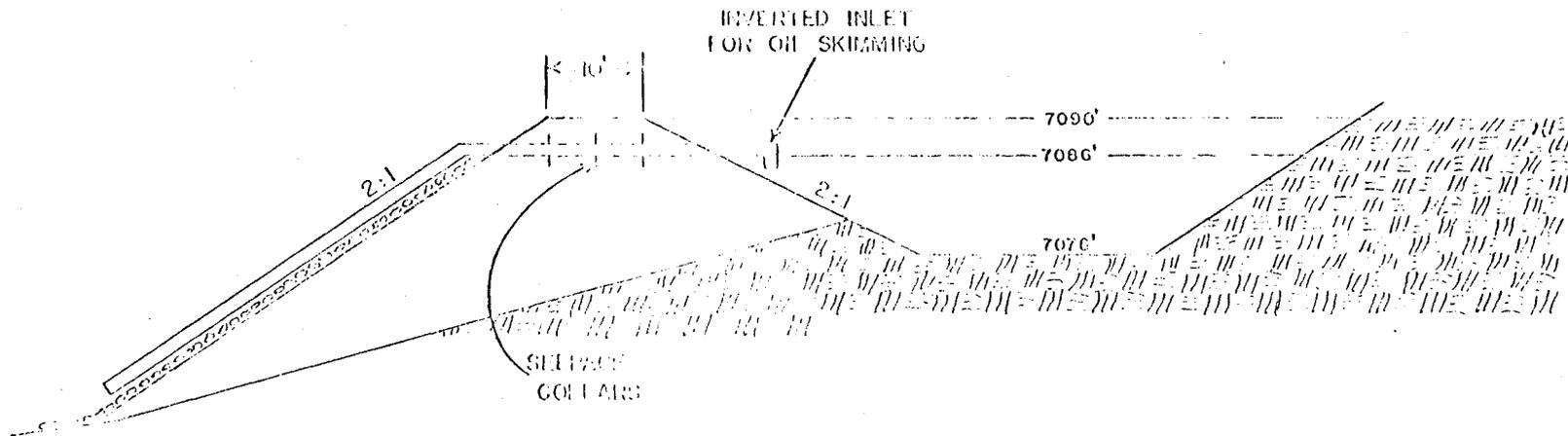


FIGURE 'A'

CROSS SECTION OF SEDIMENT BASIN

AND

DAM STRUCTURE

SCALE 1"=20'

DATE 7-12-78

Construction Specifications

For

Sedimentation Ponds

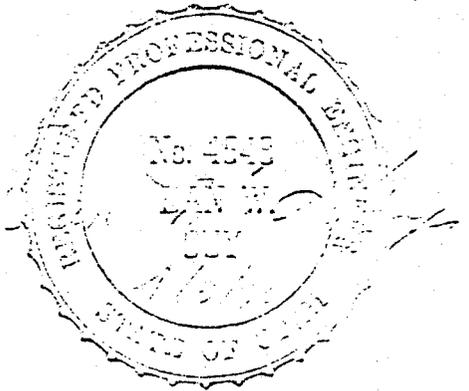
1. All construction of sedimentation ponds will be performed under the direction of a qualified registered professional engineer.
2. Dams shall be constructed with primary overflows 4 ft. from the top, and emergency overflows 2 ft. from the top.
3. The areas of pond construction shall be examined for topsoil, and if present in removable quantities such soil shall be removed separately and stored in an approved topsoil storage location.
4. In areas where fill is to be placed, natural ground shall be removed for at least 12" below the base of the structure.
5. Native materials will be used where practical. Fill will be placed in lifts not to exceed 15" and compacted prior to placement of next lift. Compaction of all fill materials shall be at least 95%.
6. Rip-rap will be placed at all inlets and outlets to prevent scouring. Rip-rap will consist of substantial (non-slaking) rock material of 6" or greater size.
7. Each pond shall be fitted with an inverted inlet to

the primary overflow, to prevent the passage of oil into the discharge.

8. Slopes of the dams shall not be steeper than 2.0:1, inside and outside.

9. Tops and external slopes of the dams shall be planted with an approved seed mix to prevent erosion and promote stability. Compaction of the slopes shall be at least 95%.

10. Top width of dams shall be not less than $(H + 35)/5$.



Pond Discharge Structures

General

Each pond will be fitted with 2 discharge structures - a principle spillway and an emergency spillway. The principle spillways will allow for normal, self dewatering of the ponds before reaching an overflow point. If this principle spillway should become deluged by a massive inflow of water, the second, or emergency spillway will provide for safe discharge of water from the ponds.

Specifications

Principle Spillways - This will consist of an 18" culvert, fitted with an inverted inlet to provide for oil skimming. The inlet will be approximately 1' below water level. The culvert will be located 4' below the top of the dam, and will discharge directly onto a rip-rapped channel leading to the main drainage. This spillway will provide for the normal dewatering of the pond at base capacity.

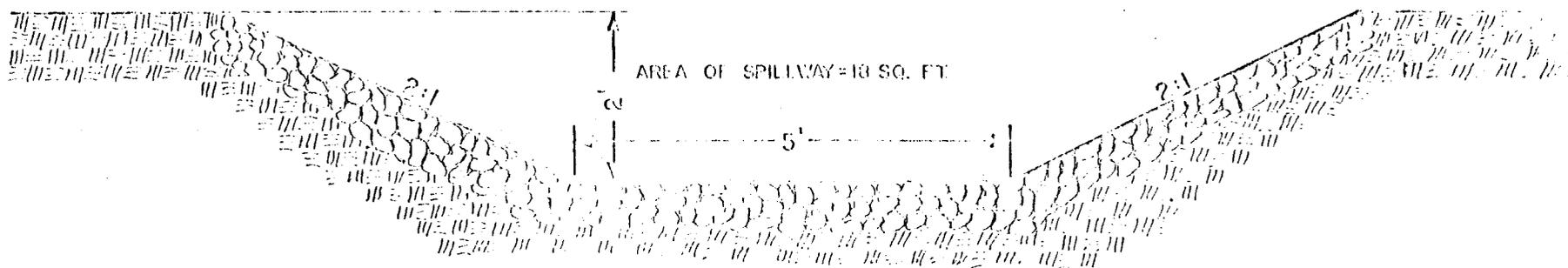
Emergency Spillways - The emergency spillway will be of the open-notch type, with a trapezoidal cross-section. The spillway dimensions will be as shown on the attached sheet. This will be located 2' above the principle spillway and 2' below the top of the dam. This structure will

be rip-rapped through the point of discharge and into the main channel. This spillway will provide an added safety factor to protect the dam in the event of overload on the culvert discharge.

TOWERS IRONWORKS, INC.

PRICL, UTAH

PINNACLE LINE



SECTION OF EMERGENCY SPILLWAY

SCALE 1"=2'

DATE 7-14-78

Calculations

Source for Formulae

B.L.M. State Engineer

Rational Formula

$$QP = Cia$$

QP = Peak Discharge (C.f.s.)

C = Runoff Coefficient (@ 100% runoff, C = 1)

i = Rainfall intensity (in./hr.) for a 25 year - 6 hour storm in Price, i = .255

a = Area (acres)

Manning Equation

$$D = \left(\frac{(2.16Qn)}{\sqrt{s}} \right)^{0.375}$$

D = Diameter (feet)

Q = QP = Peak Discharge (cfs)

n = Roughness factor (0.02 for steel culvert)

s = Slope (0.0556% = 1 foot for 18 feet)

Pond A (Principle Spillway)

1. $QP = Cia; C=1, i=.255, a=1.48$ acre

$$QP = (1) (0.255) (1.48)$$

$$QP = .3774 \text{ cfs}$$

2. $D = \left(\frac{(2.16Qn)}{\sqrt{s}} \right)^{.375}; Q = 0.2774, n = 0.02, \sqrt{s} = 0.2357$

$$D = \left(\frac{(2.16)(.3774)(0.02)}{0.2357} \right)^{0.375}$$

Req. D = .367 ft. = 4.4 inches

Actual D = 1.5 ft. = 18.0 inches

Pond B (Principle Spillway)

1. $QP = Cia; C=1, i=.255, a=.557$

$$QP = (1)(0.255)(.557)$$

$$QP = .142 \text{ cfs}$$

2. $D = \left(\frac{(2.16QN)}{\sqrt{s}} \right)^{.375}; Q = .142, n = 0.02, \sqrt{s} = 0.2357$

$$D = \left(\frac{(2.16)(.142)(0.02)}{0.2357} \right)^{.375}$$

Req. D = 0.25 ft. - 3.0 inches

Actual D = 1.5 ft. - 18.0 inches

Conclusion. The above calculations show the principle discharge structures for each pond to be more than adequate to pass the runoff from a 25 year - 6 hour precipitation event draining to the ponds. Since the emergency spillways have a cross-sectional area of 10 times that of the culverts (18 ft.² vs. 1.77 ft.²) it is obvious that they will be adequate to safely pass much larger events if necessary.

Diversion Structures

General

Diversion ditch locations are shown on the enclosed Surface Facilities Map. The direction of flow is also shown. All diversions are classed as temporary, and will be removed upon final reclamation. One diversion will direct the runoff water from a very small undisturbed area (.95 acres) along the upslope side of the road to a 30" culvert passing natural drainage beneath the road. Another small diversion will direct the runoff from 1.01 acres between the haul road and the lower office pad, southward to a rip-rapped area of natural drainage.

Specifications

Diversions along the upslope side of the road will be as per specifications on the haul road design. At a minimum, these, and any other diversions shown, will meet the minimum size specifications on the attached Diversion Ditch Typical sheet. Diversions are sized to carry the runoff from a 50 year - 24 hour precipitation event in the area.

Maintenance

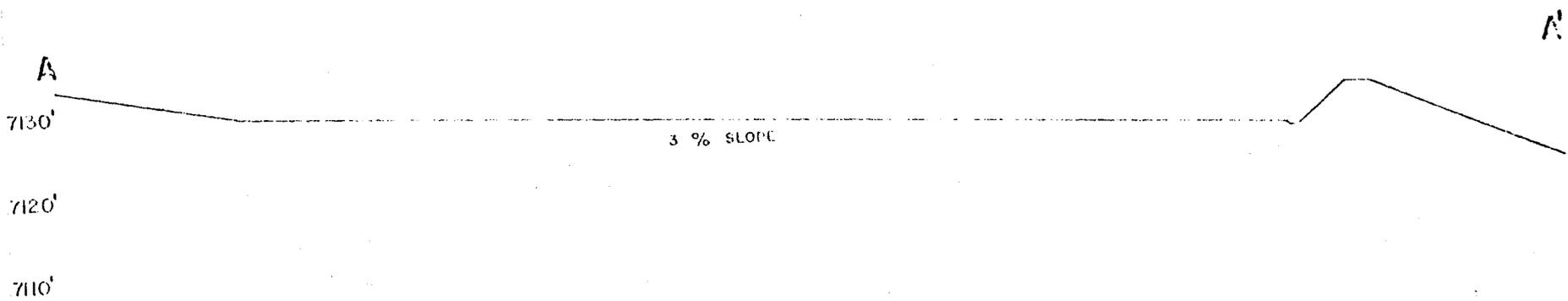
All diversions will be maintained so as to pass the volumes of water for which they were designed. Sluffage will be cleaned out along with regular road maintenance

procedures, and any blockage will be removed as soon as practicable after occurrence. Velocities will be controlled as needed to prevent excessive scouring.

TOWER RECEPTION, INC.

PRICE, UTAH

FINISHED L.S.



SURFACE IRRADIATION PADS

CROSS SECTION A-A'

DATA OBTAINED FROM THE

STANDARD RUNOFF COLLECTION

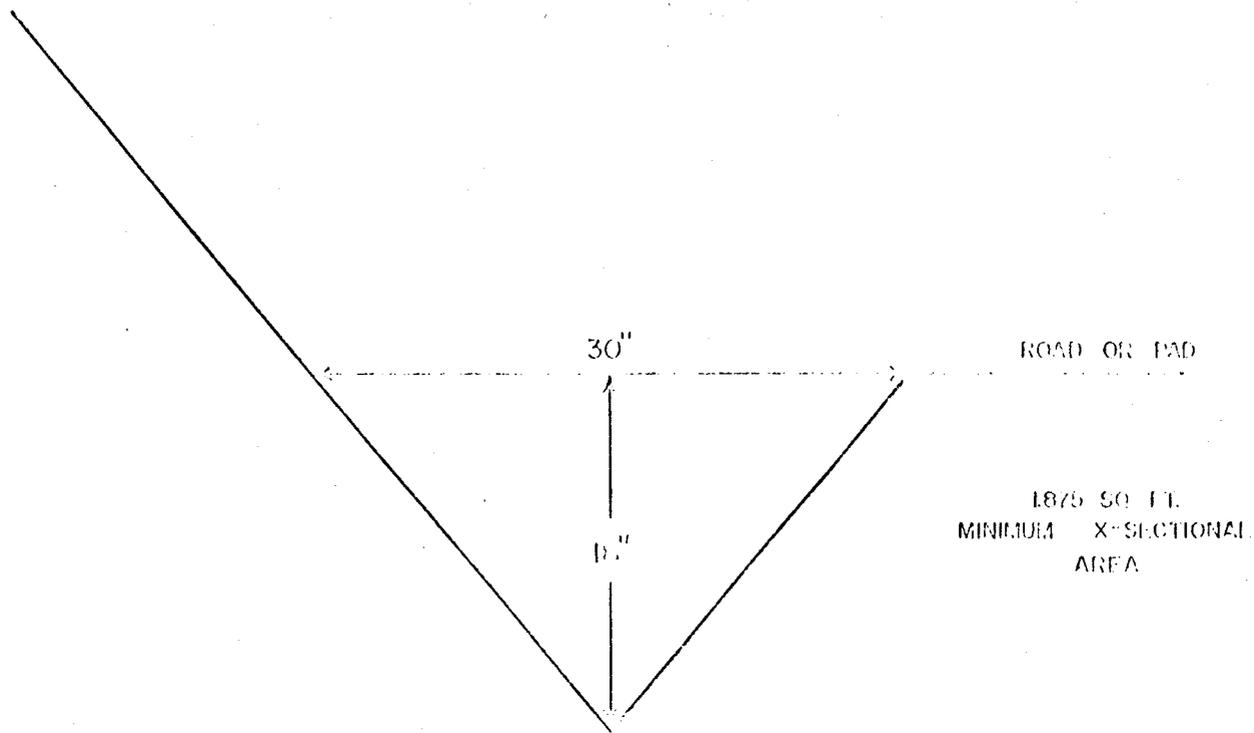
SCALE 1"=20'

DATE 7-11-78

TRUCKEE ROAD, TRUCKEE, 1980.

TRUCKEE, UTAH

TRUCKEE ROAD



DITCH SECTION TYPICAL

SCALE: 1" = 10"

DATE: 3-14-80

Calculations

Road Diversions

1. $QP = Cia; c=1, i=0.103, a=0.95$

$$QP = (1)(.103)(.95)$$

$$QP = .098 \text{ cfs}$$

2. $D = \left(\frac{(2.16Qn)}{\sqrt{s}} \right)^{0.375}; Q = .098, n=0.02, \sqrt{s}=0.2357$

$$D = \left(\frac{(2.16)(.098)(.02)}{0.2357} \right)^{0.375}$$

Req. $D = .22 \text{ feet} = 2.66 \text{ inches}$

3. Since the diversion is passed into an 18" diameter culvert - the culvert is shown to be adequate in size.

The culvert has an area of 1.77 ft.^2 , and all diversions have a minimum of 1.375 ft.^2 cross-sectional area; therefore, diversions are concluded to be adequate to safely pass the required runoff.

Pad Diversion (C-9)

1. $QP = Cia; c=1, i=0.103, a=1.01$

$$QP = (1)(0.103)(1.01)$$

$$QP = 0.104 \text{ cfs}$$

2. $D = \left(\frac{(2.16Qn)}{\sqrt{s}} \right)^{0.375}; Q=.104, n=.02, \sqrt{s}=0.2357$

$$D = \left(\frac{(2.16)(.104)(.02)}{0.2357} \right)^{0.375}$$

Req. $D = .226 \text{ feet} = 2.718 \text{ inches}$

Required area = $.04 \text{ ft.}^2$

3. Using an equivalent area for required size diameter, the 1.875 ft.² area of the diversion is found to be more than adequate to pass the potential runoff.

Culverts

General

Culvert sizes and locations are shown on the attached Watershed Evaluation Map. One additional culvert, C-9, has been added for the pad diversion. Culvert size determinations are shown in the attached sheets for C-9.

Specifics

Culverts will be sized as per the designations on the attached maps, and will be placed to drain on a minimum of .0556% slope (1 ft./18ft.).

Each culvert will be fitted with a trash rack on the inlet to help prevent plugging from washed-in debris.

Each culvert shall discharge onto a protected surface (i.e. rip-rap, conveyor belting, flexible downspouts, or other) to prevent scouring and erosion. The use of energy dissipators shall be employed as necessary to reduce velocities and prevent erosion from culvert discharges.

Maintenance

Culverts shall be inspected regularly, and cleaned as necessary to provide for passage of designed flows.

Inlets and outlets shall also be maintained so as to prevent plugging or undue restriction of water flow.

CULVERT SIZE DETERMINATION

SOURCE:

Bureau of Land Management State Engineer

NATIONAL FORMULA:

$$QP = Cia$$

QP = Peak Discharge (cubic feet per second)

C = Runoff coefficient (@ 100% runoff, C=1)

i = Rainfall intensity (inches per hour) for a 10 year,
24 hour storm in Price i=0.0758

a = area (acres)

MANNING EQUATION

$$D = \frac{2.16Qn^{0.375}}{\sqrt{s}}$$

D = Diameter (feet)

Q = QP = Peak Discharge (cfs)

n = roughness factor (0.02 for steel culvert)

s = slope (0.0556% = 1 foot for 18 feet)

Using the above formulas minimum culvert sizes were calculated based on 100% runoff from a 10 year, 24 hour storm:

<u>CULVERT NUMBER</u>	<u>MINIMUM SIZE</u>	<u>SIZE TOWER WILL USE</u> <u>See Surface Facilities Map</u>
C ₉	8 inch	24 inch

It should be noted that the culvert sizes Tower will use are sufficient for 100% runoff from a 100 year, 24 hour storm in Price.

• CALCULATIONS USED FOR MINIMUM CULVERT SIZES

C_g QP = Cia, C=1, i=0.0758, a=21.64 acre

QP = (1)(0.0758)(21.64)

QP = 1.64

D = $\frac{2.16Qn^{0.375}}{\sqrt{s}}$; Q=1.64, n=0.02, $\sqrt{s}=0.2357$

D = $\frac{2.16(1.64)(0.02)^{0.375}}{0.2357}$

D = .64 feet = 8 inches

EXHIBIT III-B
ELECTRICAL SPECIFICATIONS

TOWER RESOURCES, INC.

ELECTRICAL SPECIFICATION NO. TR-2

DEADMAN CANYON MINE SUBSTATION

I. General

This specification is for the construction of an outdoor permanent substation. This substation will be used to step-down the incoming 46 KV, 3-phase, 60 Hertz power supply from Utah Power and Light Company to a distribution voltage of 4160 volts, 3-phase, 60 Hertz for supplying power to Tower Resources, Inc.'s Pinnacle Coal Mine and surface facilities at the present time. However, the entire substation secondary and mine power distribution system shall be designed, installed, and insulated in accordance with 8 KV specifications to facilitate the future conversion to a 7200 volt mine power distribution system. The substation will also contain a section that will step-down the mine primary distribution voltage (4160 or 7200 volts) to 480 volts, 3-phase, 60 Hertz power for surface power distribution purposes.

All work shall be done in strict adherence to the latest National Electrical Code; Part 77, Code of

Federal Regulations; and all applicable local, state, and federal laws, regulations, and codes. In addition, all applicable spacings and clearances shall conform to the recommendations given in Utah Power and Light Company's Drawing C1501, "Outdoor Substation Clearances", which is attached. The general layout is to be as shown on the conceptual drawing TR-2-1.

II. Definitions

- A. The term "purchase" shall refer to Tower Resources, Inc.
- B. The term "contractor" shall refer to the successful bidder who is constructing the substation.

III. Work By Purchaser

The purchaser will grade and drain substation site; and survey and locate foundations, footers, and pads for the substation structure, power transformers, ground resistor, control transformer, and distribution boxes.

IV. Material Supplied By Purchaser

The purchaser shall supply all major substation components such as power transformers; switchgear; control transformer; grounding resistor; 46 KV load

break switch; 39 KV intermediate type lightning arrestors; 46 KV deadend insulators; S & C SMD-1A, 46 KV fused disconnects and fuse units; 4.5 KV intermediate type lightning arrestors, and 8 KV solid disconnect switches.

V. Material Supplied By Contractor

The contractor shall supply all conduit, conduit fittings, wire and cable, stress cones, terminals, fencing material, steel, and concrete necessary to complete the construction of the substation as specified.

VI. Work By Contractor

A. Grounding

1. A ground field (grid) not exceeding 3 ohms shall be established within the station by means of interconnected driven ground rods. The ground rods shall be copper-clad steel electrodes, 3/4 inch diameter x 12 feet long. A main ground loop shall be constructed by interconnecting the ground rods with stranded, soft-drawn, bare copper wire, size 500 MCM. The main ground loop should follow the fence line as closely as possible with the tops of the ground rods at least 24 inches below finished grade.

2. The main tap from the ground loop to the neutral grounding resistor shall also be stranded, soft-drawn, bare copper wire, size 500 MCM.
3. Taps from the ground loop are to be connected to all columns of the substation metallic structure, to all metallic cases and enclosures within the substation and switchgear house, and to the operating mechanisms and operating handles of all air-break switches within the substation. All of these shall be stranded, soft-drawn, bare copper wire, size 250 MCM.
4. A dual-path ground will be provided for 46 KV and 4.16 KV lightning arrestors, size 2/0 AWG minimum.
5. The fence shall be grounded in accordance with the following specifications and Utah Power and Light Company's Drawing UC-57923-C "Grounding Steel Fence Details" which is attached for reference.
 - a. All corner posts and all gate posts shall be grounded.
 - b. Ground taps at intervals not exceeding 50 feet in length will be placed between corner posts and between gate posts and corner posts.

- c. Gate panels and removable panels will be bonded to ground with flexible straps (shunts).
 - d. All grounds will be extended up the fabric and bonded to each strand of fence.
 - e. All ground taps shall be stranded, soft-drawn, bare copper wire, size 250 MCM minimum.
6. A ground tap shall be provided for the grounded mat located at each grounded operating handle of airbreak switches. Each ground tap shall be stranded, soft-drawn, bare copper wire, size 250 MCM minimum.
7. Ground wire connections to the main ground loop, to the electrodes and to the substation structure shall be by thermit weld. Bolted ground clamps shall be used on all electrical equipment within the substation and switch-gear house.
8. All conduits shall be bonded to panel boards, wire troughs or other metallic enclosures by means of grounding bushings or ground clamps. Bonding is to be provided across all conduit connections that are not fully threaded.

B. Substation Structure Construction

1. The contractor shall supply all materials, fabricate, and erect the heavy guage steel

structure. Outline drawings and instructions pertaining to the construction of the substation structure shall be furnished by purchaser. Note that the drawings are to be used as guidelines only and are not detailed enough to be used as fabrication specifications. The contractor shall be responsible for design, layout, fabrication, and erection of the substation structure. The structure shall be designed on the basis of 1500 lbs. tension per wire $\pm 15^{\circ}$ from straight and 80 MPH wind. The contractor shall be responsible for locating all necessary anchors and/or fasteners within the concrete footers and pads in order to erect the structure. The contractor shall also be responsible for all concrete work associated with the substation construction.

2. The incoming 46 KV, 3-phase, 60 Hertz power line will dead-end on the incoming end of the substation structure with a slack span from the 2-pole terminal structure that will be centered on the substation. The incoming conductors, which are three, single, bare 266.8 MCM ACSR conductors, shall terminate on the line side of the substation incoming-line, air-break

switch. In addition, 1 3/8" EHS Grade B, 7-strand, galvanized steel static wire carried along the overhead power line shall be solidly grounded to the substation structure. The contractor shall be responsible for terminating the incoming line on strain insulators provided by the purchaser and mounted by the contractor. The contractor shall be responsible for providing a means to solidly ground the static wire to the substation structure and to make the connection. The contractor shall supply and install the jumper wires required between the strain insulators and the line-side of the incoming-line, air-brak switch.

3. The purchaser shall supply and the contractor shall install the incoming line switch on the substation structure. This switch shall be a three-pole, gang operated, air-break, load-break, manually operated switch rated at 46 KV and 600 amperes. The switch operating mechanism will be arranged so that the operating handle is located near ground level enabling the switch to be opened and closed from the ground. The switch operating handle shall be grounded as specified previously. A metal mat, grounded as previously specified, shall be provided by

purchaser and installed by contractor. The switch shall be arranged so that it will automatically ground all three phases on the load-side of the switch when fully in "open" position. The contractor shall install this switch and make all necessary connections; including grounds, bus work and wires. The busing will be supplied by the contractor.

4. Lightning arrestors shall be supplied by the purchaser and installed and connected by the contractor on the load-side of the 46 KV incoming line switch. These lightning arrestors shall be rated for at least 40 KV to ground and one shall be provided for each phase (3). All bus work, wiring and grounding shall be installed by the contractor. The contractor will supply the busing. A dual-path ground shall be provided.
5. Three single-pole fused cut-outs shall be provided for transformer protection on the primary (46 KV) side. These fuse cut-outs shall be S & C Electric Company type SMD-1A or equivalent. They shall be rated for at least 46 KV and 200 amperes. Each fused cut-out will be equipped with a 46 KV, 20 ampere current-limiting fuse. These fuse cut-outs will be supplied by the purchaser.

6. The purchaser shall supply and the contractor shall install the 46 KV insulators that are required.
7. The contractor shall furnish and install all 46 KV bus work that is required. All bus work will be copper and all terminations will be for copper-to-copper connections. All terminations will also be furnished by and installed by contractor. Busing shall be copper tubing (IPS).
8. All clearances and spacings in the substation and on the substation structure shall comply with the 1978 National Electrical Code, AIEE standards, and Utah Power & Light Company's Drawing CI501 "Outdoor Substation Clearances" shall be used as a reference. All energized 46 KV parts are to be at least 120 inches above finished ground level. All energized 4160 volt parts are to be at least 111 inches above finished ground level.
9. All 4160 volt bus work within the substation will be copper and will be furnished by and installed by the contractor. All terminations are to be for copper-to-copper connections and will be furnished by and installed by the contractor.

10. Lightning arrestors will be supplied by the purchaser and installed and connected by the contractor as closely as practical to the load-side (4160 volt) of the main transformer. These lightning arrestors will be rated for at least 4160 volts to ground and one shall be provided for each phase (3). A dual-path ground shall be provided. All bus work, wiring and grounding shall be installed by the contractor. The purchaser will supply all bus work that is required.
11. The purchaser shall supply and the contractor shall install all insulators on the 4160 volt side of the substation. All 4160-volt side insulators will be rated for at least 7.5 KV to ground.
12. The purchaser will supply and the contractor will install a 25 KVA, 4160 volt, 120/240 volt, single-phase control power transformer on the 4160-volt end of the substation. All necessary terminals, mounting brackets and associated hardware required for this installation will also be provided by the purchaser. The contractor shall furnish and install enclosed fuse cut-outs on the primary side (4160 volt) of this control transformer. The

fuse cut-outs shall be rated for at least 8 KV and 100 amperes, with fuse links rated at 8 KV and 9.0 amperes.

13. The contractor shall furnish and install an outdoor, NEMA 3R (raintight), 8 pole-space, 100 ampere rated circuit breaker panel. This circuit breaker panel shall be equipped with circuit breakers with the following ratings:

1 - 30 ampere, 2 - pole

2 - 20 ampere, 1 - pole

14. The contractor shall furnish all parts and install a service drop from the 25 KVA control transformer to the circuit breaker panel. This service drop shall consist of a 1½ inch weatherhead; 1½ inch rigid conduit; a 1½ inch weather-tight hub; and the enclosed service conductors which shall be 2 - #2 AWG, type THW, black phase conductors; 1 - #2 AWG, type THW white neutral conductor; and 1 - #6 AWG, bare copper ground wire. Note that the center-tapped neutral shall be grounded to the substation structure ground field.

15. The contractor shall furnish all parts and install a 120 volt, single-phase, auxiliary power outlet on the substation structure column beneath the circuit breaker panel. This

power outlet shall consist of a 20 ampere, 1-pole circuit breaker in the circuit breaker panel; a ½ inch rigid galvanized conduit offset nipple, locknuts, and plastic bushings; the enclosed conductors which shall be 1 - #12 AWG, type THW, black phase conductor; 1 - #12, type THW white neutral conductor; and 1 - #12 AWG, bare copper ground wire; a weather-proof outlet box; a 20-ampere-rated duplex receptacle; a weather-proof cover; and the necessary mounting accessories.

16. The contractor shall supply and install two 200 watt mercury vapor street lights and the power circuits for these lights. The lights shall be mounted on both sides of the 46 KV end of the structure as shown on the attached diagrams. The lights shall be equipped with photocells. The lighting circuit shall consist of a 20 ampere, 1-pole circuit breaker in the circuit breaker panel; ½ inch rigid galvanized conduit; ½ inch weather-proof boxes; and the enclosed conductors which shall be 1 - #12 AWG, type THW, black phase conductor; 1 - #12 AWG, type THW, white neutral conductor; and 1 - #12 AWG, bare copper ground wire.

17. All 120/240 volt control and power circuits, and all 480 volt distribution circuits on the substation structure and located within the substation area shall be enclosed in galvanized rigid conduit and all conductors shall be 600 volt, type THW, copper. All buried conduits shall be coated and sealed with black mastic compound.
18. All 46 KV busing, complete with fittings and terminals, shall be supplied and installed by the contractor. This busing shall be electrical tubing-type copper (IPS) rated at 600 amperes continuous, and braced to withstand the mechanical forces associated with currents up to 10,000 amperes instantaneously. See the attached diagrams.
19. All 8 KV busing, complete with fittings and terminals, shall be supplied and installed by the contractor. This busing shall be 4/0 bare copper, stranded, single-conductor cable suspended from one end of the substation secondary to the other by means of 8 KV strain insulators. See the attached diagrams.
20. The purchaser shall supply and the contractor shall install three (one per phase) non-fused (solid blade) disconnect switches on the

substation structure on the line-side of the mine oil circuit breaker. The contractor shall connect the line-side of these disconnect switches to the secondary busing on the substation and the load-side of the mine oil circuit breaker.

21. The purchaser shall supply and the contractor shall install three (one per phase) fused cut-outs on the substation structure to provide protection and disconnect functions for the surface power transformer bank. The line-side of these fused cut-outs shall be connected to the substation secondary bus work (4160 volts), and the load-side shall be connected to the surface transformer bank. The surface power transformer bank shall provide 480 volt, 3-phase, 60 Hertz power for surface loads. The connections shall be made with 4/0, bare, stranded copper wire. All wire and connectors shall be supplied by the contractor. The voltage rating of the fused cut-outs, insulators, and fuse links shall be at least 8 KV. The current rating of the fused cut-outs shall be 200 amperes and the current rating of the fuse links shall be sized to protect the surface transformer bank and will be specified at a later date.

22. The contractor shall provide mounting brackets at the location shown on the attached diagrams for the installation of the utility company metering cabinet. The contractor shall also provide a beam or other mounting arrangement on the substation structure for installation of the utility company secondary (4160 volt) metering transformers.
23. The contractor shall provide and install a fence that shall completely enclose the substation. The fence shall be in accordance with Utah Power and Light Company specifications, which are attached (page 2 of the attached Utah Power and Light Company "Specifications and Requirements for Customer-Owned Substations- 69,000 Volts and Below"). The most important items of these specifications and additional instructions are listed below.
 - a. The fence is to be of galvanized chain link 7 feet in height with 1 foot extension of barbed wire above for an overall height of 8 feet.
 - b. The fence shall be grounded in accordance with the specifications

for fence grounding previously described in the section of this specification headed "Grounding".

- c. At no point shall the bottom of the fence fabric and bottom of fabric on gates and removable panels be more than 2" above finished grade.
- d. The substation fencing shall not be connected or in contact with any other fencing.
- e. "Danger-High Voltage" signs shall be prominently displayed on all sides of the fence facing outside.
- f. One man gate (3 feet wide) and one equipment gate (10 feet wide overall, consisting of 2 - 5 foot wide gates) shall be provided. The man gate shall be located on the end opposite the high-voltage end of the substation opposite the hillside and near the high-voltage end. These gates shall be constructed of galvanized steel pipe and chain link, and shall be 8 feet high overall. All gates shall be provided with locking provisions to prevent unauthorized entrances.

C. The purchaser shall supply and the contractor shall install the main substation distribution transformer or transformer bank. The substation structure has been outlined to provide the required spacings and clearances for a capacity of up to 5,000 KVA. However, the initial transformers will probably be a bank of three 333 KVA, single-phase transformers (1,000 KVA total capacity). Therefore, the contractor will likely need to provide transformer stands to achieve the required vertical clearance for 46 KV lowest line parts of 120 inches. All transformers shall be equipped with primary and secondary top-mounted bushings for connection to the substation structure equipment and bus work. The contractor shall provide a 4/0 bare copper wire bus extended between 46 KV strain insulators on the substation primary end for connection of the transformer bank primary (46 KV). The contractor shall make all transformer power connections and supply all material except transformer bushing terminals needed to make the connections. The contractor shall install and connect substation ground field taps for each power transformer.

D. The purchaser shall supply and the contractor shall install and wire a neutral current-limiting grounding resistor. The purchaser shall supply and the contractor shall install and wire a neutral current transformer. The neutral current transformer shall be mounted inside the grounding resistor shall be completely enclosed in a galvanized expanded metal enclosure, complete with top-mounted bushings. The contractor shall supply and install a galvanized steel stand that will elevate the grounding resistor such that the height to the exposed terminals above the bushings is at least 111 inches. A ½ inch galvanized rigid conduit shall be provided and installed by the contractor which will initiate at the neutral grounding resistor and terminate at the mine oil circuit breaker. This conduit shall enclose two #12 AWG, type THW conductors that connect to the neutral current transformer and the ground fault relay at the mine oil circuit breaker control panel. The contractor shall connect the line-side of the neutral grounding resistor to the main transformer neutral and the load-side to the mine ground field and mine neutral ground conductor. Refer to the attached diagrams for clarification. The contractor shall also ground the neutral

grounding resistor enclosure to the substation ground field.

- E. The purchaser shall supply and the contractor shall install a mine oil circuit breaker complete with control panel and stand. The vertical clearance to the lowest live part above the finished grade on this oil circuit breaker must be at least 111 inches. This oil circuit breaker shall be equipped with line-side and load-side, top-mounted bushings. The line-side of the circuit breaker shall be connected to the disconnect switches provided on the substation structure. The load-side of the oil circuit breaker shall be connected to an overhead power line extending to the mine portal via the appropriate stand-off and strain insulators mounted on the substation structure. For the purposes of this bid, the contractor shall make the line-side connections as described above. In addition, the contractor shall extend a conductor on each phase from the load-side of the circuit breaker to the stand-off insulators and strain insulator provided on the substation structure, leaving an 18 inch pig-tail for connection to the overhead lines. All interconnecting conductors used to make the connections described above shall be 4/0 AWG, stranded,

bare copper. The contractor shall furnish all parts and materials and install a control power circuit for the oil circuit breaker. This control power circuit shall consist of a 30 ampere, 2-pole circuit breaker in the circuit breaker panel (240 volt, 1-phase, 60 Hertz); ½ inch galvanized rigid conduit, fittings, and mounting accessories; and the enclosed conductors which shall be 2 - #10 AWG, type THW, black phase conductors; and 1 - #10 AWG, bare copper ground wire. The contractor shall solidly ground the mine oil circuit breaker frame to the substation ground field. A neutral ground current transformer circuit to be installed by the contractor has already been specified. A mine power feeder ground monitor circuit must also be installed by the contractor. The contractor shall supply all parts and materials to install this circuit as specified. Note that the ground monitor unit shall be equipped by the purchaser and contained in the mine oil circuit breaker control panel. The ground monitor circuit shall originate at the mine oil circuit breaker control panel and terminate at the mine power feeder ground and pilot wires as described below. This ground monitor circuit shall consist of a ½ inch galvanized rigid conduit, fittings, and mounting accessories; and the

enclosed conductors which are 1 - #10 AWG, type THW, yellow pilot wire, and 1 - #10 AWG, type THW, green ground wire. The yellow wire shall be connected to the mine feeder circuit pilot wire at the point where it leaves the substation structure via a strain insulator accessing it to the overhead power line to the mine. The green wire shall be connected to the mine neutral ground wire on the load-side of the neutral grounding resistor. The contractor shall test, calibrate, and set the oil circuit breaker protective relays and current transformers as specified by the purchaser.

- F. The purchaser shall supply and the contractor shall install a surface power transformer bank. All transformers shall be equipped with top-mounted bushings. The contractor shall make all transformer connections and shall solidly ground the transformer cases to the substation ground field. The transformer bank will very likely consist of three 150 to 200 KVA, single-phase transformers (450 to 600 KVA total capacity). The contractor shall be responsible for achieving the required vertical clearance of 111 inches to live parts on this transformer bank primary (4.15 or 7.2 KV). The contractor shall supply all material

needed to install and connect the surface power transformer bank. The surface power transformer bank shall supply 480 volts, 3-phase, 60 Hertz power to a distribution box located in the substation enclosure. The specifications for this power feeder circuit and the distribution box are given below.

- G. The contractor shall supply all parts, material, and labor to install a 480 volt, 3-phase, 60 Hertz power feeder circuit from the surface power transformer to a 480 volt distribution box that will be specified later. This power feeder circuit shall consist of a 4-inch weatherhead, 4-inch rigid galvanized conduit, necessary 4-inch rigid galvanized conduit fittings, and the enclosed conductors. The conductors are 2-350 MCM, type THW, copper conductors in parallel per phase. This 4-inch conduit shall be solidly grounded to the substation ground field by means of a grounding bushing. This power feeder circuit shall initiate at the surface power transformer secondary terminals and terminate on the line-side of the 600 ampere main breaker at the 480 volt distribution box. The conduit shall be constructed in accordance with acceptable standards for a weatherproof installation. See the attached diagrams for a clarification of the work described above and to determine the relative locations of the transformer bank and distribution box.
- H. The contractor shall supply all materials for and construct a 480 volt distribution box located as shown in the substation on the attached

diagrams. This distribution box shall be constructed of heavy guage steel, and shall be weatherproof and weathertight. All conduits entering the distribution box shall be equipped with weathertight hubs. The incoming power feeder circuit for the distribution box shall terminate on the line-side of the 600 ampere main circuit breaker. The load-side of this main circuit breaker shall be connected to three copper buses (one per phase) by means of 2-350 MCM, type THW, copper conductors. The buses shall be rated at least 600 amperes continuous and braced to withstand the magnetic forces associated with 10,000 amperes of fault current momentarily. The distribution box shall be equipped with 3-225 ampere circuit breakers and 1-50 ampere circuit breaker to supply and protect the 480 volt branch circuits. The 225 ampere circuit breakers shall be used to supply the "Fan", "Belt Drive", and "Bath House and Office". The 50 ampere circuit breaker shall be used to supply a yard lighting circuit. The line-sides of the 225 ampere circuit breakers shall be connected to the phase buses by means of 4/0, type THW, copper conductors. The line-side of the 50 ampere circuit breaker shall be connected to the phase buses by means of #6,

type THW, copper conductors. The distribution box shall be equipped with a copper ground bus extending across the bottom of the box for the entire length of the box. This copper ground bus shall be rated at 600 amperes continuous and shall be solidly grounded to the distribution box frame and to the substation ground field. All circuit breakers shall be standard molded-case, 3-pole, thermal-magnetic trip, 600 volt rated. The box shall be constructed such that all circuit breakers can be operated external to the box, all circuit breakers have lock-out provisions, and all circuit breakers are easily accessible by means of hinged doors which also have locking provisions. The box shall be constructed to provide for enough length for the possible future addition of a 400 ampere circuit breaker.

- I. The contractor shall supply all parts, material, and labor to install the branch distribution circuits, conduit risers, and initial pole (pole C on attached diagrams) for the 480 volt distribution circuits. Rigid galvanized conduits equipped with weathertight hubs shall originate at the distribution box, extend underground to pole C, and extend up pole C by means of rigid galvanized conduit risers and

weatherheads. All buried conduits shall be coated with black mastic compound. Pole C shall be a 40 ft., butt-treated, Class 2 or 3 pole. The contractor shall supply, set, install all necessary hardware on, and supply all hardware on this pole. The branch distribution circuits for the "Fan", "Belt Drive", and "Bath House and Office" shall be protected by 225 ampere circuit breakers at the distribution box; shall be enclosed by 2½-inch rigid galvanized conduits; and shall be fed by 3 - 4/0, type THW, copper phase conductors, and 1 - 4/0, type THW copper ground conductor for each distribution circuit. The 50 ampere lighting circuit shall consist of 2 - #6, type THW, copper phase conductors; and 1 - #6, type THW, copper ground conductor enclosed in 1 inch rigid galvanized conduit. All ground conductors shall originate and be solidly connected to the distribution box ground bus. The conduit risers on the poles shall all terminate with weatherheads and 18-inch pigtaills for all conductors shall extend from the weatherheads for connection to future overhead powerlines. The contractor shall supply and install stand-offs, unistrut, and unistrut clamps for attaching the conduit risers to the pole.

- J. The contractor shall supply all parts, material, and labor to install the necessary hardware and insulators to facilitate the connection of the future mine 4160 volt overhead powerline drop into the substation. The contractor shall extend 4/0, bare, copper conductors for each phase from the mine oil circuit breaker to stand-off insulators provided on the substation structure. A 24-inch pigtail for each phase shall extend from these stand-off insulators for connection to the power drop. Strain insulators shall also be provided on the substation structure for each phase for termination of the future overhead powerline at the substation. A splice shall be made between the stand-off insulator and strain insulator for each phase for final connection of the overhead power line to the mine oil circuit breaker. Similarly, the necessary strain and stand-off insulators shall be provided on the substation structure to facilitate the transition from the substation to the overhead power line for the mine ground conductor and ground monitor (pilot) conductor.
- K. The contractor shall supply all parts, material, and labor to install a mine neutral ground field. This ground field shall at no point be

located less than 25 feet from the substation ground field or structure. In addition, the neutral ground conductor connected to this ground field shall be insulated from the substation structure, substation ground field, and all lightning arrestor grounds. The ground field shall be constructed in accordance with the following guidelines.

1. The mine neutral ground field (grid) shall not exceed 3 ohms and shall be established by means of interconnected driven ground rods. The ground rods shall be copper-clad steel electrodes, 3/4-inch diameter x 12 feet long.
2. A main ground loop shall be constructed by interconnecting the ground rods with stranded, soft-drawn, bare copper wire, size 500 MCM. This main ground loop shall be connected to the tops of the ground rods which shall be located at least 24 inches below finished grade.
3. The main tap from the ground loop shall also be stranded, soft-drawn, bare copper wire, size 500 MCM. This main tap shall extend up a 30 ft. pole provided to extend the neutral ground field conductor into the substation. A 4/0 ACSR

conductor shall extend from this pole to the substation. The necessary strain and stand-off insulators shall be provided on the substation structure to facilitate the connection of this conductor to the mine neutral ground bus in the substation. Note that approved copper-to-aluminum connectors shall be used to make all copper-to-aluminum connections. The contractor shall make all connections required to connect the mine neutral ground field to the substation neutral ground bus. The contractor shall supply all necessary parts, materials, connectors, conductors, insulators, pole, and labor to complete this phase of the project.

4. The initial ground field construction shall consist of digging a 24-inch deep, square trench that is centered on a 30 ft. square. A total of 12 - 3/4-inch x 12 ft. ground rods shall be driven around the square trench on 10 ft. centers. The ground rods shall then be interconnected with wire as previously specified to establish the main ground loop. The connections between the ground rods and wire shall be by thermit

weld. The main tap from the ground loop as previously specified, shall be connected to the ground loop by means of thermit weld. The contractor shall measure the resistance of the ground field upon completion of the above steps. If the resistance of the ground field is 3 ohms or less, the construction is complete and the trenches may be filled and the ground wire connections to the substation completed. However, if the resistance is greater than 3 ohms, additional ground rods must be driven until a measured resistance not exceeding 3 ohms is obtained. Refer to Drawing No. TR-2-2 for a layout of the initial ground field construction and the location of additional ground rods if necessary.

- L. The contractor shall furnish and spread gravel throughout the entire area enclosed by the substation to an average depth of at least 6 inches.

EXHIBIT III-C

WATER WELLS

Zimmerman Well Service

4081 Sunnydale Drive ○ Moab, Utah 84532

Sept. 25, 1980

Tower Resources
Box 1027
Price, Utah 84501

Pump Test on Wells drilled for Tower Resources

Well #1

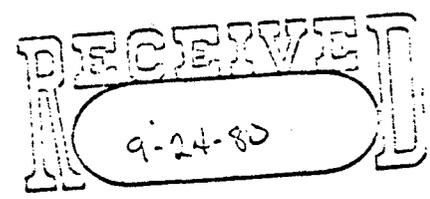
Depth 130' Static water level 58' Drawdown to
67' after 4 Hrs. at 50 GPM.

Well #2

Depth 155' Static water level 57' Drawdown to 88'
after 2 Hrs. at 30 GPM.

Depth 280' Static water level 57' Drawdown 100' after
1 Hr. at 30 GPM.
Was pumping 25 GPM at end of test.

For Tower Resources
P.O. Box 1027
Price, Utah 84501



Lab. No. 1319

Sample ID: Well #1 Pinnacle Mine

Date Rec'd. 08-29-80

Date Sampled 08-29-80

<u>PARAMETER</u>	<u>VALUE</u>	
pH	7.5	
Total Alkalinity	452.6	mg/l CaCo3
Acidity	0	mg/l CaCo3
Chloride	26.4	mg/l
Conductivity	1290	umhos/cm
Hardness (Ca&Mg)	2.54	mg/l CaCo3
Cyanide	*	
Flouride	*	
Nitrogen, Ammonia	*	
Nitrogen, Nitrate	*	
Nitrogen, Nitrite	*	
Phenol	*	
Phosphorus, Ortho	Less than 0.1	mg/l
Phosphorus, Total	Less than 0.1	mg/l
Total Dissolved Solids	846	mg/l
Total Suspended Solids	4.0	mg/l
Sulfate	251.4	mg/l
Turbidity	1.1	NTU
Aluminum	Less than 0.5	mg/l
Antimony	Less than 0.5	mg/l
Barium	Less than 0.2	mg/l
Boron	2680	ug/l
Cadnium	Less than 0.02	mg/l
Calcium	1.0	mg/l
Chromium	0.08	mg/l
Cobalt	Less than 0.05	mg/l
Copper	Less than 0.02	mg/l
Iron, Total	0.04	mg/l
Lead	Less than 0.1	mg/l
Magnesium	14.08	mg/l
Manganese	0.01	mg/l
Molybdenum	*	
Nickel	Less than 0.06	mg/l
Potassium	5.8	mg/l
Silica	8.56	mg/l
Sodium	22.8	mg/l

Respectfully Submitted

For Tower Resources
P.O. Box 1027
Price, Utah 84501

Sample ID: Well #1 Pinnacle Mine

Lab. No. 1319 (cont'd)
Date Rec'd. 08/29/80
Date Sampled 08/29/80

<u>PARAMETER</u>		<u>VALUE</u>	
Cyanide	Less than	0.50	mg/l
Flouride		0.30	mg/l
Nitrogen, Ammonia		0.10	mg/l
Nitrogen, Nitrate		0.36	mg/l
Phenol	Less than	0.10	mg/l
Arsenic		0.7	µg/l
Mercury		3.5	µg/l
Selenium	Less than	0.2	µg/l

Respectfully Submitted 

For Tower Resources
P.O. Box 1027
Price, Utah 84501

Lab. No. 1319 (cont'd)

Sample ID: Well #1 Pinnacle Mine

Date Rec'd. _____

Date Sampled _____

<u>PARAMETER</u>	<u>VALUE</u>		
Vanadium	Less than	0.6	mg/l
Zinc	Less than	0.01	mg/l
Silver	Less than	0.03	mg/l
Arsenic		*	
Mercury		*	
Selenium		*	
Bicarb. Alkalinity		452.6	mg/l CaCo ₃
Carbinate Alkalinity		0	mg/l CaCo ₃

Respectfully Submitted 

For Tower Resources
P.O. Box 1027
Price, Utah 84501

Lab. No. 1327 (cont'd)

Sample ID: Well #2 Pinnacle Mine

Date Rec'd. _____

Date Sampled _____

<u>PARAMETER</u>		<u>VALUE</u>	
Aluminum	less than	0.06	mg/l
Antimony	less than	0.35	mg/l
Barium	less than	0.20	mg/l
Boron		700	ug/l
Cadmium	less than	0.02	mg/l
Calcium		54.50	mg/l
Chromium	less than	0.05	mg/l
Cobalt	less than	0.05	mg/l
Copper	less than	0.03	mg/l
Total Iron	less than	0.05	mg/l
Lead	less than	0.05	mg/l
Magnesium		27.6	mg/l
Manganese	less than	0.01	mg/l
Molybdenum	less than	0.1	mg/l
Nickle	less than	0.04	mg/l
Potassium		12.8	mg/l
Silica		7.49	mg/l
Sodium		39.3	mg/l
Vanadium	less than	0.02	mg/l
Zinc	less than	0.01	mg/l
Silver	less than	0.01	mg/l
Arsenic		1.3	ug/l
Mercury	less than	0.2	ug/l
Selenium	less than	0.2	ug/l
Bicarb. Alkalinity		461.2	mg/l
Carb. Alkalinity		0	

Respectfully Submitted 

For Tower Resources
P.O. Box 1027
Price, Utah 84501

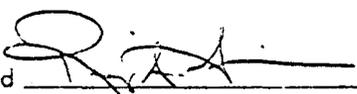
Sample ID: Well #2 Pinnacle Mine

Lab. No. 1327

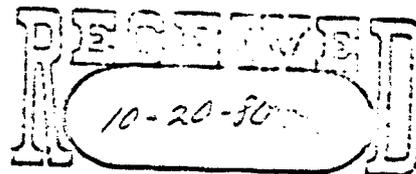
Date Rec'd. 09/11/80

Date Sampled 09/07/80

<u>PARAMETER</u>	<u>VALUE</u>	
pH	7.7	
Total Alkalinity	461.2	mgCaCO ₃ /L
Acidity	-0-	
Chloride	41.0	mg/l
Conductivity	1690	µmhos/cm
Cyanide less than	0.5	mg/l
Flouride	.219	mg/l
Nitrogen, Ammonia	0.50	mg/l
Nitrogen, Nitrate	0.37	mg/l
Phenol less than	0.1	mg/l
Phosphorus, Ortho less than	0.1	mg/l
Phosphorus, Total less than	0.1	mg/l
Total Dissolved Solids	1164	mg/l
Total Suspended Solids	105	mg/l
Sulfate	483.9	mg/l
Turbidity	7.4	NTU

Respectfully Submitted 

For Tower Resources
P.O. Box 1027
Price, Utah 84501



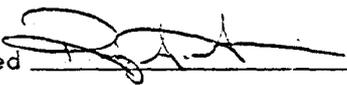
Sample ID: Pinnacle Mine Well #3

Lab. No. 1340

Date Rec'd. 10/02/80

Date Sampled 09/29/80

<u>PARAMETER</u>		<u>VALUE</u>	
pH		8.2	
Total Alkalinity		315.8	mg Ca Co ₃ /L
Acidity		0	
Chloride		58.6	mg/l
Conductivity		2150	umhos/cm
Cyanide	less than	0.5	mg/l
Flouride		0.304	mg/l
Nitrogen, Ammonia		0.18	mg/l
Nitrogen, Nitrate		0.71	mg/l
Nitrogen, Nitrite		*	
Phenol	less than	0.1	mg/l
Phosphorus, Ortho		0.42	mg/l
Phosphorus, Total		0.62	mg/l
Total Dissolved Solids		1791	mg/l
Total Suspended Solids		4.5	mg/l
Sulfate		818.9	mg/l
Turbidity		2.6	NTU
Aluminum	less than	0.06	mg/l
Antimony	less than	0.35	mg/l
Barium	less than	0.2	mg/l
Boron		240	mg/l
Cadnium	less than	0.02	mg/l
Calcium		303.8	mg/l
Chromium	less than	0.05	mg/l
Cobalt	less than	0.05	mg/l
Copper		0.23	mg/l
Total Iron		0.68	mg/l
Lead		0.05	mg/l
Magnesium		41.0	mg/l
Manganese		0.18	mg/l
Molybdenum	less than	0.1	mg/l
Nickle	less than	0.04	mg/l
Potassium		12.9	mg/l
Silica		10.5	mg/l

Respectfully Submitted 

For Tower Resources
P.O. Box 1027
Price, Utah 84501

Lab. No. 1340 (cont'd)

Sample ID: Pinnacle Mine Well #3

Date Rec'd. _____

Date Sampled _____

<u>PARAMETER</u>		<u>VALUE</u>	
Sodium		58.0	mg/l
Vanadium	less than	0.2	mg/l
Zinc	less than	0.01	mg/l
Silver	less than	0.05	mg/l
Arsenic		*	
Mercury		*	
Selenium		*	
Bicarb. Alkalinity		315.8	mg/l
Carb. Alkalinity		0	

* To be reported at a later date.

Respectfully Submitted  _____

EXHIBIT III-D

WASTEWATER DISPOSAL SYSTEM (OFFICE BUILDING)
WASTEWATER DISPOSAL SYSTEM (PINNACLE MINE)

WASTEWATER DISPOSAL SYSTEM
FOR THE
PINNACLE MINE
OFFICE BUILDING

PREPARED FOR:

TOWER RESOURCES, INC.

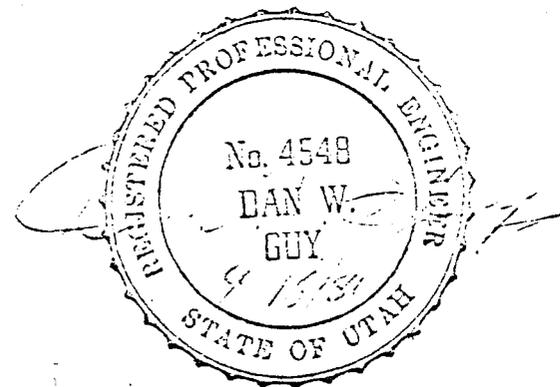
BY

DAN W. GUY

REGISTERED PROFESSIONAL ENGINEER

STATE OF UTAH NO. 4548

APPROVED
FOR THE BOARD OF PROFESSIONAL ENGINEERS
STATE OF UTAH
DATE Sept 17, 1980
Dan W. Guy



PLAN FOR CONSTRUCTION AND MAINTENANCE
OF
WASTEWATER DISPOSAL SYSTEM

General Description

The Pinnacle Mine is to be located in the Right Fork of Deadman Canyon, in Carbon County, some 10 miles northeast of Price, Utah. Due to the remote location, no existing sewage disposal facilities are available; therefore, this submittal encompasses a complete design for wastewater disposal from the office building on site.

Pinnacle Mine
Wastewater Disposal System Specifications

Criteria

The following criteria have been used in the design of this system:

- 1) Office facilities, complete with toilets and drinking fountains will be available.
- 2) Facilities designed for 20 men/day.
- 3) Disposal system designed for 15 gallon/day/man. (Based on average of "day workers at offices" use in Table V-2, of Part V, Small Underground Wastewater Disposal Systems).
- 4) Percolation rate of 17 inches/minute.
- 5) Design is based to comply with standards set forth in the Utah State Division of Health, Code of Waste Disposal Regulations, Part V, Small Underground Wastewater Disposal Systems.
- 6) Design is certified by a registered professional engineer, State of Utah.

Design

The system herein proposed is a septic tank/drainfield type, using proven and approved materials and techniques. It will consist of a wastewater discharge line, a septic tank, and an absorption field.

Location and Installation

Location and installation of the system shall be such that, with reasonable maintenance, it will function in a sanitary manner and will not create a nuisance, health hazard or endanger the quality of any waters of the state. The proposed location of the system is shown on the attached map.

Construction Materials

All materials used in the construction of the system shall be durable, sound and not unduly subject to corrosion. Pipe, pipe fittings and similar materials shall comply with the requirements of the Utah Plumbing Code.

Wastewater Drainage Line

This line will convey wastewater from the office to the septic tank. The following criteria will be followed in the installation of this line:

- 1) It shall be of suitable, approved material and will have watertight and root-proof joints.
- 2) It will have an inside diameter of 4 inches, and will be laid on a minimum grade of 15 inches per 100 feet.
- 3) Cleanouts will be installed every 50 feet and at all changes in direction. Cleanouts will consist of 2-45° bends with cleanout.
- 4) Lines will not be closer than 10 feet horizontally to any water service pipes.

Wastewater Quantity Estimate

Estimates are based on Table V-2, "Estimated Quantity of Domestic Wastewater", Part V, Small Underground Wastewater Disposal Systems, which shows an average of 15 gal/day/person for office day workers. Using the projected manning of 20 people, the estimated daily wastewater will be:

$$20 \text{ men} \times 15 \text{ gallon/man/day} = 300 \text{ gallons/day.}$$

Septic Tank

The septic tank shall be constructed of durable material designed to withstand expected physical loads and corrosive forces. It shall be designed to provide settling of solids, accumulation of sludge and scum, and access for cleaning.

The septic tank herein proposed is a standard, approved concrete type, sold commercially under the name of Duraconcrete. This tank will meet all requirements of Parts V-13 through V-20 of Part V, Small Underground Wastewater Disposal Systems. A detailed drawing of this proposed tank is attached.

Septic tank sizing is based on the requirements of V-15, a., which requires a 750 gallon septic tank for flows less than 500 gallons per day. Since Q is expected to be 300 gallons per day, V=750 gallons. The proposed tank is therefore sized at a 1,000 gallon capacity to allow for an added safety factor.

Discharge Line

The effluent from the septic tank will be conducted to the absorption field, through a watertight line meeting the requirements for house sewers. Outlet inverts will be at least 1 inch below the inlet invert.

Absorption Field

- 1) Soil Exploration: The attached drawing shows a 10' deep soil exploration test in the proposed drainfield area. This test assures at least 4' of soil between the base of the proposed absorption system and bedrock.
- 2) Installation: The field is proposed to be placed level, with all trenches interconnected.
- 3) Sizing: The percolation rate for this area is found to be 17 minutes per inch. A copy of the percolation test report is attached. Based on this rate, an allowable rate of application to the field will be 1.2 gallons per square foot per day, requiring a minimum of 250 square feet of absorption area for the expected wastewater discharge of 300 gallons per day. The proposed field will consist of 2-50' long x 36" wide trenches, separated by a minimum of 7.5' of undisturbed earth (wall to wall). This will provide an absorption area of 345 square feet, including side trenches, slightly

more than required.

- 4) Criteria: The absorption field will consist of gravel filled trenches provided with perforated pipes to distribute septic tank effluent in the gravel fill, from which it will percolate through the trench walls and bottom into the surrounding sub-surface soil.
- a) The portion of the trenches below the distribution lines shall be in natural or acceptably stabilized earth.
 - b) The proposed system will be level, with all trench bottoms constructed at the same elevation. Distribution lines and trenches will be level and interconnected.
 - c) Effluent distribution lines shall be 4" diameter, perforated pipe of suitable material.
 - d) The gravel fill in the trench shall be of $\frac{1}{2}$ " to $2\frac{1}{2}$ " drain rock, and will completely encase the distribution pipe. The gravel will be covered with untreated building paper or straw prior to backfill.
 - e) Heavy equipment will not be driven over the trenches during backfilling or after completion of the absorption field.

Percolation Test

for

Pinnacle Mine

Office Building

The following percolation test was run at 2 points within the proposed drainfield site for the Pinnacle Mine Office Building on Sept. 2, 1980. The test was performed by Mr. Mike Glasson, under the direction of Dan W. Guy, a registered professional engineer, State of Utah.

The test was performed as follows:

- 1) 2 holes were dug in the area of the proposed absorption field. Each hole was 6 inches in diameter, with vertical sides, and dug to the depth of the bottom of the proposed field. Hole locations are shown on the enclosed map.
- 2) The sides and bottom of each hole was roughened, and all loose materials were removed. Two inches of coarse sand were placed in the bottom of each hole to prevent scouring.
- 3) The holes were filled with water greater than 12 inches above the sand, and each hole was kept filled for 4 hours.
- 4) The water level was adjusted to 6 inches over the sand. The drop in water level was then measured from a fixed reference point, at 30 minute intervals for a period of 4 hours. The water level was brought back to a depth of 6 inches after each measurement.

5) The drop during the final 30 minute period was used to calculate the percolation rate.

6) The following table is a tabulation of all measurements:

WEST HOLE #1

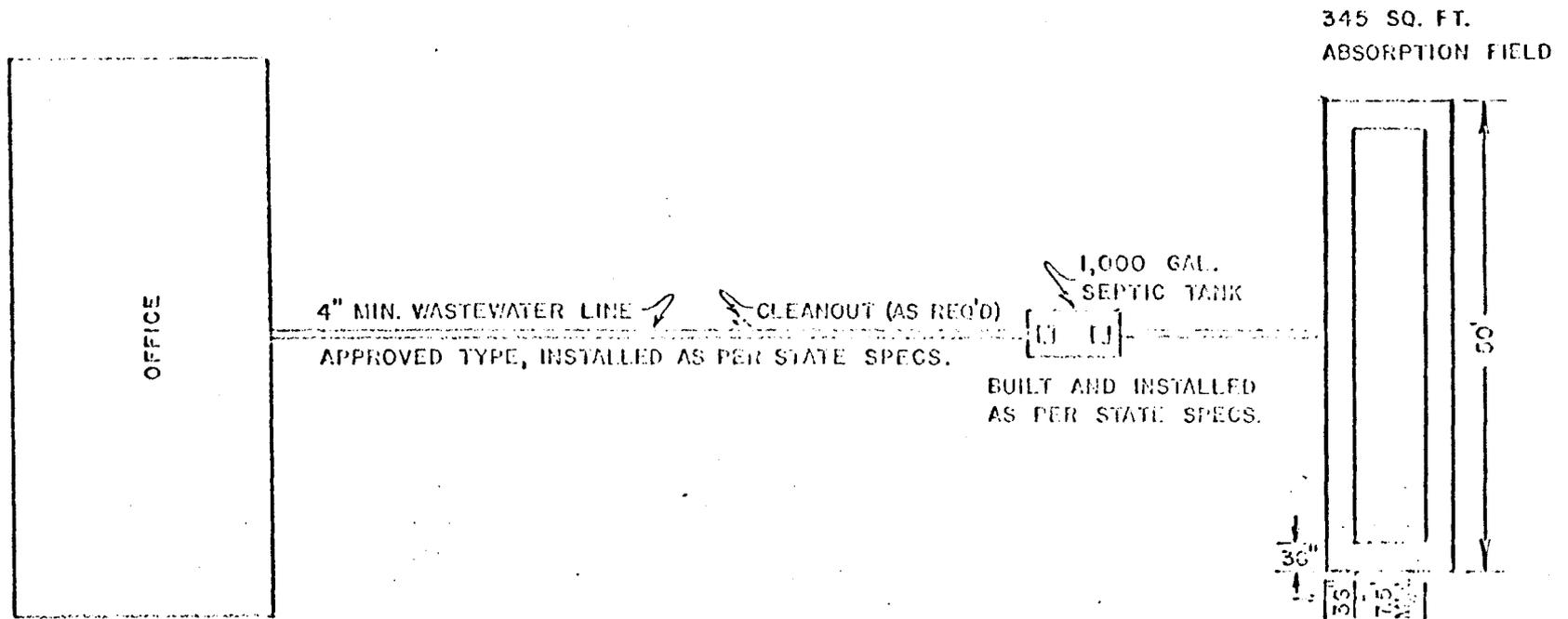
Measurement No.	Time (start 10:15)	Water Level Drop
1	10:45	3-3/8"
2	11:15	3-1/8"
3	11:45	2-5/8"
4	12:15	2-1/8"
5	12:45	1-7/8"
6	1:15	1-3/4"
7	1:45	1-3/4"
8	2:15	1-3/4"

EAST HOLE #2

Measurement No.	Time (start 10:25)	Water Level Drop
1	10:55	3-1/4"
2	11:25	2-3/8"
3	11:55	2-1/4"
4	12:25	2-1/8"
5	11:55	1-7/8"
6	1:25	1-7/8"
7	1:55	1-3/4"
8	2:25	1-3/4"

TOWER RESOURCES, INC.

PIREACLE MINE
OFFICE BUILDING

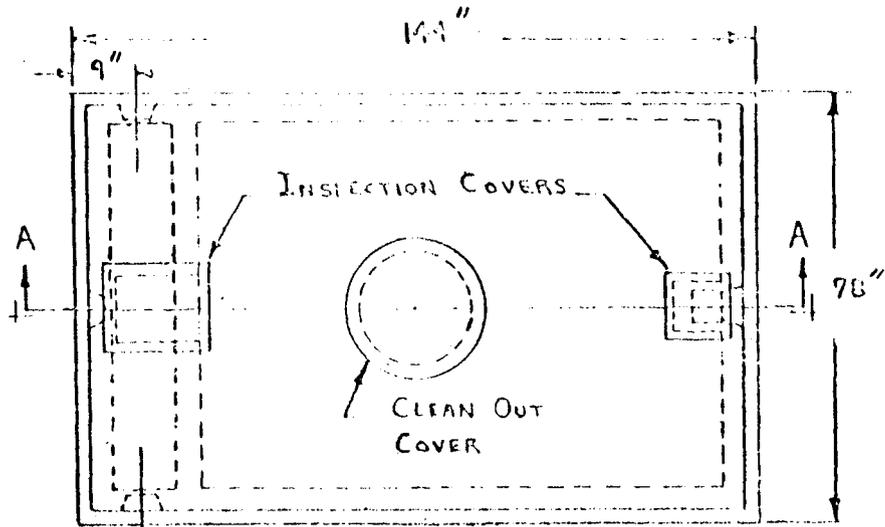


WATER DISPOSAL SYSTEM

DATE: 9-1-80

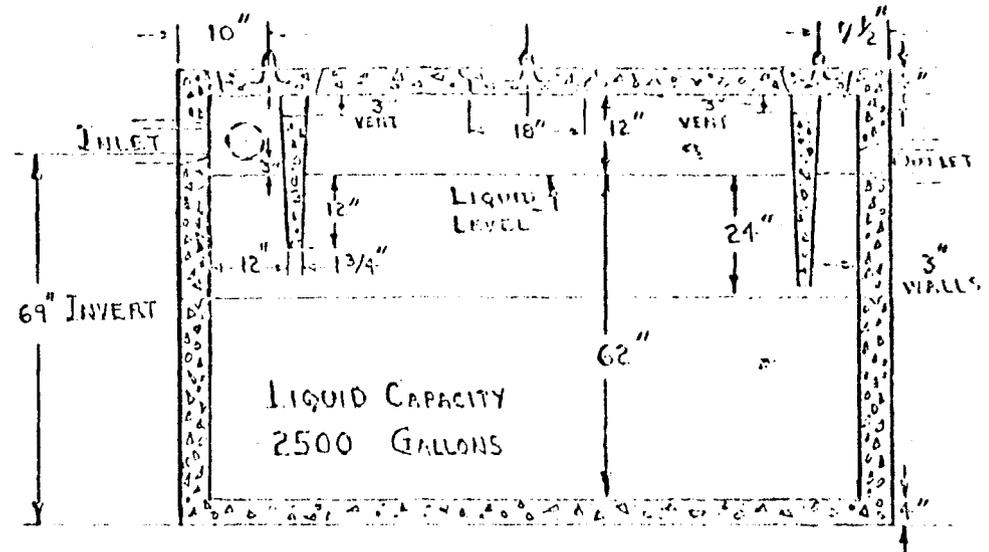
SCALE: AS SHOWN

Sept 17, 1980 *Geoff Stary*



ALT. INLET
KNOCKOUTS 3 PLACES

TOP VIEW

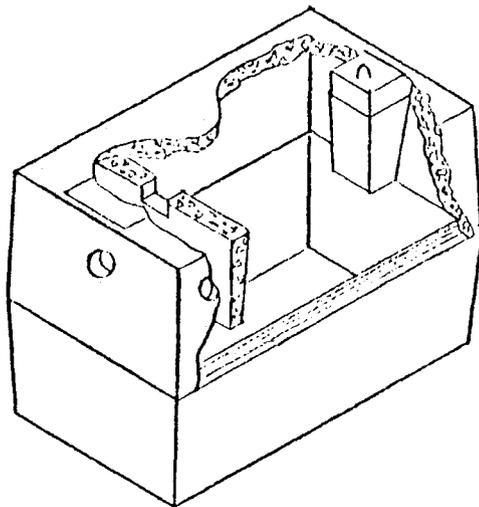


SECTION A-A

NOTE :

- CAPACITY - 2500 GALLONS
- WEIGHT - 28000 POUNDS
- EXCAVATION DIMENSIONS - 9' X 15'
- FLOW LINE - 5'-9"

SEALED WITH ASPHALT ROPE AND REINFORCED WITH 4" X 4" - 4 X 4 WELDED FABRIC



CUTAWAY ISOMETRIC

2500 GALLON - TWO PEICE SEPTIC TANK

SCALE: NONE

APPROVED BY:

DRAWN BY

DATE: 4-29-74

REVISED

DURA - CRETE, INC.

1495 W. 3500 S.

SALT LAKE CITY, U

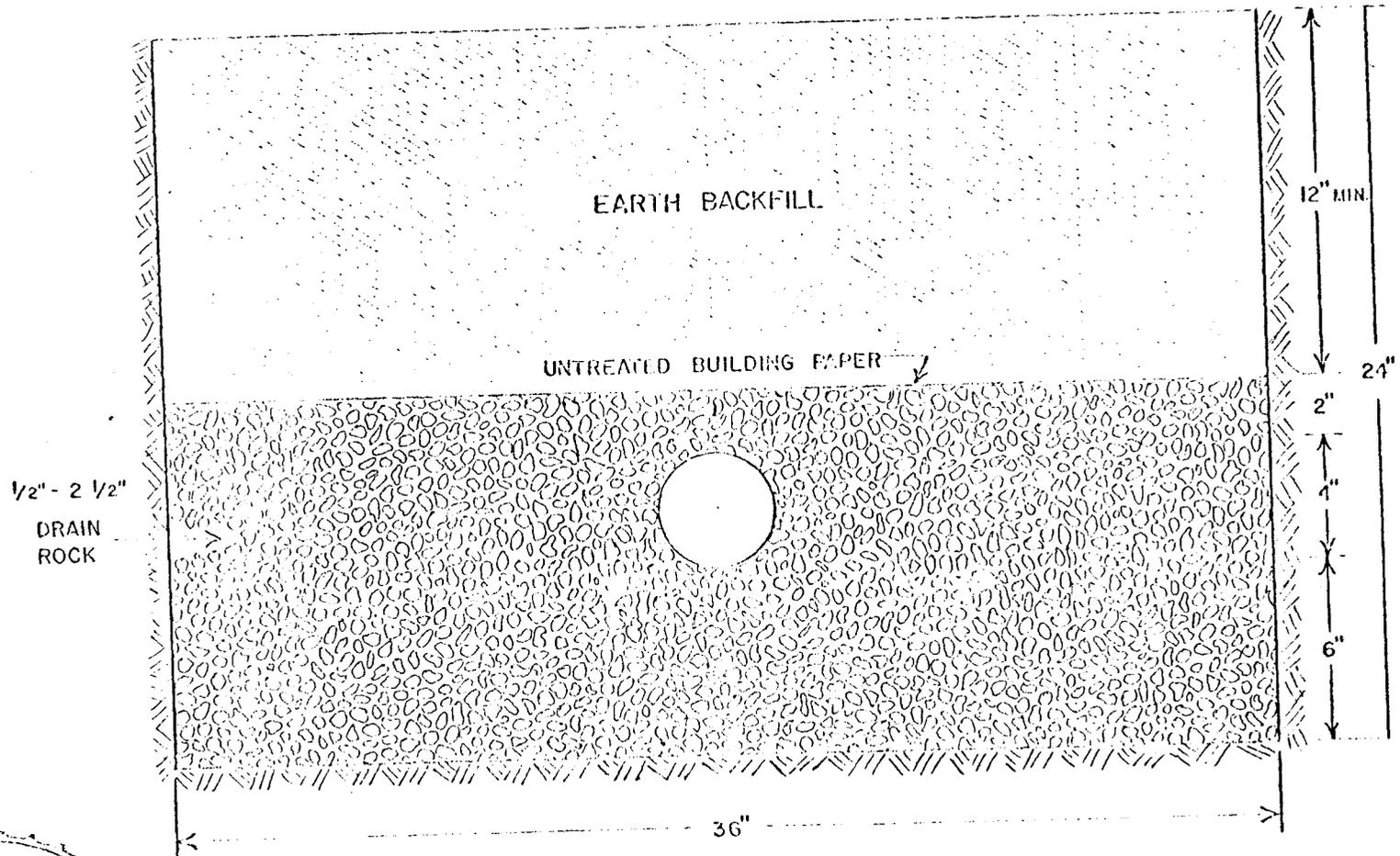
DRAWING TITLE

PHONE NO. 262-1140

TOWER RESOURCES, INC.

PRICE, UTAH

PINNACLE MINE



TRENCH DETAIL

SCALE 1" = 6"
DATE 4-7-80



TOWER RESOURCES, INC.

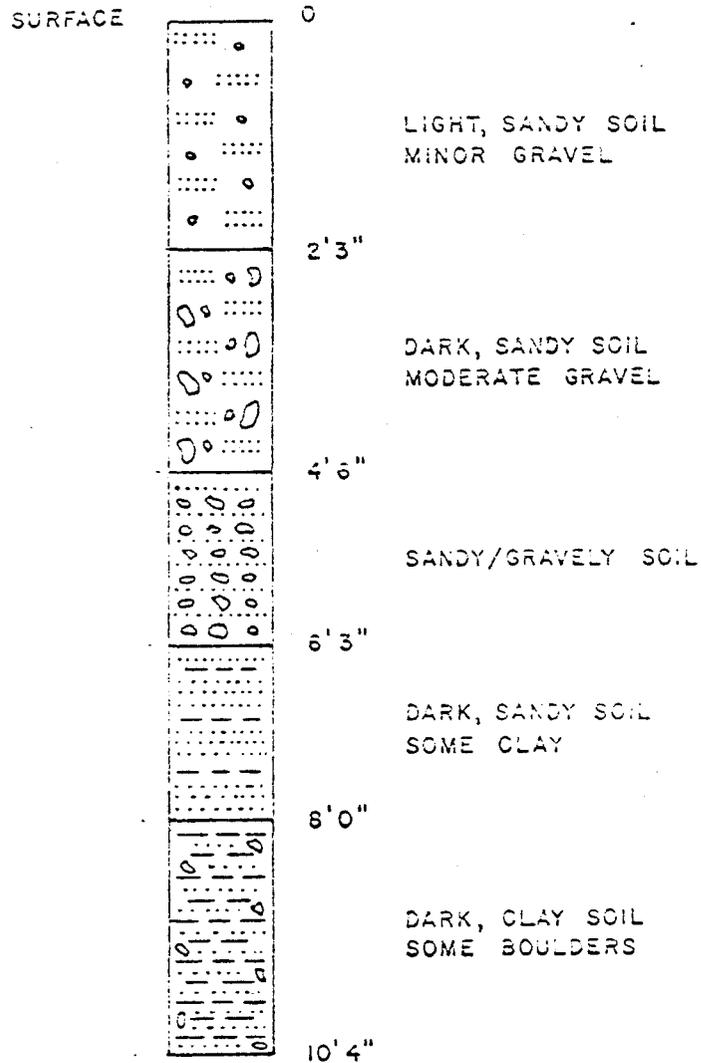
TEST HOLE

AT

DRAINFIELD SITE

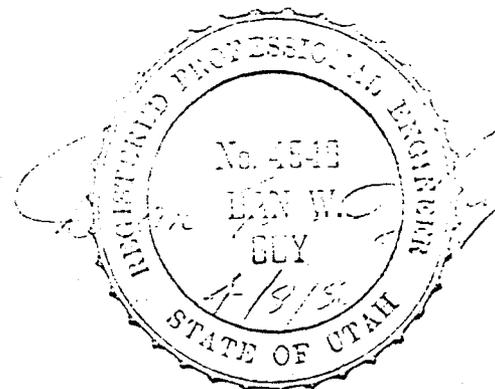
PINNACLE MINE

OFFICE BUILDING



WASTEWATER DISPOSAL SYSTEM
FOR THE
PINNACLE MINE

PREPARED FOR:
TOWER RESOURCES, INC.
BY
DAN W. GUY
REGISTERED PROFESSIONAL ENGINEER
STATE OF UTAH NO. 4548



PLAN FOR CONSTRUCTION AND MAINTENANCE
OF
WASTEWATER DISPOSAL SYSTEM

General Description

The Pinnacle Mine is to be located in the Right Fork of Deadman Canyon, in Carbon County, some 10 miles northeast of Price, Utah. Due to the remote location, no existing sewage disposal facilities are available; therefore, this submittal encompasses a complete design for wastewater disposal on site.

Pinnacle Mine
Wastewater Disposal System Specifications

Criteria

The following criteria have been used in the design of this system:

- 1) Bathhouse facilities, complete with showers, toilets and drinking fountains will be available.
- 2) Facilities designed for 45 men/day.
- 3) Disposal system designed for 35 gallon/day/man. (Based on average of factory use in Table V-2, of Part V, Small Underground Wastewater Disposal Systems).
- 4) Percolation rate of 17 minutes/inch.
- 5) Design is based to comply with standards set forth in the Utah State Division of Health, Code of Waste Disposal Regulations, Part V, Small Underground Wastewater Disposal Systems.
- 6) Design is certified by a registered professional engineer, State of Utah.

Design

The system herein proposed is a septic tank/drainfield type, using proven and approved materials and techniques. It will consist of a wastewater discharge line, a septic tank, and an absorption field.

Location and Installation

Location and installation of the system shall be such that, with reasonable maintenance, it will function in a sanitary manner and will not create a nuisance, health hazard or endanger the quality of any waters of the state. The proposed location of the system is shown on the attached map.

Construction Materials

All materials used in the construction of the system shall be durable, sound and not unduly subject to corrosion. Pipe, pipe fittings and similar materials shall comply with the requirements of the Utah Plumbing Code.

Wastewater Drainage Line

This line will convey wastewater from the bathhouse to the septic tank. The following criteria will be followed in the installation of this line:

- 1) It shall be of suitable, approved material and will have watertight and root-proof joints.
- 2) It will have an inside diameter of 4 inches, and will be laid on a minimum grade of 15 inches per 100 feet.
- 3) Cleanouts will be installed every 50 feet and at all changes in direction. Cleanouts will consist of 2-45° bends with cleanout.
- 4) Lines will not be closer than 10 feet horizontally to any water service pipes.

Wastewater Quantity Estimate

Since no actual figures are available for this operation, discharge quantity has been estimated from discussions with Mr. Gerald Story. This discussion determined an estimated usage of 35 gallons per day per person. Using the projected manning of 45 people, the estimated daily wastewater will be:

$$45 \text{ men} \times 35 \text{ gallon/man/day} = 1,575 \text{ gallons/day.}$$

Septic Tank

The septic tank shall be constructed of durable material designed to withstand expected physical loads and corrosive forces. It shall be designed to provide settling of solids, accumulation of sludge and scum, and access for cleaning.

The septic tank herein proposed is a standard, approved concrete type, sold commercially under the name of Dura-crete. This tank will meet all requirements of Parts V-13 through V-20 of Part V, Small Underground Wastewater Disposal Systems. A detailed drawing of this proposed tank is attached.

Septic tank sizing is based on the following formula:

$V = 1,125 + 75\%Q$. Since Q is expected to be 1,575 gallons per day, $V = 1,125 + 0.75 (1,575)$ or 2,306.25 gallons. The proposed tank is therefore sized at a 2,500 gallon capacity to allow for an added safety factor.

Discharge Line

The effluent from the septic tank will be conducted to the absorption field, through a watertight line meeting the requirements for house sewers. Outlet inverts will be at least 1 inch below the inlet invert.

Absorption Field

- 1) Soil Exploration: The attached drawing shows a 10' deep soil exploration test in the proposed drainfield area. This test assures at least 4' of soil between the base of the proposed absorption system and bedrock.
- 2) Installation: The field is proposed to be placed level, with all trenches interconnected.
- 3) Sizing: The percolation rate for this area is found to be 17 minutes per inch. A copy of the percolation test report is attached. Based on this rate, an allowable rate of application to the field will be 1.2 gallons per square foot per day, requiring a minimum of 1,312.5 square feet of absorption area for the expected wastewater discharge of 1,575 gallons per day. The proposed field will consist of 4-100' long x 36" wide trenches, separated by a minimum of 7.5' of undisturbed earth (wall to wall). This will provide an absorption area of 1,335 square feet, including side trenches, slightly more than

required.

- 4) Criteria: The absorption field will consist of gravel filled trenches provided with perforated pipes to distribute septic tank effluent in the gravel fill, from which it will percolate through the trench walls and bottom into the surrounding sub-surface soil.
- a) The portion of the trenches below the distribution lines shall be in natural or acceptably stabilized earth.
 - b) The proposed system will be level, with all trench bottoms constructed at the same elevation. Distribution lines and trenches will be level and interconnected.
 - c) Effluent distribution lines shall be 4" diameter, perforated pipe of suitable material.
 - d) The gravel fill in the trench shall be of $\frac{1}{2}$ " to $2\frac{1}{2}$ " drain rock, and will completely encase the distribution pipe. The gravel will be covered with untreated building paper or straw prior to backfill.
 - e) Heavy equipment will not be driven over the trenches during backfilling or after completion of the absorption field.

Percolation Test

for

Pinnacle Mine

The following percolation test was run at 2 points within the proposed drainfield site for Tower Resources' Pinnacle Mine on May 2, 1980. The test was performed by Mr. Mike Glasson, under the direction of Dan W. Guy, a registered professional engineer, State of Utah.

The test was performed as follows:

- 1) 2 holes were dug in the area of the proposed absorption field. Each hole was 6 inches in diameter, with vertical sides, and dug to the depth of the bottom of the proposed field. Hole locations are shown on the enclosed map.
- 2) The sides and bottom of each hole was roughened, and all loose materials were removed. Two inches of coarse sand were placed in the bottom of each hole to prevent scouring.
- 3) The holes were filled with water greater than 12 inches above the sand, and each hole was kept filled for 4 hours.
- 4) The water level was adjusted to 6 inches over the sand. The drop in water level was then measured from a fixed reference point, at 30 minute intervals for a period of 4 hours. The

water level was brought back to a depth of 6 inches after each measurement.

- 5) The drop during the final 30 minute period was used to calculate the percolation rate.
- 6) The following table is a tabulation of all measurements:

NORTH HOLE

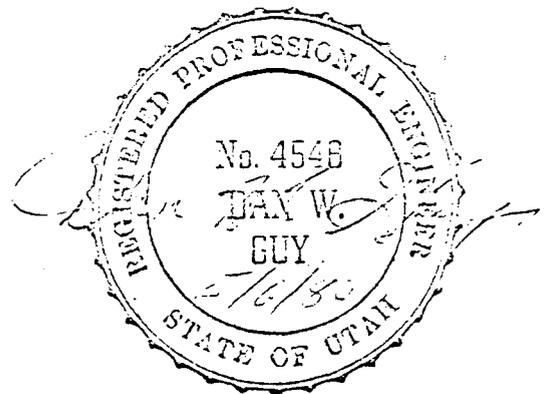
Measurement No.	Time (start 11:42)	Water Level Drop
1	12:12	3-7/8"
2	12:42	3-1/4"
3	1:12	2-7/8"
4	1:42	2-3/8"
5	2:12	1-7/8"
6	2:42	1-3/4"
7	3:12	1-3/4"
8	3:42	1-3/4"

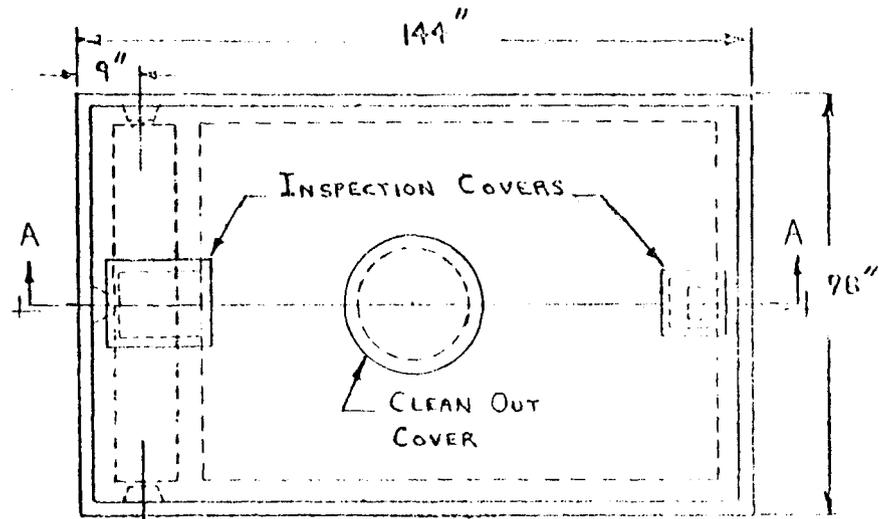
SOUTH HOLE

Measurement No.	Time (start 11:50)	Water Level Drop
1	12:20	3-1/8"
2	12:50	2-5/8"
3	1:20	2-1/4"
4	1:50	2 "
5	2:20	1-3/4"
6	2:50	1-3/4"
7	3:20	1-3/4"
8	3:50	1-3/4"

The preceding table of readings shows a percolation rate of 1.75" per 30 minute period, or a rate of 17.14 minutes per inch. Using the table (Figure V-1) on page 12 of "Small Underground Wastewater Disposal Systems", the allowable rate of application is 1.2 gallons per square foot per day.

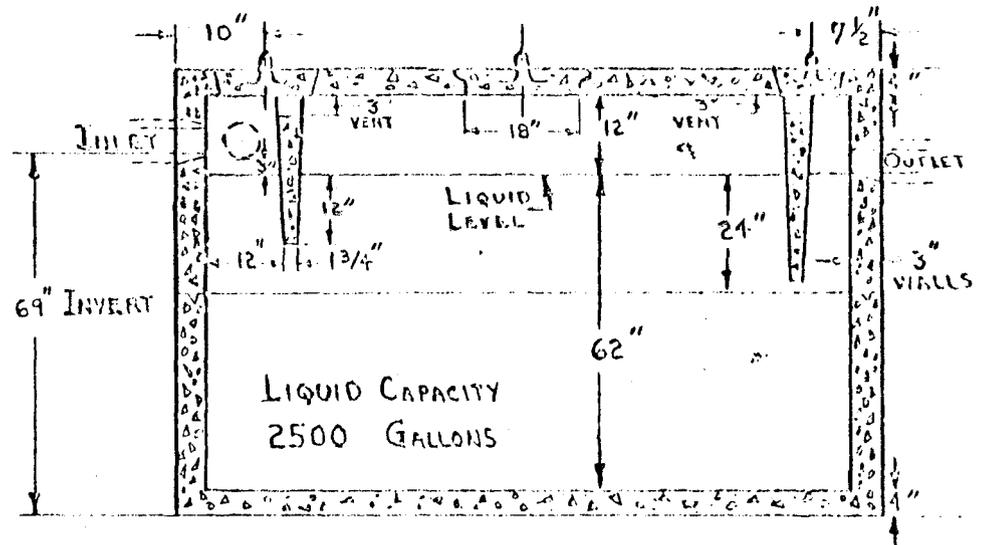
The percolation test was run under the direction of a registered professional engineer, and is hereby certified to be a true and accurate representation of the percolation capabilities of the sites herein described.





ALT. INLET
KNOCKOUTS 3 PLACES

TOP VIEW



SECTION A-A

NOTE :

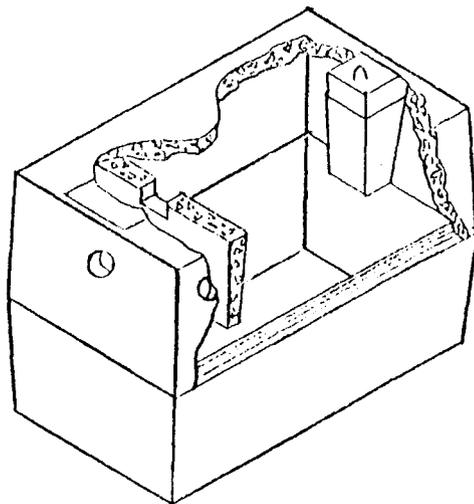
CAPACITY - 2500 GALLONS

WEIGHT - 28000 POUNDS

EXCAVATION DIMENSIONS - 9' X 15'

FLOW LINE - 5'-9"

SEALED WITH ASPHALT ROPE AND REINFORCED
WITH 4" X 4" - 4 X 4 WELDED FABRIC



CUTAWAY ISOMETRIC

2500 GALLON - TWO PEICE SEPTIC TANK

SCALE: NONE

APPROVED BY:

DRAWN BY

DATE: 4-29-74

REVISED

DURA - CRETE, INC.

1445 W. 3500 S.

SALT LAKE CITY, UT.

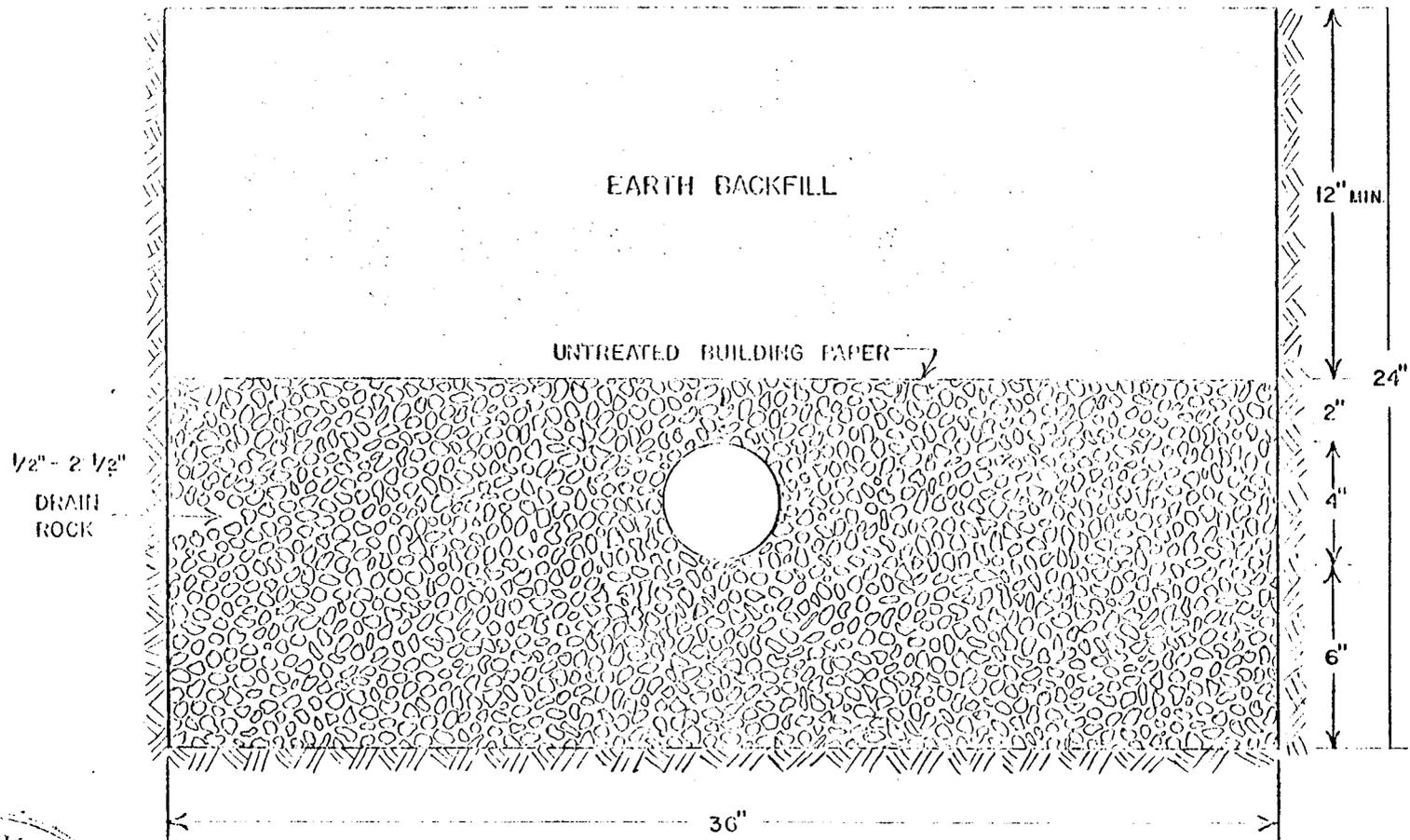
DRAWING NUMBER

PHONE NO. 262-1140

TOWER RESOURCES, INC.

PRICE, UTAH

PINNACLE MINE



TRENCH DETAIL

SCALE 1" = 6"

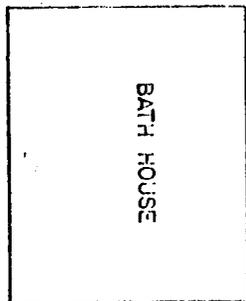
DATE 4-7-80



TOWER RESOURCES, INC.

PRICE, UTAH

PINNACLE MINE

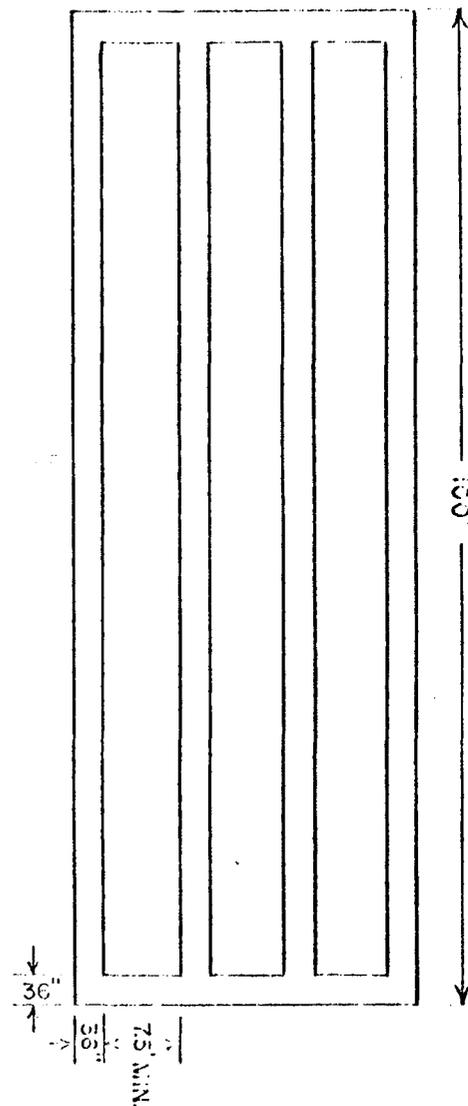


4" MIN. WASTEWATER LINE → CLEANOUT (AS REQ'D)
APPROVED TYPE, INSTALLED AS PER STATE SPECS.

2500 GAL.
SEPTIC TANK
6.5' x 12' x 6.7'

BUILT AND INSTALLED
AS PER STATE SPECS.

1335 SQ. FT. ABSORPTION FIELD



WATER DISPOSAL SYSTEM

DATE: 4-6-80

SCALE AS SHOWN



EXHIBIT III-E
EMISSION INVENTORY

Emission Inventory

Table 1 shows all of Tower's potential Point & Non-fugitive and Fugitive particulate emission sources. These sources were arrived at using EPA's Region VIII interim policy paper. Some of the emission sources described in that paper do not apply to Tower's operation since this inventory is for those surface sources relating to underground mining rather than sources resulting from surface mining operations. Unrelated sources include blasting, overburden & topsoil removal, drilling, overburden & topsoil shaping and topsoil & overburden stockpile erosion.

Sources which relate to Tower's underground mining facility can be controlled to a large degree. Some methods of control which are pointed out in the interim policy paper are: spray systems, enclosures, and minimizing drop distances. This control can be accomplished by maintaining a stockpile which effectively minimizes the drop distance. These controls have efficiencies of anywhere from 25 to 90%.

Table 2 shows the worst case emission sources, the EPA formula used to calculate emissions, the control methods to be used and the control efficiency where:

s = silt content of all weather gravel surface (17%)
or, silt content of coal (8%)

S = average speed traveled over roads (40 mph)

W = wet days per year ≥ 0.01 ppt (37.25)

U = average wind speed (4.13 meters/sec., 9.2 mph)

A = rock & gravel or clay factor (0.025)

I = 38 tpy (rock & gravel) }
47 tpy (clay) } 42.5 tpy

K = 1.0

C = 0.5

L' = 1.0

V' = 1.0

W = vehicle weight in tons, pick up (2.5)

d = dry days per year (327.75)

Y = loader, truck, or railcar capacity
(10, 41, 148 yd³ respectively)

M = moisture content of coal (10%)

Table 3 shows average wind speeds and precipitation for this area, based on U.S. Weather Bureau statistics, gathered at the Price Area Bureau of Land Management Office.

Table 4 shows the potential versus controlled emissions for Tower's 1.5 million tpy mine. Following Table 4 are calculations showing the emission source, the EPA formula used and the potential emissions given in tons per year, lbs. per hour and lbs. per day.

TABLE 1

Emission Inventory

The emissions as related to Tower's underground mining can be subdivided into four major categories, as follows:

A. Coal Handling, Processing and Transportation

1. Fugitive

- a. Haul Roads
- b. Paved Roads

2. Point and Non-fugitive

- a. Conveyor Belts
- b. Crushing
- c. Truck Loading
- d. Truck Dumping
- e. Coal drop (transfer)
- f. Railcar Loading
- g. Screening

B. Wind Erosion

1. Fugitive

- a. Coal Storage Piles
- b. Disturbed Areas

C. Personnel and Support Access

1. Fugitive

- a. Access Roads

D. Road Maintenance

1. Fugitive

- a. Haul Roads
- b. Access Roads

TABLE 2

Worst Case Emission Rates

Emission Source	EPA Formula	Control	Control Efficiency
1. Point & Non-fugitive			
A. Coal Handling			
1. Conveyors	0.05 lbs./ton	} 10% mine run moisture content	40%
2. Transfers	0.15 lbs./ton		
3. Truck Loading	} $0.0018 \frac{(s/5) (U/5)}{(M/2)^2 (Y/6)}$		
4. Truck Dumping			
5. Rail Car Loading			
B. Coal Processing			
1. Crushing			
- a. Primary	0.05 lbs./ton	} covered (enclosed)	90%
b. Secondary	0.15 lbs./ton		
2. Screening	0.15 lbs./ton	water spray	50%

TABLE 2, Continued
Worst Case Emission Rates

Emission Source	EPA Formula	Control	Control Efficiency
2. Fugitive Dust			
A. Haul Roads	$0.81 s (S/30) \frac{(365-W)}{(365)}$ lbs./VMT	Watering @ shift changes	50%
B. Paved Roads	0.01345 lbs./VMT		
C. Wind Erosion			
1. Storage Piles	1.6 u lbs./acre-hr.	Chemical stabilization on dead storage	25%
2. Disturbed Areas	$AIKCL'V'$ tons/acre/year		
D. Access Roads	$5.9 (s/12)(S/30)(W/3) \cdot 8$ (d/365) lbs./VMT	Restrict speed, water @ shift	60%
E. Haul & Access Road Maintenance	32 lbs./hr. grader use	Post maintenance watering	40%

TABLE 3

Precipitation - (days per year with $> 0.01''$)

	1974	1975	1976	1977
Jan.	7	5	0	1
Feb.	1	4	2	2
March	0	4	1	0
April	1	0	3	3
May	0	4	4	9
June	0	9	1	3
July	7	6	4	7
Aug.	2	2	3	6
Sept.	1	4	8	4
Oct.	8	2	2	3
Nov.	2	3	0	2
Dec.	<u>3</u>	<u>1</u>	<u>0</u>	<u>5</u>
	32	44	28	45

avg. = 37.25 (yearly)

Wind Speed (mph)

Jan.	7.2
Feb.	8.2
March	10.5
April	9.8
May	10.2
June	9.3
July	10.3
Aug.	9.3
Sept.	10.6
Oct.	8.4
Nov.	8.7
Dec.	<u>8.3</u>

Avg. = 9.2 mph = 4.13 meters/sec.

Source: U.S. Weather Bureau

TABLE 4

Summary of Potential and Controlled Emissions

1.5 Million Ton per Year

Point and Non-fugitive Sources

"Worst Case"

Point & Non-fugitive Sources	TPY	Potential		Control (%)	Controlled		
		lbs/day	lbs/hr		TPY	lbs/day	lbs/hr
A. Coal Handling							
1. Conveyors	37.5	205.5	8.6	40	22.5	123.3	5.16
2. Transfer	112.5	616.4	25.7	40	67.5	369.84	15.42
3. Truck Loading	0.3	1.6	0.1	--	0.3	1.6	0.1
4. Truck Dumping	0.02	0.1	0.01	--	0.02	0.1	0.01
5. Railcar Loading	0.006	0.04	0.001	--	0.006	0.04	0.001
B. Coal Processing							
1. Crushing							
a. Primary	37.5	205.5	8.6	90	3.75	20.55	.86
b. Secondary	112.5	616.4	25.7	90	11.25	61.64	2.57
2. Screening	112.5	616.4	25.7	50	56.25	308.2	12.85
Totals:	412.83	2261.50	94.4	64	161.58	885.27	36.97

TABLE 4, Continued

"Worst Case"

Fugitive Sources	TPY	Potential		Control (%)	Controlled		
		lbs/day	lbs/hr		TPY	lbs/day	lbs/hr
A. Coal Transportation							
1. Haul Roads	70.0	583.6	24.3	50	35.0	291.8	12.2
2. Paved Roads	2.1	17.5	0.7	--	2.1	17.5	0.7
B. Wind Erosion							
1. Storage Piles							
a. Minesite	6.1	33.3	1.4	25	4.6	25.0	1.1
b. Railroad Loadout	16.5	90.4	3.8	25	12.4	67.8	2.9
2. Disturbed Areas							
a. Minesite	1.2	6.8	0.3	--	1.2	6.8	0.3
b. Railroad Loadout	3.7	20.3	0.8	--	3.7	20.3	0.8
C. Personnel & Support Access							
1. Access Roads	13.1	72.0	3.0	60	5.2	28.8	1.2
D. Road Maintenance							
1. Haul & Access Roads	6.7	36.5	1.5	40	4.0	21.9	0.9
Totals:	119.4	860.4	35.8	43	68.2	479.9	20.1

CALCULATIONS
POINT AND NON-FUGITIVE SOURCES
1.5 MILLION TONS PER YEAR

A. Coal Handling

1. Conveyors

$$EF = 0.05 \text{ lbs./ton} \times 1.5 \text{ million tons/year}$$

$$EF = 75,000 \text{ lbs./year} \div 2,000 \text{ lbs./ton}$$

$$EF = \underline{37.5 \text{ tons/year}} \div 365 \text{ days/year}$$

$$EF = .10 \text{ tons/day} \times 2,000 \text{ lbs./ton}$$

$$EF = \underline{205.5 \text{ lbs./day}} \div 24 \text{ hrs./day}$$

$$EF = \underline{8.6 \text{ lbs./hr.}}$$

2. Coal Transfer

$$EF = 0.15 \text{ lbs./ton} \times 1.5 \text{ million tons/year}$$

$$EF = 225,000 \text{ lbs./year} \div 2,000 \text{ lbs./ton}$$

$$EF = \underline{112.5 \text{ tons/year}} \div 365 \text{ days/year}$$

$$EF = .31 \text{ tons/day} \times 2,000 \text{ lbs./ton}$$

$$EF = \underline{616 \text{ lbs./day}} \div 24 \text{ hrs./day}$$

$$EF = \underline{25.7 \text{ lbs./hr.}}$$

3. Truck Loading (3 locations)

$$EF = .0018 \frac{(s/5)(U/5)}{(M/2)^2(Y/6)} \text{ lbs./ton}$$

Where: s = 8%

U = 9.2 mph

M = 10%

Y = 10 yd³ (loader)

$$\therefore EF = .0018 \frac{(8/5)(9.2/5)}{(10/2)^2(10/6)} \text{ lbs./ton}$$

$$EF = .0001 \text{ lbs./ton} \times 3 \text{ locations}$$

$$EF = .0004 \text{ lbs./ton} \times 1.5 \text{ million tons/year}$$

$$EF = 572 \text{ lbs./year} \div 2,000 \text{ lbs./ton}$$

$$EF = \underline{0.3 \text{ tons/year}} \div 365 \text{ days/year}$$

$$EF = .0008 \text{ tons/day} \times 2,000 \text{ lbs./ton}$$

$$EF = \underline{1.6 \text{ lbs./day}} \div 24 \text{ hrs./day}$$

$$EF = \underline{0.1 \text{ lbs./hr.}}$$

4. Truck Dumping (1 location)

$$EF = .0018 \frac{(s/5)(U/5)}{(M/2)^2(Y/6)} \text{ lbs./ton}$$

Where Y = 41 yd³ (28 ton truck)

$$\therefore EF = .0018 \frac{(8/5)(9.2/5)}{(10/2)^2(41/6)} \text{ lbs./ton}$$

$$EF = .00003 \text{ lbs./ton} \times 1.5 \text{ million ton/year}$$

$$EF = 47 \text{ lbs./year} \div 2,000 \text{ lbs./ton}$$

$$EF = \underline{0.02 \text{ tons/year}} \div 365 \text{ days/year}$$

$$EF = .0001 \text{ tons/day} \times 2,000 \text{ lbs./ton}$$

$$EF = \underline{0.1 \text{ lbs./day}} \div 24 \text{ hrs./day}$$

$$EF = \underline{0.01 \text{ lbs./hr.}}$$

5. Railcar Loading (1 location)

$$EF = .0018 \frac{(s/5)(U/5)}{(M/2)^2(Y/6)} \text{ lbs./ton}$$

Where Y = 148 yd³ (100 ton railcar)

$$\therefore EF = .0018 \frac{(8/5)(9.2/5)}{(10/2)^2(148/6)} \text{ lbs./ton}$$

$$EF = .000009 \text{ lbs/ton} \times 1.5 \text{ million tons/year}$$

$$EF = 12.9 \text{ lbs./year} \div 2,000 \text{ lbs./ton}$$

$$EF = \underline{0.006 \text{ tons/year}} \div 365 \text{ days/year}$$

$$EF = 0.00002 \text{ tons/day} \times 2,000 \text{ lbs./ton}$$

$$EF = \underline{0.04 \text{ lbs./day}} \div 24 \text{ hrs./day}$$

$$EF = \underline{.001 \text{ lbs./hr.}}$$

Total Coal Handling (uncontrolled): 150.33 Tons/year
823.2 lbs./day
34.4 lbs./hr.

B. Coal Processing

1. Coal Crushing

a. Primary

$$EF = 0.05 \text{ lbs./ton} \times 1.5 \text{ million tons/year}$$

$$EF = 75,000 \text{ lbs./year} \div 2,000 \text{ lbs./ton}$$

$$EF = \underline{37.5 \text{ tons/year}} \div 365 \text{ days/year}$$

$$EF = .1 \text{ tons/day} \times 2,000 \text{ lbs./ton}$$

$$EF = \underline{205.5 \text{ lbs./day}} \div 24 \text{ hrs./day}$$

$$EF = \underline{8.6 \text{ lbs./hr.}}$$

b. Secondary

$$EF = 0.15 \text{ lbs./ton} \times 1.5 \text{ million tons/year}$$

$$EF = 225,000 \text{ lbs./year} \div 2,000 \text{ lbs./ton}$$

$$EF = \underline{112.5 \text{ tons/year}} \div 365 \text{ days/year}$$

$$EF = .3 \text{ tons/day} \times 2,000 \text{ lbs./ton}$$

$$EF = \underline{616.4 \text{ lbs./day}} \div 24 \text{ hrs./day}$$

$$EF = \underline{25.7 \text{ lbs./hr.}}$$

2. Coal Screening

$$EF = 0.15 \text{ lbs./ton} \times 1.5 \text{ million tons/year}$$

$$EF = 225,000 \text{ lbs./year} \div 2,000 \text{ lbs./ton}$$

$$EF = \underline{112.5 \text{ tons/year}} \div 365 \text{ days/year}$$

$$EF = .3 \text{ tons/day} \times 2,000 \text{ lbs./ton}$$

$$EF = \underline{616.4 \text{ lbs./day}} \div 24 \text{ hrs./day}$$

$$EF = \underline{25.7 \text{ lbs./hr.}}$$

Total Coal Processing (uncontrolled): 262.5 tons/year
1438.3 lbs./day
60.0 lbs./hr.

B. Coal Processing

1. Coal Crushing

a. Primary

$$EF = 0.05 \text{ lbs./ton} \times 1.5 \text{ million tons/year}$$

$$EF = 75,000 \text{ lbs./year} \div 2,000 \text{ lbs./ton}$$

$$EF = \underline{37.5 \text{ tons/year}} \div 365 \text{ days/year}$$

$$EF = .1 \text{ tons/day} \times 2,000 \text{ lbs./ton}$$

$$EF = \underline{205.5 \text{ lbs./day}} \div 24 \text{ hrs./day}$$

$$EF = \underline{8.6 \text{ lbs./hr.}}$$

b. Secondary

$$EF = 0.15 \text{ lbs./ton} \times 1.5 \text{ million tons/year}$$

$$EF = 225,000 \text{ lbs./year} \div 2,000 \text{ lbs./ton}$$

$$EF = \underline{112.5 \text{ tons/year}} \div 365 \text{ days/year}$$

$$EF = .3 \text{ tons/day} \times 2,000 \text{ lbs./ton}$$

$$EF = \underline{616.4 \text{ lbs./day}} \div 24 \text{ hrs./day}$$

$$EF = \underline{25.7 \text{ lbs./hr.}}$$

2. Coal Screening

$$EF = 0.15 \text{ lbs./ton} \times 1.5 \text{ million tons/year}$$

$$EF = 225,000 \text{ lbs./year} \div 2,000 \text{ lbs./ton}$$

$$EF = \underline{112.5 \text{ tons/year}} \div 365 \text{ days/year}$$

$$EF = .3 \text{ tons/day} \times 2,000 \text{ lbs./ton}$$

$$EF = \underline{616.4 \text{ lbs./day}} \div 24 \text{ hrs./day}$$

$$EF = \underline{25.7 \text{ lbs./hr.}}$$

Total Coal Processing (uncontrolled): 262.5 tons/year
1438.3 lbs./day
60.0 lbs./hr.

Grand Total Non-fugitive (uncontrolled): 412.8 tons/year
2261.5 lbs./day
94.4 lbs./hr.

FUGITIVE SOURCES

1.5 MILLION TONS PER YEAR

A. Coal Transportation

1. Haul Roads

$$EF = 0.81 \text{ s } (S/30) \frac{(365 - W)}{(365)} \text{ lbs./VMT}$$

Where: $s = 0.17$

$S = 40 \text{ mph}$

$W = 37.25$

VMT = vehicle miles travelled

∴ $EF = 0.165 \text{ lbs./VMT}$

@ 8.51 miles and 208 round trips/day

= 3540.16 miles/day

∴ 0.165 lbs./VMT,

$EF = \underline{70.0 \text{ tons/year}}$

$EF = \underline{583.6 \text{ lbs./day}}$

$EF = \underline{24.3 \text{ lbs./hr.}}$

2. Paved Roads

$EF = 0.01345 \text{ lbs./VMT}$

@ 6.26 miles and 208 round trips/day

= 1302.08 miles/day

. . @ 0.01345 lbs./VMT

EF = 2.1 tons/year

EF = 17.5 lbs./day

EF = 0.7 lbs./hr.

Total Coal Transportation (uncontrolled): 72.1 tons/year

601.1 lbs./day

25.0 lbs./hr.

B. Wind Erosion

1. Storage Piles

a. Minesite

EF = 1.6 u lbs./acre-hr.

Where u = 4.13 meters/sec.

. . EF = 6.61 lbs./acre-hr.

@ 8760 hrs./year and .21 acres

= 1839.6 acre-year

. . @ 6.61 lbs./acre-hr.

EF = 6.1 tons/year

EF = 33.3 lbs./day

EF = 1.4 lbs./hr.

b. Railroad Loadout

EF = 1.6 u lbs./acre-hr.

Where u = 4.13 meters/sec.

. . EF = 6.61 lbs./acre-hr

@ 8760 hrs/year and .57 acres

= 4993.2 acre-hrs./year

$$\begin{aligned} & \dots @ 6.61 \text{ lbs/acre-hr} \\ & \text{EF} = \underline{16.5 \text{ tons/year}} \\ & \text{EF} = \underline{90.4 \text{ lbs./day}} \\ & \text{EF} = \underline{3.8 \text{ lbs./hr.}} \end{aligned}$$

2. Disturbed Areas

a. Minesite

$$\text{EF} = \text{AIKCL}'\text{V}'$$

$$\text{Where } A = 0.025$$

$$I = 42.5$$

$$K = 1.0$$

$$C = 0.5$$

$$L' = 1.0$$

$$V' = 1.0$$

@ 2.35 acres

$$\begin{aligned} & \dots \text{EF} = 0.53 \text{ tons/acre/year} \\ & \text{EF} = \underline{1.2 \text{ tons/year}} \\ & \text{EF} = \underline{6.8 \text{ lbs./day}} \\ & \text{EF} = \underline{0.3 \text{ lbs./hr.}} \end{aligned}$$

b. Railroad Loadout

$$\text{EF} = \text{AIKCL}'\text{V}'$$

$$\text{EF} = 0.53 \text{ tons/acre/year}$$

@ 7.0 acres

$$\begin{aligned} & \dots \text{EF} = \underline{3.7 \text{ tons/year}} \\ & \text{EF} = \underline{20.3 \text{ lbs./day}} \\ & \text{EF} = \underline{0.8 \text{ lbs./hr.}} \end{aligned}$$

Total Wind Erosion (uncontrolled): 27.5 tons/year
150.8 lbs./day
6.3 lbs./hr.

C. Personnel & Support Access

1. Access Roads

$$EF = 5.9 (s/12) (S/30) (W/3) \cdot 8 (d/365) \text{ lbs./VMT}$$

$$\text{Where } s = 0.17$$

$$S = 40.0$$

$$W = 2.5$$

$$d = 327.75$$

@ 5.82 miles and 50 round trips/day

$$= 832.8 \text{ VMT/day}$$

$$\therefore EF = 0.09 \text{ lbs./VMT} \times 832.8 \text{ VMT/day}$$

$$EF = \underline{72.0 \text{ lbs./day}}$$

$$EF = \underline{13.1 \text{ tons/year}}$$

$$EF = \underline{3.0 \text{ lbs./hr.}}$$

Total Personnel & Support (uncontrolled): 13.1 tons/year
72.0 lbs./day
3.0 lbs./hr.

D. Road Maintenance

1. Haul & Access Road Maintenance

$$EF = 32 \text{ lbs./hr. grader time}$$

@ one 8 hr. shift/week and 52 weeks/year

$$= 416 \text{ hrs./year}$$

$$\therefore EF = 13,312 \text{ lbs./year} \div 2000 \text{ lbs./ton}$$

$$EF = \underline{6.7 \text{ tons/year} \div 365 \text{ days/year}}$$

$$EF = 0.02 \text{ tons/day} \times 2000 \text{ lbs./ton}$$

$$EF = \underline{36.5 \text{ lbs./day} \div 24 \text{ hrs./day}}$$

$$EF = \underline{1.5 \text{ lbs./hr.}}$$

Total Road Maintenance (uncontrolled): 6.7 tons/year
36.5 lbs./day
1.5 lbs./hr.

Grand Total Fugitive (uncontrolled): 119.4 tons/year
860.4 lbs./day
35.8 lbs./hr.

Grand Total (uncontrolled)
Fugitive & Non-fugitive: 533.1 tons/year
3127.4 lbs./day
130.4 lbs./hr.

EXHIBIT III-F
RECLAMATION COST PROJECTION

COST PROJECTION
FOR
RECLAMATION OF THE
ZIONS FEE

Restoration to the pre-mining land use will require:

<u>JOB DESCRIPTION</u>	<u>Equipment</u>	<u>Hours</u>	<u>Costs</u>
1. Mine Portal area (.282 acres)			
a. Seal portals, remove conveyor, etc.	Loader	8	\$3,000
b. Fill pad	Loader	12	780
c. Contour slope	D-7	8	560
d. compact	Loader	4	260
e. replace topsoil	Loader	6	390
f. grade topsoil	Grader	4	240
g. revegetate	Drill	2	50
h. stake slope	Engineer	4	<u>200</u>
	Total Portal:		\$5,480
2. Roads 1 mile			
a. recontour	D-7	20	\$1400
b. compact	Loader	10	650
c. topsoil	Loader	8	520
d. grade	Grader	8	480
e. revegetate	Drill	4	<u>200</u>
	Total Roads:		\$3150

JOB DESCRIPTION

	<u>Equipment</u>	<u>Hours</u>	<u>Costs</u>
3. Coal Pile Area (.416 acres)			
a. fill pad	Loader	16	\$1040
b. contour slope	D-7	8	560
c. compact	Loader	4	240
d. topsoil	Loader	6	390
e. grade	Grader	4	240
f. revegetate	Drill	2	75
g. stake	Engineer	4	<u>200</u>
	Total Stockpile Area:		\$2,745
4. Seal Wells			
a. remove monitors		8	\$ 400
b. fill, cement		8	<u>400</u>
	Total Wells:		\$800
5. Material Storage & Building Areas (1.6)			
a. remove all structures	5 man crew	120	\$6000
b. recontour	D-7	16	1120
c. compact	Loader	4	260
d. replace topsoil	Loader	8	520
e. grade	Grader	4	240
f. revegetate	Drill	2	<u>300</u>
	Total Material:		\$ 8,340

APPENDIX C
(EXHIBITS IV A, B, C, AND D)

EXHIBIT IV-A

DRILL HOLE LOGS

PROPERTY

(CENTENNIAL COAL ASSOCIATES)

LARSON LEASE

D.H..NO.

#6 (Page 1 of 3)

LOCATION

NW Corner of SE $\frac{1}{2}$ of SW $\frac{1}{2}$
Section 5, T13S, R11E, SLM
Collar Elevation 8558

T.D.

2275

DATE BEGIN

December 9, 1971

DATE COMPLETE

March 22, 1972

LITHOLOGIC LOG

NQ Wireline

E. J. Longyear

INTERVAL

DESCRIPTION

GENERALIZED GEOLOGIC LOG OF DRILL HOLE #6

<u>Depth</u>	<u>Thickness</u>	
0 - 675'	675'	Rock bit. Limestone of Flagstal Formation, sandstones and shales of the North Horn Formation.
675' - 1725'	1050'	Sandstones and shales interbedded, massive, typical of the North Horn, Price River, and Castlegate formations.
1725' - 1756'	31'	Shale, gray to black, often carbonaceous.
1756' - 1756' 10"	0' 10"	<u>Coal</u>
1756' 10" - 1784'	27' 2"	Sandstone, marbled gray to white, with occasional thin, shaley beds.
1784' - 1784' 6"	0' 6"	<u>Coal</u>
1784' 6" - 1798' 10"	14' 4"	Shale, dark gray to black, organic.
1798' 10" - 1802' 9"	3' 11"	<u>Coal - LOWER SUNNYSIDE</u>
1802' 9" - 1879'	76' 3"	Sandstone, gray to marbled-gray and black, medium-grained, generally crossbedded.
1879' - 1881' 2"	2' 2"	<u>Coal - CENTENNIAL SEAM</u>
1881' 2" - 1886' 11"	5' 9"	Shale, Black, carbonaceous.
1886' 11" - 1891' 4"	4' 5"	Shale, gray, sandy, organic.
1891' 4" - 1894' 4"	3' 0"	<u>Coal</u>
1894' 4" - 1918' 8"	24' 4"	Sandstone, marbled gray and white, fine-grained.
1918' 8" - 1928'	9' 4"	Shale, gray.
1928' - 1929'	1' 0"	<u>Coal</u> , dirty, poor quality
929' - 1937'	8' 0"	Shale, light gray to gray, sandy.
1937' - 1956' 6"	19' 6"	Sandstone, marbled gray and white, fine-grained, varved.

PROPERTY

(CENTENNIAL COAL ASSOCIATES)

D.H. NC.

LARSON LEASE

#6 (Page 2 of 3)

LOCATION

NW Corner of SE½ of SW½
Section 5, T13S, R11E, SLM
Collar Elevation 8558

T.D.

2275

DATE BEGIN

December 9, 1971

DATE COMPLETE

March 22, 1972

LITHOLOGIC LOG

NQ Wireline
E. J. Longyear

INTERVAL

DESCRIPTION

Depth	Thickness	
1956' 6"-1958' 6"	2' 0"	<u>Coal</u>
1958' 6"-1975' 6"	17' 0"	Shale, black, carbonaceous with thin coal seams and boney bands.
1975' 6"-1977'	1' 6"	<u>Coal</u>
1977' -1989'	12' 0"	Sandstone, white to dark gray, fine-grained, shaley.
1989 -1995	6' 0"	Shale.
1995' -1998' 10"	3' 10"	<u>Coal</u> - <u>GILSON SEAM</u>
1998' 10"-1999' 1"	0' 3"	Shale, black, carbonaceous, boney.
99' 1"-2005'	4' 11"	Shale, dark gray.
2005' -2006' 7"	1' 7"	<u>Coal</u>
2006' 7"-2025'	18' 5"	Shale, gray, with some carbonaceous matter.
2025' 5"-2028' 10"	3' 5"	Sandstone, white, fine-grained with detrital material.
2028' 10"-2029' 6"	0' 8"	<u>Coal</u>
2029' 6"-2031' 6"	2' 0"	Shale, gray.
2031' 6"-2042'	10' 6"	Sandstone and shale interbedded gray and white, varved.
2042' -2045'	3' 0"	Shale, gray.
2045' -2047' 6"	2' 6"	<u>Coal</u> , boney, poor quality.
2047' 6"-2066' 6"	19' 0"	Sandstone, white to gray, fine-grained, varved.
2066' 6"-2067' 6"	1' 0"	<u>Coal</u>
2067' 6"-2072' 6"	5' 0"	Shale, gray.
072' 6"-2083'	10' 6"	Sandstone, white to gray, fine-grained.
2083' -2100' 6"	17' 6"	Shale, gray to black, contains Pelecypods.

PROPERTY

(CENTENNIAL COAL ASSOCIATES)
LARSON LEASE

D.H..NC.

#6 (Page 3 of 3)

LOCATION

NW Corner of SE½ of SW½
Section 5, T13S, R11E, SLM
Collar Elevation 8558

T.D.

2275

DATE BEGIN

December 9, 1971

DATE COMPLETE

March 22, 1972

LITHOLOGIC LOG

NQ Wireline
E. J. Longyear

INTERVAL		DESCRIPTION
Depth	Thickness	
2100' 6"-2101' 6"	1' 0"	<u>Coal</u>
2101' 6"-2110' 6"	9' 0"	Sandstone, white to gray, fine-grained, shaley.
2110' 6"-2188'	77' 6"	Sandstone, gray, medium-grained, subrounded, crossbedded, 10-15% dark minerals. KENILWORTH SANDSTONE.
2188' -2204' 8"	16' 8"	Shale, gray, sandy.
2204' 8"-2205' 11"	1' 3"	<u>Coal</u>
2205' 11"-2207' 9"	1' 10"	Boney, carbonaceous particles
2207' 9"-2211' 6"	3' 9"	<u>Coal</u>
2211' 6"-2252'	40' 6"	Sandstone, gray and white, very fine-grained, shaley.
2252' -2256' 3"	4' 3"	<u>Coal - LOWER ABERDEEN SEAM</u>
2256' 3"-2275'	18' 9"	Sandstone, gray, medium-grained, crossbedded, 5-7% dark minerals. ABERDEEN SANDSTONE.

} UPPER ABERDEEN

Logged by Samuel Quigley
March 23, 1972

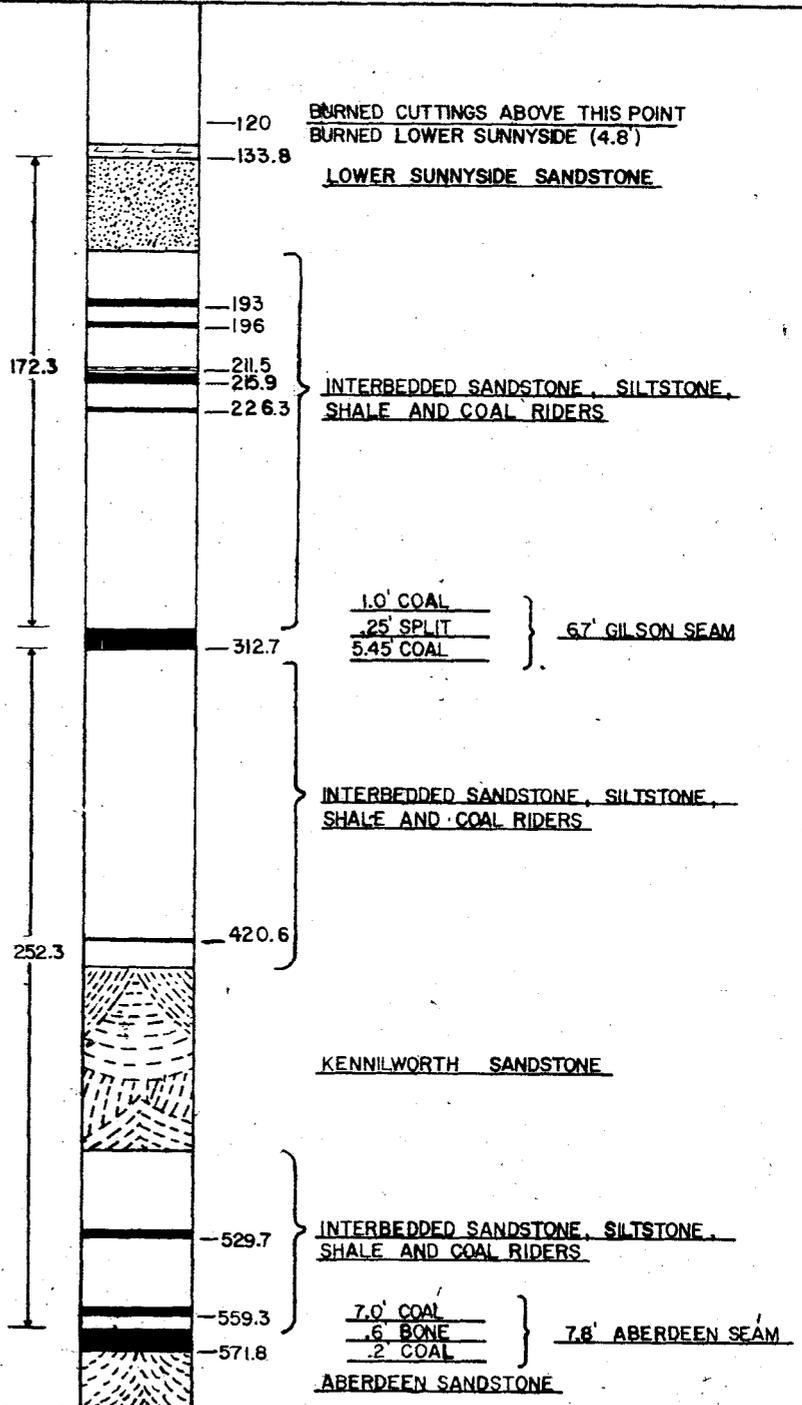
AMCA COAL LEASING INC. - DRILL HOLE LOG
CARBON COUNTY, UTAH

HOLE NO. 77-1-GP
 ELEVATION 7555'
 ANGLE 90°
 BEARING _____
 DEPTH 675'

LOCATION ZIONS FEE
 COORDINATES N 58,000
 E 52,430
 SECTION NE 1/4 SE 1/4 SW 1/4, SEC 7
 T. 13 S, R. 11 E.
 FROM: CENTER 1,140 W
1,415 S

DATE STARTED 10/24/77
 COMPLETED 10/28/77
 LOGGED BY M. GLASSON

SCALE: 1" = 50'

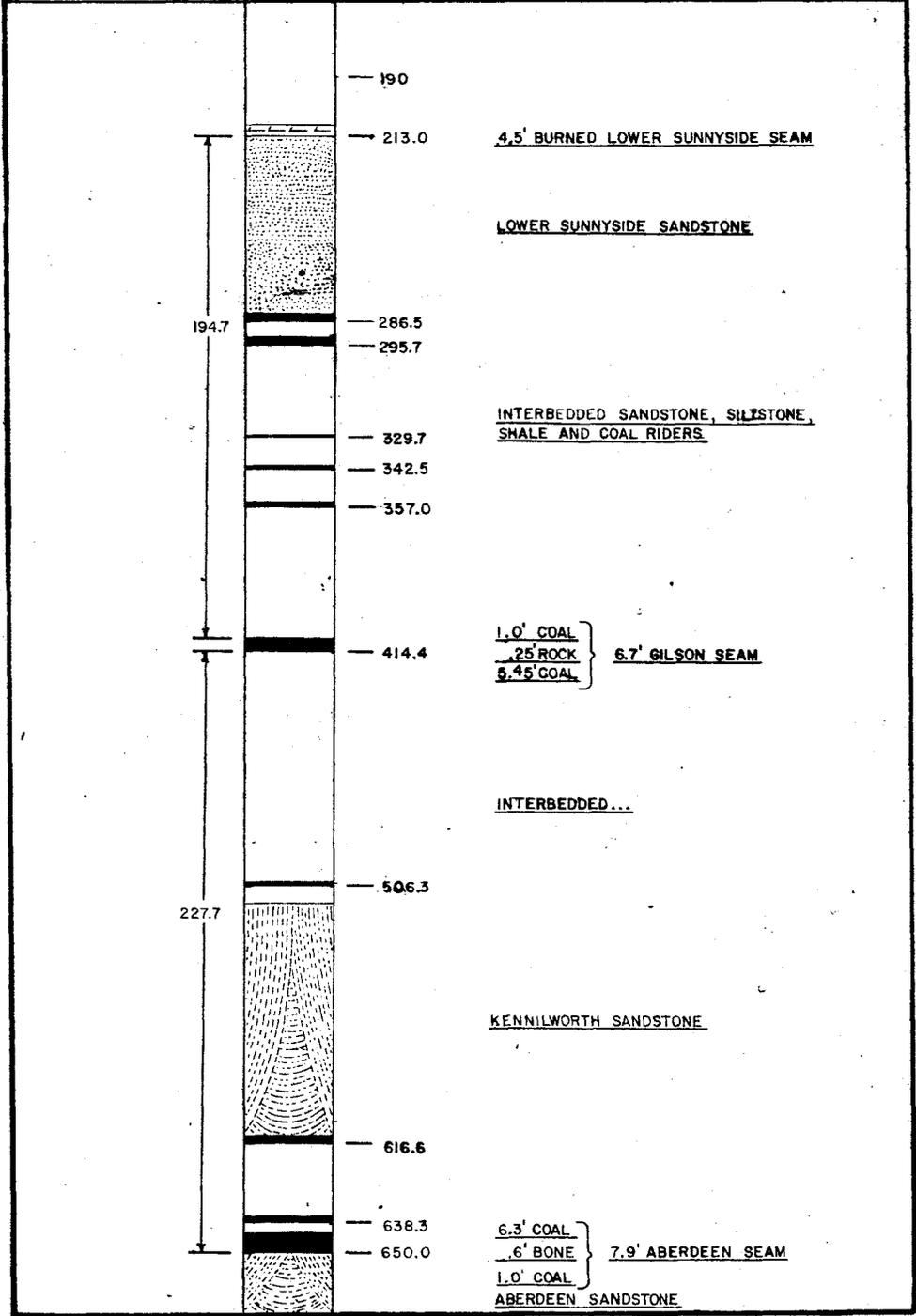


AMCA COAL LEASING INC. - DRILL HOLE LOG
CARBON COUNTY, UTAH

HOLE NO. 77-2-CP
 ELEVATION 7520'
 ANGLE 90°
 BEARING _____
 DEPTH 690'
 DATE STARTED 10-28-77
 COMPLETED 11-2-77
 LOGGED BY M. GLASSON

LOCATION ZIONS FEE
 COORDINATES N. 58,510
 E. 53,200
 SECTION SE 1/4 NE 1/4 SW 1/4 SEC. 7
 T. 13 S, R. 11 E.
 FROM: CENTER - 905' SOUTH
395' WEST

SCALE: 1" = 50'



AMCA COAL LEASING INC. - DRILL HOLE LOG
CARBON COUNTY, UTAH

HOLE NO. 77-3-CP

ELEVATION 7,425'

ANGLE 90°

BEARING _____

DEPTH 866'

LOCATION ZIONS FEE

COORDINATES N. 59,885

E. 53,460

SECTION SE 1/4 SE 1/4 NW 1/4 SEC 7

T. 13 S, R. 11 E.

FROM: CENTER 475' N.

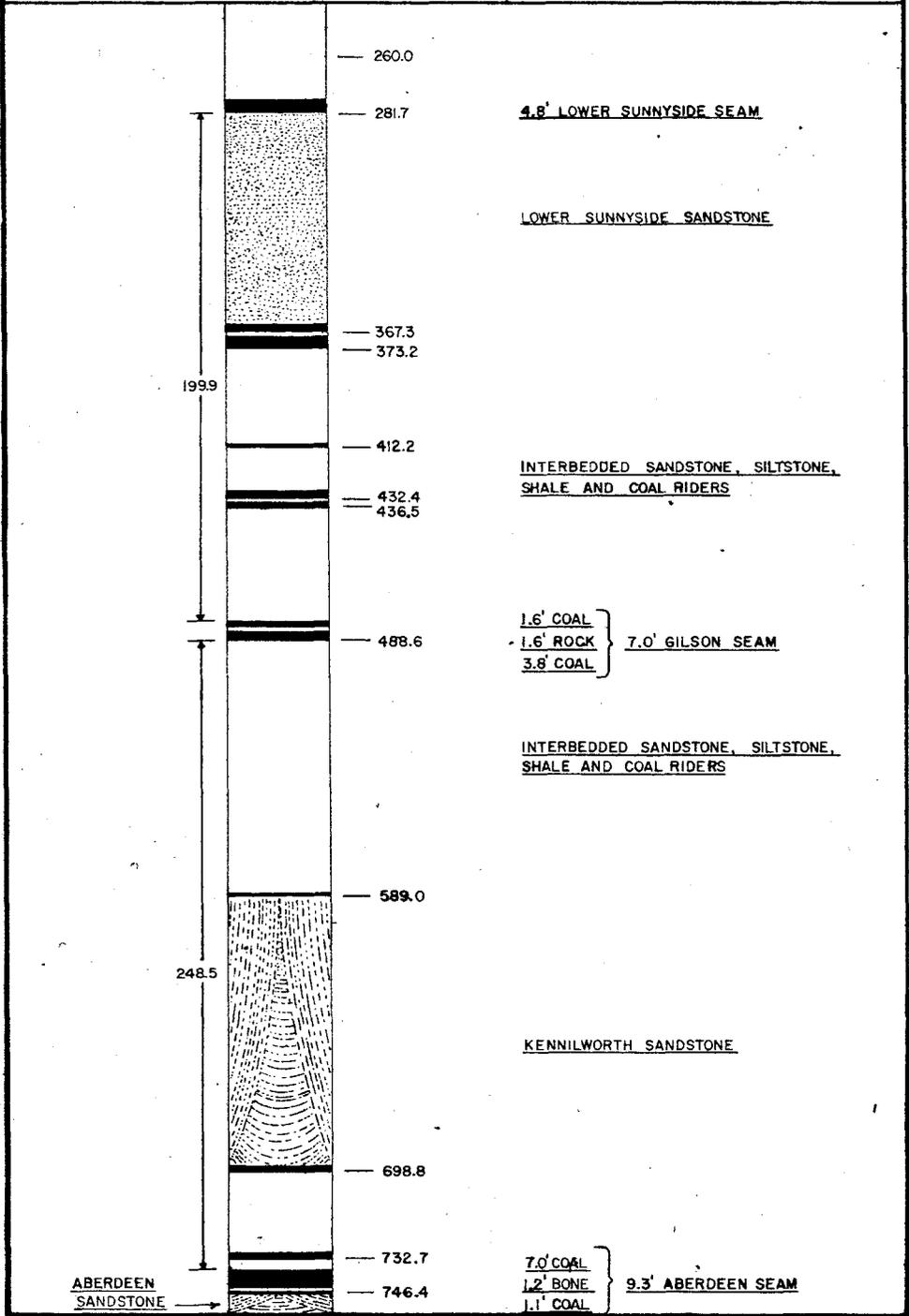
160' W.

DATE STARTED 11/7/77

COMPLETED 11/12/77

LOGGED BY M. GLASSON

SCALE: 1" = 50'



AMCA COAL LEASING INC. - DRILL HOLE LOG
CARBON COUNTY, UTAH

HOLE NO. 77-4-CP

ELEVATION 7070'

ANGLE 90°

BEARING _____

DEPTH 105'

LOCATION ZIONS FEE

COORDINATES N. 56880

E. 53540

SECTION SE 1/4 SE 1/4 SW 1/4 SEC. 7

T. 13 S, R. 11 E.

FROM: CENTER, 2,520' S.

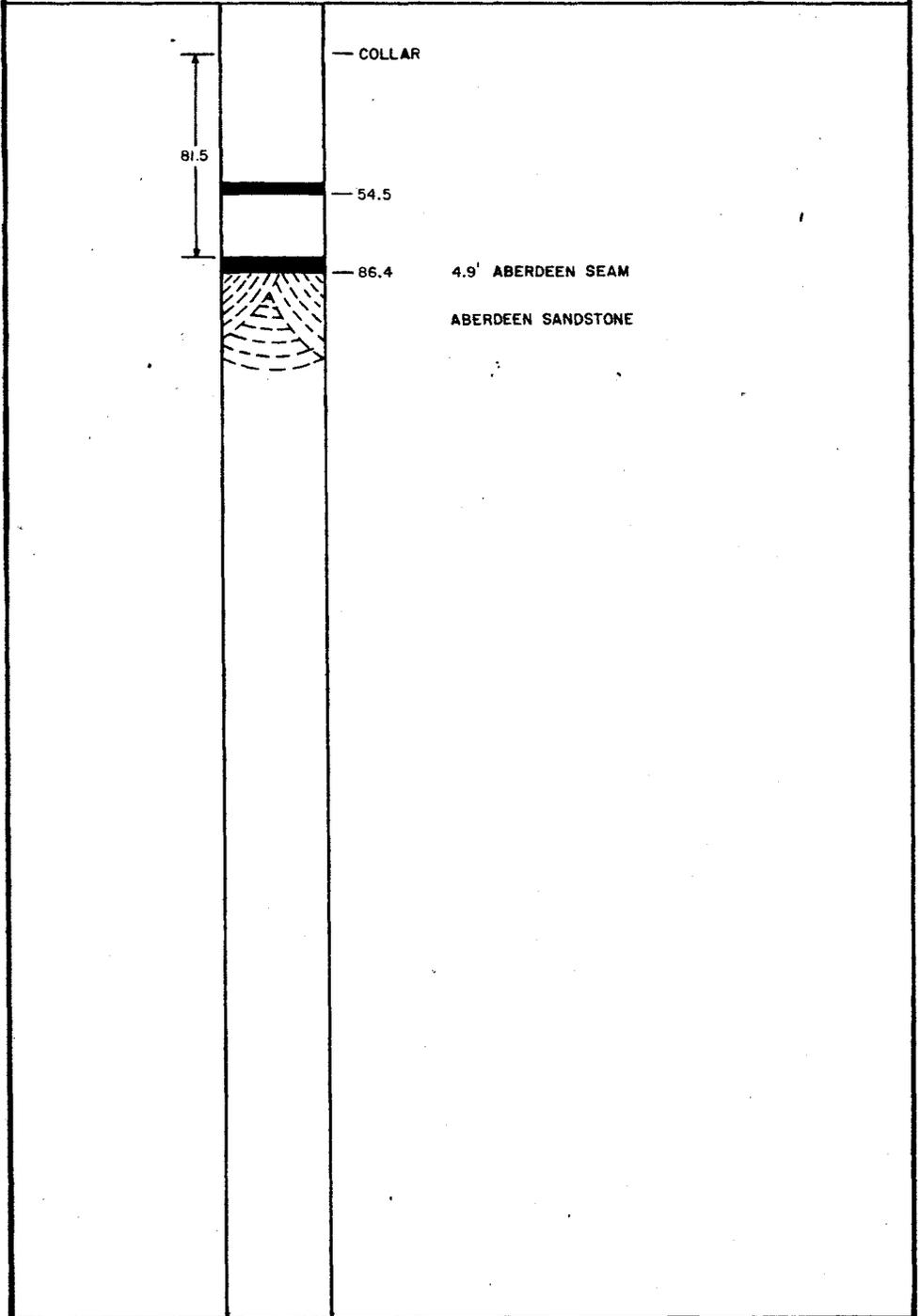
DATE STARTED 11/13/77

COMPLETED 11/13/77

LOGGED BY M. GLASSON

SCALE: 1" = 50'

60' W.



AMCA COAL LEASING INC. - DRILL HOLE LOG
CARBON COUNTY, UTAH

HOLE NO. 77-9-CP

ELEVATION 7,085'

ANGLE 90°

BEARING _____

DEPTH 85'

LOCATION ZIONS FEE

COORDINATES N. 56,870

E. 53,305

SECTION SE 1/4 SE 1/4 SW 1/4 SEC 7

T. 13 S, R. 11 E.

FROM: CENTER, 2,620 S.

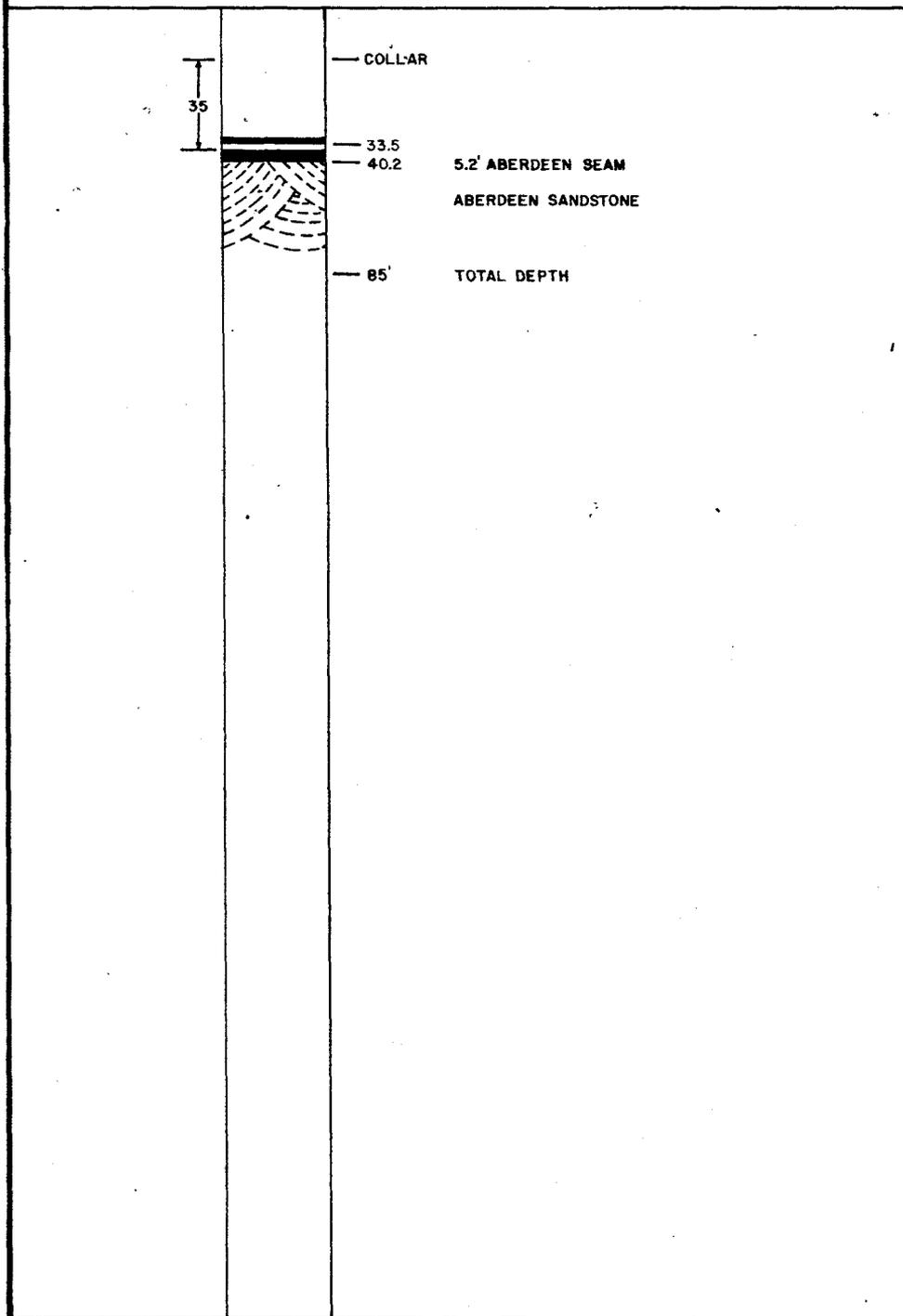
290 W.

DATE STARTED 11/14/77

COMPLETED 11/14/77

LOGGED BY M. GLASSON

SCALE: 1" = 50'



AMCA COAL LEASING INC. - DRILL HOLE LOG
CARBON COUNTY, UTAH

HOLE NO. 77-6-CP

ELEVATION 7,080'

ANGLE 90°

BEARING _____

DEPTH 80'

LOCATION ZIONS FEE

COORDINATES N. 56,825

E. 53,330

SECTION NE 1/4 NE 1/4 NW 1/4 SEC 18

T. 13 S, R. 11 E.

FROM: CENTER, 2,635 N.

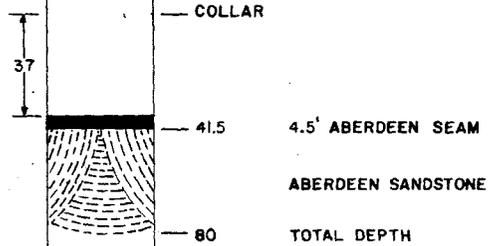
255 W.

DATE STARTED 11/14/77

COMPLETED 11/14/77

LOGGED BY M. GLASSON

SCALE: 1" = 50'



AMCA COAL LEASING INC. - DRILL HOLE LOG
CARBON COUNTY, UTAH

HOLE NO. 77-7-CP

ELEVATION 7,010'

ANGLE 90°

BEARING _____

DEPTH 45'

LOCATION ZIONS FEE

COORDINATES N. 56,780

E. 53,430

SECTION NE 1/4 NE 1/4 NW 1/4 SEC 18

DATE STARTED 11/14/77

COMPLETED 11/14/77

LOGGED BY M. GLASSON

T. 13 S, R. 11 E.

FROM: CENTER, 2,605 N.

160 W.

SCALE: 1" = 50'

13.8



— COLLAR

— 16.0 2.2' ABERDEEN SEAM

ABERDEEN SANDSTONE

— 45 TOTAL DEPTH

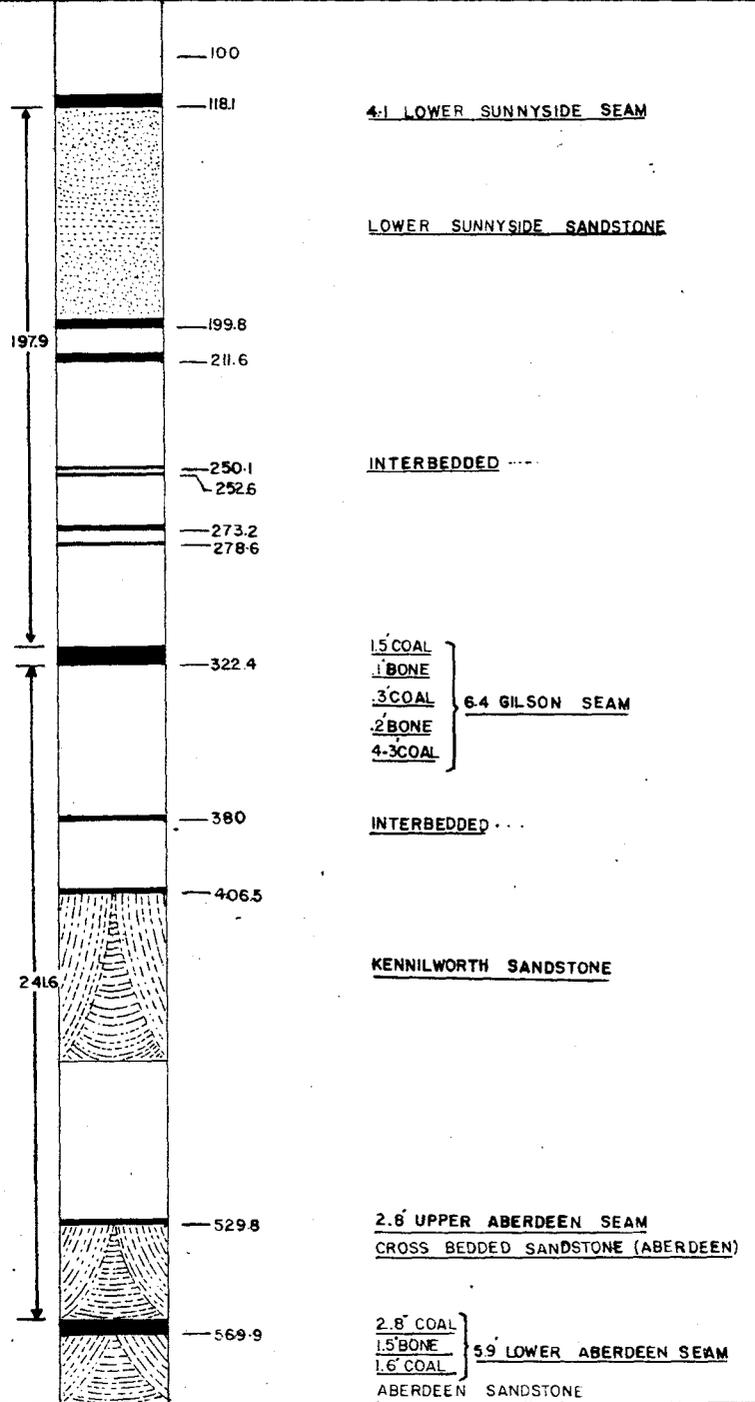
AMCA COAL LEASING INC. - DRILL HOLE LOG
CARBON COUNTY, UTAH

HOLE NO. DH-2
 ELEVATION 7275
 ANGLE 90°
 BEARING _____
 DEPTH 580

LOCATION ZION FEE VICINITY _____
 COORDINATES N. 80,960
 E. 51,320
 SECTION SW 1/4 NW 1/4 SEC 7
 T. 13 S, R. 11 E.
 FROM: CENTER 1,535 N
2,270 W

DATE STARTED 11-15-71
 COMPLETED 11-19-71
 LOGGED BY S. QUIGLEY

SCALE: 1" = 50'



AMCA COAL LEASING INC. - DRILL HOLE LOG
CARBON COUNTY, UTAH

HOLE NO. DH-2-A

ELEVATION 7,165'

ANGLE 90°

BEARING _____

DEPTH 303'

LOCATION ZIONS FEE VICINITY

COORDINATES N. 58,180

E. 53,840

SECTION SW 1/4 NW 1/4 SE 1/4 SEC 7

T. 13 S, R. 11 E.

FROM: CENTER, 1235 S.

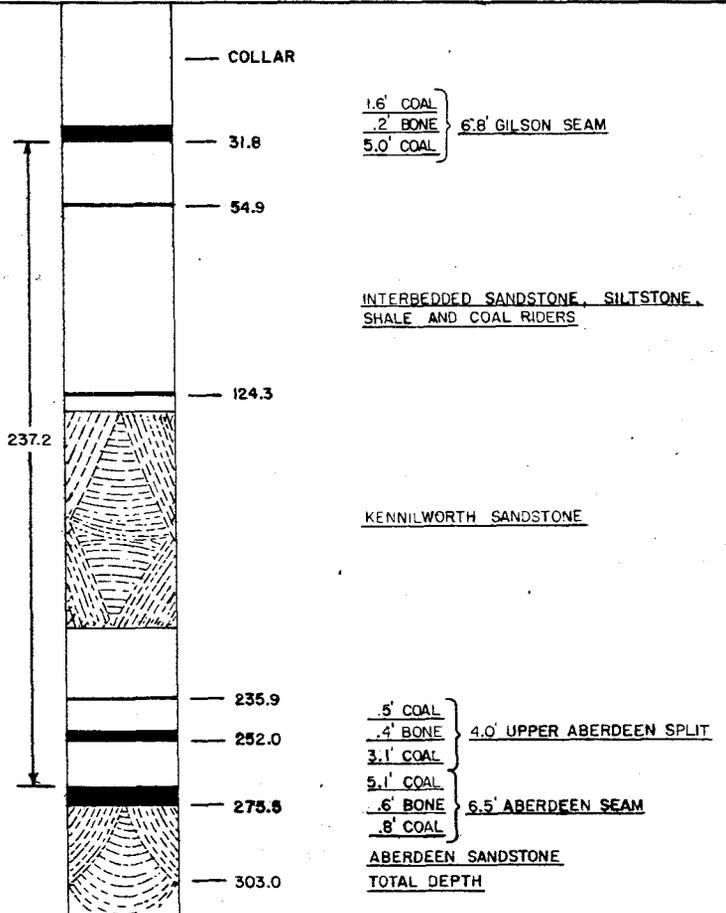
250 E.

DATE STARTED 11/8/71

COMPLETED 11/12/71

LOGGED BY S. QUIGLEY

SCALE: 1" = 50'



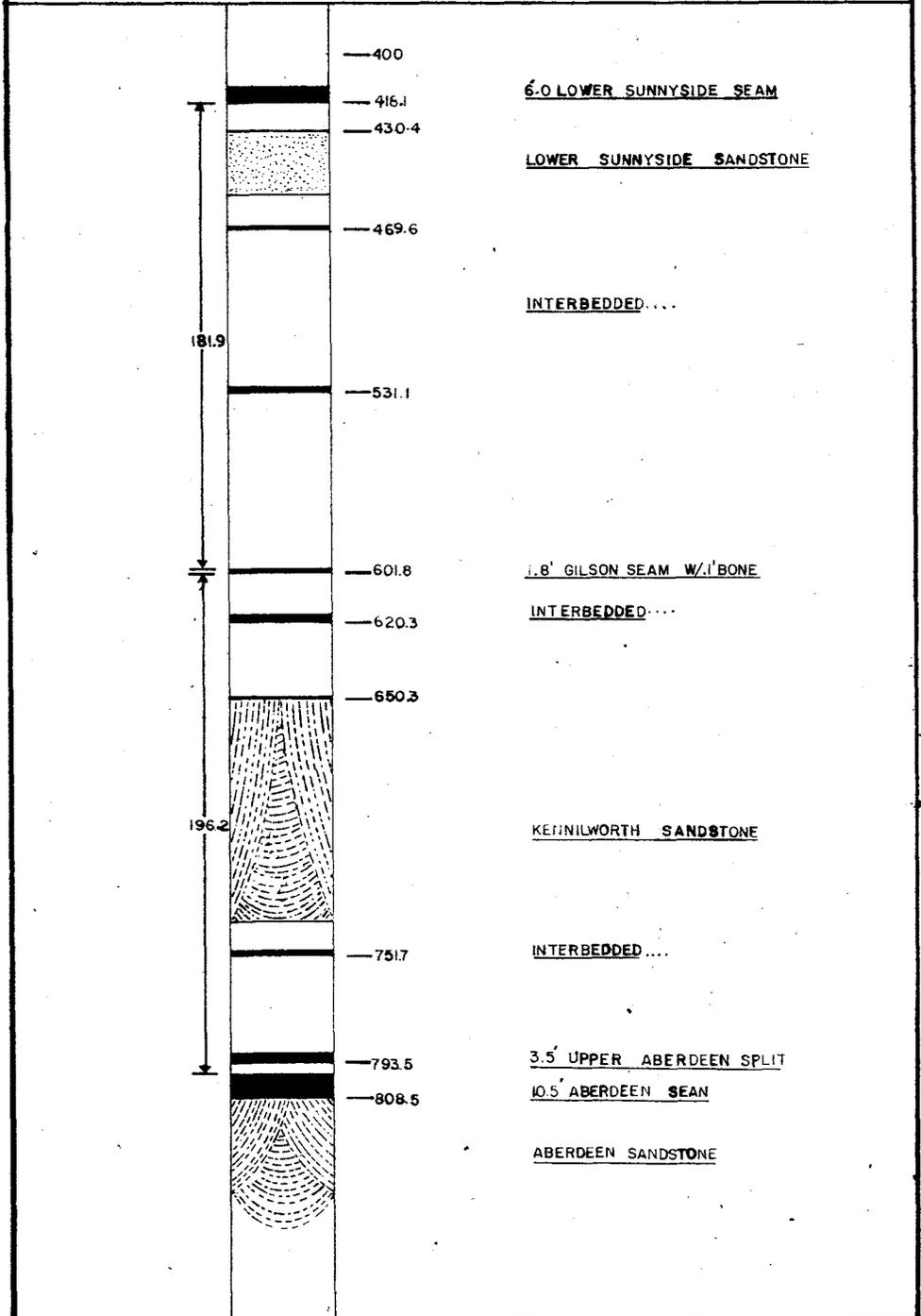
AMCA COAL LEASING INC. - DRILL HOLE LOG
CARBON COUNTY, UTAH

HOLE NO. DH-5
 ELEVATION 7275'
 ANGLE 90°
 BEARING _____
 DEPTH 832'

LOCATION ZION FEE VICINITY
 COORDINATES N. 59,956
E. 54,535
 SECTION SE 1/4 SW 1/4 NE 1/4 SEC 7
 T. 13 S, R. 11 E.
 FROM: CENTER 545 N
930 E

DATE STARTED 12-10-71
 COMPLETED 1-4-72
 LOGGED BY S-QUIGLEY

SCALE: 1" = 50'



AMCA COAL LEASING INC. - DRILL HOLE LOG
CARBON COUNTY, UTAH

HOLE NO. DH - NACC - 6

ELEVATION 7,460'

ANGLE 90°

BEARING _____

DEPTH APPROX. 1,020'

LOCATION ZIONS FEE VICINITY

COORDINATES N. 62.160

E. 50.185

SECTION SE 1/4 SE 1/4 SE 1/4 SEC 1

T. 13 S, R. 10 E.

FROM: SE CORNER 200' N.

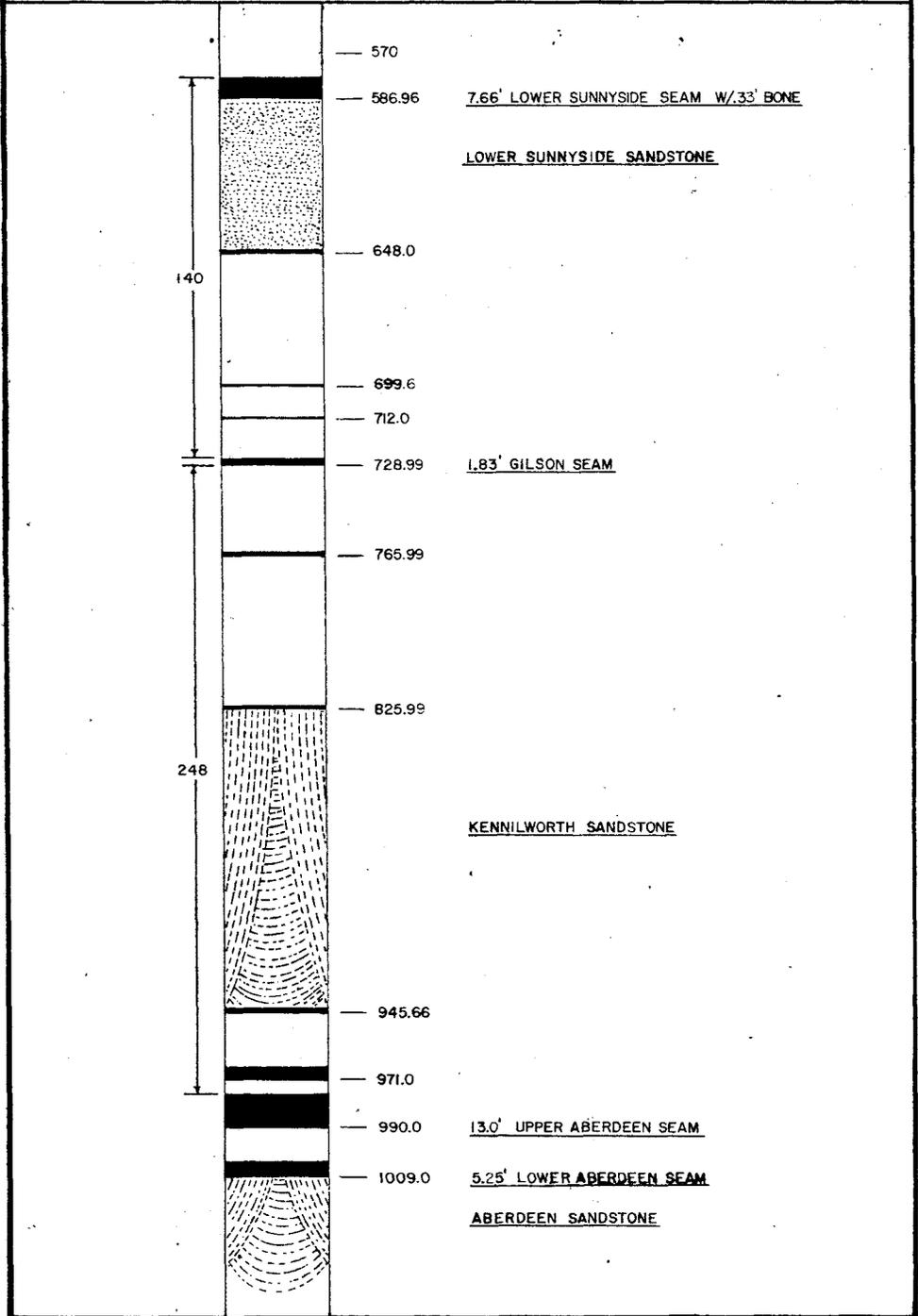
655' W.

DATE STARTED APPROX. 1948

COMPLETED APPROX. 1948

LOGGED BY _____

SCALE: 1" = 50'



AMCA COAL LEASING INC. - DRILL HOLE LOG
CARBON COUNTY, UTAH

HOLE NO. DH-NACC-7

ELEVATION 7,192

ANGLE 90°

BEARING _____

DEPTH _____

LOCATION ZIQNS FEE VICINITY

COORDINATES N. 58,285

E. 49,955

SECTION SW 1/4 NE 1/4 SE 1/4 SEC 12

T. 13 S, R. 10 E

FROM: SE CORNER 1,440 N.

935 W.

DATE STARTED APPROX. 1948

COMPLETED APPROX. 1948

LOGGED BY S. QUIGLEY

SCALE: 1" = 50'

