Sunnyside Coal Company

Operations • Highway 123 • P.O. Box 99 • Sunnyside, Utah 84539

April 11, 1994

Ms. Pamela Grubaugh-Littig
Permit Supervisor
Utah Division of Oil, Gas and Mining
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203

Copy for #5

Dear Pam:

Re: Redesign of Hoist House Pond, Violation #93-32-3-8 (2 of 8)
Sunnyside Coal Company, Sunnyside Mine, ACT/007/007-93CC,
Folder #3, Carbon County, Utah

Due to unavailable manpower from March 7, 1994 until April 4, 1994, Sunnyside Coal Company requests an additional fifteen day extension from April 11, 1994 until April 26, 1994 to complete the construction requirements necessary to abate the violation. A complete UMWA workforce layoff took place on March 7, 1994. Thirteen men were returned to work on April 4, 1994.

Approximately ninety percent of the dirt work has been accomplished on this project. The modification of the standpipe/oil skimmer has been initiated and should be very close to completion by the time you receive this request.

Your approval of this request will be appreciated. Thank you.

Sincerely,

Peter H. Hess
Environmental Coordinator

PHH/phh

Corporate Offices
The Registry
1113 Spruce Street
Boulder, CO 80302
303-938-1506
FAX: 303-938-5050

Operations
Highway 123
P.O. Box 99
Sunnyside, UT 84539
801-888-4421
FAX: 801-888-2581

Norman H. Bangerter
Governor
Dee C. Hansen
Executive Director
Dianne R. Nielson, Ph.D.
Division Director

State of Utah

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203
801-538-5340

November 16, 1992

Mr. Joe Fielder, General Manager
Sunnyside Coal Company
P.O. Box 99
Sunnyside, Utah 84539

Dear Mr. Fielder:

Re: Incidental Boundary Change (IBC), Carbon County Lease, Sunnyside Coal Company, Sunnyside Mine, ACT/007/007, Folder #2, Carbon County, Utah

The above-noted amendment for an incidental boundary change in Section 21, NE1/4 has been reviewed and is conditionally approved. Final approval will be given when seven copies of the updated mining maps are submitted, as well as the updated text for the mining and reclamation plan.

Sincerely,

Pamela Grubaugh-Littig
Permit Supervisor

jbe
cc: Henry Sauer
007007.IBC

PERMIT TRACKING FORM

Type of Proposal:

MRP AMENDMENT	
MRP REVISION	
EXPLORATION	
I.B.C.	✓
PERMIT RENEWAL	
NEW PAP	

Enforcement Action Involved:

NOV #N___ ___ ___ ___, #___ of ___
CO #C___ ___ ___ ___, #___ of ___
TDN #X___ ___ ___ ___, #___ of ___
TDL #X___ ___ ___ ___, #___ of ___
DIVISION ORDER: date _____

Title of Proposal: Sunnyside IBC

Company/Mine Name: Sunnyside Coal Company, Sunnyside Mine

File # (INA / PRO / ACT / CEP) 007 / ... or T

11/19

PROJECT LEADER: _____

Reviewers		Tech Memo D	
		Yes	N
HYDROLOGY	Hugh (Would you please handle this ASAP. Thx)	( )	(
BIOLOGY		( )	(
ENGINEER	Jesse	( )	(
SOILS	Kenny	( )	
GEOLOGY		( )	
LEG		( )	

Pam,

This is OK.

- Mining plan unchanged
- No surface disturbance, so no bond changes
- Access to property checks
- Area is correct
- Property description OK
- Subsidence plan OK

Jen

Pam,

Dat

(1) I: Have the R2P2 requirements been fulfilled? yes
T
T
D
O Jesse should probably check legals, ownership, bonding, etc.

(2) C
T
T Hydro Concerns?

(3) _____

(4) Condition... Stipulations Due _____
Recieved _____

10/19

Jesse -

IBC for Sunnyside - please review mining plan, subsidence ... Anything else? Pam

OTHEI Thanks Kenny

Agency		Sign-off
( ) OSMRE		
( ) USFS		
( ) BLM	CALL Gary Johnson re: R2P2 if applicable	
( ) USFWS		
( ) NPS		
( ) HEALTH		
( ) UDWR		
( ) H2O RTS.		
( ) HISTORY		

PERMIT TRACKING FORM

Type of Proposal:

MRP AMENDMENT	
MRP REVISION	
EXPLORATION	
I.B.C.	✓
PERMIT RENEWAL	
NEW PAP	

Enforcement Action Involved:

NOV #N___ ___ ___ ___, #___ of ___
CO #C___ ___ ___ ___, #___ of ___
TDN #X___ ___ ___ ___, #___ of ___
TDL #X___ ___ ___ ___, #___ of ___
DIVISION ORDER: date_____

Title of Proposal: Sunnyside TBC

Company/Mine Name: Sunnyside Coal Company, Sunnyside Mine

File # (INA / PRO / (ACT) / CEP) 007 / 007 - ~~92~~ T 92

PROJECT LEADER: _____

	Reviewers	Tech Memo Drafted Yes	Tech Memo Drafted No	Date Completed
HYDROLOGY	Hugh (Would like to please thanks this ASAP TAA)	( )	(✓)	mining already underway; no surface impacts
BIOLOGY		( )	( )	
ENGINEER	Rose	( )	(✓)	
SOILS	Henry	( )	(✓)	
GEOLOGY		( )	(✓)	no surface impacts
LEGAL/FIN		( )	( )	

Dates:

(1) Initial Plan Received 10/8/92
Tech Review Due 10/23/92
Tech Review Complete _____
Deficiencies Sent _____
Operator Response Due _____

(2) Operator Response Rc'd _____
Tech Review Due _____
Tech Review Complete _____

(3) Publication Approval _____

(4) Conditional Approval _____
Stipulations Due _____
Stipulations Recieved _____

(5) Final Approval _____
Filed in MRP _____
Author _____

(6) Proposal Denied _____

OTHER AGENCY INVOLVEMENT:

	Agency	Transmittal Date	Sign-off	COMMENTS:
( )	OSMRE			
( )	USFS			
( )	BLM	CALL Gary Johnson re: R2P2 if applicable		
( )	USFWS			
( )	NPS			
( )	HEALTH			
( )	UDWR			
( )	H2O RTS.			
( )	HISTORY			

Sunnyside Coal Company

Operations • Highway 123 • P.O. Box 99 • Sunnyside, Utah 84539

ACT/007/007
#2
Copy FAM

October 6, 1992

Ms. Pamela Grubaugh-Littig
Permit Supervisor
Division of Oil, Gas, and Mining
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, UT 84180-1203

Dear Pamela,

Re: Incidental Boundary Change (IBC), Carbon County Lease for No. 1 Slope and No. 24 Left Entries for development of No. 24 Left Longwall Panel

Sunnyside Mines requests an Incidental Boundary Change (IBC) for continued downslope development of the No. 1 Slope and entry development for No. 24 Left Longwall Panel. The IBC occurs in the NE1/4 of Section 21, T14S, R14E, SLB&M, Utah.

The requested IBC area, as described more fully in the attached Application For Permit Amendment, is approximately 33.2 acres. The IBC represents a 10.5 per cent increase in the size of the surface or subsurface disturbed area.

The surface land is owned and controlled by Sunnyside Coal Company. The coal is owned and controlled by Carbon County, Utah. Sunnyside Coal Company has a Coal Lease and Agreement for the area of the IBC.

Thank your for your prompt attention to this IBC request.

Sincerely,

Gary Gray
Chief Mine Engineer

Corporate Offices
The Registry
1113 Spruce Street
Boulder, CO 80302
303-938-1506
FAX: 303-938-5050

Sales Office
1350 17th Street
Suite 350
Denver, CO 80202
303-534-3348
FAX: 303-825-8626

West Coast Division
1345 Astoria Drive
Fairfield, CA 94533
707-425-4506

Operations
Highway 123
P.O. Box 99
Sunnyside, UT 84539
801-888-4421
FAX: 801-888-2581

Application For Permit Amendment

Incidental Boundary Change (IBC)
Carbon County Lease
for
No. 1 Slope, No. 24 Left Entries, and
Development of No. 24 Left Longwall Panel

Sunnyside Coal Company
Sunnyside Mine
Sunnyside, UT 84539

Permit ACT/007/007

RECEIVED
OCT 0 8 1992
DIVISION OF
OIL GAS & MINING

JME Companies

ENVIRONMENTAL SERVICES DIVISION
12211 W. Alameda Parkway, Suite 207
Lakewood CO 80228
(303)-969-9759

September 14, 1992

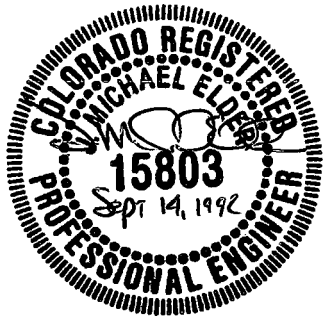
Mr. Gary Gray
Chief Engineer
Sunnyside Mine
P.O. Box 99
Sunnyside, UT 84539

Re: Incidental Boundary Change Carbon County Lease

Certification

I prepared the attached **Application for Permit Amendment for an Incidental Boundary Change for the Carbon County Lease**. This document is based on information provided to me by Sunnyside Mine and the information provided to me is accepted as correct.

I certify that the attached document is correct to my knowledge and belief.



J. Michael Elder, PE
Engineer

Application For Permit Amendment
Incidental Boundary Change (IBC)
Carbon County Lease
for
No. 1 Slope, No. 24 Left Entries, and
Development of No. 24 Left Longwall Panel

Sunnyside Mine

Prepared for:

Sunnyside Coal Company
Sunnyside Mine
Sunnyside, UT 84539

Permit ACT/007/007

Prepared by:

J. Michael Elder
JME Companies
ENVIRONMENTAL SERVICES DIVISION
12211 W. Alameda Parkway, Suite 207
Lakewood CO 80228
(303)-969-9759

September 14, 1992

Application For Permit Amendment
Incidental Boundary Change (IBC)
Carbon County Lease
for
No. 1 Slope, No. 24 Left Entries, and
Development of No. 24 Left Longwall Panel

Sunnyside Coal Company
Permit ACT/007/007

Sunnyside Coal Company requires an Incidental Boundary Change (IBC) for continued downdip development of the No. 1 Mine. The No. 24 Left Longwall Panel is the next panel to be developed. Completion of the No. 23 Left Longwall Panel development will occur within the next several months. This IBC is an extension of a previously approved IBC for the development of the No. 23 Left Longwall Panel (approved May 1989).

The IBC is requested for the NE1/4 of Section 21, T14S, R14E, SLB&M, Utah (Attachment 1). The IBC occurs within coal owned and controlled by Carbon County, Utah. Sunnyside Coal Company owns and controls the surface.

The permit change should be considered as an amendment since:

1. R645-303-224,100 - There is less than a 15 percent increase in surface or subsurface disturbed area. The requested IBC is approximately 33.2 acres. The current surface disturbance is approximately 315.5 acres.

2. R645-303-224,200 - Operations remain within the existing cumulative impact area.

3. R645-303-224,300 - Operations are engaged within the same hydrologic basin authorized in the approved permit.

4. R645-303-224,400 - No division order has been issued for this change.

5. R645-303-224,500 - There has been no cancellation or material reductions of any guarantees of the original permit.

6. R645-303-224,600 - And, no other law or regulation applies to this change application.

TABLE OF CONTENTS

1. General

The existing mine permit boundary does not allow for expansion into No. 24 Left Longwall Panel. This permit amendment for an IBC allows expansion into this area. Sunnyside Mines intends to incorporate all of Section 21 into the mine permit boundary in the Permit Renewal Application in order to continue mining downdip during the next five year permit term.

The IBC area includes portions of Pole Canyon and the adjacent canyon walls. Sunnyside Mines does not maintain any surface facilities or conduct any surface activities in the area of the IBC. The terrain is extremely steep and rugged.

2. Environmental Impacts

This amendment is anticipated to have the following environmental impacts.

a. Soil Resources.

No additional impacts to the soil resources are anticipated. No surface disturbance is associated with this IBC. Longwall mining may cause regional subsidence; however no surface effects, other than small differences in the existing elevation, are anticipated.

Sufficient soil baseline resource information is included in the existing PAP for the IBC area. Note that the soil types on the Soil Identification Map of the current PAP list the soil types within the IBC of the NE1/4 of Section 21, T14S, R14E, SLB&M, Utah as

JTG, Repp Doney Complex (40%-70% slopes),
PSH, Zillion Complex (55%-80% slopes), and
HUG, Midfork-Elwood Complex (50%-70% slopes).

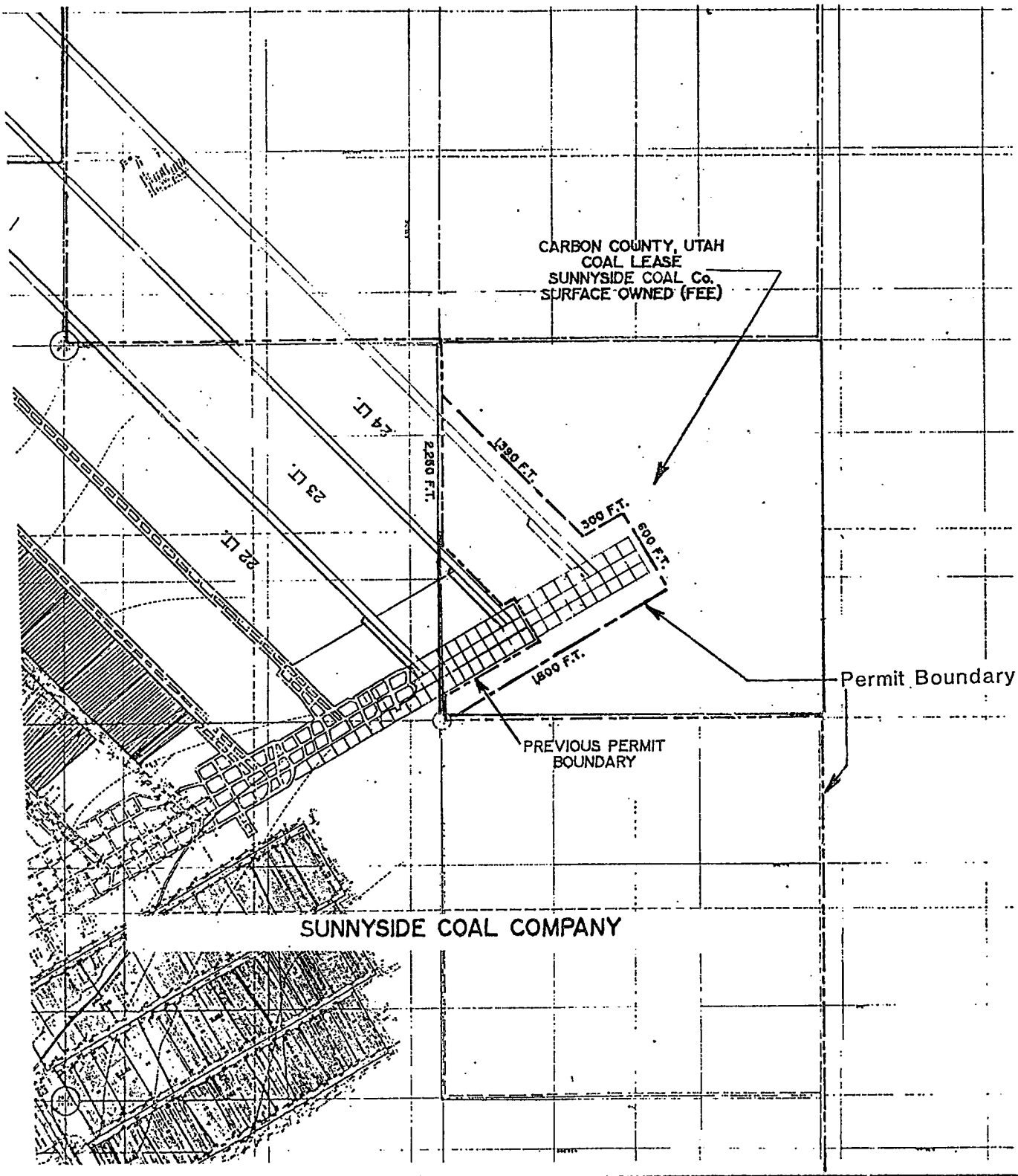
Based on the 1988 SCS Soil Survey of Carbon Area, Utah, the mapped soil map units have been identified as

JTG = 71, Pathead extremely bouldery fine sandy loam, 40 to 70 percent slopes,
PSH = 76, Perma family-Datino complex, and
HUG = 62, Midfork family-Comodore complex.

Although the map unit descriptions have changed, the soil locations on the map are virtually identical to the PAP Soil Identification Map. The Detailed Soil Map Unit Descriptions are included as Appendix A. The Soil Classification Descriptions are presented in Appendix B. The Soil Resource designations for Section 21 are presented on Attachment 2.

R 14 E

T 14 S



Sunnyside Coal Company

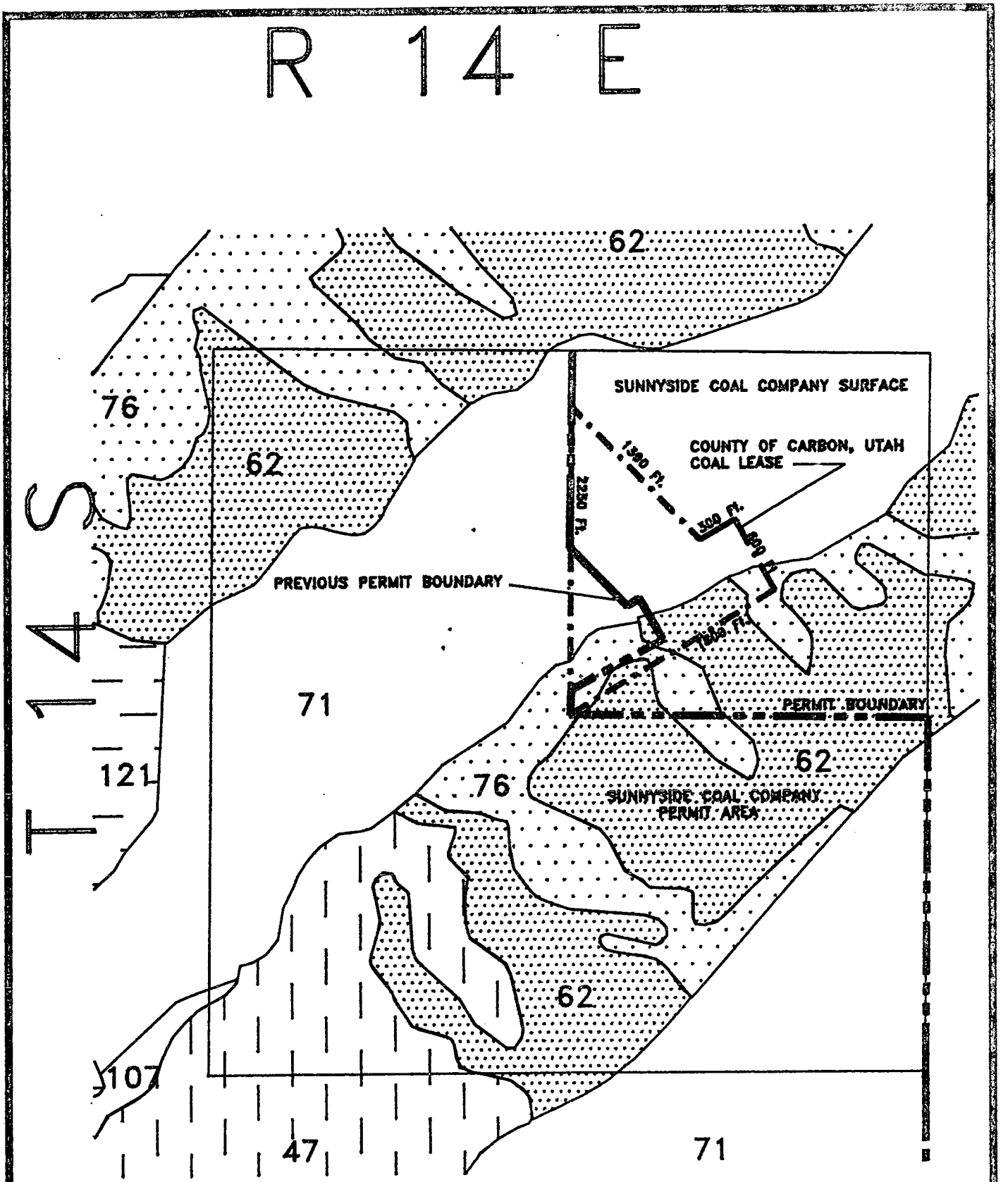
SUNNYSIDE MINES

REVISIONS		
NO.	DATE	BY
1	4/19/89	B.F.A.
2	9/08/92	B.F.A.
3		
4		

INCIDENTAL BOUNDARY CHANGE
SECTION 21, NE 1/4

DRAWN BY J.M.E.	DATE 9/05/92
CHECKED BY	DATE
APPROVED	SCALE 1" = 1,000'

DRAWING NO. A1-0229



SUNNYSIDE COAL COMPANY

Project: INCIDENTAL BOUNDARY CHANGE
NE 1/4 OF SECTION 21, T14S, R14E

	By	Date		
Drawn By:	RHF		Scale: 1" = 1000'	Date: 9/16/92
Checked				
Approved	JME		Proj. No:	Sheet 1 of 1
Approved				
Approved			Dwg. No: ATTACHMENT 2	

b. Biological Resources.
No additional impacts to the vegetation and wildlife of the IBC area are expected. Existing vegetation and fish and wildlife baseline data cover the area.

No additional disturbance will be created. No surface disturbance is associated with this IBC. Longwall mining may cause regional subsidence; however no surface effects, other than small differences in the existing elevation, are anticipated.

c. Land Use and Air Quality
The premining, current, and post mining land use is fish and wildlife habitat, and rangeland use in the canyon bottom for the area immediately adjacent to the IBC area. The IBC area is also designated fish and wildlife habitat, and rangeland use in the canyon bottom (extreme SW protion of the NE1/4).

No additional impact to cultural and historical resources is anticipated as there is no anticipated additional disturbance.

No change to the existing Bureau of Air Quality permit is anticipated. The projected production rate remains below 1mm tpy. No additional fugitive dust control measures will be required. No increases or decreases in vehicle miles are anticipated.

d. Geology.
The geologic data is presented in the approved permit for the area. No geological impacts are anticipated for the IBC area.

The plan for casing and sealing boreholes in the area remains the same as presented in the approved permit.

Longwall mining may cause regional subsidence; however no surface effects, other than small differences in the existing elevation, are anticipated. The area of the IBC is monitored in accordance with the PAP Subsidence monitoring plan. Permanent subsidence monuments are located in Bear Canyon and Whitmore Canyon.

e. Hydrology.
The IBC area creates no surface disturbance. Surface water runoff within this undisturbed area is not captured. No additional impacts to the existing surface hydrological resources are anticipated.

Additional underground mining will occur within the IBC area. Groundwater within this disturbed area is captured, pumped, treated, and discharged in accordance with the measures presented in the approved PAP. No additional ground water structures or treatment facilities are required. No additional impacts to the existing ground water hydrological resources are anticipated.

The IBC area remains in compliance with the existing hydrological information and plans in the approved permit.

3. IBC Land Information

The requested IBC is approximately 33.2 acres. The IBC is an extension of a previously requested IBC for the No. 23 Left Longwall panel development. The legal for the IBC (including the previously approved 6.8 acres) is as follows:

Beginning at the SW corner of NE1/4 of Section 21 (center of Section 21), T14S, R14E, SLB&M, Utah;
thence N60^{0}09'46"E, 1800 ft;
thence N29^{0}50'14"W, 600 ft;
thence S60^{0}09'46"W, 300 ft;
thence N45^{0}00'02"W, 1390 ft;
thence S00^{0}34'48"W, 2250 ft to the point of beginning for a total area of approximately 40.0 acres. ~40.1 acres

a. Right-of-Entry Information

Sunnyside Coal Company, through its predecessor Sunnyside Reclamation & Salvage, Inc., has a Lease and Agreement with Carbon County, Utah for extracting coal from the NE1/4, Section 21, T14S, R14E, SLB&M, Utah. Effective March 22, 1989, the Lease and Agreement is for a five year primary term and a five year subsequent term. The lease is provided in Appendix C.

Sunnyside Coal Company, through its predecessor Sunnyside Reclamation & Salvage, Inc., owns and controls the surface of the NE1/4, Section 21, T14S, R14E, SLB&M, Utah. The surface rights are conveyed by Deed and Assignment dated March 9, 1989 as part of Kaiser Coal Corporation bankruptcy proceedings designated Case No. 87B-01552-E before the United States Bankruptcy Court for the District of Colorado (document filed Carbon County, Utah, Book 287, Pages 52-95, March 10, 1989).

b. Status of Unsuitability Claims

Sunnyside Coal Company's existing permit boundary area is exempted from an Unsuitable for Mining

Designation under provisions of R645-103-330 by meeting the requirements of R645-103-331 through 333. Mining has been conducted within the permit area prior to August 3, 1977. The permit area is currently permitted for mining. Substantial legal and financial commitments were made at Sunnyside Mines prior to January 4, 1977.

The requested IBC area is immediately adjacent to the current mine permit boundary. The area is not incompatible with existing state or local land use plans or programs; does not affect fragile or historical lands; does not affect renewable resource lands; nor does the area exist within a natural hazard lands area. The IBC area does not include any occupied dwellings or any public roads.

4. Reclamation Plans

No surface reclamation activities are anticipated. No surface disturbance is associated with this IBC. Longwall mining may cause regional subsidence; however no surface effects, other than small differences in the existing elevation, are anticipated.

5. Bonding

No additional or incremental bonding is required for the inclusion of the IBC area within the permit boundary. No surface disturbance is associated with the IBC and no surface reclamation activities are anticipated.

APPENDIX A Detailed Soil Map Units

13--Cabba Family-Guben-Rock Outcrop Complex

This map unit is on canyonsides, mainly east of Price Canyon and south of Nine Mile Canyon. Slopes are 40 to 75 percent, 300 to 400 feet long, and convex. Elevation is 6,000 to 8,200 feet. The average annual precipitation is about 14 to 16 inches; the average annual air temperature is 42 to 45 degrees F; and the average freeze-free period is 60 to 120 days.

This unit is 50 percent Cabba family bouldery loam, 40 to 70 percent slopes; 20 percent Guben extremely bouldery loam, dry, 40 to 75 percent slopes; 15 percent Rock outcrop; and 15 percent other soils. About 30 percent of this unit has slopes of 40 to 50 percent. The Cabba family soil is on canyonsides between ledges of Rock outcrop; the Guben soil is on toe slopes; and Rock outcrop is on canyon rims, ledges, and very steep side slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 8 percent Guben extremely bouldery fine sandy loam, 5 percent Guben extremely stony loam, and small areas of Winetti soils on the bottoms of drainageways.

The Cabba family soil is shallow and well drained. It formed in residuum and colluvium derived dominantly from sandstone and shale of the Green River Formation. The present vegetation is mainly pinyon, Juniper, Salina wildrye, and Mormon-tea. Typically, the surface layer is pale brown bouldery loam about 3 inches thick. The underlying material is brown and light yellowish brown loam about 12 inches thick. Soft shale is at a depth of about 15 inches. Depth to shale ranges from 8 to 20 inches.

Permeability of the Cabba family soil is moderate. Available water capacity is about 1.5 to 3.0 inches. Water supplying capacity is 3 to 6 inches. Effective rooting depth is 8 to 20 inches. The organic matter content of the surface layer is 1 to 3 percent. Runoff is rapid, and the hazard of water erosion is high.

The Guben soil is very deep and well drained. It formed in colluvium derived dominantly from sandstone and shale of the Green river Formation,. The present vegetation is mainly Douglas-fir, pinyon, juniper, Salina wildrye, birchleaf mountainmahogany, and serviceberry. Typically, the surface is covered with a mat of partially decomposed leaves, twigs, and needles about 0.5 inch thick. The surface layer is grayish brown extremely bouldery loam about 7 inches thick. The subsoil is pale brown very stony loam about 8 inches thick. The upper 15 inches of the substratum is very pale brown very stony loam, and the lower part to a depth of 60 inches or more

is light yellowish brown very stony loam. A layer of carbonate accumulation is at a depth of about 15 inches.

Permeability of the Guben soil is moderate. Available water capacity is about 3.5 to 5.0 inches. Water supplying capacity is 7 to 10 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 3 to 5 percent. Runoff is rapid, and the hazard of water erosion is high.

Rock outcrop consists of areas of exposed bedrock. It is dominantly sandstone and shale and is on canyon rims, ledges, and very steep side slopes.

This unit is used as wildlife habitat, rangeland, and woodland.

The potential vegetation on the Cabba family and Guben soils includes an overstory of pinyon, Utah juniper, and Douglas-fir with a canopy of 50 percent. The understory vegetation is 10 percent grasses, 15 percent forbs, and 75 percent shrubs. Among the important plants are birchleaf mountainmahogany, Utah serviceberry, bluegrass, and Salina wildrye.

The site index for pinyon and Utah juniper is 37. Average yield is 6 cords of wood per acre. The potential is poor for production of posts or christmas trees. The unit is severely limited for the harvesting of wood products because of the steepness of slope, rock fragments on the surface, and the hazard of erosion.

This unit is not grazeable by livestock because of the steepness of slope and the bouldery surface layer.

The Cabba family and guben soils are in capability subclass Vlle, nonirrigated, and the Upland Very Steep Shallow Loam (Pinyon-Utah Juniper) woodland site. Rock outcrop is in capability subclass Vlls. It is not placed in a woodland site.

47--Guben-Rock Outcrop Complex

This map unit is on mountain slopes. It is in the Book Cliffs, north of Helper and west of the Green River. Slopes are 50 to 80 percent, 100 to 200 feet long, and plane to convex. The present vegetation is mainly Douglas-fir, serviceberry, birchleaf mountainmahogany, mockorange, and western wheatgrass. Elevation ranges from 5,000 to 9,500 feet but is dominantly 6,000 to 7,500 feet. The average annual precipitation is about 16 to 20 inches; the average annual air temperature is 38 to 45 degrees F; and the average freeze-free period is 60 to 100 days.

This unit is 55 percent Guben extremely bouldery fine sandy loam, 50 to 80 percent slopes; 20 percent Rock outcrop, and 25 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 12 percent Midfork family soils in concave areas and 10 percent Comodore very stony fine sandy loam, moist, intermingled throughout the unit. Also included are small areas of Perma family soils that have slopes of 60 to 80 percent.

The Guben soil is very deep and well drained. It formed in colluvium derived dominantly from sandstone and shale. Typically, the surface is covered with a mat of partially decomposed needles, twigs, and leaves about 0.5 inch thick. The surface layer is brown extremely bouldery fine sandy loam about 7 inches thick. The subsoil is brown very stony loam about 17 inches thick. The substratum to a depth of 60 inches or more is light brown very stony loam.

Permeability of the Guben soil is moderate Available water capacity is about 3.5 to 5.0 inches. Water supplying capacity is 8.5 to 12.0 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 3 to 5 percent. Runoff is moderate, and the hazard of water erosion is slight.

Rock outcrop consists of areas of exposed bedrock, dominantly interbedded sandstone, and shale. It occurs as ledges.

This unit is used as rangeland, wildlife habitat, woodland, and recreation areas.

The potential vegetation on the Guben soil includes an overstory of Rocky Mountain Douglas-fir and pinyon with a canopy of 50 percent. The understory vegetation is 40 percent grasses, 15 percent forbs, and 45 percent shrubs. Among the important plants are Salina wildrye, wheatgrass, birchleaf mountainmahogany, and snowberry.

This unit is severely limited for harvesting wood products because of the steepness of slope, the hazard of erosion, and stones and boulders on the surface.

This unit is not grazeable by livestock because of the steepness of slope.

The Guben soil is in capability subclass Vlle, nonirrigated, and in the Mountain Very Steep Stony Loam (Douglas-fir) woodland site Rock outcrop is in capability subclass Vllls. It is not placed in a woodland site.

62--Midfork Family-Comodore Complex

This map unit is on mountain slopes. It is along the Book Cliffs and Whitmore and Price Canyons. Slopes are 200 to 300 feet long and are convex. The present vegetation is mainly Douglas-fir, snowberry, and quaking aspen. Elevation is 7,900 to 9,500 feet.

This unit is 50 percent Midfork family bouldery loam, 50 to 70 percent slopes; 20 percent Comodore bouldery loam, 50 to 70 percent slopes; and 30 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 15 percent soils that are similar to the Midfork family soil but have a dark-colored surface layer less than 6 inches thick; 10 percent soils that are similar to the Midfork family soil but have a thick surface layer and a layer of calcium carbonate accumulation; and 5 percent Comodore very stony fine sandy loam, moist.

The Midfork family soil is very deep and well drained. It formed in colluvium derived dominantly from sandstone and shale. The average annual precipitation is 20 to 25 inches; the average annual air temperature is 34 to 38 degrees F; and the average freeze-free period is 40 to 60 days.

Typically, the surface is covered with a mat of partially decomposed twigs, leaves, and needles about 2 inches thick. The surface layer is brown bouldery loam about 7 inches thick. The next layer is yellowish brown very channery loam 10 inches thick. Below this to a depth of 60 inches or more is yellowish brown very gravelly loam.

Permeability of the Midfork family soil is moderate. Available water capacity is about 5.5 to 7.0 inches. Water supplying capacity is 10 to 17 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 5 to 10 percent. Runoff is rapid, and the hazard of water erosion is high.

The Comodore soil is shallow and well drained. It formed in colluvium derived dominantly from sandstone, siltstone, and shale. The average annual precipitation is 38 to 45 degrees F, and the average freeze-free period is 60 to 80 days.

Typically, the surface is covered with a mat of needles and twigs about 1 inch thick. The surface layer is brown bouldery loam about 6 inches thick. The underlying material to a depth of 19 inches is brown very stony loam over sandstone. Depth to sandstone ranges from 10 to 20 inches.

Permeability of the Comodore soil is moderate. Available water capacity is about 1.5 to 2.5 inches. Water supplying

capacity is 3 to 5 inches. Effective rooting depth is 10 to 20 inches. The organic matter content of the surface layer is 3 to 5 percent. Runoff is rapid, and the hazard of water erosion is high.

This unit is used for wildlife habitat and woodland.

The potential vegetation on this unit includes an overstory of Douglas-fir with a canopy of 90 percent. The understory vegetation is 10 percent grasses, 5 percent forbs, and 85 percent shrubs. Among the important plants are sedge, mountainlover, and snowberry.

The site index for Douglas-fir is 50. Average yield is about 27,200 board feet per acre for 100-year-old trees 12 inches in diameter or more.

This unit is severely limited for the harvesting of wood products because of the steepness of slope and hazard of erosion.

This map unit is in capability subclass Vlle, nonirrigated, and in the High Mountain Very Steep Loam (Douglas-fir) woodland site.

71--Pathead Extremely Bouldery Fine Sandy Loam, 40 to 70 Percent Slopes

This moderately deep, well drained soil is on mountain slopes and canyonsides. It is in the areas of Range Creek, Rock Creek, Whitmore Canyon, and Price Canyon. It formed in colluvium derived dominantly from sandstone and shale. Slopes are 100 to 200 feet long and have south aspects. The present vegetation in most areas is mainly curlleaf mountainmahogany, pinyon, juniper, Salina wildrye, and serviceberry. Elevation is 7,500 to 9,000 feet. The average annual precipitation is 16 to 20 inches; the average annual air temperature is 38 to 45 degrees F; and the average freeze-free period is 60 to 100 days.

Typically, the surface layer is pale brown extremely bouldery fine sandy loam about 4 inches thick. The underlying material to a depth of 38 inches is pale brown and very pale brown very stony find sandy loam. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are about 15 percent Perma soils that have slopes of 60 to 80 percent; 10 percent Comodore soils; and small areas of Senchert loam and Rock outcrop. The soils are in concave areas.

Permeability of this Pathead soil is moderate. Available water capacity is about 1.5 to 3.0 inches. Water supplying capacity is 4.0 to 8.5 inches. Effective rooting depth is 20 to 40 inches. The organic matter content of the surface layer is 1 to 3. Runoff is rapid, and the hazard of water erosion is moderate.

This unit is used as rangeland, wildlife habitat, and recreation areas.

The potential plant community on the Pathead soil is 35 percent grasses, 15 percent forbs, and 50 percent shrubs. Among the important plants are curlleaf mountainmahogany, Salina wildrye, and snowberry.

This unit is not grazeable by livestock because of the steepness of slope.

This map unit is in capability subclass Vlle, nonirrigated, and in the Mountain Very Steep Stony Loam (Curlleaf Mountainmahogany) range site.

76--Perma Family-Datino Complex

This map unit is on mountain slopes and canyonsides. It is near Range Creek, Dry Canyon, Patmos Head, Range Valley Mountain, and Soldier Creek and in Price Canyon. Slopes are 60 to 80 percent. Elevation is 7,200 to 8,700 feet. The average annual precipitation is about 16 to 20 inches; the average annual air temperature is 38 to 45 degrees F; and the average freeze-free period is 60 to 80 days.

This unit is 40 percent Perma family very stony sandy loam, 60 to 80 percent slopes; 35 percent Datino extremely stony fine sandy loam, 60 to 80 percent slopes; and 25 percent other soils. The Perma soil is on narrow spur ridges, and the Datino soil is near the tops of the side slopes and in shallow alluvial drainageways. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 10 percent Sheepcan stony loam, 5 percent soils that are similar to the Datino soil but have an extremely bouldery surface layer, 5 percent Datino Variant loam that has slopes of 40 to 60 percent, and 5 percent Rock outcrop. The included areas are intermingled throughout the unit.

The Perma family soil is very deep and well drained. It formed in colluvium derived dominantly from sandstone and shale. Slopes are 300 to 400 feet long and are plane to convex. The present vegetation is mainly serviceberry, birchleaf mountainmahogany, mountain big sagebrush, and curlleaf mountainmahogany. Typically, the surface layer is dark brown very stony sandy loam about 7 inches thick. The upper 15 inches of the subsoil is brown cobbly sandy loam, and the lower 13 inches is brown very cobbly sandy loam. The substratum to a depth of 60 inches or more is brown very stony sandy loam.

Permeability of the Perma family soil is moderately rapid. Available water capacity is about 3 to 5 inches. Water supplying capacity is 6 to 9 inches. Effective rooting depth is 60 inches or more The organic matter content of the surface layer is 3 to 5 percent. Runoff is rapid, and the hazard or water erosion is high.

The Datino soil is very deep and well drained. It formed in colluvium derived dominantly from sandstone and shale. Slopes are 300 to 400 feet long and are plane to convex. The present vegetation is mainly birchleaf mountainmahogany, serviceberry, Douglas-fir, Wasatch penstemon, mountain big sagebrush, snowberry, pinegrass, and Salina wildrye. Typically, the surface layer is brown extremely stony fine sandy loam about 9 inches thick. The subsoil is brown very stony loam about 7 inches thick. The substratum to a depth of 60 inches or more

is pale brown very stony fine sandy loam. A layer of calcium carbonate accumulation is at a depth of about 16 inches.

Permeability of the Datino soil is moderate. Available water capacity is about 3.5 to 6.0 inches. Water supplying capacity is 6 to 8 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 3 to 5 percent. Runoff is rapid, and the hazard of water erosion is high.

This unit is used for wildlife habitat.

The potential plant community on the Perma family soil is 20 percent grasses, 10 percent forbs, and 70 percent shrubs. Among the important plants are birchleaf mountainmahogany and serviceberry.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments.

It is not practical to revegetate large areas of this soil because of the stoniness of the soil. For critical erosion control, small areas can be mechanically treated and seeded. Plants that may be suitable for critical area seedings are those native to the area, intermediate wheatgrass, orchardgrass, smooth brome, ladak alfalfa, Lewis flax, small burnet, and yellow sweetclover.

The potential vegetation on the Datino soil includes an overstory of Rocky Mountain Douglas-fir and pinyon with a canopy of 30 percent. The understory vegetation is 40 percent grasses, 15 percent forbs, and 45 percent shrubs. Among the important plants are Salina wildrye, slender wheatgrass, birchleaf mountainmahogany, and snowberry.

This soil is severely limited for harvesting wood products because of the steepness of slope, the hazard of erosion, and stones and boulders on the surface.

This unit is not grazeable by livestock because of the steepness of slope.

This unit is in capability subclass VIIe, nonirrigated. The Perma family soil is in the Mountain Very Steep Stony Loam (Browse) range site. The Datino soil is in the Mountain Very Steep Stony Loam (Douglas-fir) woodland site.

107--Shupert-Winetti Complex

This map unit is on narrow valley and canyon floors in the Book Cliffs and in an area northwest of Price and east of Sunnyside. Slopes are 1 to 8 percent, 100 to 200 feet long, and concave. The present vegetation in most areas is mainly basin big sagebrush, rabbitbrush, cheatgrass, needleandthread, and dropseed. Elevation ranges from 4,600 to 7,200 feet but commonly is 5,200 to 6,400 feet. The average annual precipitation is 12 to 16 inches, the average annual air temperature is 43 to 45 degrees F, and the average freeze-free period is 80 to 100 days.

This unit is 40 percent Shupert gravelly loam, 1 to 8 percent slopes; 35 percent Winetti bouldery sandy loam, 1 to 8 percent slopes; and 25 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 15 percent Haverdad loam on toe slopes, 5 percent Glenberg family very fine sandy loam on toe slopes at lower elevations, and 5 percent soils that are similar to the Winetti soil but are along the stream channels and support riparian vegetation.

The Shupert soil is very deep and well drained. It formed in alluvium derived dominantly from sandstone and shale. Typically, the surface layer is pale brown gravelly loam about 3 inches thick. The next layer is pale brown clay loam about 6 inches thick. Below this to a depth of 60 inches or more is light brownish gray and light yellowish brown clay loam.

Permeability of the Shupert soil is moderately slow. Available water capacity is about 10.0 to 11.5 inches. Water supplying capacity is 6.5 to 10.0 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 2 percent. Runoff is slow, and the hazard of water erosion is moderate. This soil is subject to flooding during prolonged, high-intensity storms. Channeling and deposition are common along streambanks.

The Winetti soil is very deep and well drained. It formed in alluvium derived dominantly from sandstone and shale. Typically, the surface layer is grayish brown bouldery sandy loam about 6 inches thick. The next layer is pale brown loam about 5 inches thick. The next layer is pale brown and brown very bouldery loam about 23 inches thick. Below this to a depth of 60 inches or more is pale brown very gravelly sandy loam.

Permeability of the Winetti soil is moderately rapid. Available water capacity is about 4.0 to 5.5 inches. Water supplying capacity is 4.5 to 8.0 inches. Effective rooting depth is 60 inches or more. The organic matter content of the

surface layer is 1 to 3 percent. Runoff is slow, and the hazard or water erosion is slight. This soil is subject to flooding during prolonged, high-intensity storms. Channeling and deposition are common along streambanks.

This unit is used mainly as rangeland and wildlife habitat. It is also used for irrigated crops.

The potential plant community on the Shupert and Winetti soils is 60 percent grasses, 10 percent forbs, and 30 percent shrubs. Important plants are basin wildrye, western wheatgrass, basin big sagebrush, and rubber rabbitbrush.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments. If the desirable forage plants are mostly depleted, brush management and rangeland seeding can be used to improve the rangeland vegetation. Suitable brush management practices include prescribed burning, chemical spraying, and mechanical treatment.

The suitability of this unit for rangeland seeding is good. Plants suitable for seeding include adapted native plant and Russian wildrye, crested wheatgrass, and ladak alfalfa.

This map unit is in capability unit IIIe-3, irrigated, and in capability subclass Vlle, nonirrigated. It is in the Loamy Bottom range site.

121--Travessilla-Rock Outcrop-Gerst Complex

This map unit is on canyonsides in the area of Jack Creek and along the Book Cliffs, extending from Price Canyon to Sunnyside. Slopes are 40 to 70 percent. Elevation ranges from 5,000 to 8,100 feet but dominantly is 6,000 to 7,500 feet.

This unit is 40 percent Travessilla extremely bouldery loam, 40 to 70 percent slopes; 30 percent Rock outcrop; 20 percent Gerst very channery loam, dry, 50 to 70 percent slopes; and 10 percent other soils. About 25 percent of the Travessilla soil has slopes of 40 to 50 percent. The Travessilla soil is on north and west aspects at the higher elevations. Rock outcrop is on canyon rims and ledges. The Gerst soil is on south and west aspects at the lower elevations. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 5 percent Guben extremely bouldery loam on canyonsides.

The Travessilla soil is shallow and well drained. It formed in residuum and colluvium derived dominantly from sandstone and shale. Slopes are 100 to 200 feet long, are concave to convex, and have north and east aspects. The present vegetation in most areas is mainly pinyon, juniper, Douglas-fir, Salina wildrye, and birchleaf mountainmahogany. The average annual precipitation is mountainmahogany. The average annual precipitation is 12 to 14 inches; the average annual air temperature is 45 to 47 degrees F; and the average freeze-free period is 80 to 120 days. Typically, the surface layer is pale brown extremely bouldery loam about 2 inches thick. The underlying material to a depth of 12 inches is pale brown very fine sandy loam over sandstone. Depth to sandstone ranges from 10 to 20 inches.

Permeability of the Travessilla soil is moderately rapid. Available water capacity is about 1 to 2 inches. Water supplying capacity is 3 to 4 inches. Effective rooting depth is 10 to 20 inches. The organic matter content of the surface layer is 1 to 2 inches. Runoff is rapid, and the hazard of water erosion is high.

Rock outcrop consists of areas of exposed sandstone and siltstone.

The Gerst soil is shallow and well drained. It formed in residuum derived dominantly from shale. Slopes are 100 to 200 feet long, are concave to convex, and have south and west aspects. The present vegetation in most areas is mainly juniper, pinyon, Salina wildrye, and Mormon-tea. The average annual precipitation is 10 to 12 inches; the average annual air temperature is 47 to 49 degrees F; and the average freeze-

free period is 110 to 135 days. Typically, this surface layer is light brownish gray very channery loam about 5 inches thick. The underlying material to a depth of 19 inches is light brownish gray channery loam over weathered shale. Weathered shale is at a depth of 10 to 20 inches.

Permeability of the Gerst soil is moderately slow. Available water capacity is about 1.5 to 23.0 inches. Water supplying capacity is 2 to 3 inches. Effective rooting depth is 10 to 20 inches. The organic matter content of the surface layer is 0.5 to 1.0 percent. Runoff is rapid, an the hazard of water erosion is high.

This unit is used as rangeland, woodland, and wildlife habitat.

The potential vegetation on the Travessilla soil includes an overstory of pinyon, Utah juniper and Douglas-fir with a canopy of 30 percent. The understory vegetation is 10 percent grasses, 15 percent forbs, and 75 percent shrubs. Among the important plants are birchleaf mountainmahogany, Utah service-berry, bluegrass, and Salina wildrye.

The site index for pinyon and Utah juniper is 37. Average yield is 6 cords of wood per acre. The potential for the production of posts or Christmas trees is very poor. This unit is severely limited for the harvesting of wood products because of the steepness of slope and the hazard of erosion.

This soil is not grazeable by livestock because of the steepness of slope and the stony surface layer.

The potential vegetation on the Gerst soil includes an overstory of Utah juniper and pinyon with a canopy of 5 to 20 percent. The understory vegetation is 10 percent grasses, 10 percent forbs, and 80 percent shrubs. Among the important plants are galleta, Salina wildrye, and shadscale.

The site index for Utah juniper and pinyon is 15 to 20. Average yield is 1 to 2 cords of wood per acre. The potential for the production of posts or Christmas trees is poor. Limitations for the harvesting of wood products are severe because of the steepness of slope and the hazard of erosion.

The suitability of this soil for grazing is very poor. The main limitations are steepness of slope and the hazard of erosion.

This map unit is in capability subclass Vlle, nonirrigated. The Travessilla soil is in the Upland Very Steep Shallow Loam (Pinyon-Utah Juniper) woodland site. The Gerst soil is in the Semidesert Very Steep Shallow Clay (Utah Juniper) woodland site. The Rock outcrop is not placed in a woodland site.

APPENDIX B Soil Classification

Cabba Family

The Cabba family consists of shallow, well drained, moderately permeable soils on benches, canyon rims, and steep canyon-sides. These soils formed in residuum and colluvium derived dominantly from shale or siltstone of the Green River Formation. Slope is 3 to 70 percent. Elevation is 5,000 to 8,200 feet. Average annual precipitation ranges from 12 to 16 inches, and average annual air temperature ranges from 42 to 45 degrees F.

These soils are loamy, mixed (calcareous), frigid, shallow Typic Ustorthents.

Reference pedon of a Cabba family bouldery loam in an area of Cabba family-Guben Rock outcrop complex, on the slopes of Cottonwood Ridge, about 250 feet west and 1,500 feet north of the southeast corner of Sec. 7, T. 13 S., R. 16 E.

A1-- 0 to 3 inches; pale brown (10YR 6/3) bouldery loam, brown (10YR 4/3) moist; moderate medium granular structure parting to moderate fine granular; loose, slightly sticky and slightly plastic; common very fine and fine roots; 5 percent pebbles, 10 percent cobbles, and 15 percent boulders; slightly calcareous; disseminated calcium carbonate; mildly alkaline (pH 7.8); abrupt smooth boundary.

C1-- 3 to 7 inches; brown (10YR 5/3) loam, dark brown (10YR 4/3) moist; weak fine granular structure; loose, slightly sticky and slightly plastic; common very fine and fine roots; slightly calcareous; mildly alkaline (pH 7.8); abrupt smooth boundary.

C2-- 7 to 15 inches; light yellowish brown (10YR 6/4) loam, yellowish brown (10YR 5/4) moist; massive; soft, friable, slightly sticky and slightly plastic; common very fine and fine roots; slightly calcarious; moderately alkaline (pH 8.3); abrupt smooth boundary.

C3r-- 15 inches; rippable shale; soft carbonate coatings on surface or rock.

Paralithic contact is at a depth of 8 to 20 inches.

A Horizon: Hue in 10 YR or 5Y, and value is 4 or 5 when moist. Texture is gravelly loam, bouldery loam, or extremely channery loam.

C Horizon: Hue is 10 YR or 2.5Y, value is 5 or 6 when dry, and chroma is 2 to 4. Texture is loam, gravelly loam, or clay loam. Clay content is 20 to 35 percent. Rock fragment content is 0 to 30 percent.

Comodore Series

The Comodore series consists of shallow, well drained, moderately permeable soils on mountain slopes. These soils formed in colluvium derived dominantly from sandstone. Slope is 50 to 70 percent. Elevation is 6,800 to 9,000 feet. Average annual precipitation ranges from 16 to 20 inches, and average annual air temperature ranges from 38 to 45 degrees F.

These soils are loamy-skeletal, mixed Lithic Haploborolls.

Typical pedon of a Comodore very stony fine sandy loam in an area of Comodore-Datino Variant complex; about 12 miles east of Price, near Dugout Creek; about 2,300 feet north and 2,000 feet east of the southwest corner of Sec. 23, T. 13 S., R. 12 E.

A1-- 0 to 6 inches; dark grayish brown (10YR 4/2) very stony fine sandy loam, very dark brown (10YR 2/2) moist; weak fine granular structure; soft, friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; few very fine and fine pores; 15 percent pebbles, 20 percent cobbles, and 20 percent stones; mildly alkaline (pH 7.4); clear smooth boundary.

C1-- 6 to 14 inches; very dark grayish brown (10YR 3/2) very stony loam, very dark brown (10YR 2/2) moist; weak fine subangular blocky structure; soft, friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; few very fine pores; 15 percent pebbles, 15 percent cobbles, and 15 percent stones; mildly alkaline (pH 7.4); abrupt wavy boundary.

R-- 14 inches; fractured sandstone.

Bedrock is at a depth of 10 to 20 inches. The control section is 35 to 45 percent rock fragments.

A Horizon: Value is 2 or 3 when moist, and chroma is 2 or 3. Texture is very stony fine sandy loam or bouldery loam.

C Horizon: Value is 3 to 5 when dry and 2 to 4 when moist, and chroma is 2 to 3. Clay content is 19 to 24 percent. The horizon is 15 to 20 percent pebbles, 10 to 15 percent cobbles and 15 to 20 percent stones.

Datino Series

The Datino Series consists of very deep, well drained, moderately permeable soils on canyonsides and mountain slopes. These soils formed in colluvium derived dominantly from sandstone and shale. Slope is 15 to 80 percent. Elevation is 6,800 to 8,700 feet. Average annual precipitation ranges from 16 to 20 inches, and average annual air temperature ranges from 38 to 45 degrees F.

These soils are loamy-skeletal, mixed Typic Haploborolls.

Typical pedon of a Datino extremely stony fine sandy loam in an area of Perma family-Datino complex, about 0.25 mile south of Soldier Creek Mine, 2,400 feet west and 2,200 feet south of the northeast corner of Sec. 18, T. 13 S., R. 12 E.

A1-- 0 to 10 inches; brown (10YR 4/3) extremely stony fine sandy loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, friable, slightly sticky and slightly plastic; common very fine and fine roots and few medium and coarse roots; few very fine pores; 15 percent pebbles, 25 percent cobbles, and 25 percent stones; moderately alkaline (pH 7.9); clear smooth boundary.

B2-- 10 to 16 inches; brown (10YR 5/3) very stony loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine, fine, medium, and coarse roots; common very fine and fine pores and few medium pores; 15 percent pebbles, 15 percent cobbles, and 10 percent stones; slightly calcareous; moderately alkaline (pH 7.9) gradual wavy boundary.

C1ca-- 16 to 41 inches; pale brown (10YR 6/3) very stony fine sandy loam, brown (10YR 5/3) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine, fine, medium, and coarse roots; common very fine and fine pores; 15 percent pebbles, 20 percent cobbles, and 25 percent stones strongly calcareous; soft powdery masses of calcium carbonate; moderately alkaline (pH 8.0); gradual smooth boundary.

C2-- 41 to 60 inches; pale brown (10YR 6/3) very stony fine sandy loam, brown (10YR 5/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine, fine, medium, and coarse roots; few very fine pores; 15 percent pebbles, 20 percent cobbles, and 25 percent stones; moderately calcareous; disseminated calcium carbonate; moderately alkaline (pH 7.9).

Secondary calcium carbonate is at a depth of 15 to 22 inches. The mollic epipedon is 10 to 15 inches thick. The solum is 15

to 22 inches thick. The particle-size control section is 35 to 60 percent rock fragments.

A Horizon: Value is 4 or 5 when dry and 2 or 3 when moist, and chroma is 2 or 3.

B2 Horizon: Value is 3 to 5 when dry and 2 to 4 when moist, and chroma is 2 or 3. Clay content is 18 to 26 percent. Rock fragment content is 35 to 45 percent. Reaction is mildly alkaline or moderately alkaline.

C Horizon: Value is 5 or 6 when dry, and chroma is 2 or 3. Clay content is 16 to 25 percent. Rock fragment content is 40 to 70 percent. Reaction is mildly alkaline or moderately alkaline.

Gerst Series

The Gerst series consists of shallow, well drained, moderately slowly permeable soils on the sides of mesas, benches, terraces, and canyons and on mountain slopes and hillslopes. These soils formed in residuum and colluvium derived dominantly from shale and sandstone. Slope is 3 to 70 percent. Elevation is 5,200 to 8,000 feet. Average annual precipitation ranges from 8 to 14 inches, and average annual air temperature ranges from 45 to 50 degrees F.

These soils are loamy, mixed (calcareous), mesic, shallow Ustic Torriorthents.

Typical pedon of a Gerst extremely stony loam in an area of Gerst-Strych-Badland complex, 50 to 70 percent slopes, about 5 miles northwest of East Carbon City, about 2,400 feet south and 1,200 feet west of the northeast corner of Sec. 16, T. 14 S., R. 13 E.

A1-- 0 to 7 inches; light brownish gray (10YR 6/2) extremely stony loam, dark brown (10YR 4/3) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, few fine, and many coarse roots; many fine and few medium pores; 30 percent pebbles, 10 percent cobbles, and 30 percent stones and boulders; strongly calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.2); clear smooth boundary.

C1-- 7 to 16 inches; gray (10YR 6/1) channery silt loam, dark grayish brown (10YR 4/2) moist; massive; hard, friable, sticky and plastic; common very fine roots and few medium and coarse roots; 15 percent shale fragments; strongly calcareous; disseminated calcium carbonate; strongly alkaline (pH 8.6); clear smooth boundary.

C2-- 16 to 19 inches; light brownish gray (10YR 6/2) channery silt loam, grayish brown (10YR 5/2) moist; massive; hard, friable, slightly sticky and plastic; few very fine and fine roots; 20 percent shale fragments; strongly calcareous; disseminated calcium carbonate; strongly alkaline (pH 8.6); clear smooth boundary.

Cr-- 19 inches; partly weathered shale.

Paralithic contact is at a depth of 8 to 20 inches.

A Horizon: Value is 4 or 5 when moist, and chroma is 2 or 3. Texture is very channery loam, cobbly loam, or extremely stony loam. Reaction is moderately alkaline or strongly alkaline.

C Horizon: Hue is 10YR or 2.5Y, value is 4 or 5 when moist, and chroma is 1 or 2. Texture is channery loam, channery silt

loam, or channery clay loam. Clay content is 18 to 32 percent. Rock fragment content is 15 to 25 percent.

Guben Series

The Guben series consists of very deep, well drained moderately permeable soils on canyonsides and mountain slopes. These soils formed in colluvium derived dominantly from sandstone and shale. Slope is 15 to 75 percent. Elevation is 5,000 to 9,500 feet. Average annual precipitation ranges from 14 to 20 inches, and average annual air temperature ranges from 38 to 45 degrees F.

These soils are loamy-skeletal, mixed Typic Calciborolls.

Typical pedon of Guben extremely bouldery loam in an area of Cabba family-Guben-Rock outcrop complex, in Prickly Pear Canyon, about 1,200 feet south and 2,000 feet east of the northwest corner of Sec. 14, T. 12 S., R. 15 E.

01-- 0.5 inch to 0; pine needles and grasses.

A1-- 0 to 7 inches; grayish brown (10YR 5/2) extremely bouldery loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; 15 percent pebbles, 10 percent cobbles, 5 percent stones, and 10 percent boulders; moderately calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.2); clear wavy boundary.

B2-- 7 to 15 inches; pale brown (10YR 6/3) very stony loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; 10 percent pebbles, 15 percent cobbles, and 20 percent stones; moderately calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.4); clear wavy boundary.

C1ca- 15 to 30 inches; very pale brown (10YR 6/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots and few fine, medium, and coarse roots; few very fine and fine pores; 10 percent pebbles, 20 percent cobbles, 20 percent stones, and disseminated calcium carbonate; strongly alkaline (pH 8.6); clear smooth boundary.

C2-- 30 to 60 inches; light yellowish brown (10YR 6/4) very stony loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine, fine, and medium roots; few very fine and medium pores and common fine pores; 10 percent pebbles, 20 percent cobbles, 25 percent stones, and 5 percent boulders;

moderately calcareous; disseminated calcium carbonate; strongly alkaline (pH 9.0).

The mollic epipedon is 7 to 10 inches thick. The solum is 15 to 24 inches thick. The particle-size control section is 35 to 60 percent rock fragments. Secondary calcium carbonate is at a depth of 11 to 24 inches.

A Horizon: Value is 4 or 5 when dry, and chroma is 2 or 3. Texture is extremely bouldery loam, extremely stony loam, or extremely bouldery fine sandy loam. Reaction is mildly alkaline or moderately alkaline. Calcium carbonate equivalent is 11 to 19 percent.

B Horizon: Hue is 10YR or 7.5YR, value is 5 or 6 when dry and 3 or 4 when moist, and chroma is 2 to 4. Texture is very stony loam or very cobbly loam. Clay content is 17 to 22 percent. Rock fragment content is 35 to 55 percent. Reaction is mildly alkaline or moderately alkaline. Calcium carbonate equivalent is 20 to 25 percent.

Cca Horizon: Hue is 7.5YR or 10YR, value is 6 or 7 when dry and 5 or 6 when moist, and chroma is 2 to 4. Texture is very stony loam or very cobbly fine sandy loam. Clay content is 17 to 25 percent. Rock fragment content is 35 to 60 percent. Reaction is moderately alkaline or strongly alkaline. Calcium carbonate equivalent is 20 to 38 percent.

C Horizon: Texture is very stony loam or very cobbly fine sandy loam. Clay content is 17 to 24 percent. Reaction is moderately alkaline or strongly alkaline Calcium carbonate equivalent is 19 to 30 percent.

Midfork Family

The Midfork family consists of very deep, well drained, moderately permeable soils is mountain slopes. These soils formed in gravelly colluvium derived dominantly from calcareous sedimentary rock. Slope is 50 to 70 from calcareous sedimentary rock. Slope is 50 to 70 percent. Elevation is 7,000 to 9,500 feet. Average annual precipitation ranges from 20 to 25 inches, and average annual air temperature ranges from 34 to 38 degrees F.

These soils are loamy-skeletal, mixed Typic Croborolls.

Reference pedon of a Midfork family bouldery loam, in an area of Midfork family-Comodore complex, about 16 miles east of Sunnyside, about 1,600 feet north and 950 feet east of the southwest corner of Sec. 15, T. 15 S., R. 16 E. (No general land office survey has been made.)

02- 2 inches to 0; partially decomposed twigs, leaves, and needles.

A11-- 0 to 4 inches; brown (10YR 4/3) bouldery loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; soft, very friable; few very fine and fine roots; 5 percent channers, 5 percent flagstones, and 20 percent boulders; neutral (pH 7.2); abrupt smooth boundary.

A12-- 4 to 7 inches; brown (10YR 4/3) bouldery loam, dark brown (10YR 3/3) moist; weak medium prismatic structure parting to weak medium granular slightly hard, firm, slightly sticky and slightly plastic common fine and few medium roots; few very fine and fine pores; 10 percent fine pebbles, 5 percent cobbles, and 5 percent boulders; mildly alkaline (pH 7.8); clear smooth boundary.

C1-- 7 to 17 inches; yellowish brown (10YR 5/4) very channery loam, brown (10YR 4/3) moist; massive; slightly hard, firm, slightly sticky and slightly plastic; common fine and few medium roots; 10 percent pebbles, 30 percent channers, and 5 percent cobbles; slightly calcareous; disseminated calcium carbonate; mildly alkaline (pH 7.8); gradual smooth boundary.

C2-- 17 to 60 inches; yellowish brown (10YR 5/4) very gravelly loam, brown (10YR 4/3) moist; massive, soft, friable, slightly sticky and slightly plastic; few fine roots; 25 percent pebbles and 10 percent channers; slightly calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.4)

The mollic epipedon is 7 to 15 inches thick. The particle-size control section is very gravelly loam or very channery loam. Clay content is 18 to 24 percent. Rock fragment content of the particle-size control section is 35 to 65 percent.

A Horizon: Chroma is 2 or 3. Reaction is neutral or mildly alkaline.

C Horizon: Chroma is 2 or 3. Reaction is mildly alkaline or moderately alkaline.

Pathead Series

The Pathead series consists of moderately deep, well drained, moderately permeable soils on benches, ridges, canyonsides, and mountain slopes. These soils formed in colluvium and residuum derived dominantly from sandstone and shale. Slope is 15 to 70 percent. Elevation is 5,900 to 9,000 feet. Average annual precipitation is 14 to 20 inches, and average annual air temperature is 38 to 45 degrees F.

These soils are loamy-skeletal, mixed (calcareous), frigid Typic Ustorthents.

Typical pedon of a Pathead extremely stony loam in an area of Pathead-Curecanti family association, about 2 miles north and 4 miles west of Helper, about 1,100 feet north and 400 feet west of the southeast corner of Sec. 6, T. 13 S., R. 9 E.

A1-- 0 to 3 inches; brown (10YR 5/3) extremely stony loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine roots; few very fine pores; 5 percent pebbles, 15 percent cobbles, 40 percent stones, and 5 percent boulders; moderately calcareous; disseminated calcium carbonate; strongly alkaline (pH 8.6); abrupt smooth boundary.

C1-- 3 to 14 inches; pale brown (10YR 6/3) very cobbly loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine roots and few fine and medium roots; many very fine pores; 20 percent pebbles and 5 percent cobbles; moderately calcareous; disseminated calcium carbonate; strongly alkaline (pH 8.8); clear smooth boundary.

C2-- 14 to 26 inches; pale brown (10YR 6/3) very cobbly loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; soft, friable, slightly sticky and slightly plastic; common very fine and few fine roots; few very fine pores; 20 percent pebbles, 25 percent cobbles, and 5 percent stones; moderately calcareous; disseminated calcium carbonate; strongly alkaline (pH 8.8); clear smooth boundary.

R-- 26 inches; sandstone.

Bedrock is at a depth of 20 to 40 inches. The particle-size control section is 35 to 60 percent rock fragments.

A Horizon: Value is 5 or 6 when dry and 3 to 5 when moist, and chroma is 2 or 3. Texture is gravelly loam, cobbly loam, extremely stony fine sandy loam, extremely stony loam, or

extremely bouldery fine sandy loam. Reaction is moderately alkaline or strongly alkaline.

C Horizon: Hue is 10YR or 2.5Y, value is 6 or 7 when dry and 3 to 5 when moist, and chroma is 2 to 4. Texture is very cobbly loam, extremely cobbly loam, or very stony fine sandy loam. Clay content is 18 to 27 percent. Calcium carbonate equivalent is 11 to 28 percent. Reaction is moderately alkaline or strongly alkaline.

Perma Family

The Perma family consist of very deep, well drained, moderately rapidly permeable soils on mountain slopes. These soils formed in colluvium derived dominantly from sandstone and shale. Slope is 15 to 80 percent. Elevation is 7,200 to 8,800 feet. Average annual precipitation ranges from 16 to 20 inches, and average annual air temperature ranges from 38 to 45 degrees F.

These soils are loamy-skeletal, mixed Typic Haploborolls.

Reference pedon of a Perma family very stony sandy loam in an area of Perma family-Datino complex, about 1.5 miles north and east of Geneva Coal Mine; 2,400 feet north and 600 feet east of the southwest corner of Sec. 35, T. 15 S., R. 14 E.

A11-- 0 to 7 inches; dark brown (7.5YR 4/2) very stony sandy loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; soft, very friable; many very fine and coarse roots, common fine roots, and few medium roots; common very fine pores; 10 percent pebbles, 10 percent cobbles, and 20 percent stones; neutral (pH 6.8); clear smooth boundary.

A12-- 7 to 15 inches; dark brown (7.5YR 4/2) cobbly sandy loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine roots, common fine and coarse roots, and few medium roots; common very fine pores; 10 percent pebbles, 15 percent cobbles, and 5 percent stones; neutral (pH 6.8); abrupt smooth boundary.

B21-- 15 to 22 inches; brown (7.5YR 5/3) cobbly sandy loam, dark brown (7.5YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and few fine roots; few very fine and fine pores; 15 percent pebbles and 15 percent cobbles; neutral (pH 7.0); clear smooth boundary.

B22-- 22 to 35 inches; brown (7.5YR 5/3) very cobbly sandy loam, dark brown (7.5YR 4/3) moist; moderate medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few very fine, fine, coarse, and very coarse roots; common very fine pores; 25 percent pebbles and 20 percent cobbles; neutral (pH 6.6); clear smooth boundary.

C1-- 35 to 60 inches; brown (7.5YR 5/3) very stony sandy loam, dark brown (7.5YR 4/3) moist; massive; soft, very friable, slightly sticky and slightly plastic; few very

fine and fine roots and common coarse roots; many very fine pores; 15 percent pebbles, 15 percent cobbles, and 20 percent stones; neutral (pH 6.6)

A Horizon: Value is 4 or 5 when dry and 2 or 3 when moist, and chroma is 2 or 3.

B2 Horizon: Hue is 7.5YR or 10YR, value is 4 or 5 when moist, and chroma is 2 or 3.

C Horizon: Hue is 7.5YR or 10YR.

Shupert Series

The Shupert series consists of very deep, well drained, slowly permeable soils on narrow valley and canyon floors. These soils formed in alluvium derived from sandstone and shale. Slope is 1 to 8 percent. Elevation ranges from 4,600 to 7,200 feet but commonly is 5,200 to 6,400 feet. Average annual precipitation is 12 to 16 inches, and average annual air temperature is 43 to 45 degrees F.

These soils are fine-loamy, mixed (calcareous), frigid Typic Ustifluvents.

Typical pedon of a Shupert gravelly loam in an area of Shupert-Winetti complex, about 4 miles north of Whitmore Park, about 1,000 feet south and 2,000 feet west of the southeast corner of Sec. 32, T. 12 S., R. 12 E.

A1-- 0 to 3 inches; pale brown (10YR 6/3) gravelly loam, olive brown (2.5Y 4/3) moist; weak thin platy structure parting to moderate very fine subangular blocky; soft, very friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots and few coarse roots; common very fine and fine random tubular pores; 30 percent pebbles; slightly calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.2); clear smooth boundary.

C1-- 3 to 9 inches; pale brown (10YR 6/3) clay loam, brown (10YR 4/3) moist; weak fine and medium subangular blocky structure; soft, friable, slightly sticky and slightly plastic; common very fine and fine roots and few medium and coarse roots; common very fine and fine random tubular pores; slightly calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.2); clear wavy boundary.

IIC2-- 9 to 21 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots and few medium and coarse roots; common very fine and fine and few medium random tubular pores; 15 percent pebbles; slightly calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.4); clear smooth boundary.

IIC3-- 21 to 34 inches; light yellowish brown (10YR 6/4) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots and few medium and coarse roots; common very fine

and fine and few medium random tubular pores; 10 percent pebbles; slightly calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.4); clear wavy boundary.

IIC4-- 34 to 49 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine and fine and few medium random tubular pores; 10 percent pebbles; slightly calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.4); clear smooth boundary.

IIC5-- 49 to 60 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine, fine, and medium random tubular pores; 5 percent pebbles; slightly calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.4).

The particle-size control section is 0 to 15 percent rock fragments.

A Horizon: Hue is 10YR or 2.5Y, value is 5 or 6 when dry and 4 or 5 when moist, and chroma is 2 or 3.

C Horizon: Hue is 10YR or 2.5Y, value is 5 to 7 when dry ad 4 or 5 when moist, and chroma is 2 to 4. Texture is clay loam, but in some pedons there are thin lenses of gravelly clay loam and gravelly loam.

Travessilla Series

The Travessilla series consists of shallow, well drained, moderately permeable and moderately rapidly permeable soils on mesas, benches, canyonsides, mountain slopes, and foot slopes. These soils formed in residuum and colluvium derived dominantly from sandstone and interbedded shale. Slope is 1 to 80 percent. Elevation is 5,000 to 8,700 feet but is dominantly 5,500 to 6,500 feet. Average annual precipitation is 10 to 14 inches, and average annual air temperature is 45 to 50 degrees F.

These soils are loamy, mixed (calcareous), mesic Lithic Ustic Torriorthents.

Typical pedon of a Travessilla fine sandy loam in an area of Travessilla-Rock outcrop complex, about 5 miles west of Price, about 2,400 feet north and 2,500 feet east of the southwest corner of Sec. 15, T. 14 S., R. 9 E.

A1-- 0 to 2 inches; brown (10YR 5/3) fine sandy loam, dark yellowish brown (10YR 4/4) moist; weak thick platy structure; soft, very friable; few fine and medium roots; few fine pores; slightly calcareous; mildly alkaline (pH 7/6); clear smooth boundary.

C1-- 2 to 5 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 4/3) moist; weak medium subangular blocky structure parting to weak fine subangular blocky; soft, very friable; few fine and medium roots; few fine pores; 15 percent channers; mildly alkaline (pH 7/5); clear smooth boundary.

C2-- 5 to 10 inches; brown (10YR 5/3) fine sandy loam, dark yellowish brown (10YR 4/4) moist; massive; few fine and medium pores; 15 percent channers; moderately calcareous; mildly alkaline (pH 7/6); abrupt wavy boundary.

R-- 10 inches; sandstone.

Bedrock is at a depth of 7 to 20 inches.

A Horizon: Hue is 7.5YR or 10YR, value is 5 or 6 when dry and 3 or 4 when moist, and chroma is 3 or 4. Texture is sandy loam, very gravelly fine sandy loam, fine sandy loam, or extremely boundary loam. Reaction is mildly alkaline or moderately alkaline.

C Horizon: Hue is 7.5YR or 10YR, value is 5 to 7 when dry and 4 to 6 when moist, and chroma is 3 or 4. Texture is sandy loam, fine sandy loam, very fine sandy loam, or loam. Rock fragment content is 0 to 15 percent. Reaction is mildly alkaline or moderately alkaline.

Winetti Series

The Winetti series consists of very deep, well drained, moderately rapidly permeable soils on narrow valley and canyon floors. These soils formed in alluvium derived from sandstone and shale. Slope is 1 to 8 percent. Elevation is 4,600 to 7,200 feet but commonly is 5,200 to 6,400 feet. Average annual precipitation is 12 to 16 inches, and average annual air temperature is 43 to 45 degrees F.

These soils are loamy-skeletal, mixed (calcareous), frigid Typic Ustifluvents.

Typical pedon of a Winetti bouldery sandy loam in an area of Shupert-Winetti complex, about 2.5 miles north of Sunnyside Mine, about 1,800 feet south and 2,500 feet west of the northeast corner of Sec. 20, T. 14 S., R. 14 E.

A1-- 0 to 6 inches; grayish brown (10YR 5/2) bouldery sandy loam, dark grayish brown (10YR 4/2) moist; moderate medium granular structure; soft, very friable; common very fine, fine, and medium roots and few coarse roots; 4 percent cobbles, 15 percent stones, and 10 percent boulders; slightly calcareous; disseminated calcium carbonate; mildly alkaline (pH 7.6); abrupt smooth boundary.

C1-- 6 to 11 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; common fine pores; 10 percent pebbles; strongly calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.2); clear wavy boundary.

C2-- 11 to 26 inches; pale brown (10YR 6/3) very bouldery loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; common fine pores; 10 percent pebbles, 5 percent cobbles, 10 percent stones, and 15 percent boulders; strongly calcareous; coatings of calcium carbonate on the underside of rock fragments; moderately alkaline (pH 8.4); abrupt smooth boundary.

C3-- 26 to 34 inches; brown (10YR 5/3) very bouldery loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; common fine pores; 10 percent pebbles, 5 percent cobbles, 10 percent stones, and 15 percent boulders; strongly calcareous; coatings of calcium carbonate on the underside of rock fragments; moderately alkaline (pH 8.4); abrupt smooth boundary.

C4-- 34 to 60 inches; pale brown (10YR 6/3) very gravelly sandy loam, brown (10YR 5/3) moist; single grain; loose, very friable slightly sticky; few very fine and fine roots; 40 percent pebbles, 5 percent cobbles, and 5 percent boulders; strongly calcareous; coatings of calcium carbonate on the underside of rock fragments, moderately alkaline (pH 8.4).

The particle-size control section is 35 to 50 percent rock fragments.

C Horizon: Value is 5 or 6 when dry and 4 or 5 when moist, and chroma is 2 or 3. Texture is mainly very bouldery loam or very gravelly sandy loam, but there are thin layers of very bouldery sandy clay loam in some pedons. Clay content is 14 to 17 percent.

APPENDIX C Carbon County, Utah Lease

SRS, Inc. Sunnyside Reclamation & Salvage, Inc.
P.O. Box 99 — Sunnyside, Utah 84539

April 13, 1989

T14S R14E SLBM
SECTION 21: NE1/4

Mr. Lowell P. Braxton
Division of Oil, Gas & Mining
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203

Dear Mr. Braxton:

Re: County Lease, Township 14 South, Range 14 East, SLBM

Following your phone conversation with Bill Balaz, I have enclosed a copy of the Lease Agreement with the Carbon County commissioners.

This executed lease shows that SRS, Inc. has right of entry for the incidental bounday change (IBC) referred to in your letter dated April 10, 1989.

Your prompt resolution to this request will be greatly appreciated.

If you have any questions, please feel free to contact me.

Sincerly yours,

Karl R. Houskeeper

Karl R. Houskeeper
Environmental Coordinator

KRH:th

cc: Bill Balaz

Enclosure

LEASE

This Lease and Agreement becoming effective as of the 22nd day of March, 1989, by and between Carbon County, a body politic of the State of Utah, acting by and through its Board of Commissioners, made and adopted on June 10, 1981, hereinafter called Lessor, and Sunnyside Reclamation and Salvage, Inc., a Colorado Corporation, hereinafter called Lessee;

WITNESSETH:

1. Lessor, for and in consideration of the royalties, covenants, and agreements hereinafter to be paid, kept, and performed by Lessee, has demised, leased, and let, and by these presents does demise, lease, and let unto Lessee all coal in the following described real property ("Premises"):

Township 14 South, Range 14 East, SLBM

- Section 21: NE1/4

2. The terms of this Lease shall be five (5) years from the effective date hereof ("Primary Term") and as may be terminated or extended as provided herein.

3. Lessee shall pay to Lessor a production royalty equal to four percent (4%) of the value on every ton of 2,000 pounds of coal mined, removed, and sold from the Premises during the term of this Lease. Lessee shall make payment for the same on the 18th day of each month for the preceding month's production. In no case shall the production royalty payable be less than One and No/100 Dollars ($1.00) per ton. It is understood and agreed that if said royalties do not amount to Ten Dollars ($10.00) per month, in any calendar month, Lessee shall nevertheless pay said amount of Ten Dollars ($10.00) per month as a minimum royalty on the 18th day of each month during the term of this Lease; said payments shall be made at the office of the Treasurer of Carbon County at Price, Utah. As evidence of the amount of coal mined and sold, Lessee shall furnish to the County Clerk of Carbon County at his office at Price, Utah, upon his request and on a confidential basis, copies of the applicable production and sale records relating to this Lease, the Premises, and the coal mined therefrom.

4. The Lessee shall engage in the diligent development of the coal resources subject to the Lease.

5. Lessee shall operate and mine the Premises in a workmanlike manner in accordance with good and economical mining with due regard to the safety, development, and preservation of said premises, and shall comply with the laws of the State of Utah, the Industrial Commission of the State of Utah, the United States Government, and with all other applicable rules, regulations, and laws which may hereafter be enacted or promulgated in the interest of safety and workmanlike operations of the Premises.

6. Lessor may, at reasonable times and at its sole risk and expense, enter upon the Premises for the purpose of inspection; and Lessee shall, at all reasonable times, leave the Premises and mine open to such inspection. Lessee further agrees, upon demand of Lessor, to furnish within a reasonable time a detailed plat, or working plan, of its operations on the Premises.

7. Lessee shall pay, when due, all taxes lawfully assessed by the State of Utah upon improvements or output of coal on or from the Premises.

8. Lessee shall keep books of account showing the amount of coal mined and sold from the Premises; and said books of account shall, on a confidential basis, be open to the inspection of Lessor at all reasonable times. Upon demand of Lessor, the Lessee shall make a report of tonnage mined by the 15th day of each month covering all production from the Premises for the previous month.

9. Lessee shall furnish a copy of the Utah State Mine Inspection Report to Lessor upon request within a reasonable time after such inspection is made.

10. Lessee shall indemnify Lessor from any and all liability, including attorney's fees and court costs, which may occur as a result of Lessee's activities upon the Premises.

11. It is mutually agreed that in the event of labor strikes, fires, floods, and other causes beyond the reasonable control of the Lessee, production may be suspended so long as necessary by the exigence

of said conditions, provided that this is not to be construed as changing the provisions for minimum royalty payments as outlined in Section 3 of this Agreement.

12. Upon the expiration of this Lease, or upon the failure to pay the royalties when due, or upon failure to comply within a reasonable time with the written request of Lessor with any of the terms and conditions of this Lease, the same shall terminate thirty (30) days after Lessor gives written notice to Lessee of the grounds for termination; and Lessor may enter upon and take possession of the Premises without process of law or court action; and Lessee agrees to pay all expenses, including a reasonable attorney's fee for the enforcement of the provisions of this Lease. Lessee shall have a period of ninety (90) days from the termination or expiration of this Lease to remove any personal property from the Premises.

13. Lessor hereby grants unto Lessee the right and option to renew this Lease for one (1) successive five (5) year term after the termination hereof under the same terms and conditions herein stated; provided, however, that the amount of royalty shall be renegotiated at the end of the Primary Term, said renegotiation to be based upon the rate charged by the Federal Government on coal lands leased in the area; and, provided further, that any increase in royalty renegotiated shall not exceed the rate charged by the Federal Government in such instances. The minimum granted royalty of Ten Dollars ($10.00) per month shall not be renegotiated. Said option to renew shall be exercised by Lessee giving its written notice to Lessor of its intent to renew at least sixty (60) days prior to the end of the Primary Term.

14. Lessee shall not assign this Lease, or any portion of the Premises, without first receiving the written consent of the Lessor to do so. Such consent shall not be unreasonably withheld.

15. This Lease is issued only under such title as the Lessor may hold; and if Lessor is hereafter divested of such title, Lessor shall not be liable for any damages sustained by Lessee, nor shall Lessee be entitled to or claim any refund of rentals or royalties or other monies theretofore paid to Lessor. It is now agreed that if any acreage here-

under is deleted because of failure of title in Lessor, such deletion shall be deducted from the total acreage of 40 acres and the minimum monthly royalty shall be reduced accordingly on a pro-rata basis.

16. Notices provided herein shall be given to the parties as follows:

If to the Lessor:
Carbon County Courthouse
Price Utah 84501
Attention: _____

If to the Lessee:
Sunnyside Reclamation & Salvage, Inc.
P. O. Box 99
Sunnyside, Utah 84539
Attention: Mine Manager

17. This Agreement shall be binding upon the heirs, successors, and assigns of Lessee.

IN WITNESS WHEREOF, Lessor has caused this instrument to be subscribed by the Board of Commissioners of Carbon County, State of Utah, and the Lessee has hereunto set its hand and seal:

This Agreement is memorialized on the 12th day of April, 1989.

CARBON COUNTY, a body politic of the State of Utah

By William P. Krompel

By Emma R. Hughendall

By Lynda C. Barnes

ATTEST:

Jean A. Whittes, Deputy
Clerk of Carbon County,
State of Utah

SUNNYSIDE RECLAMATION & SALVAGE, INC.
a Colorado Corporation

By James T. Cooper
Vice President

STATE OF UTAH)
: SS
COUNTY OF CARBON)

On this _____ of _____, 1989, personally appeared before me _____, _____, _____, and _____, the signers of the above lease between Carbon County and Sunnyside Reclmation & Salvage, Inc. who duly acknowledged to me that they executed the same.

_____
NOTARY PUBLIC

My Commission Expires:

_____

Residing At:

_____

****
*
* ** TRANSMIT CONFIRMATION REPORT **
*
* Journal No. : 018
* Receiver : 801 637 4584
* Transmitter : DIV OIL GAS & MINING
* Date : Oct 15,92 13:12
* Document : 02 pages
* Time : 02'10"
* Mode : G3 NORMAL
* Result : T.4.1
*
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TRANSMIT CONFIRMATION REPORT

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Transmitter	:	DIV OIL GAS & MINING
Date	:	Oct 15,92 13:27
Document	:	02 pages
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Result	:	OK

FAX COVER SHEET

Utah Division of Oil, Gas and Mining
Department of Natural Resources
3 Triad Center, 355 West North Temple
Suite 350
Salt Lake City, Utah 84180-1203

Telephone (801) 538-5340
FAX (801) 359-3940

DATE: 10-15-92

FAX #: 637-4584

FROM: Pam

PLEASE DELIVER THE FOLLOWING PAGE(S) TO:

Gary Johnson

TOTAL NUMBER OF PAGES, INCLUDING THIS PAGE 4

COMMENTS: _____

If you do not receive all pages or have any problems with receiving, please call (801) 538-5340 and ask for:

Jamean

AT25/14

Fax to gary johnson
637-4584
Thx.
Pam

Application For Permit Amendment
Incidental Boundary Change (IBC)
Carbon County Lease
for
No. 1 Slope, No. 24 Left Entries, and
Development of No. 24 Left Longwall Panel

Sunnyside Coal Company
Permit ACT/007/007

Sunnyside Coal Company requires an Incidental Boundary Change (IBC) for continued downdip development of the No. 1 Mine. The No. 24 Left Longwall Panel is the next panel to be developed. Completion of the No. 23 Left Longwall Panel development will occur within the next several months. This IBC is an extension of a previously approved IBC for the development of the No. 23 Left Longwall Panel (approved May 1989).

The IBC is requested for the NE1/4 of Section 21, T14S, R14E, SLB&M, Utah (Attachment 1). The IBC occurs within coal owned and controlled by Carbon County, Utah. Sunnyside Coal Company owns and controls the surface.

The permit change should be considered as an amendment since:

1. R645-303-224,100 - There is less than a 15 percent increase in surface or subsurface disturbed area. The requested IBC is approximately 33.2 acres. The current surface disturbance is approximately 315.5 acres.

2. R645-303-224,200 - Operations remain within the existing cumulative impact area.

3. R645-303-224,300 - Operations are engaged within the same hydrologic basin authorized in the approved permit.

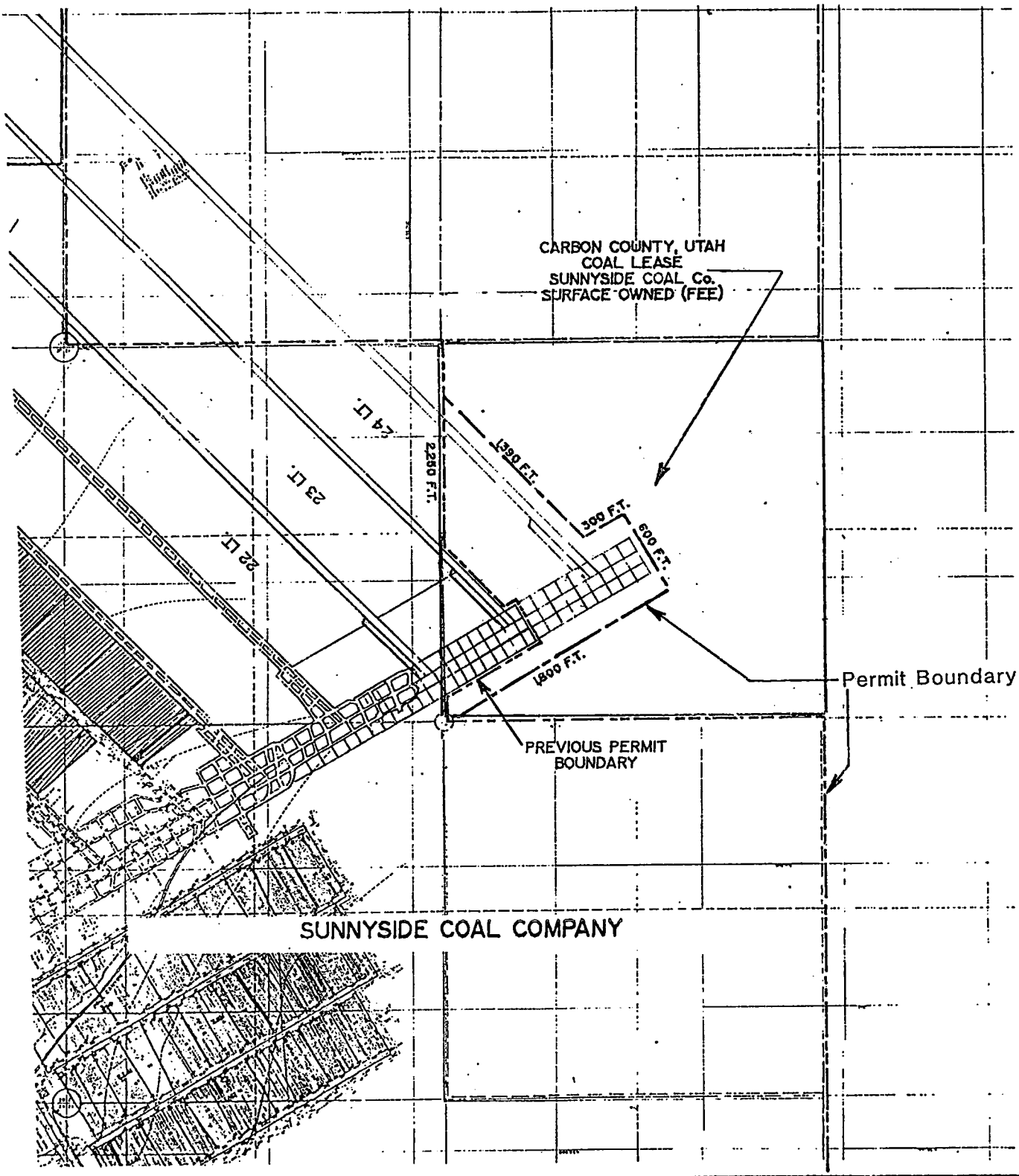
4. R645-303-224,400 - No division order has been issued for this change.

5. R645-303-224,500 - There has been no cancellation or material reductions of any guarantees of the original permit.

6. R645-303-224,600 - And, no other law or regulation applies to this change application.

R 14 E

T 14 S



Sunnyside Coal Company

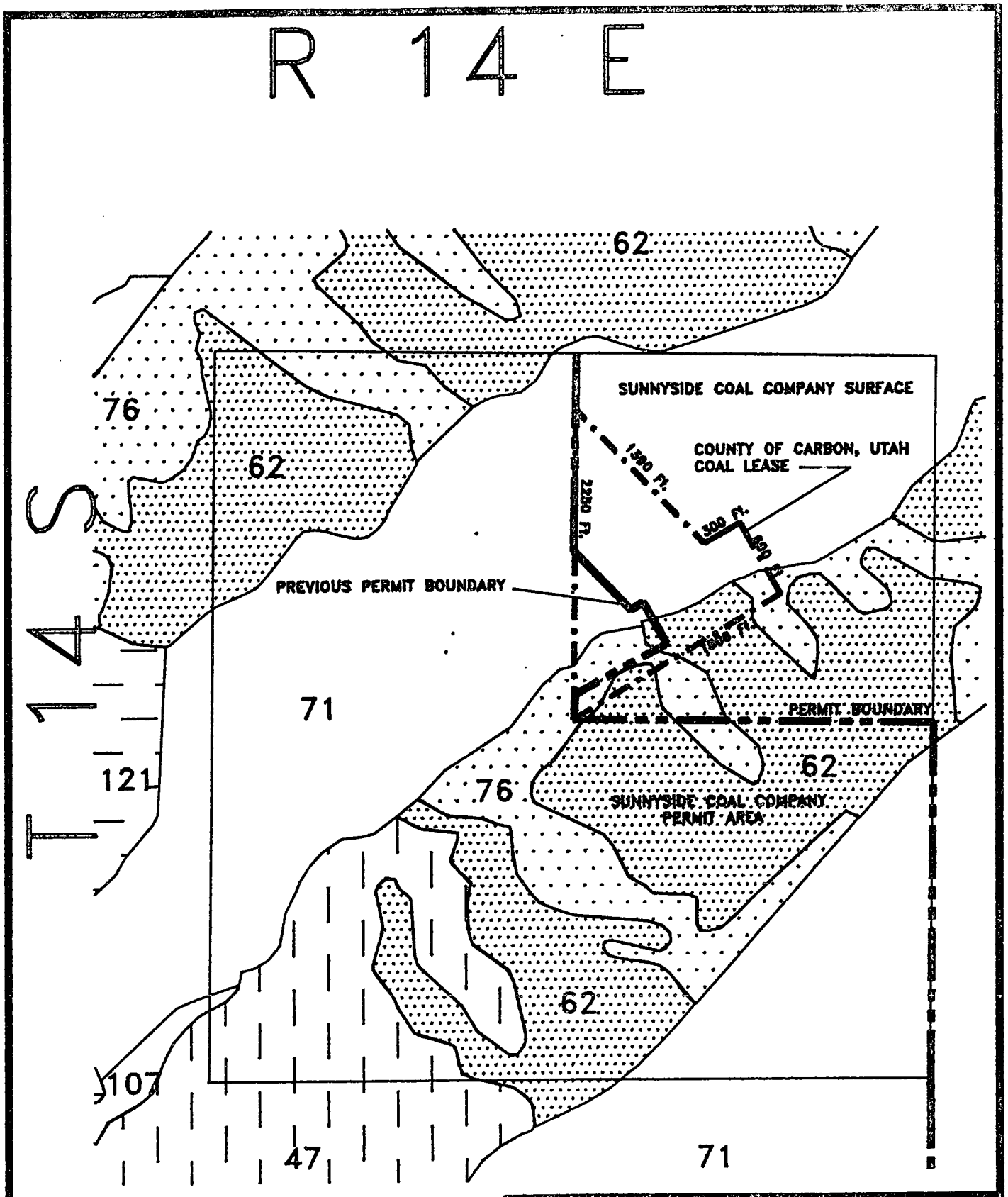
SUNNYSIDE MINES

REVISIONS		
NO.	DATE	BY
1	4/19/89	B.F.A.
2	9/08/92	B.F.A.
3		
4		

INCIDENTAL BOUNDARY CHANGE
SECTION 21, NE 1/4

DRAWN BY	J.M.E.	DATE	9/05/92
CHECKED BY		DATE	
APPROVED		SCALE	1" = 1,000'

DRAWING NO. A1-0229



SUNNYSIDE COAL COMPANY

Project: INCIDENTAL BOUNDARY CHANGE
NE 1/4 OF SECTION 21, T14S, R14E

	By	Date		
Drawn By	RHF		Scale: 1" = 1000'	Date: 9/16/92
Checked				
Approved	JME		Proj. No:	Sheet 1 of 1
Approved				
Approved			Dwg. No: ATTACHMENT 2	

Application For Permit Amendment

Incidental Boundary Change (IBC)
Carbon County Lease
for
No. 1 Slope, No. 24 Left Entries, and
Development of No. 24 Left Longwall Panel

Sunnyside Coal Company
Sunnyside Mine
Sunnyside, UT 84539

Permit ACT/007/007

JME Companies

ENVIRONMENTAL SERVICES DIVISION
12211 W. Alameda Parkway, Suite 207
Lakewood CO 80228
(303)-969-9759

September 14, 1992

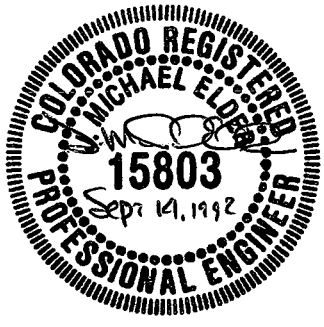
Mr. Gary Gray
Chief Engineer
Sunnyside Mine
P.O. Box 99
Sunnyside, UT 84539

Re: Incidental Boundary Change Carbon County Lease

Certification

I prepared the attached **Application for Permit Amendment for an Incidental Boundary Change for the Carbon County Lease**. This document is based on information provided to me by Sunnyside Mine and the information provided to me is accepted as correct.

I certify that the attached document is correct to my knowledge and belief.



J. Michael Elder, PE
Engineer

Application For Permit Amendment
Incidental Boundary Change (IBC)
Carbon County Lease
for
No. 1 Slope, No. 24 Left Entries, and
Development of No. 24 Left Longwall Panel

Sunnyside Mine

Prepared for:

Sunnyside Coal Company
Sunnyside Mine
Sunnyside, UT 84539

Permit ACT/007/007

Prepared by:

J. Michael Elder
JME Companies
ENVIRONMENTAL SERVICES DIVISION
12211 W. Alameda Parkway, Suite 207
Lakewood CO 80228
(303)-969-9759

September 14, 1992

TABLE OF CONTENTS

1. General

The existing mine permit boundary does not allow for expansion into No. 24 Left Longwall Panel. This permit amendment for an IBC allows expansion into this area. Sunnyside Mines intends to incorporate all of Section 21 into the mine permit boundary in the Permit Renewal Application in order to continue mining downdip during the next five year permit term.

The IBC area includes portions of Pole Canyon and the adjacent canyon walls. Sunnyside Mines does not maintain any surface facilities or conduct any surface activities in the area of the IBC. The terrain is extremely steep and rugged.

2. Environmental Impacts

This amendment is anticipated to have the following environmental impacts.

a. Soil Resources.

No additional impacts to the soil resources are anticipated. No surface disturbance is associated with this IBC. Longwall mining may cause regional subsidence; however no surface effects, other than small differences in the existing elevation, are anticipated.

Sufficient soil baseline resource information is included in the existing PAP for the IBC area. Note that the soil types on the Soil Identification Map of the current PAP list the soil types within the IBC of the NE1/4 of Section 21, T14S, R14E, SLB&M, Utah as

JTG, Repp Doney Complex (40%-70% slopes),
PSH, Zillion Complex (55%-80% slopes), and
HUG, Midfork-Elwood Complex (50%-70% slopes).

Based on the 1988 SCS Soil Survey of Carbon Area, Utah, the mapped soil map units have been identified as

JTG = 71, Pathead extremely bouldery fine sandy loam, 40 to 70 percent slopes,
PSH = 76, Perma family-Datino complex, and
HUG = 62, Midfork family-Comodore complex.

Although the map unit descriptions have changed, the soil locations on the map are virtually identical to the PAP Soil Identification Map. The Detailed Soil Map Unit Descriptions are included as Appendix A. The Soil Classification Descriptions are presented in Appendix B. The Soil Resource designations for Section 21 are presented on Attachment 2.

b. Biological Resources.
No additional impacts to the vegetation and wildlife of the IBC area are expected. Existing vegetation and fish and wildlife baseline data cover the area.

No additional disturbance will be created. No surface disturbance is associated with this IBC. Longwall mining may cause regional subsidence; however no surface effects, other than small differences in the existing elevation, are anticipated.

c. Land Use and Air Quality
The premining, current, and post mining land use is fish and wildlife habitat, and rangeland use in the canyon bottom for the area immediately adjacent to the IBC area. The IBC area is also designated fish and wildlife habitat, and rangeland use in the canyon bottom (extreme SW protion of the NE1/4).

No additional impact to cultural and historical resources is anticipated as there is no anticipated additional disturbance.

No change to the existing Bureau of Air Quality permit is anticipated. The projected production rate remains below 1mm tpy. No additional fugitive dust control measures will be required. No increases or decreases in vehicle miles are anticipated.

d. Geology.
The geologic data is presented in the approved permit for the area. No geological impacts are anticipated for the IBC area.

The plan for casing and sealing boreholes in the area remains the same as presented in the approved permit.

Longwall mining may cause regional subsidence; however no surface effects, other than small differences in the existing elevation, are anticipated. The area of the IBC is monitored in accordance with the PAP Subsidence monitoring plan. Permanent subsidence monuments are located in Bear Canyon and Whitmore Canyon.

e. Hydrology.
The IBC area creates no surface disturbance. Surface water runoff within this undisturbed area is not captured. No additional impacts to the existing surface hydrological resources are anticipated.

Additional underground mining will occur within the IBC area. Groundwater within this disturbed area is captured, pumped, treated, and discharged in accordance with the measures presented in the approved PAP. No additional ground water structures or treatment facilities are required. No additional impacts to the existing ground water hydrological resources are anticipated.

The IBC area remains in compliance with the existing hydrological information and plans in the approved permit.

3. IBC Land Information

The requested IBC is approximately 33.2 acres. The IBC is an extension of a previously requested IBC for the No. 23 Left Longwall panel development. The legal for the IBC (including the previously approved 6.8 acres) is as follows:

Beginning at the SW corner of NE1/4 of Section 21 (center of Section 21), T14S, R14E, SLB&M, Utah;
thence N60^{0}09'46"E, 1800 ft;
thence N29^{0}50'14"W, 600 ft;
thence S60^{0}09'46"W, 300 ft;
thence N45^{0}00'02"W, 1390 ft;
thence S00^{0}34'48"W, 2250 ft to the point of beginning for a total area of approximately 40.0 acres.

a. Right-of-Entry Information

Sunnyside Coal Company, through its predecessor Sunnyside Reclamation & Salvage, Inc., has a Lease and Agreement with Carbon County, Utah for extracting coal from the NE1/4, Section 21, T14S, R14E, SLB&M, Utah. Effective March 22, 1989, the Lease and Agreement is for a five year primary term and a five year subsequent term. The lease is provided in Appendix C.

Sunnyside Coal Company, through its predecessor Sunnyside Reclamation & Salvage, Inc., owns and controls the surface of the NE1/4, Section 21, T14S, R14E, SLB&M, Utah. The surface rights are conveyed by Deed and Assignment dated March 9, 1989 as part of Kaiser Coal Corporation bankruptcy proceedings designated Case No. 87B-01552-E before the United States Bankruptcy Court for the District of Colorado (document filed Carbon County, Utah, Book 287, Pages 52-95, March 10, 1989).

b. Status of Unsuitability Claims

Sunnyside Coal Company's existing permit boundary area is exempted from an Unsuitable for Mining

Designation under provisions of R645-103-330 by meeting the requirements of R645-103-331 through 333. Mining has been conducted within the permit area prior to August 3, 1977. The permit area is currently permitted for mining. Substantial legal and financial commitments were made at Sunnyside Mines prior to January 4, 1977.

The requested IBC area is immediately adjacent to the current mine permit boundary. The area is not incompatible with existing state or local land use plans or programs; does not affect fragile or historical lands; does not affect renewable resource lands; nor does the area exist within a natural hazard lands area. The IBC area does not include any occupied dwellings or any public roads.

4. Reclamation Plans

No surface reclamation activities are anticipated. No surface disturbance is associated with this IBC. Longwall mining may cause regional subsidence; however no surface effects, other than small differences in the existing elevation, are anticipated.

5. Bonding

No additional or incremental bonding is required for the inclusion of the IBC area within the permit boundary. No surface disturbance is associated with the IBC and no surface reclamation activities are anticipated.

APPENDIX A Detailed Soil Map Units

13--Cabba Family-Guben-Rock Outcrop Complex

This map unit is on canyonsides, mainly east of Price Canyon and south of Nine Mile Canyon. Slopes are 40 to 75 percent, 300 to 400 feet long, and convex. Elevation is 6,000 to 8,200 feet. The average annual precipitation is about 14 to 16 inches; the average annual air temperature is 42 to 45 degrees F; and the average freeze-free period is 60 to 120 days.

This unit is 50 percent Cabba family bouldery loam, 40 to 70 percent slopes; 20 percent Guben extremely bouldery loam, dry, 40 to 75 percent slopes; 15 percent Rock outcrop; and 15 percent other soils. About 30 percent of this unit has slopes of 40 to 50 percent. The Cabba family soil is on canyonsides between ledges of Rock outcrop; the Guben soil is on toe slopes; and Rock outcrop is on canyon rims, ledges, and very steep side slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 8 percent Guben extremely bouldery fine sandy loam, 5 percent Guben extremely stony loam, and small areas of Winetti soils on the bottoms of drainageways.

The Cabba family soil is shallow and well drained. It formed in residuum and colluvium derived dominantly from sandstone and shale of the Green River Formation. The present vegetation is mainly pinyon, Juniper, Salina wildrye, and Mormon-tea. Typically, the surface layer is pale brown bouldery loam about 3 inches thick. The underlying material is brown and light yellowish brown loam about 12 inches thick. Soft shale is at a depth of about 15 inches. Depth to shale ranges from 8 to 20 inches.

Permeability of the Cabba family soil is moderate. Available water capacity is about 1.5 to 3.0 inches. Water supplying capacity is 3 to 6 inches. Effective rooting depth is 8 to 20 inches. The organic matter content of the surface layer is 1 to 3 percent. Runoff is rapid, and the hazard of water erosion is high.

The Guben soil is very deep and well drained. It formed in colluvium derived dominantly from sandstone and shale of the Green river Formation,. The present vegetation is mainly Douglas-fir, pinyon, juniper, Salina wildrye, birchleaf mountainmahogany, and serviceberry. Typically, the surface is covered with a mat of partially decomposed leaves, twigs, and needles about 0.5 inch thick. The surface layer is grayish brown extremely bouldery loam about 7 inches thick. The subsoil is pale brown very stony loam about 8 inches thick. The upper 15 inches of the substratum is very pale brown very stony loam, and the lower part to a depth of 60 inches or more

is light yellowish brown very stony loam. A layer of carbonate accumulation is at a depth of about 15 inches.

Permeability of the Guben soil is moderate. Available water capacity is about 3.5 to 5.0 inches. Water supplying capacity is 7 to 10 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 3 to 5 percent. Runoff is rapid, and the hazard of water erosion is high.

Rock outcrop consists of areas of exposed bedrock. It is dominantly sandstone and shale and is on canyon rims, ledges, and very steep side slopes.

This unit is used as wildlife habitat, rangeland, and woodland.

The potential vegetation on the Cabba family and Guben soils includes an overstory of pinyon, Utah juniper, and Douglas-fir with a canopy of 50 percent. The understory vegetation is 10 percent grasses, 15 percent forbs, and 75 percent shrubs. Among the important plants are birchleaf mountainmahogany, Utah serviceberry, bluegrass, and Salina wildrye.

The site index for pinyon and Utah juniper is 37. Average yield is 6 cords of wood per acre. The potential is poor for production of posts or christmas trees. The unit is severely limited for the harvesting of wood products because of the steepness of slope, rock fragments on the surface, and the hazard of erosion.

This unit is not grazeable by livestock because of the steepness of slope and the bouldery surface layer.

The Cabba family and guben soils are in capability subclass Vlle, nonirrigated, and the Upland Very Steep Shallow Loam (Pinyon-Utah Juniper) woodland site. Rock outcrop is in capability subclass Vlls. It is not placed in a woodland site.

47--Guben-Rock Outcrop Complex

This map unit is on mountain slopes. It is in the Book Cliffs, north of Helper and west of the Green River. Slopes are 50 to 80 percent, 100 to 200 feet long, and plane to convex. The present vegetation is mainly Douglas-fir, serviceberry, birchleaf mountainmahogany, mockorange, and western wheatgrass. Elevation ranges from 5,000 to 9,500 feet but is dominantly 6,000 to 7,500 feet. The average annual precipitation is about 16 to 20 inches; the average annual air temperature is 38 to 45 degrees F; and the average freeze-free period is 60 to 100 days.

This unit is 55 percent Guben extremely bouldery fine sandy loam, 50 to 80 percent slopes; 20 percent Rock outcrop, and 25 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 12 percent Midfork family soils in concave areas and 10 percent Comodore very stony fine sandy loam, moist, intermingled throughout the unit. Also included are small areas of Perma family soils that have slopes of 60 to 80 percent.

The Guben soil is very deep and well drained. It formed in colluvium derived dominantly from sandstone and shale. Typically, the surface is covered with a mat of partially decomposed needles, twigs, and leaves about 0.5 inch thick. The surface layer is brown extremely bouldery fine sandy loam about 7 inches thick. The subsoil is brown very stony loam about 17 inches thick. The substratum to a depth of 60 inches or more is light brown very stony loam.

Permeability of the Guben soil is moderate Available water capacity is about 3.5 to 5.0 inches. Water supplying capacity is 8.5 to 12.0 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 3 to 5 percent. Runoff is moderate, and the hazard of water erosion is slight.

Rock outcrop consists of areas of exposed bedrock, dominantly interbedded sandstone, and shale. It occurs as ledges.

This unit is used as rangeland, wildlife habitat, woodland, and recreation areas.

The potential vegetation on the Guben soil includes an overstory of Rocky Mountain Douglas-fir and pinyon with a canopy of 50 percent. The understory vegetation is 40 percent grasses, 15 percent forbs, and 45 percent shrubs. Among the important plants are Salina wildrye, wheatgrass, birchleaf mountainmahogany, and snowberry.

This unit is severely limited for harvesting wood products because of the steepness of slope, the hazard of erosion, and stones and boulders on the surface.

This unit is not grazeable by livestock because of the steepness of slope.

The Guben soil is in capability subclass VIIe, nonirrigated, and in the Mountain Very Steep Stony Loam (Douglas-fir) woodland site Rock outcrop is in capability subclass VIIIs. It is not placed in a woodland site.

62--Midfork Family-Comodore Complex

This map unit is on mountain slopes. It is along the Book Cliffs and Whitmore and Price Canyons. Slopes are 200 to 300 feet long and are convex. The present vegetation is mainly Douglas-fir, snowberry, and quaking aspen. Elevation is 7,900 to 9,500 feet.

This unit is 50 percent Midfork family bouldery loam, 50 to 70 percent slopes; 20 percent Comodore bouldery loam, 50 to 70 percent slopes; and 30 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 15 percent soils that are similar to the Midfork family soil but have a dark-colored surface layer less than 6 inches thick; 10 percent soils that are similar to the Midfork family soil but have a thick surface layer and a layer of calcium carbonate accumulation; and 5 percent Comodore very stony fine sandy loam, moist.

The Midfork family soil is very deep and well drained. It formed in colluvium derived dominantly from sandstone and shale. The average annual precipitation is 20 to 25 inches; the average annual air temperature is 34 to 38 degrees F; and the average freeze-free period is 40 to 60 days.

Typically, the surface is covered with a mat of partially decomposed twigs, leaves, and needles about 2 inches thick. The surface layer is brown bouldery loam about 7 inches thick. The next layer is yellowish brown very channery loam 10 inches thick. Below this to a depth of 60 inches or more is yellowish brown very gravelly loam.

Permeability of the Midfork family soil is moderate. Available water capacity is about 5.5 to 7.0 inches. Water supplying capacity is 10 to 17 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 5 to 10 percent. Runoff is rapid, and the hazard of water erosion is high.

The Comodore soil is shallow and well drained. It formed in colluvium derived dominantly from sandstone, siltstone, and shale. The average annual precipitation is 38 to 45 degrees F, and the average freeze-free period is 60 to 80 days.

Typically, the surface is covered with a mat of needles and twigs about 1 inch thick. The surface layer is brown bouldery loam about 6 inches thick. The underlying material to a depth of 19 inches is brown very stony loam over sandstone. Depth to sandstone ranges from 10 to 20 inches.

Permeability of the Comodore soil is moderate. Available water capacity is about 1.5 to 2.5 inches. Water supplying

capacity is 3 to 5 inches. Effective rooting depth is 10 to 20 inches. The organic matter content of the surface layer is 3 to 5 percent. Runoff is rapid, and the hazard of water erosion is high.

This unit is used for wildlife habitat and woodland.

The potential vegetation on this unit includes an overstory of Douglas-fir with a canopy of 90 percent. The understory vegetation is 10 percent grasses, 5 percent forbs, and 85 percent shrubs. Among the important plants are sedge, mountainlover, and snowberry.

The site index for Douglas-fir is 50. Average yield is about 27,200 board feet per acre for 100-year-old trees 12 inches in diameter or more.

This unit is severely limited for the harvesting of wood products because of the steepness of slope and hazard of erosion.

This map unit is in capability subclass VIIe, nonirrigated, and in the High Mountain Very Steep Loam (Douglas-fir) woodland site.

71--Pathead Extremely Bouldery Fine Sandy Loam, 40 to 70 Percent Slopes

This moderately deep, well drained soil is on mountain slopes and canyonsides. It is in the areas of Range Creek, Rock Creek, Whitmore Canyon, and Price Canyon. It formed in colluvium derived dominantly from sandstone and shale. Slopes are 100 to 200 feet long and have south aspects. The present vegetation in most areas is mainly curlleaf mountainmahogany, pinyon, juniper, Salina wildrye, and serviceberry. Elevation is 7,500 to 9,000 feet. The average annual precipitation is 16 to 20 inches; the average annual air temperature is 38 to 45 degrees F; and the average freeze-free period is 60 to 100 days.

Typically, the surface layer is pale brown extremely bouldery fine sandy loam about 4 inches thick. The underlying material to a depth of 38 inches is pale brown and very pale brown very stony find sandy loam. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are about 15 percent Perma soils that have slopes of 60 to 80 percent; 10 percent Comodore soils; and small areas of Senchert loam and Rock outcrop. The soils are in concave areas.

Permeability of this Pathead soil is moderate. Available water capacity is about 1.5 to 3.0 inches. Water supplying capacity is 4.0 to 8.5 inches. Effective rooting depth is 20 to 40 inches. The organic matter content of the surface layer is 1 to 3. Runoff is rapid, and the hazard of water erosion is moderate.

This unit is used as rangeland, wildlife habitat, and recreation areas.

The potential plant community on the Pathead soil is 35 percent grasses, 15 percent forbs, and 50 percent shrubs. Among the important plants are curlleaf mountainmahogany, Salina wildrye, and snowberry.

This unit is not grazeable by livestock because of the steepness of slope.

This map unit is in capability subclass Vlle, nonirrigated, and in the Mountain Very Steep Stony Loam (Curlleaf Mountainmahogany) range site.

76--Perma Family-Datino Complex

This map unit is on mountain slopes and canyonsides. It is near Range Creek, Dry Canyon, Patmos Head, Range Valley Mountain, and Soldier Creek and in Price Canyon. Slopes are 60 to 80 percent. Elevation is 7,200 to 8,700 feet. The average annual precipitation is about 16 to 20 inches; the average annual air temperature is 38 to 45 degrees F; and the average freeze-free period is 60 to 80 days.

This unit is 40 percent Perma family very stony sandy loam, 60 to 80 percent slopes; 35 percent Datino extremely stony fine sandy loam, 60 to 80 percent slopes; and 25 percent other soils. The Perma soil is on narrow spur ridges, and the Datino soil is near the tops of the side slopes and in shallow alluvial drainageways. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 10 percent Sheepcan stony loam, 5 percent soils that are similar to the Datino soil but have an extremely bouldery surface layer, 5 percent Datino Variant loam that has slopes of 40 to 60 percent, and 5 percent Rock outcrop. The included areas are intermingled throughout the unit.

The Perma family soil is very deep and well drained. It formed in colluvium derived dominantly from sandstone and shale. Slopes are 300 to 400 feet long and are plane to convex. The present vegetation is mainly serviceberry, birchleaf mountainmahogany, mountain big sagebrush, and curlleaf mountainmahogany. Typically, the surface layer is dark brown very stony sandy loam about 7 inches thick. The upper 15 inches of the subsoil is brown cobbly sandy loam, and the lower 13 inches is brown very cobbly sandy loam. The substratum to a depth of 60 inches or more is brown very stony sandy loam.

Permeability of the Perma family soil is moderately rapid. Available water capacity is about 3 to 5 inches. Water supplying capacity is 6 to 9 inches. Effective rooting depth is 60 inches or more The organic matter content of the surface layer is 3 to 5 percent. Runoff is rapid, and the hazard or water erosion is high.

The Datino soil is very deep and well drained. It formed in colluvium derived dominantly from sandstone and shale. Slopes are 300 to 400 feet long and are plane to convex. The present vegetation is mainly birchleaf mountainmahogany, serviceberry, Douglas-fir, Wasatch penstemon, mountain big sagebrush, snowberry, pinegrass, and Salina wildrye. Typically, the surface layer is brown extremely stony fine sandy loam about 9 inches thick. The subsoil is brown very stony loam about 7 inches thick. The substratum to a depth of 60 inches or more

is pale brown very stony fine sandy loam. A layer of calcium carbonate accumulation is at a depth of about 16 inches.

Permeability of the Datino soil is moderate. Available water capacity is about 3.5 to 6.0 inches. Water supplying capacity is 6 to 8 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 3 to 5 percent. Runoff is rapid, and the hazard of water erosion is high.

This unit is used for wildlife habitat.

The potential plant community on the Perma family soil is 20 percent grasses, 10 percent forbs, and 70 percent shrubs. Among the important plants are birchleaf mountainmahogany and serviceberry.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments.

It is not practical to revegetate large areas of this soil because of the stoniness of the soil. For critical erosion control, small areas can be mechanically treated and seeded. Plants that may be suitable for critical area seedings are those native to the area, intermediate wheatgrass, orchardgrass, smooth brome, ladak alfalfa, Lewis flax, small burnet, and yellow sweetclover.

The potential vegetation on the Datino soil includes an overstory of Rocky Mountain Douglas-fir and pinyon with a canopy of 30 percent. The understory vegetation is 40 percent grasses, 15 percent forbs, and 45 percent shrubs. Among the important plants are Salina wildrye, slender wheatgrass, birchleaf mountainmahogany, and snowberry.

This soil is severely limited for harvesting wood products because of the steepness of slope, the hazard of erosion, and stones and boulders on the surface.

This unit is not grazeable by livestock because of the steepness of slope.

This unit is in capability subclass VIIe, nonirrigated. The Perma family soil is in the Mountain Very Steep Stony Loam (Browse) range site. The Datino soil is in the Mountain Very Steep Stony Loam (Douglas-fir) woodland site.

107--Shupert-Winetti Complex

This map unit is on narrow valley and canyon floors in the Book Cliffs and in an area northwest of Price and east of Sunnyside. Slopes are 1 to 8 percent, 100 to 200 feet long, and concave. The present vegetation in most areas is mainly basin big sagebrush, rabbitbrush, cheatgrass, needleandthread, and dropseed. Elevation ranges from 4,600 to 7,200 feet but commonly is 5,200 to 6,400 feet. The average annual precipitation is 12 to 16 inches, the average annual air temperature is 43 to 45 degrees F, and the average freeze-free period is 80 to 100 days.

This unit is 40 percent Shupert gravelly loam, 1 to 8 percent slopes; 35 percent Winetti bouldery sandy loam, 1 to 8 percent slopes; and 25 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 15 percent Haverdad loam on toe slopes, 5 percent Glenberg family very fine sandy loam on toe slopes at lower elevations, and 5 percent soils that are similar to the Winetti soil but are along the stream channels and support riparian vegetation.

The Shupert soil is very deep and well drained. It formed in alluvium derived dominantly from sandstone and shale. Typically, the surface layer is pale brown gravelly loam about 3 inches thick. The next layer is pale brown clay loam about 6 inches thick. Below this to a depth of 60 inches or more is light brownish gray and light yellowish brown clay loam.

Permeability of the Shupert soil is moderately slow. Available water capacity is about 10.0 to 11.5 inches. Water supplying capacity is 6.5 to 10.0 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 2 percent. Runoff is slow, and the hazard of water erosion is moderate. This soil is subject to flooding during prolonged, high-intensity storms. Channeling and deposition are common along streambanks.

The Winetti soil is very deep and well drained. It formed in alluvium derived dominantly from sandstone and shale. Typically, the surface layer is grayish brown bouldery sandy loam about 6 inches thick. The next layer is pale brown loam about 5 inches thick. The next layer is pale brown and brown very bouldery loam about 23 inches thick. Below this to a depth of 60 inches or more is pale brown very gravelly sandy loam.

Permeability of the Winetti soil is moderately rapid. Available water capacity is about 4.0 to 5.5 inches. Water supplying capacity is 4.5 to 8.0 inches. Effective rooting depth is 60 inches or more. The organic matter content of the

surface layer is 1 to 3 percent. Runoff is slow, and the hazard or water erosion is slight. This soil is subject to flooding during prolonged, high-intensity storms. Channeling and deposition are common along streambanks.

This unit is used mainly as rangeland and wildlife habitat. It is also used for irrigated crops.

The potential plant community on the Shupert and Winetti soils is 60 percent grasses, 10 percent forbs, and 30 percent shrubs. Important plants are basin wildrye, western wheatgrass, basin big sagebrush, and rubber rabbitbrush.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments. If the desirable forage plants are mostly depleted, brush management and rangeland seeding can be used to improve the rangeland vegetation. Suitable brush management practices include prescribed burning, chemical spraying, and mechanical treatment.

The suitability of this unit for rangeland seeding is good. Plants suitable for seeding include adapted native plant and Russian wildrye, crested wheatgrass, and ladak alfalfa.

This map unit is in capability unit IIIe-3, irrigated, and in capability subclass VIIe, nonirrigated. It is in the Loamy Bottom range site.

121--Travessilla-Rock Outcrop-Gerst Complex

This map unit is on canyonsides in the area of Jack Creek and along the Book Cliffs, extending from Price Canyon to Sunnyside. Slopes are 40 to 70 percent. Elevation ranges from 5,000 to 8,100 feet but dominantly is 6,000 to 7,500 feet.

This unit is 40 percent Travessilla extremely bouldery loam, 40 to 70 percent slopes; 30 percent Rock outcrop; 20 percent Gerst very channery loam, dry, 50 to 70 percent slopes; and 10 percent other soils. About 25 percent of the Travessilla soil has slopes of 40 to 50 percent. The Travessilla soil is on north and west aspects at the higher elevations. Rock outcrop is on canyon rims and ledges. The Gerst soil is on south and west aspects at the lower elevations. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 5 percent Guben extremely bouldery loam on canyonsides.

The Travessilla soil is shallow and well drained. It formed in residuum and colluvium derived dominantly from sandstone and shale. Slopes are 100 to 200 feet long, are concave to convex, and have north and east aspects. The present vegetation in most areas is mainly pinyon, juniper, Douglas-fir, Salina wildrye, and birchleaf mountainmahogany. The average annual precipitation is mountainmahogany. The average annual precipitation is 12 to 14 inches; the average annual air temperature is 45 to 47 degrees F; and the average freeze-free period is 80 to 120 days. Typically, the surface layer is pale brown extremely bouldery loam about 2 inches thick. The underlying material to a depth of 12 inches is pale brown very fine sandy loam over sandstone. Depth to sandstone ranges from 10 to 20 inches.

Permeability of the Travessilla soil is moderately rapid. Available water capacity is about 1 to 2 inches. Water supplying capacity is 3 to 4 inches. Effective rooting depth is 10 to 20 inches. The organic matter content of the surface layer is 1 to 2 inches. Runoff is rapid, and the hazard of water erosion is high.

Rock outcrop consists of areas of exposed sandstone and siltstone.

The Gerst soil is shallow and well drained. It formed in residuum derived dominantly from shale. Slopes are 100 to 200 feet long, are concave to convex, and have south and west aspects. The present vegetation in most areas is mainly juniper, pinyon, Salina wildrye, and Mormon-tea. The average annual precipitation is 10 to 12 inches; the average annual air temperature is 47 to 49 degrees F; and the average freeze-

free period is 110 to 135 days. Typically, this surface layer is light brownish gray very channery loam about 5 inches thick. The underlying material to a depth of 19 inches is light brownish gray channery loam over weathered shale. Weathered shale is at a depth of 10 to 20 inches.

Permeability of the Gerst soil is moderately slow. Available water capacity is about 1.5 to 23.0 inches. Water supplying capacity is 2 to 3 inches. Effective rooting depth is 10 to 20 inches. The organic matter content of the surface layer is 0.5 to 1.0 percent. Runoff is rapid, an the hazard of water erosion is high.

This unit is used as rangeland, woodland, and wildlife habitat.

The potential vegetation on the Travessilla soil includes an overstory of pinyon, Utah juniper and Douglas-fir with a canopy of 30 percent. The understory vegetation is 10 percent grasses, 15 percent forbs, and 75 percent shrubs. Among the important plants are birchleaf mountainmahogany, Utah service-berry, bluegrass, and Salina wildrye.

The site index for pinyon and Utah juniper is 37. Average yield is 6 cords of wood per acre. The potential for the production of posts or Christmas trees is very poor. This unit is severely limited for the harvesting of wood products because of the steepness of slope and the hazard of erosion.

This soil is not grazeable by livestock because of the steepness of slope and the stony surface layer.

The potential vegetation on the Gerst soil includes an overstory of Utah juniper and pinyon with a canopy of 5 to 20 percent. The understory vegetation is 10 percent grasses, 10 percent forbs, and 80 percent shrubs. Among the important plants are galleta, Salina wildrye, and shadscale.

The site index for Utah juniper and pinyon is 15 to 20. Average yield is 1 to 2 cords of wood per acre. The potential for the production of posts or Christmas trees is poor. Limitations for the harvesting of wood products are severe because of the steepness of slope and the hazard of erosion.

The suitability of this soil for grazing is very poor. The main limitations are steepness of slope and the hazard of erosion.

This map unit is in capability subclass Vlle, nonirrigated. The Travessilla soil is in the Upland Very Steep Shallow Loam (Pinyon-Utah Juniper) woodland site. The Gerst soil is in the Semidesert Very Steep Shallow Clay (Utah Juniper) woodland site. The Rock outcrop is not placed in a woodland site.

APPENDIX B Soil Classification

Cabba Family

The Cabba family consists of shallow, well drained, moderately permeable soils on benches, canyon rims, and steep canyon-sides. These soils formed in residuum and colluvium derived dominantly from shale or siltstone of the Green River Formation. Slope is 3 to 70 percent. Elevation is 5,000 to 8,200 feet. Average annual precipitation ranges from 12 to 16 inches, and average annual air temperature ranges from 42 to 45 degrees F.

These soils are loamy, mixed (calcareous), frigid, shallow Typic Ustorthents.

Reference pedon of a Cabba family bouldery loam in an area of Cabba family-Guben Rock outcrop complex, on the slopes of Cottonwood Ridge, about 250 feet west and 1,500 feet north of the southeast corner of Sec. 7, T. 13 S., R. 16 E.

A1-- O to 3 inches; pale brown (10YR 6/3) bouldery loam, brown (10YR 4/3) moist; moderate medium granular structure parting to moderate fine granular; loose, slightly sticky and slightly plastic; common very fine and fine roots; 5 percent pebbles, 10 percent cobbles, and 15 percent boulders; slightly calcareous; disseminated calcium carbonate; mildly alkaline (pH 7.8); abrupt smooth boundary.

C1-- 3 to 7 inches; brown (10YR 5/3) loam, dark brown (10YR 4/3) moist; weak fine granular structure; loose, slightly sticky and slightly plastic; common very fine and fine roots; slightly calcareous; mildly alkaline (pH 7.8); abrupt smooth boundary.

C2-- 7 to 15 inches; light yellowish brown (10YR 6/4) loam, yellowish brown (10YR 5/4) moist; massive; soft, friable, slightly sticky and slightly plastic; common very fine and fine roots; slightly calcarious; moderately alkaline (pH 8.3); abrupt smooth boundary.

C3r-- 15 inches; rippable shale; soft carbonate coatings on surface or rock.

Paralithic contact is at a depth of 8 to 20 inches.

A Horizon: Hue in 10 YR or 5Y, and value is 4 or 5 when moist. Texture is gravelly loam, bouldery loam, or extremely channery loam.

C Horizon: Hue is 10 YR or 2.5Y, value is 5 or 6 when dry, and chroma is 2 to 4. Texture is loam, gravelly loam, or clay loam. Clay content is 20 to 35 percent. Rock fragment content is 0 to 30 percent.

Comodore Series

The Comodore series consists of shallow, well drained, moderately permeable soils on mountain slopes. These soils formed in colluvium derived dominantly from sandstone. Slope is 50 to 70 percent. Elevation is 6,800 to 9,000 feet. Average annual precipitation ranges from 16 to 20 inches, and average annual air temperature ranges from 38 to 45 degrees F.

These soils are loamy-skeletal, mixed Lithic Haploborolls.

Typical pedon of a Comodore very stony fine sandy loam in an area of Comodore-Datino Variant complex; about 12 miles east of Price, near Dugout Creek; about 2,300 feet north and 2,000 feet east of the southwest corner of Sec. 23, T. 13 S., R. 12 E.

A1-- 0 to 6 inches; dark grayish brown (10YR 4/2) very stony fine sandy loam, very dark brown (10YR 2/2) moist; weak fine granular structure; soft, friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; few very fine and fine pores; 15 percent pebbles, 20 percent cobbles, and 20 percent stones; mildly alkaline (pH 7.4); clear smooth boundary.

C1-- 6 to 14 inches; very dark grayish brown (10YR 3/2) very stony loam, very dark brown (10YR 2/2) moist; weak fine subangular blocky structure; soft, friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; few very fine pores; 15 percent pebbles, 15 percent cobbles, and 15 percent stones; mildly alkaline (pH 7.4); abrupt wavy boundary.

R-- 14 inches; fractured sandstone.

Bedrock is at a depth of 10 to 20 inches. The control section is 35 to 45 percent rock fragments.

A Horizon: Value is 2 or 3 when moist, and chroma is 2 or 3. Texture is very stony fine sandy loam or bouldery loam.

C Horizon: Value is 3 to 5 when dry and 2 to 4 when moist, and chroma is 2 to 3. Clay content is 19 to 24 percent. The horizon is 15 to 20 percent pebbles, 10 to 15 percent cobbles and 15 to 20 percent stones.

Datino Series

The Datino Series consists of very deep, well drained, moderately permeable soils on canyonsides and mountain slopes. These soils formed in colluvium derived dominantly from sandstone and shale. Slope is 15 to 80 percent. Elevation is 6,800 to 8,700 feet. Average annual precipitation ranges from 16 to 20 inches, and average annual air temperature ranges from 38 to 45 degrees F.

These soils are loamy-skeletal, mixed Typic Haploborolls.

Typical pedon of a Datino extremely stony fine sandy loam in an area of Perma family-Datino complex, about 0.25 mile south of Soldier Creek Mine, 2,400 feet west and 2,200 feet south of the northeast corner of Sec. 18, T. 13 S., R. 12 E.

A1-- 0 to 10 inches; brown (10YR 4/3) extremely stony fine sandy loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, friable, slightly sticky and slightly plastic; common very fine and fine roots and few medium and coarse roots; few very fine pores; 15 percent pebbles, 25 percent cobbles, and 25 percent stones; moderately alkaline (pH 7.9); clear smooth boundary.

B2-- 10 to 16 inches; brown (10YR 5/3) very stony loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine, fine, medium, and coarse roots; common very fine and fine pores and few medium pores; 15 percent pebbles, 15 percent cobbles, and 10 percent stones; slightly calcareous; moderately alkaline (pH 7.9) gradual wavy boundary.

C1ca-- 16 to 41 inches; pale brown (10YR 6/3) very stony fine sandy loam, brown (10YR 5/3) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine, fine, medium, and coarse roots; common very fine and fine pores; 15 percent pebbles, 20 percent cobbles, and 25 percent stones strongly calcareous; soft powdery masses of calcium carbonate; moderately alkaline (pH 8.0); gradual smooth boundary.

C2-- 41 to 60 inches; pale brown (10YR 6/3) very stony fine sandy loam, brown (10YR 5/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine, fine, medium, and coarse roots; few very fine pores; 15 percent pebbles, 20 percent cobbles, and 25 percent stones; moderately calcareous; disseminated calcium carbonate; moderately alkaline (pH 7.9).

Secondary calcium carbonate is at a depth of 15 to 22 inches. The mollic epipedon is 10 to 15 inches thick. The solum is 15

to 22 inches thick. The particle-size control section is 35 to 60 percent rock fragments.

A Horizon: Value is 4 or 5 when dry and 2 or 3 when moist, and chroma is 2 or 3.

B2 Horizon: Value is 3 to 5 when dry and 2 to 4 when moist, and chroma is 2 or 3. Clay content is 18 to 26 percent. Rock fragment content is 35 to 45 percent. Reaction is mildly alkaline or moderately alkaline.

C Horizon: Value is 5 or 6 when dry, and chroma is 2 or 3. Clay content is 16 to 25 percent. Rock fragment content is 40 to 70 percent. Reaction is mildly alkaline or moderately alkaline.

Gerst Series

The Gerst series consists of shallow, well drained, moderately slowly permeable soils on the sides of mesas, benches, terraces, and canyons and on mountain slopes and hillslopes. These soils formed in residuum and colluvium derived dominantly from shale and sandstone. Slope is 3 to 70 percent. Elevation is 5,200 to 8,000 feet. Average annual precipitation ranges from 8 to 14 inches, and average annual air temperature ranges from 45 to 50 degrees F.

These soils are loamy, mixed (calcareous), mesic, shallow Ustic Torriorthents.

Typical pedon of a Gerst extremely stony loam in an area of Gerst-Strych-Badland complex, 50 to 70 percent slopes, about 5 miles northwest of East Carbon City, about 2,400 feet south and 1,200 feet west of the northeast corner of Sec. 16, T. 14 S., R. 13 E.

A1-- 0 to 7 inches; light brownish gray (10YR 6/2) extremely stony loam, dark brown (10YR 4/3) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, few fine, and many coarse roots; many fine and few medium pores; 30 percent pebbles, 10 percent cobbles, and 30 percent stones and boulders; strongly calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.2); clear smooth boundary.

C1-- 7 to 16 inches; gray (10YR 6/1) channery silt loam, dark grayish brown (10YR 4/2) moist; massive; hard, friable, sticky and plastic; common very fine roots and few medium and coarse roots; 15 percent shale fragments; strongly calcareous; disseminated calcium carbonate; strongly alkaline (pH 8.6); clear smooth boundary.

C2-- 16 to 19 inches; light brownish gray (10YR 6/2) channery silt loam, grayish brown (10YR 5/2) moist; massive; hard, friable, slightly sticky and plastic; few very fine and fine roots; 20 percent shale fragments; strongly calcareous; disseminated calcium carbonate; strongly alkaline (pH 8.6); clear smooth boundary.

Cr-- 19 inches; partly weathered shale.

Paralithic contact is at a depth of 8 to 20 inches.

A Horizon: Value is 4 or 5 when moist, and chroma is 2 or 3. Texture is very channery loam, cobbly loam, or extremely stony loam. Reaction is moderately alkaline or strongly alkaline.

C Horizon: Hue is 10YR or 2.5Y, value is 4 or 5 when moist, and chroma is 1 or 2. Texture is channery loam, channery silt

loam, or channery clay loam. Clay content is 18 to 32 percent. Rock fragment content is 15 to 25 percent.

Guben Series

The Guben series consists of very deep, well drained moderately permeable soils on canyonsides and mountain slopes. These soils formed in colluvium derived dominantly from sandstone and shale. Slope is 15 to 75 percent. Elevation is 5,000 to 9,500 feet. Average annual precipitation ranges from 14 to 20 inches, and average annual air temperature ranges from 38 to 45 degrees F.

These soils are loamy-skeletal, mixed Typic Calciborolls.

Typical pedon of Guben extremely bouldery loam in an area of Cabba family-Guben-Rock outcrop complex, in Prickly Pear Canyon, about 1,200 feet south and 2,000 feet east of the northwest corner of Sec. 14, T. 12 S., R. 15 E.

O1-- 0.5 inch to 0; pine needles and grasses.

A1-- 0 to 7 inches; grayish brown (10YR 5/2) extremely bouldery loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; 15 percent pebbles, 10 percent cobbles, 5 percent stones, and 10 percent boulders; moderately calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.2); clear wavy boundary.

B2-- 7 to 15 inches; pale brown (10YR 6/3) very stony loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; 10 percent pebbles, 15 percent cobbles, and 20 percent stones; moderately calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.4); clear wavy boundary.

C1ca-- 15 to 30 inches; very pale brown (10YR 6/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots and few fine, medium, and coarse roots; few very fine and fine pores; 10 percent pebbles, 20 percent cobbles, 20 percent stones, and disseminated calcium carbonate; strongly alkaline (pH 8.6); clear smooth boundary.

C2-- 30 to 60 inches; light yellowish brown (10YR 6/4) very stony loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine, fine, and medium roots; few very fine and medium pores and common fine pores; 10 percent pebbles, 20 percent cobbles, 25 percent stones, and 5 percent boulders;

moderately calcareous; disseminated calcium carbonate; strongly alkaline (pH 9.0).

The mollic epipedon is 7 to 10 inches thick. The solum is 15 to 24 inches thick. The particle-size control section is 35 to 60 percent rock fragments. Secondary calcium carbonate is at a depth of 11 to 24 inches.

A Horizon: Value is 4 or 5 when dry, and chroma is 2 or 3. Texture is extremely bouldery loam, extremely stony loam, or extremely bouldery fine sandy loam. Reaction is mildly alkaline or moderately alkaline. Calcium carbonate equivalent is 11 to 19 percent.

B Horizon: Hue is 10YR or 7.5YR, value is 5 or 6 when dry and 3 or 4 when moist, and chroma is 2 to 4. Texture is very stony loam or very cobbly loam. Clay content is 17 to 22 percent. Rock fragment content is 35 to 55 percent. Reaction is mildly alkaline or moderately alkaline. Calcium carbonate equivalent is 20 to 25 percent.

Cca Horizon: Hue is 7.5YR or 10YR, value is 6 or 7 when dry and 5 or 6 when moist, and chroma is 2 to 4. Texture is very stony loam or very cobbly fine sandy loam. Clay content is 17 to 25 percent. Rock fragment content is 35 to 60 percent. Reaction is moderately alkaline or strongly alkaline. Calcium carbonate equivalent is 20 to 38 percent.

C Horizon: Texture is very stony loam or very cobbly fine sandy loam. Clay content is 17 to 24 percent. Reaction is moderately alkaline or strongly alkaline Calcium carbonate equivalent is 19 to 30 percent.

Midfork Family

The Midfork family consists of very deep, well drained, moderately permeable soils is mountain slopes. These soils formed in gravelly colluvium derived dominantly from calcareous sedimentary rock. Slope is 50 to 70 from calcareous sedimentary rock. Slope is 50 to 70 percent. Elevation is 7,000 to 9,500 feet. Average annual precipitation ranges from 20 to 25 inches, and average annual air temperature ranges from 34 to 38 degrees F.

These soils are loamy-skeletal, mixed Typic Croborolls.

Reference pedon of a Midfork family bouldery loam, in an area of Midfork family-Comodore complex, about 16 miles east of Sunnyside, about 1,600 feet north and 950 feet east of the southwest corner of Sec. 15, T. 15 S., R. 16 E. (No general land office survey has been made.)

02- 2 inches to 0; partially decomposed twigs, leaves, and needles.

A11-- 0 to 4 inches; brown (10YR 4/3) bouldery loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; soft, very friable; few very fine and fine roots; 5 percent channers, 5 percent flagstones, and 20 percent boulders; neutral (pH 7.2); abrupt smooth boundary.

A12-- 4 to 7 inches; brown (10YR 4/3) bouldery loam, dark brown (10YR 3/3) moist; weak medium prismatic structure parting to weak medium granular slightly hard, firm, slightly sticky and slightly plastic common fine and few medium roots; few very fine and fine pores; 10 percent fine pebbles, 5 percent cobbles, and 5 percent boulders; mildly alkaline (pH 7.8); clear smooth boundary.

C1-- 7 to 17 inches; yellowish brown (10YR 5/4) very channery loam, brown (10YR 4/3) moist; massive; slightly hard, firm, slightly sticky and slightly plastic; common fine and few medium roots; 10 percent pebbles, 30 percent channers, and 5 percent cobbles; slightly calcareous; disseminated calcium carbonate; mildly alkaline (pH 7.8); gradual smooth boundary.

C2-- 17 to 60 inches; yellowish brown (10YR 5/4) very gravelly loam, brown (10YR 4/3) moist; massive, soft, friable, slightly sticky and slightly plastic; few fine roots; 25 percent pebbles and 10 percent channers; slightly calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.4)

The mollic epipedon is 7 to 15 inches thick. The particle-size control section is very gravelly loam or very channery loam. Clay content is 18 to 24 percent. Rock fragment content of the particle-size control section is 35 to 65 percent.

A Horizon: Chroma is 2 or 3. Reaction is neutral or mildly alkaline.

C Horizon: Chroma is 2 or 3. Reaction is mildly alkaline or moderately alkaline.

Pathead Series

The Pathead series consists of moderately deep, well drained, moderately permeable soils on benches, ridges, canyonsides, and mountain slopes. These soils formed in colluvium and residuum derived dominantly from sandstone and shale. Slope is 15 to 70 percent. Elevation is 5,900 to 9,000 feet. Average annual precipitation is 14 to 20 inches, and average annual air temperature is 38 to 45 degrees F.

These soils are loamy-skeletal, mixed (calcareous), frigid Typic Ustorthents.

Typical pedon of a Pathead extremely stony loam in an area of Pathead-Curecanti family association, about 2 miles north and 4 miles west of Helper, about 1,100 feet north and 400 feet west of the southeast corner of Sec. 6, T. 13 S., R. 9 E.

A1-- 0 to 3 inches; brown (10YR 5/3) extremely stony loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine roots; few very fine pores; 5 percent pebbles, 15 percent cobbles, 40 percent stones, and 5 percent boulders; moderately calcareous; disseminated calcium carbonate; strongly alkaline (pH 8.6); abrupt smooth boundary.

C1-- 3 to 14 inches; pale brown (10YR 6/3) very cobbly loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine roots and few fine and medium roots; many very fine pores; 20 percent pebbles and 5 percent cobbles; moderately calcareous; disseminated calcium carbonate; strongly alkaline (pH 8.8); clear smooth boundary.

C2-- 14 to 26 inches; pale brown (10YR 6/3) very cobbly loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; soft, friable, slightly sticky and slightly plastic; common very fine and few fine roots; few very fine pores; 20 percent pebbles, 25 percent cobbles, and 5 percent stones; moderately calcareous; disseminated calcium carbonate; strongly alkaline (pH 8.8); clear smooth boundary.

R-- 26 inches; sandstone.

Bedrock is at a depth of 20 to 40 inches. The particle-size control section is 35 to 60 percent rock fragments.

A Horizon: Value is 5 or 6 when dry and 3 to 5 when moist, and chroma is 2 or 3. Texture is gravelly loam, cobbly loam, extremely stony fine sandy loam, extremely stony loam, or

extremely bouldery fine sandy loam. Reaction is moderately alkaline or strongly alkaline.

C Horizon: Hue is 10YR or 2.5Y, value is 6 or 7 when dry and 3 to 5 when moist, and chroma is 2 to 4. Texture is very cobbly loam, extremely cobbly loam, or very stony fine sandy loam. Clay content is 18 to 27 percent. Calcium carbonate equivalent is 11 to 28 percent. Reaction is moderately alkaline or strongly alkaline.

Perma Family

The Perma family consist of very deep, well drained, moderately rapidly permeable soils on mountain slopes. These soils formed in colluvium derived dominantly from sandstone and shale. Slope is 15 to 80 percent. Elevation is 7,200 to 8,800 feet. Average annual precipitation ranges from 16 to 20 inches, and average annual air temperature ranges from 38 to 45 degrees F.

These soils are loamy-skeletal, mixed Typic Haploborolls.

Reference pedon of a Perma family very stony sandy loam in an area of Perma family-Datino complex, about 1.5 miles north and east of Geneva Coal Mine; 2,400 feet north and 600 feet east of the southwest corner of Sec. 35, T. 15 S., R. 14 E.

A11-- 0 to 7 inches; dark brown (7.5YR 4/2) very stony sandy loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; soft, very friable; many very fine and coarse roots, common fine roots, and few medium roots; common very fine pores; 10 percent pebbles, 10 percent cobbles, and 20 percent stones; neutral (pH 6.8); clear smooth boundary.

A12-- 7 to 15 inches; dark brown (7.5YR 4/2) cobbly sandy loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine roots, common fine and coarse roots, and few medium roots; common very fine pores; 10 percent pebbles, 15 percent cobbles, and 5 percent stones; neutral (pH 6.8); abrupt smooth boundary.

B21-- 15 to 22 inches; brown (7.5YR 5/3) cobbly sandy loam, dark brown (7.5YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and few fine roots; few very fine and fine pores; 15 percent pebbles and 15 percent cobbles; neutral (pH 7.0); clear smooth boundary.

B22-- 22 to 35 inches; brown (7.5YR 5/3) very cobbly sandy loam, dark brown (7.5YR 4/3) moist; moderate medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few very fine, fine, coarse, and very coarse roots; common very fine pores; 25 percent pebbles and 20 percent cobbles; neutral (pH 6.6); clear smooth boundary.

C1-- 35 to 60 inches; brown (7.5YR 5/3) very stony sandy loam, dark brown (7.5YR 4/3) moist; massive; soft, very friable, slightly sticky and slightly plastic; few very

fine and fine roots and common coarse roots; many very fine pores; 15 percent pebbles, 15 percent cobbles, and 20 percent stones; neutral (pH 6.6)

A Horizon: Value is 4 or 5 when dry and 2 or 3 when moist, and chroma is 2 or 3.

B2 Horizon: Hue is 7.5YR or 10YR, value is 4 or 5 when moist, and chroma is 2 or 3.

C Horizon: Hue is 7.5YR or 10YR.

Shupert Series

The Shupert series consists of very deep, well drained, slowly permeable soils on narrow valley and canyon floors. These soils formed in alluvium derived from sandstone and shale. Slope is 1 to 8 percent. Elevation ranges from 4,600 to 7,200 feet but commonly is 5,200 to 6,400 feet. Average annual precipitation is 12 to 16 inches, and average annual air temperature is 43 to 45 degrees F.

These soils are fine-loamy, mixed (calcareous), frigid Typic Ustifluvents.

Typical pedon of a Shupert gravelly loam in an area of Shupert-Winetti complex, about 4 miles north of Whitmore Park, about 1,000 feet south and 2,000 feet west of the southeast corner of Sec. 32, T. 12 S., R. 12 E.

A1-- 0 to 3 inches; pale brown (10YR 6/3) gravelly loam, olive brown (2.5Y 4/3) moist; weak thin platy structure parting to moderate very fine subangular blocky; soft, very friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots and few coarse roots; common very fine and fine random tubular pores; 30 percent pebbles; slightly calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.2); clear smooth boundary.

C1-- 3 to 9 inches; pale brown (10YR 6/3) clay loam, brown (10YR 4/3) moist; weak fine and medium subangular blocky structure; soft, friable, slightly sticky and slightly plastic; common very fine and fine roots and few medium and coarse roots; common very fine and fine random tubular pores; slightly calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.2); clear wavy boundary.

IIC2-- 9 to 21 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots and few medium and coarse roots; common very fine and fine and few medium random tubular pores; 15 percent pebbles; slightly calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.4); clear smooth boundary.

IIC3-- 21 to 34 inches; light yellowish brown (10YR 6/4) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots and few medium and coarse roots; common very fine

and fine and few medium random tubular pores; 10 percent pebbles; slightly calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.4); clear wavy boundary.

IIC4-- 34 to 49 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine and fine and few medium random tubular pores; 10 percent pebbles; slightly calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.4); clear smooth boundary.

IIC5-- 49 to 60 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine, fine, and medium random tubular pores; 5 percent pebbles; slightly calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.4).

The particle-size control section is 0 to 15 percent rock fragments.

A Horizon: Hue is 10YR or 2.5Y, value is 5 or 6 when dry and 4 or 5 when moist, and chroma is 2 or 3.

C Horizon: Hue is 10YR or 2.5Y, value is 5 to 7 when dry ad 4 or 5 when moist, and chroma is 2 to 4. Texture is clay loam, but in some pedons there are thin lenses of gravelly clay loam and gravelly loam.

Travessilla Series

The Travessilla series consists of shallow, well drained, moderately permeable and moderately rapidly permeable soils on mesas, benches, canyonsides, mountain slopes, and foot slopes. These soils formed in residuum and colluvium derived dominantly from sandstone and interbedded shale. Slope is 1 to 80 percent. Elevation is 5,000 to 8,700 feet but is dominantly 5,500 to 6,500 feet. Average annual precipitation is 10 to 14 inches, and average annual air temperature is 45 to 50 degrees F.

These soils are loamy, mixed (calcareous), mesic Lithic Ustic Torriorthents.

Typical pedon of a Travessilla fine sandy loam in an area of Travessilla-Rock outcrop complex, about 5 miles west of Price, about 2,400 feet north and 2,500 feet east of the southwest corner of Sec. 15, T. 14 S., R. 9 E.

A1-- 0 to 2 inches; brown (10YR 5/3) fine sandy loam, dark yellowish brown (10YR 4/4) moist; weak thick platy structure; soft, very friable; few fine and medium roots; few fine pores; slightly calcareous; mildly alkaline (pH 7/6); clear smooth boundary.

C1-- 2 to 5 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 4/3) moist; weak medium subangular blocky structure parting to weak fine subangular blocky; soft, very friable; few fine and medium roots; few fine pores; 15 percent channers; mildly alkaline (pH 7/5); clear smooth boundary.

C2-- 5 to 10 inches; brown (10YR 5/3) fine sandy loam, dark yellowish brown (10YR 4/4) moist; massive; few fine and medium pores; 15 percent channers; moderately calcareous; mildly alkaline (pH 7/6); abrupt wavy boundary.

R-- 10 inches; sandstone.

Bedrock is at a depth of 7 to 20 inches.

A Horizon: Hue is 7.5YR or 10YR, value is 5 or 6 when dry and 3 or 4 when moist, and chroma is 3 or 4. Texture is sandy loam, very gravelly fine sandy loam, fine sandy loam, or extremely boundary loam. Reaction is mildly alkaline or moderately alkaline.

C Horizon: Hue is 7.5YR or 10YR, value is 5 to 7 when dry and 4 to 6 when moist, and chroma is 3 or 4. Texture is sandy loam, fine sandy loam, very fine sandy loam, or loam. Rock fragment content is 0 to 15 percent. Reaction is mildly alkaline or moderately alkaline.

Winetti Series

The Winetti series consists of very deep, well drained, moderately rapidly permeable soils on narrow valley and canyon floors. These soils formed in alluvium derived from sandstone and shale. Slope is 1 to 8 percent. Elevation is 4,600 to 7,200 feet but commonly is 5,200 to 6,400 feet. Average annual precipitation is 12 to 16 inches, and average annual air temperature is 43 to 45 degrees F.

These soils are loamy-skeletal, mixed (calcareous), frigid Typic Ustifluvents.

Typical pedon of a Winetti bouldery sandy loam in an area of Shupert-Winetti complex, about 2.5 miles north of Sunnyside Mine, about 1,800 feet south and 2,500 feet west of the northeast corner of Sec. 20, T. 14 S., R. 14 E.

A1-- 0 to 6 inches; grayish brown (10YR 5/2) bouldery sandy loam, dark grayish brown (10YR 4/2) moist; moderate medium granular structure; soft, very friable; common very fine, fine, and medium roots and few coarse roots; 4 percent cobbles, 15 percent stones, and 10 percent boulders; slightly calcareous; disseminated calcium carbonate; mildly alkaline (pH 7.6); abrupt smooth boundary.

C1-- 6 to 11 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; common fine pores; 10 percent pebbles; strongly calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.2); clear wavy boundary.

C2-- 11 to 26 inches; pale brown (10YR 6/3) very bouldery loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; common fine pores; 10 percent pebbles, 5 percent cobbles, 10 percent stones, and 15 percent boulders; strongly calcareous; coatings of calcium carbonate on the underside of rock fragments; moderately alkaline (pH 8.4); abrupt smooth boundary.

C3-- 26 to 34 inches; brown (10YR 5/3) very bouldery loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; common fine pores; 10 percent pebbles, 5 percent cobbles, 10 percent stones, and 15 percent boulders; strongly calcareous; coatings of calcium carbonate on the underside of rock fragments; moderately alkaline (pH 8.4); abrupt smooth boundary.

C4-- 34 to 60 inches; pale brown (10YR 6/3) very gravelly sandy loam, brown (10YR 5/3) moist; single grain; loose, very friable slightly sticky; few very fine and fine roots; 40 percent pebbles, 5 percent cobbles, and 5 percent boulders; strongly calcareous; coatings of calcium carbonate on the underside of rock fragments, moderately alkaline (pH 8.4).

The particle-size control section is 35 to 50 percent rock fragments.

C Horizon: Value is 5 or 6 when dry and 4 or 5 when moist, and chroma is 2 or 3. Texture is mainly very bouldery loam or very gravelly sandy loam, but there are thin layers of very bouldery sandy clay loam in some pedons. Clay content is 14 to 17 percent.

APPENDIX C Carbon County, Utah Lease

SRS, Inc.
Sunnyside Reclamation & Salvage, Inc.
P.O. Box 99 — Sunnyside, Utah 84539

April 13, 1989

T14S R14E SLBM
SECTION 21: NE1/4

Mr. Lowell P. Braxton
Division of Oil, Gas & Mining
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203

Dear Mr. Braxton:

Re: County Lease, Township 14 South, Range 14 East, SLBM

Following your phone conversation with Bill Balaz, I have enclosed a copy of the Lease Agreement with the Carbon County commissioners.

This executed lease shows that SRS, Inc. has right of entry for the incidental bounday change (IBC) referred to in your letter dated April 10, 1989.

Your prompt resolution to this request will be greatly appreciated.

If you have any questions, please feel free to contact me.

Sincerly yours,

Karl R. Houskeeper

Karl R. Houskeeper
Environmental Coordinator

KRH:th

cc: Bill Balaz

Enclosure

LEASE

This Lease and Agreement becoming effective as of the 22nd day of March, 1989, by and between Carbon County, a body politic of the State of Utah, acting by and through its Board of Commissioners, made and adopted on June 10, 1981, hereinafter called Lessor, and Sunnyside Reclamation and Salvage, Inc., a Colorado Corporation, hereinafter called Lessee;

WITNESSETH:

1. Lessor, for and in consideration of the royalties, covenants, and agreements hereinafter to be paid, kept, and performed by Lessee, has demised, leased, and let, and by these presents does demise, lease, and let unto Lessee all coal in the following described real property ("Premises"):

Township 14 South, Range 14 East, SLBM

- Section 21: NE1/4

2. The terms of this Lease shall be five (5) years from the effective date hereof ("Primary Term") and as may be terminated or extended as provided herein.

3. Lessee shall pay to Lessor a production royalty equal to four percent (4%) of the value on every ton of 2,000 pounds of coal mined, removed, and sold from the Premises during the term of this Lease. Lessee shall make payment for the same on the 18th day of each month for the preceding month's production. In no case shall the production royalty payable be less than One and No/100 Dollars ($1.00) per ton. It is understood and agreed that if said royalties do not amount to Ten Dollars ($10.00) per month, in any calendar month, Lessee shall nevertheless pay said amount of Ten Dollars ($10.00) per month as a minimum royalty on the 18th day of each month during the term of this Lease; said payments shall be made at the office of the Treasurer of Carbon County at Price, Utah. As evidence of the amount of coal mined and sold, Lessee shall furnish to the County Clerk of Carbon County at his office at Price, Utah, upon his request and on a confidential basis, copies of the applicable production and sale records relating to this Lease, the Premises, and the coal mined therefrom.

4. The Lessee shall engage in the diligent development of the coal resources subject to the Lease.

5. Lessee shall operate and mine the Premises in a workmanlike manner in accordance with good and economical mining with due regard to the safety, development, and preservation of said premises, and shall comply with the laws of the State of Utah, the Industrial Commission of the State of Utah, the United States Government, and with all other applicable rules, regulations, and laws which may hereafter be enacted or promulgated in the interest of safety and workmanlike operations of the Premises.

6. Lessor may, at reasonable times and at its sole risk and expense, enter upon the Premises for the purpose of inspection; and Lessee shall, at all reasonable times, leave the Premises and mine open to such inspection. Lessee further agrees, upon demand of Lessor, to furnish within a reasonable time a detailed plat, or working plan, of its operations on the Premises.

7. Lessee shall pay, when due, all taxes lawfully assessed by the State of Utah upon improvements or output of coal on or from the Premises.

8. Lessee shall keep books of account showing the amount of coal mined and sold from the Premises; and said books of account shall, on a confidential basis, be open to the inspection of Lessor at all reasonable times. Upon demand of Lessor, the Lessee shall make a report of tonnage mined by the 15th day of each month covering all production from the Premises for the previous month.

9. Lessee shall furnish a copy of the Utah State Mine Inspection Report to Lessor upon request within a reasonable time after such inspection is made.

10. Lessee shall indemnify Lessor from any and all liability, including attorney's fees and court costs, which may occur as a result of Lessee's activities upon the Premises.

11. It is mutually agreed that in the event of labor strikes, fires, floods, and other causes beyond the reasonable control of the Lessee, production may be suspended so long as necessary by the exigence

of said conditions, provided that this is not to be construed as changing the provisions for minimum royalty payments as outlined in Section 3 of this Agreement.

12. Upon the expiration of this Lease, or upon the failure to pay the royalties when due, or upon failure to comply within a reasonable time with the written request of Lessor with any of the terms and conditions of this Lease, the same shall terminate thirty (30) days after Lessor gives written notice to Lessee of the grounds for termination; and Lessor may enter upon and take possession of the Premises without process of law or court action; and Lessee agrees to pay all expenses, including a reasonable attorney's fee for the enforcement of the provisions of this Lease. Lessee shall have a period of ninety (90) days from the termination or expiration of this Lease to remove any personal property from the Premises.

13. Lessor hereby grants unto Lessee the right and option to renew this Lease for one (1) successive five (5) year term after the termination hereof under the same terms and conditions herein stated; provided, however, that the amount of royalty shall be renegotiated at the end of the Primary Term, said renegotiation to be based upon the rate charged by the Federal Government on coal lands leased in the area; and, provided further, that any increase in royalty renegotiated shall not exceed the rate charged by the Federal Government in such instances. The minimum granted royalty of Ten Dollars ($10.00) per month shall not be renegotiated. Said option to renew shall be exercised by Lessee giving its written notice to Lessor of its intent to renew at least sixty (60) days prior to the end of the Primary Term.

14. Lessee shall not assign this Lease, or any portion of the Premises, without first receiving the written consent of the Lessor to do so. Such consent shall not be unreasonably withheld.

15. This Lease is issued only under such title as the Lessor may hold; and if Lessor is hereafter divested of such title, Lessor shall not be liable for any damages sustained by Lessee, nor shall Lessee be entitled to or claim any refund of rentals or royalties or other monies theretofore paid to Lessor. It is now agreed that if any acreage here-

under is deleted because of failure of title in Lessor, such deletion shall be deducted from the total acreage of 40 acres and the minimum monthly royalty shall be reduced accordingly on a pro-rata basis.

16. Notices provided herein shall be given to the parties as follows:

If to the Lessor:

Carbon County Courthouse
Price Utah 84501
Attention: _____

If to the Lessee:

Sunnyside Reclamation & Salvage, Inc.
P. O. Box 99
Sunnyside, Utah 84539
Attention: Mine Manager

17. This Agreement shall be binding upon the heirs, successors, and assigns of Lessee.

IN WITNESS WHEREOF, Lessor has caused this instrument to be subscribed by the Board of Commissioners of Carbon County, State of Utah, and the Lessee has hereunto set its hand and seal:

This Agreement is memorialized on the 12th day of April, 1989.

CARBON COUNTY, a body politic of the State of Utah

By William P. Krompel

By Emma R. Kingsdall

By Lynda C. Barnes

ATTEST:

Jeanne A. Winters, Deputy
Clerk of Carbon County,
State of Utah

SUNNYSIDE RECLAMATION & SALVAGE, INC.
a Colorado Corporation

By James T. Cooper
Vice President

STATE OF UTAH)
: SS
COUNTY OF CARBON)

On this _____ of _____, 1989, personally appeared before me _____, _____, _____, and _____, the signers of the above lease between Carbon County and Sunnyside Reclmation & Salvage, Inc. who duly acknowledged to me that they executed the same.

_____
NOTARY PUBLIC

My Commission Expires:

_____

Residing At:

_____

Application For Permit Amendment

Incidental Boundary Change (IBC)
Carbon County Lease
for
No. 1 Slope, No. 24 Left Entries, and
Development of No. 24 Left Longwall Panel

Sunnyside Coal Company
Sunnyside Mine
Sunnyside, UT 84539

Permit ACT/007/007

JME Companies

ENVIRONMENTAL SERVICES DIVISION
12211 W. Alameda Parkway, Suite 207
Lakewood CO 80228
(303)-969-9759

September 14, 1992

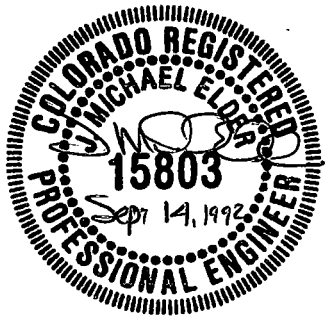
Mr. Gary Gray
Chief Engineer
Sunnyside Mine
P.O. Box 99
Sunnyside, UT 84539

Re: Incidental Boundary Change Carbon County Lease

Certification

I prepared the attached **Application for Permit Amendment for an Incidental Boundary Change for the Carbon County Lease**. This document is based on information provided to me by Sunnyside Mine and the information provided to me is accepted as correct.

I certify that the attached document is correct to my knowledge and belief.



J. Michael Elder, PE
Engineer

Application For Permit Amendment
Incidental Boundary Change (IBC)
Carbon County Lease
for
No. 1 Slope, No. 24 Left Entries, and
Development of No. 24 Left Longwall Panel

Sunnyside Mine

Prepared for:

Sunnyside Coal Company
Sunnyside Mine
Sunnyside, UT 84539

Permit ACT/007/007

Prepared by:

J. Michael Elder
JME Companies
ENVIRONMENTAL SERVICES DIVISION
12211 W. Alameda Parkway, Suite 207
Lakewood CO 80228
(303)-969-9759

September 14, 1992

Application For Permit Amendment
Incidental Boundary Change (IBC)
Carbon County Lease
for
No. 1 Slope, No. 24 Left Entries, and
Development of No. 24 Left Longwall Panel

Sunnyside Coal Company
Permit ACT/007/007

Sunnyside Coal Company requires an Incidental Boundary Change (IBC) for continued downdip development of the No. 1 Mine. The No. 24 Left Longwall Panel is the next panel to be developed. Completion of the No. 23 Left Longwall Panel development will occur within the next several months. This IBC is an extension of a previously approved IBC for the development of the No. 23 Left Longwall Panel (approved May 1989).

The IBC is requested for the NE1/4 of Section 21, T14S, R14E, SLB&M, Utah (Attachment 1). The IBC occurs within coal owned and controlled by Carbon County, Utah. Sunnyside Coal Company owns and controls the surface.

The permit change should be considered as an amendment since:

1. R645-303-224,100 - There is less than a 15 percent increase in surface or subsurface disturbed area. The requested IBC is approximately 33.2 acres. The current surface disturbance is approximately 315.5 acres.

2. R645-303-224,200 - Operations remain within the existing cumulative impact area.

3. R645-303-224,300 - Operations are engaged within the same hydrologic basin authorized in the approved permit.

4. R645-303-224,400 - No division order has been issued for this change.

5. R645-303-224,500 - There has been no cancellation or material reductions of any guarantees of the original permit.

6. R645-303-224,600 - And, no other law or regulation applies to this change application.

TABLE OF CONTENTS

1. General

The existing mine permit boundary does not allow for expansion into No. 24 Left Longwall Panel. This permit amendment for an IBC allows expansion into this area. Sunnyside Mines intends to incorporate all of Section 21 into the mine permit boundary in the Permit Renewal Application in order to continue mining downdip during the next five year permit term.

The IBC area includes portions of Pole Canyon and the adjacent canyon walls. Sunnyside Mines does not maintain any surface facilities or conduct any surface activities in the area of the IBC. The terrain is extremely steep and rugged.

2. Environmental Impacts

This amendment is anticipated to have the following environmental impacts.

a. Soil Resources.

No additional impacts to the soil resources are anticipated. No surface disturbance is associated with this IBC. Longwall mining may cause regional subsidence; however no surface effects, other than small differences in the existing elevation, are anticipated.

Sufficient soil baseline resource information is included in the existing PAP for the IBC area. Note that the soil types on the Soil Identification Map of the current PAP list the soil types within the IBC of the NE1/4 of Section 21, T14S, R14E, SLB&M, Utah as

JTG, Repp Doney Complex (40%-70% slopes),
PSH, Zillion Complex (55%-80% slopes), and
HUG, Midfork-Elwood Complex (50%-70% slopes).

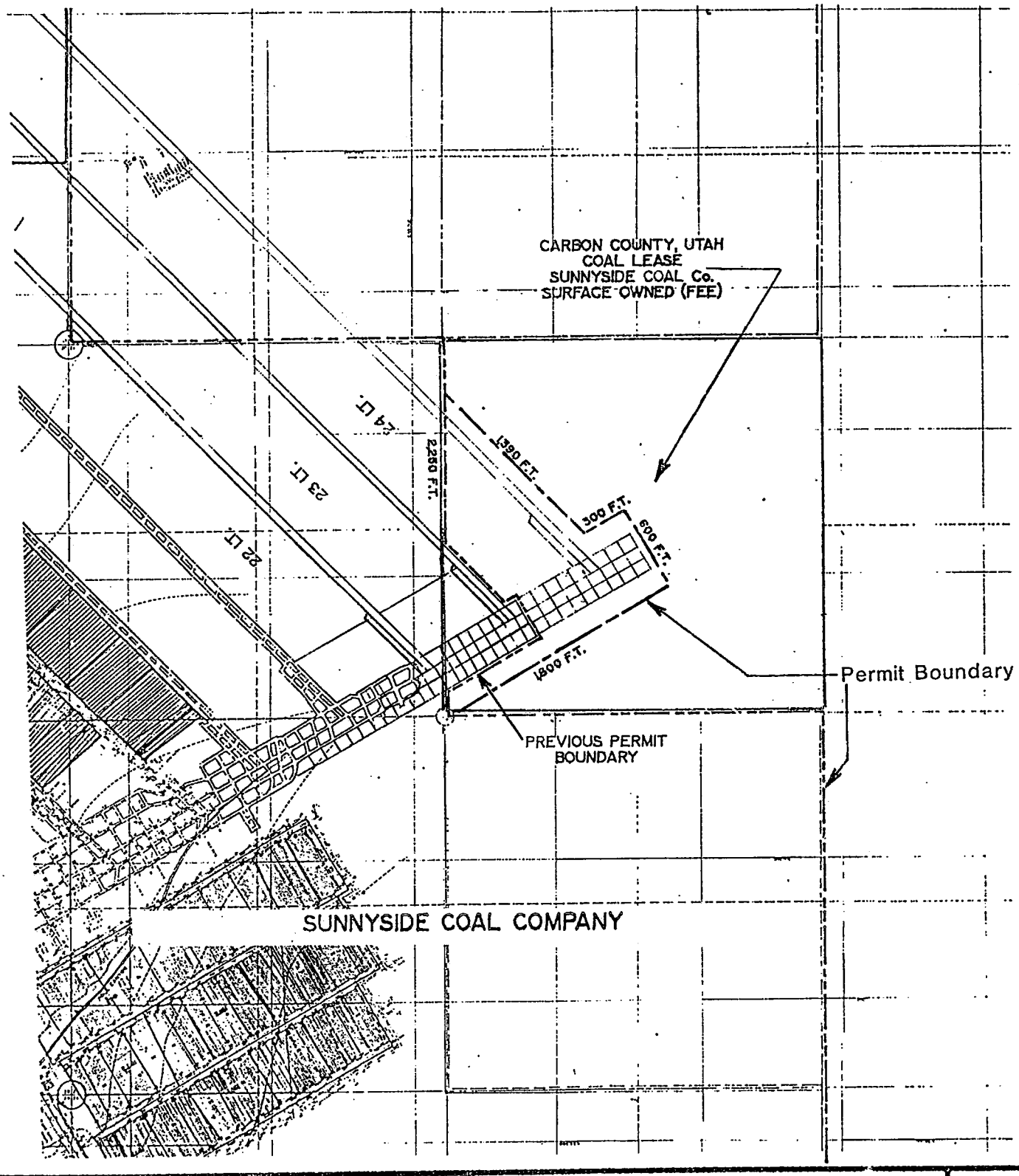
Based on the 1988 SCS Soil Survey of Carbon Area, Utah, the mapped soil map units have been identified as

JTG = 71, Pathead extremely bouldery fine sandy loam, 40 to 70 percent slopes,
PSH = 76, Perma family-Datino complex, and
HUG = 62, Midfork family-Comodore complex.

Although the map unit descriptions have changed, the soil locations on the map are virtually identical to the PAP Soil Identification Map. The Detailed Soil Map Unit Descriptions are included as Appendix A. The Soil Classification Descriptions are presented in Appendix B. The Soil Resource designations for Section 21 are presented on Attachment 2.

R 14 E

T 14 S



Sunnyside Coal Company

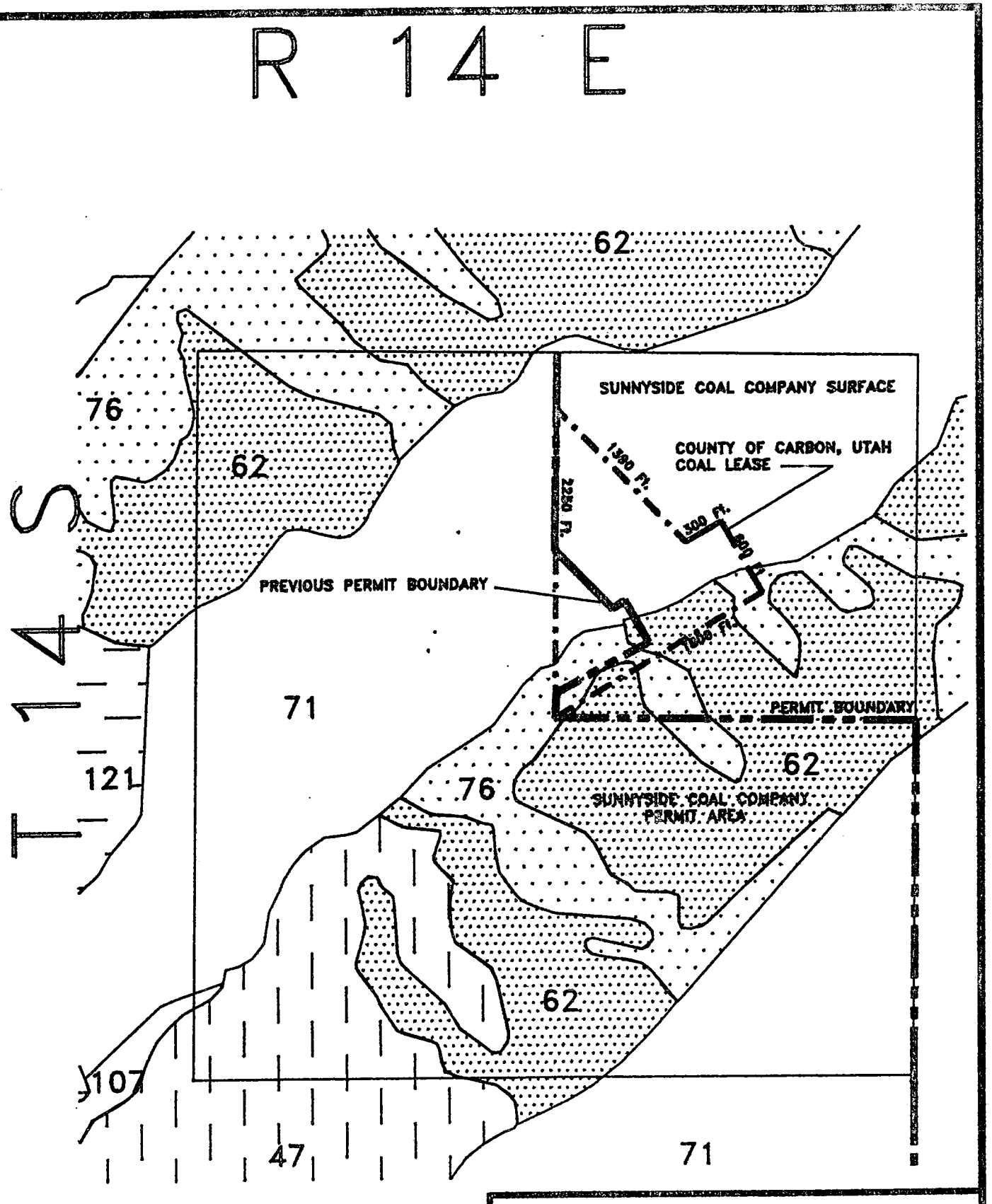
SUNNYSIDE MINES

REVISIONS		
NO.	DATE	BY
1	4/19/89	B.F.A.
2	9/08/92	B.F.A.
3		
4		

INCIDENTAL BOUNDARY CHANGE
SECTION 21, NE 1/4

DRAWN BY	J.M.E.	DATE	9/05/92
CHECKED BY		DATE	
APPROVED		SCALE	1" = 1,000'

DRAWING NO. A1-0229



SUNNYSIDE COAL COMPANY

Project: INCIDENTAL BOUNDARY CHANGE
NE 1/4 OF SECTION 21, T14S, R14E

	By	Date		
Drawn By:	RHF		Scale: 1" = 1000'	Date: 9/16/92
Checked:				
Approved:	JME		Proj. No:	Sheet 1 of 1
Approved:				
Approved:			Dwg. No: ATTACHMENT 2	

b. Biological Resources.
No additional impacts to the vegetation and wildlife of the IBC area are expected. Existing vegetation and fish and wildlife baseline data cover the area.

No additional disturbance will be created. No surface disturbance is associated with this IBC. Longwall mining may cause regional subsidence; however no surface effects, other than small differences in the existing elevation, are anticipated.

c. Land Use and Air Quality
The premining, current, and post mining land use is fish and wildlife habitat, and rangeland use in the canyon bottom for the area immediately adjacent to the IBC area. The IBC area is also designated fish and wildlife habitat, and rangeland use in the canyon bottom (extreme SW protion of the NE1/4).

No additional impact to cultural and historical resources is anticipated as there is no anticipated additional disturbance.

No change to the existing Bureau of Air Quality permit is anticipated. The projected production rate remains below 1mm tpy. No additional fugitive dust control measures will be required. No increases or decreases in vehicle miles are anticipated.

d. Geology.
The geologic data is presented in the approved permit for the area. No geological impacts are anticipated for the IBC area.

The plan for casing and sealing boreholes in the area remains the same as presented in the approved permit.

Longwall mining may cause regional subsidence; however no surface effects, other than small differences in the existing elevation, are anticipated. The area of the IBC is monitored in accordance with the PAP Subsidence monitoring plan. Permanent subsidence monuments are located in Bear Canyon and Whitmore Canyon.

e. Hydrology.
The IBC area creates no surface disturbance. Surface water runoff within this undisturbed area is not captured. No additional impacts to the existing surface hydrological resources are anticipated.

Additional underground mining will occur within the IBC area. Groundwater within this disturbed area is captured, pumped, treated, and discharged in accordance with the measures presented in the approved PAP. No additional ground water structures or treatment facilities are required. No additional impacts to the existing ground water hydrological resources are anticipated.

The IBC area remains in compliance with the existing hydrological information and plans in the approved permit.

3. IBC Land Information

The requested IBC is approximately 33.2 acres. The IBC is an extension of a previously requested IBC for the No. 23 Left Longwall panel development. The legal for the IBC (including the previously approved 6.8 acres) is as follows:

Beginning at the SW corner of NE1/4 of Section 21 (center of Section 21), T14S, R14E, SLB&M, Utah;
thence N60^{0}09'46"E, 1800 ft;
thence N29^{0}50'14"W, 600 ft;
thence S60^{0}09'46"W, 300 ft;
thence N45^{0}00'02"W, 1390 ft;
thence S00^{0}34'48"W, 2250 ft to the point of beginning for a total area of approximately 40.0 acres.

a. Right-of-Entry Information

Sunnyside Coal Company, through its predecessor Sunnyside Reclamation & Salvage, Inc., has a Lease and Agreement with Carbon County, Utah for extracting coal from the NE1/4, Section 21, T14S, R14E, SLB&M, Utah. Effective March 22, 1989, the Lease and Agreement is for a five year primary term and a five year subsequent term. The lease is provided in Appendix C.

Sunnyside Coal Company, through its predecessor Sunnyside Reclamation & Salvage, Inc., owns and controls the surface of the NE1/4, Section 21, T14S, R14E, SLB&M, Utah. The surface rights are conveyed by Deed and Assignment dated March 9, 1989 as part of Kaiser Coal Corporation bankruptcy proceedings designated Case No. 87B-01552-E before the United States Bankruptcy Court for the District of Colorado (document filed Carbon County, Utah, Book 287, Pages 52-95, March 10, 1989).

b. Status of Unsuitability Claims

Sunnyside Coal Company's existing permit boundary area is exempted from an Unsuitable for Mining

Designation under provisions of R645-103-330 by meeting the requirements of R645-103-331 through 333. Mining has been conducted within the permit area prior to August 3, 1977. The permit area is currently permitted for mining. Substantial legal and financial commitments were made at Sunnyside Mines prior to January 4, 1977.

The requested IBC area is immediately adjacent to the current mine permit boundary. The area is not incompatible with existing state or local land use plans or programs; does not affect fragile or historical lands; does not affect renewable resource lands; nor does the area exist within a natural hazard lands area. The IBC area does not include any occupied dwellings or any public roads.

4. Reclamation Plans

No surface reclamation activities are anticipated. No surface disturbance is associated with this IBC. Longwall mining may cause regional subsidence; however no surface effects, other than small differences in the existing elevation, are anticipated.

5. Bonding

No additional or incremental bonding is required for the inclusion of the IBC area within the permit boundary. No surface disturbance is associated with the IBC and no surface reclamation activities are anticipated.

APPENDIX A Detailed Soil Map Units

13--Cabba Family-Guben-Rock Outcrop Complex

This map unit is on canyonsides, mainly east of Price Canyon and south of Nine Mile Canyon. Slopes are 40 to 75 percent, 300 to 400 feet long, and convex. Elevation is 6,000 to 8,200 feet. The average annual precipitation is about 14 to 16 inches; the average annual air temperature is 42 to 45 degrees F; and the average freeze-free period is 60 to 120 days.

This unit is 50 percent Cabba family bouldery loam, 40 to 70 percent slopes; 20 percent Guben extremely bouldery loam, dry, 40 to 75 percent slopes; 15 percent Rock outcrop; and 15 percent other soils. About 30 percent of this unit has slopes of 40 to 50 percent. The Cabba family soil is on canyonsides between ledges of Rock outcrop; the Guben soil is on toe slopes; and Rock outcrop is on canyon rims, ledges, and very steep side slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 8 percent Guben extremely bouldery fine sandy loam, 5 percent Guben extremely stony loam, and small areas of Winetti soils on the bottoms of drainageways.

The Cabba family soil is shallow and well drained. It formed in residuum and colluvium derived dominantly from sandstone and shale of the Green River Formation. The present vegetation is mainly pinyon, Juniper, Salina wildrye, and Mormon-tea. Typically, the surface layer is pale brown bouldery loam about 3 inches thick. The underlying material is brown and light yellowish brown loam about 12 inches thick. Soft shale is at a depth of about 15 inches. Depth to shale ranges from 8 to 20 inches.

Permeability of the Cabba family soil is moderate. Available water capacity is about 1.5 to 3.0 inches. Water supplying capacity is 3 to 6 inches. Effective rooting depth is 8 to 20 inches. The organic matter content of the surface layer is 1 to 3 percent. Runoff is rapid, and the hazard of water erosion is high.

The Guben soil is very deep and well drained. It formed in colluvium derived dominantly from sandstone and shale of the Green river Formation,. The present vegetation is mainly Douglas-fir, pinyon, juniper, Salina wildrye, birchleaf mountainmahogany, and serviceberry. Typically, the surface is covered with a mat of partially decomposed leaves, twigs, and needles about 0.5 inch thick. The surface layer is grayish brown extremely bouldery loam about 7 inches thick. The subsoil is pale brown very stony loam about 8 inches thick. The upper 15 inches of the substratum is very pale brown very stony loam, and the lower part to a depth of 60 inches or more

is light yellowish brown very stony loam. A layer of carbonate accumulation is at a depth of about 15 inches.

Permeability of the Guben soil is moderate. Available water capacity is about 3.5 to 5.0 inches. Water supplying capacity is 7 to 10 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 3 to 5 percent. Runoff is rapid, and the hazard of water erosion is high.

Rock outcrop consists of areas of exposed bedrock. It is dominantly sandstone and shale and is on canyon rims, ledges, and very steep side slopes.

This unit is used as wildlife habitat, rangeland, and woodland.

The potential vegetation on the Cabba family and Guben soils includes an overstory of pinyon, Utah juniper, and Douglas-fir with a canopy of 50 percent. The understory vegetation is 10 percent grasses, 15 percent forbs, and 75 percent shrubs. Among the important plants are birchleaf mountainmahogany, Utah serviceberry, bluegrass, and Salina wildrye.

The site index for pinyon and Utah juniper is 37. Average yield is 6 cords of wood per acre. The potential is poor for production of posts or christmas trees. The unit is severely limited for the harvesting of wood products because of the steepness of slope, rock fragments on the surface, and the hazard of erosion.

This unit is not grazeable by livestock because of the steepness of slope and the bouldery surface layer.

The Cabba family and guben soils are in capability subclass Vlle, nonirrigated, and the Upland Very Steep Shallow Loam (Pinyon-Utah Juniper) woodland site. Rock outcrop is in capability subclass Vlls. It is not placed in a woodland site.

47--Guben-Rock Outcrop Complex

This map unit is on mountain slopes. It is in the Book Cliffs, north of Helper and west of the Green River. Slopes are 50 to 80 percent, 100 to 200 feet long, and plane to convex. The present vegetation is mainly Douglas-fir, serviceberry, birchleaf mountainmahogany, mockorange, and western wheatgrass. Elevation ranges from 5,000 to 9,500 feet but is dominantly 6,000 to 7,500 feet. The average annual precipitation is about 16 to 20 inches; the average annual air temperature is 38 to 45 degrees F; and the average freeze-free period is 60 to 100 days.

This unit is 55 percent Guben extremely bouldery fine sandy loam, 50 to 80 percent slopes; 20 percent Rock outcrop, and 25 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 12 percent Midfork family soils in concave areas and 10 percent Comodore very stony fine sandy loam, moist, intermingled throughout the unit. Also included are small areas of Perma family soils that have slopes of 60 to 80 percent.

The Guben soil is very deep and well drained. It formed in colluvium derived dominantly from sandstone and shale. Typically, the surface is covered with a mat of partially decomposed needles, twigs, and leaves about 0.5 inch thick. The surface layer is brown extremely bouldery fine sandy loam about 7 inches thick. The subsoil is brown very stony loam about 17 inches thick. The substratum to a depth of 60 inches or more is light brown very stony loam.

Permeability of the Guben soil is moderate Available water capacity is about 3.5 to 5.0 inches. Water supplying capacity is 8.5 to 12.0 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 3 to 5 percent. Runoff is moderate, and the hazard of water erosion is slight.

Rock outcrop consists of areas of exposed bedrock, dominantly interbedded sandstone, and shale. It occurs as ledges.

This unit is used as rangeland, wildlife habitat, woodland, and recreation areas.

The potential vegetation on the Guben soil includes an overstory of Rocky Mountain Douglas-fir and pinyon with a canopy of 50 percent. The understory vegetation is 40 percent grasses, 15 percent forbs, and 45 percent shrubs. Among the important plants are Salina wildrye, wheatgrass, birchleaf mountainmahogany, and snowberry.

This unit is severely limited for harvesting wood products because of the steepness of slope, the hazard of erosion, and stones and boulders on the surface.

This unit is not grazeable by livestock because of the steepness of slope.

The Guben soil is in capability subclass Vlle, nonirrigated, and in the Mountain Very Steep Stony Loam (Douglas-fir) woodland site Rock outcrop is in capability subclass Vllls. It is not placed in a woodland site.

62--Midfork Family-Comodore Complex

This map unit is on mountain slopes. It is along the Book Cliffs and Whitmore and Price Canyons. Slopes are 200 to 300 feet long and are convex. The present vegetation is mainly Douglas-fir, snowberry, and quaking aspen. Elevation is 7,900 to 9,500 feet.

This unit is 50 percent Midfork family bouldery loam, 50 to 70 percent slopes; 20 percent Comodore bouldery loam, 50 to 70 percent slopes; and 30 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 15 percent soils that are similar to the Midfork family soil but have a dark-colored surface layer less than 6 inches thick; 10 percent soils that are similar to the Midfork family soil but have a thick surface layer and a layer of calcium carbonate accumulation; and 5 percent Comodore very stony fine sandy loam, moist.

The Midfork family soil is very deep and well drained. It formed in colluvium derived dominantly from sandstone and shale. The average annual precipitation is 20 to 25 inches; the average annual air temperature is 34 to 38 degrees F; and the average freeze-free period is 40 to 60 days.

Typically, the surface is covered with a mat of partially decomposed twigs, leaves, and needles about 2 inches thick. The surface layer is brown bouldery loam about 7 inches thick. The next layer is yellowish brown very channery loam 10 inches thick. Below this to a depth of 60 inches or more is yellowish brown very gravelly loam.

Permeability of the Midfork family soil is moderate. Available water capacity is about 5.5 to 7.0 inches. Water supplying capacity is 10 to 17 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 5 to 10 percent. Runoff is rapid, and the hazard of water erosion is high.

The Comodore soil is shallow and well drained. It formed in colluvium derived dominantly from sandstone, siltstone, and shale. The average annual precipitation is 38 to 45 degrees F, and the average freeze-free period is 60 to 80 days.

Typically, the surface is covered with a mat of needles and twigs about 1 inch thick. The surface layer is brown bouldery loam about 6 inches thick. The underlying material to a depth of 19 inches is brown very stony loam over sandstone. Depth to sandstone ranges from 10 to 20 inches.

Permeability of the Comodore soil is moderate. Available water capacity is about 1.5 to 2.5 inches. Water supplying

capacity is 3 to 5 inches. Effective rooting depth is 10 to 20 inches. The organic matter content of the surface layer is 3 to 5 percent. Runoff is rapid, and the hazard of water erosion is high.

This unit is used for wildlife habitat and woodland.

The potential vegetation on this unit includes an overstory of Douglas-fir with a canopy of 90 percent. The understory vegetation is 10 percent grasses, 5 percent forbs, and 85 percent shrubs. Among the important plants are sedge, mountainlover, and snowberry.

The site index for Douglas-fir is 50. Average yield is about 27,200 board feet per acre for 100-year-old trees 12 inches in diameter or more.

This unit is severely limited for the harvesting of wood products because of the steepness of slope and hazard of erosion.

This map unit is in capability subclass VIIe, nonirrigated, and in the High Mountain Very Steep Loam (Douglas-fir) woodland site.

71--Pathead Extremely Bouldery Fine Sandy Loam, 40 to 70 Percent Slopes

This moderately deep, well drained soil is on mountain slopes and canyonsides. It is in the areas of Range Creek, Rock Creek, Whitmore Canyon, and Price Canyon. It formed in colluvium derived dominantly from sandstone and shale. Slopes are 100 to 200 feet long and have south aspects. The present vegetation in most areas is mainly curlleaf mountainmahogany, pinyon, juniper, Salina wildrye, and serviceberry. Elevation is 7,500 to 9,000 feet. The average annual precipitation is 16 to 20 inches; the average annual air temperature is 38 to 45 degrees F; and the average freeze-free period is 60 to 100 days.

Typically, the surface layer is pale brown extremely bouldery fine sandy loam about 4 inches thick. The underlying material to a depth of 38 inches is pale brown and very pale brown very stony find sandy loam. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are about 15 percent Perma soils that have slopes of 60 to 80 percent; 10 percent Comodore soils; and small areas of Senchert loam and Rock outcrop. The soils are in concave areas.

Permeability of this Pathead soil is moderate. Available water capacity is about 1.5 to 3.0 inches. Water supplying capacity is 4.0 to 8.5 inches. Effective rooting depth is 20 to 40 inches. The organic matter content of the surface layer is 1 to 3. Runoff is rapid, and the hazard of water erosion is moderate.

This unit is used as rangeland, wildlife habitat, and recreation areas.

The potential plant community on the Pathead soil is 35 percent grasses, 15 percent forbs, and 50 percent shrubs. Among the important plants are curlleaf mountainmahogany, Salina wildrye, and snowberry.

This unit is not grazeable by livestock because of the steepness of slope.

This map unit is in capability subclass Vlle, nonirrigated, and in the Mountain Very Steep Stony Loam (Curlleaf Mountainmahogany) range site.

76--Perma Family-Datino Complex

This map unit is on mountain slopes and canyonsides. It is near Range Creek, Dry Canyon, Patmos Head, Range Valley Mountain, and Soldier Creek and in Price Canyon. Slopes are 60 to 80 percent. Elevation is 7,200 to 8,700 feet. The average annual precipitation is about 16 to 20 inches; the average annual air temperature is 38 to 45 degrees F; and the average freeze-free period is 60 to 80 days.

This unit is 40 percent Perma family very stony sandy loam, 60 to 80 percent slopes; 35 percent Datino extremely stony fine sandy loam, 60 to 80 percent slopes; and 25 percent other soils. The Perma soil is on narrow spur ridges, and the Datino soil is near the tops of the side slopes and in shallow alluvial drainageways. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 10 percent Sheepcan stony loam, 5 percent soils that are similar to the Datino soil but have an extremely bouldery surface layer, 5 percent Datino Variant loam that has slopes of 40 to 60 percent, and 5 percent Rock outcrop. The included areas are intermingled throughout the unit.

The Perma family soil is very deep and well drained. It formed in colluvium derived dominantly from sandstone and shale. Slopes are 300 to 400 feet long and are plane to convex. The present vegetation is mainly serviceberry, birchleaf mountainmahogany, mountain big sagebrush, and curlleaf mountainmahogany. Typically, the surface layer is dark brown very stony sandy loam about 7 inches thick. The upper 15 inches of the subsoil is brown cobbly sandy loam, and the lower 13 inches is brown very cobbly sandy loam. The substratum to a depth of 60 inches or more is brown very stony sandy loam.

Permeability of the Perma family soil is moderately rapid. Available water capacity is about 3 to 5 inches. Water supplying capacity is 6 to 9 inches. Effective rooting depth is 60 inches or more The organic matter content of the surface layer is 3 to 5 percent. Runoff is rapid, and the hazard or water erosion is high.

The Datino soil is very deep and well drained. It formed in colluvium derived dominantly from sandstone and shale. Slopes are 300 to 400 feet long and are plane to convex. The present vegetation is mainly birchleaf mountainmahogany, serviceberry, Douglas-fir, Wasatch penstemon, mountain big sagebrush, snowberry, pinegrass, and Salina wildrye. Typically, the surface layer is brown extremely stony fine sandy loam about 9 inches thick. The subsoil is brown very stony loam about 7 inches thick. The substratum to a depth of 60 inches or more

is pale brown very stony fine sandy loam. A layer of calcium carbonate accumulation is at a depth of about 16 inches.

Permeability of the Datino soil is moderate. Available water capacity is about 3.5 to 6.0 inches. Water supplying capacity is 6 to 8 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 3 to 5 percent. Runoff is rapid, and the hazard of water erosion is high.

This unit is used for wildlife habitat.

The potential plant community on the Perma family soil is 20 percent grasses, 10 percent forbs, and 70 percent shrubs. Among the important plants are birchleaf mountainmahogany and serviceberry.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments.

It is not practical to revegetate large areas of this soil because of the stoniness of the soil. For critical erosion control, small areas can be mechanically treated and seeded. Plants that may be suitable for critical area seedings are those native to the area, intermediate wheatgrass, orchardgrass, smooth brome, ladak alfalfa, Lewis flax, small burnet, and yellow sweetclover.

The potential vegetation on the Datino soil includes an overstory of Rocky Mountain Douglas-fir and pinyon with a canopy of 30 percent. The understory vegetation is 40 percent grasses, 15 percent forbs, and 45 percent shrubs. Among the important plants are Salina wildrye, slender wheatgrass, birchleaf mountainmahogany, and snowberry.

This soil is severely limited for harvesting wood products because of the steepness of slope, the hazard of erosion, and stones and boulders on the surface.

This unit is not grazeable by livestock because of the steepness of slope.

This unit is in capability subclass Vlle, nonirrigated. The Perma family soil is in the Mountain Very Steep Stony Loam (Browse) range site. The Datino soil is in the Mountain Very Steep Stony Loam (Douglas-fir) woodland site.

107--Shupert-Winetti Complex

This map unit is on narrow valley and canyon floors in the Book Cliffs and in an area northwest of Price and east of Sunnyside. Slopes are 1 to 8 percent, 100 to 200 feet long, and concave. The present vegetation in most areas is mainly basin big sagebrush, rabbitbrush, cheatgrass, needleandthread, and dropseed. Elevation ranges from 4,600 to 7,200 feet but commonly is 5,200 to 6,400 feet. The average annual precipitation is 12 to 16 inches, the average annual air temperature is 43 to 45 degrees F, and the average freeze-free period is 80 to 100 days.

This unit is 40 percent Shupert gravelly loam, 1 to 8 percent slopes; 35 percent Winetti bouldery sandy loam, 1 to 8 percent slopes; and 25 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 15 percent Haverdad loam on toe slopes, 5 percent Glenberg family very fine sandy loam on toe slopes at lower elevations, and 5 percent soils that are similar to the Winetti soil but are along the stream channels and support riparian vegetation.

The Shupert soil is very deep and well drained. It formed in alluvium derived dominantly from sandstone and shale. Typically, the surface layer is pale brown gravelly loam about 3 inches thick. The next layer is pale brown clay loam about 6 inches thick. Below this to a depth of 60 inches or more is light brownish gray and light yellowish brown clay loam.

Permeability of the Shupert soil is moderately slow. Available water capacity is about 10.0 to 11.5 inches. Water supplying capacity is 6.5 to 10.0 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 2 percent. Runoff is slow, and the hazard of water erosion is moderate. This soil is subject to flooding during prolonged, high-intensity storms. Channeling and deposition are common along streambanks.

The Winetti soil is very deep and well drained. It formed in alluvium derived dominantly from sandstone and shale. Typically, the surface layer is grayish brown bouldery sandy loam about 6 inches thick. The next layer is pale brown loam about 5 inches thick. The next layer is pale brown and brown very bouldery loam about 23 inches thick. Below this to a depth of 60 inches or more is pale brown very gravelly sandy loam.

Permeability of the Winetti soil is moderately rapid. Available water capacity is about 4.0 to 5.5 inches. Water supplying capacity is 4.5 to 8.0 inches. Effective rooting depth is 60 inches or more. The organic matter content of the

surface layer is 1 to 3 percent. Runoff is slow, and the hazard or water erosion is slight. This soil is subject to flooding during prolonged, high-intensity storms. Channeling and deposition are common along streambanks.

This unit is used mainly as rangeland and wildlife habitat. It is also used for irrigated crops.

The potential plant community on the Shupert and Winetti soils is 60 percent grasses, 10 percent forbs, and 30 percent shrubs. Important plants are basin wildrye, western wheatgrass, basin big sagebrush, and rubber rabbitbrush.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments. If the desirable forage plants are mostly depleted, brush management and rangeland seeding can be used to improve the rangeland vegetation. Suitable brush management practices include prescribed burning, chemical spraying, and mechanical treatment.

The suitability of this unit for rangeland seeding is good. Plants suitable for seeding include adapted native plant and Russian wildrye, crested wheatgrass, and ladak alfalfa.

This map unit is in capability unit IIIe-3, irrigated, and in capability subclass Vlle, nonirrigated. It is in the Loamy Bottom range site.

121--Travessilla-Rock Outcrop-Gerst Complex

This map unit is on canyonsides in the area of Jack Creek and along the Book Cliffs, extending from Price Canyon to Sunnyside. Slopes are 40 to 70 percent. Elevation ranges from 5,000 to 8,100 feet but dominantly is 6,000 to 7,500 feet.

This unit is 40 percent Travessilla extremely bouldery loam, 40 to 70 percent slopes; 30 percent Rock outcrop; 20 percent Gerst very channery loam, dry, 50 to 70 percent slopes; and 10 percent other soils. About 25 percent of the Travessilla soil has slopes of 40 to 50 percent. The Travessilla soil is on north and west aspects at the higher elevations. Rock outcrop is on canyon rims and ledges. The Gerst soil is on south and west aspects at the lower elevations. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 5 percent Guben extremely bouldery loam on canyonsides.

The Travessilla soil is shallow and well drained. It formed in residuum and colluvium derived dominantly from sandstone and shale. Slopes are 100 to 200 feet long, are concave to convex, and have north and east aspects. The present vegetation in most areas is mainly pinyon, juniper, Douglas-fir, Salina wildrye, and birchleaf mountainmahogany. The average annual precipitation is mountainmahogany. The average annual precipitation is 12 to 14 inches; the average annual air temperature is 45 to 47 degrees F; and the average freeze-free period is 80 to 120 days. Typically, the surface layer is pale brown extremely bouldery loam about 2 inches thick. The underlying material to a depth of 12 inches is pale brown very fine sandy loam over sandstone. Depth to sandstone ranges from 10 to 20 inches.

Permeability of the Travessilla soil is moderately rapid. Available water capacity is about 1 to 2 inches. Water supplying capacity is 3 to 4 inches. Effective rooting depth is 10 to 20 inches. The organic matter content of the surface layer is 1 to 2 inches. Runoff is rapid, and the hazard of water erosion is high.

Rock outcrop consists of areas of exposed sandstone and siltstone.

The Gerst soil is shallow and well drained. It formed in residuum derived dominantly from shale. Slopes are 100 to 200 feet long, are concave to convex, and have south and west aspects. The present vegetation in most areas is mainly juniper, pinyon, Salina wildrye, and Mormon-tea. The average annual precipitation is 10 to 12 inches; the average annual air temperature is 47 to 49 degrees F; and the average freeze-

free period is 110 to 135 days. Typically, this surface layer is light brownish gray very channery loam about 5 inches thick. The underlying material to a depth of 19 inches is light brownish gray channery loam over weathered shale. Weathered shale is at a depth of 10 to 20 inches.

Permeability of the Gerst soil is moderately slow. Available water capacity is about 1.5 to 23.0 inches. Water supplying capacity is 2 to 3 inches. Effective rooting depth is 10 to 20 inches. The organic matter content of the surface layer is 0.5 to 1.0 percent. Runoff is rapid, an the hazard of water erosion is high.

This unit is used as rangeland, woodland, and wildlife habitat.

The potential vegetation on the Travessilla soil includes an overstory of pinyon, Utah juniper and Douglas-fir with a canopy of 30 percent. The understory vegetation is 10 percent grasses, 15 percent forbs, and 75 percent shrubs. Among the important plants are birchleaf mountainmahogany, Utah serviceberry, bluegrass, and Salina wildrye.

The site index for pinyon and Utah juniper is 37. Average yield is 6 cords of wood per acre. The potential for the production of posts or Christmas trees is very poor. This unit is severely limited for the harvesting of wood products because of the steepness of slope and the hazard of erosion.

This soil is not grazeable by livestock because of the steepness of slope and the stony surface layer.

The potential vegetation on the Gerst soil includes an overstory of Utah juniper and pinyon with a canopy of 5 to 20 percent. The understory vegetation is 10 percent grasses, 10 percent forbs, and 80 percent shrubs. Among the important plants are galleta, Salina wildrye, and shadscale.

The site index for Utah juniper and pinyon is 15 to 20. Average yield is 1 to 2 cords of wood per acre. The potential for the production of posts or Christmas trees is poor. Limitations for the harvesting of wood products are severe because of the steepness of slope and the hazard of erosion.

The suitability of this soil for grazing is very poor. The main limitations are steepness of slope and the hazard of erosion.

This map unit is in capability subclass Vlle, nonirrigated. The Travessilla soil is in the Upland Very Steep Shallow Loam (Pinyon-Utah Juniper) woodland site. The Gerst soil is in the Semidesert Very Steep Shallow Clay (Utah Juniper) woodland site. The Rock outcrop is not placed in a woodland site.

APPENDIX B Soil Classification

Cabba Family

The Cabba family consists of shallow, well drained, moderately permeable soils on benches, canyon rims, and steep canyon-sides. These soils formed in residuum and colluvium derived dominantly from shale or siltstone of the Green River Formation. Slope is 3 to 70 percent. Elevation is 5,000 to 8,200 feet. Average annual precipitation ranges from 12 to 16 inches, and average annual air temperature ranges from 42 to 45 degrees F.

These soils are loamy, mixed (calcareous), frigid, shallow Typic Ustorthents.

Reference pedon of a Cabba family bouldery loam in an area of Cabba family-Guben Rock outcrop complex, on the slopes of Cottonwood Ridge, about 250 feet west and 1,500 feet north of the southeast corner of Sec. 7, T. 13 S., R. 16 E.

A1-- 0 to 3 inches; pale brown (10YR 6/3) bouldery loam, brown (10YR 4/3) moist; moderate medium granular structure parting to moderate fine granular; loose, slightly sticky and slightly plastic; common very fine and fine roots; 5 percent pebbles, 10 percent cobbles, and 15 percent boulders; slightly calcareous; disseminated calcium carbonate; mildly alkaline (pH 7.8); abrupt smooth boundary.

C1-- 3 to 7 inches; brown (10YR 5/3) loam, dark brown (10YR 4/3) moist; weak fine granular structure; loose, slightly sticky and slightly plastic; common very fine and fine roots; slightly calcareous; mildly alkaline (pH 7.8); abrupt smooth boundary.

C2-- 7 to 15 inches; light yellowish brown (10YR 6/4) loam, yellowish brown (10YR 5/4) moist; massive; soft, friable, slightly sticky and slightly plastic; common very fine and fine roots; slightly calcarious; moderately alkaline (pH 8.3); abrupt smooth boundary.

C3r-- 15 inches; rippable shale; soft carbonate coatings on surface or rock.

Paralithic contact is at a depth of 8 to 20 inches.

A Horizon: Hue in 10 YR or 5Y, and value is 4 or 5 when moist. Texture is gravelly loam, bouldery loam, or extremely channery loam.

C Horizon: Hue is 10 YR or 2.5Y, value is 5 or 6 when dry, and chroma is 2 to 4. Texture is loam, gravelly loam, or clay loam. Clay content is 20 to 35 percent. Rock fragment content is 0 to 30 percent.

Comodore Series

The Comodore series consists of shallow, well drained, moderately permeable soils on mountain slopes. These soils formed in colluvium derived dominantly from sandstone. Slope is 50 to 70 percent. Elevation is 6,800 to 9,000 feet. Average annual precipitation ranges from 16 to 20 inches, and average annual air temperature ranges from 38 to 45 degrees F.

These soils are loamy-skeletal, mixed Lithic Haploborolls.

Typical pedon of a Comodore very stony fine sandy loam in an area of Comodore-Datino Variant complex; about 12 miles east of Price, near Dugout Creek; about 2,300 feet north and 2,000 feet east of the southwest corner of Sec. 23, T. 13 S., R. 12 E.

A1-- 0 to 6 inches; dark grayish brown (10YR 4/2) very stony fine sandy loam, very dark brown (10YR 2/2) moist; weak fine granular structure; soft, friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; few very fine and fine pores; 15 percent pebbles, 20 percent cobbles, and 20 percent stones; mildly alkaline (pH 7.4); clear smooth boundary.

C1-- 6 to 14 inches; very dark grayish brown (10YR 3/2) very stony loam, very dark brown (10YR 2/2) moist; weak fine subangular blocky structure; soft, friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; few very fine pores; 15 percent pebbles, 15 percent cobbles, and 15 percent stones; mildly alkaline (pH 7.4); abrupt wavy boundary.

R-- 14 inches; fractured sandstone.

Bedrock is at a depth of 10 to 20 inches. The control section is 35 to 45 percent rock fragments.

A Horizon: Value is 2 or 3 when moist, and chroma is 2 or 3. Texture is very stony fine sandy loam or bouldery loam.

C Horizon: Value is 3 to 5 when dry and 2 to 4 when moist, and chroma is 2 to 3. Clay content is 19 to 24 percent. The horizon is 15 to 20 percent pebbles, 10 to 15 percent cobbles and 15 to 20 percent stones.

Datino Series

The Datino Series consists of very deep, well drained, moderately permeable soils on canyonsides and mountain slopes. These soils formed in colluvium derived dominantly from sandstone and shale. Slope is 15 to 80 percent. Elevation is 6,800 to 8,700 feet. Average annual precipitation ranges from 16 to 20 inches, and average annual air temperature ranges from 38 to 45 degrees F.

These soils are loamy-skeletal, mixed Typic Haploborolls.

Typical pedon of a Datino extremely stony fine sandy loam in an area of Perma family-Datino complex, about 0.25 mile south of Soldier Creek Mine, 2,400 feet west and 2,200 feet south of the northeast corner of Sec. 18, T. 13 S., R. 12 E.

A1-- 0 to 10 inches; brown (10YR 4/3) extremely stony fine sandy loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, friable, slightly sticky and slightly plastic; common very fine and fine roots and few medium and coarse roots; few very fine pores; 15 percent pebbles, 25 percent cobbles, and 25 percent stones; moderately alkaline (pH 7.9); clear smooth boundary.

B2-- 10 to 16 inches; brown (10YR 5/3) very stony loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine, fine, medium, and coarse roots; common very fine and fine pores and few medium pores; 15 percent pebbles, 15 percent cobbles, and 10 percent stones; slightly calcareous; moderately alkaline (pH 7.9) gradual wavy boundary.

C1ca-- 16 to 41 inches; pale brown (10YR 6/3) very stony fine sandy loam, brown (10YR 5/3) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine, fine, medium, and coarse roots; common very fine and fine pores; 15 percent pebbles, 20 percent cobbles, and 25 percent stones strongly calcareous; soft powdery masses of calcium carbonate; moderately alkaline (pH 8.0); gradual smooth boundary.

C2-- 41 to 60 inches; pale brown (10YR 6/3) very stony fine sandy loam, brown (10YR 5/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine, fine, medium, and coarse roots; few very fine pores; 15 percent pebbles, 20 percent cobbles, and 25 percent stones; moderately calcareous; disseminated calcium carbonate; moderately alkaline (pH 7.9).

Secondary calcium carbonate is at a depth of 15 to 22 inches. The mollic epipedon is 10 to 15 inches thick. The solum is 15

to 22 inches thick. The particle-size control section is 35 to 60 percent rock fragments.

A Horizon: Value is 4 or 5 when dry and 2 or 3 when moist, and chroma is 2 or 3.

B2 Horizon: Value is 3 to 5 when dry and 2 to 4 when moist, and chroma is 2 or 3. Clay content is 18 to 26 percent. Rock fragment content is 35 to 45 percent. Reaction is mildly alkaline or moderately alkaline.

C Horizon: Value is 5 or 6 when dry, and chroma is 2 or 3. Clay content is 16 to 25 percent. Rock fragment content is 40 to 70 percent. Reaction is mildly alkaline or moderately alkaline.

Gerst Series

The Gerst series consists of shallow, well drained, moderately slowly permeable soils on the sides of mesas, benches, terraces, and canyons and on mountain slopes and hillslopes. These soils formed in residuum and colluvium derived dominantly from shale and sandstone. Slope is 3 to 70 percent. Elevation is 5,200 to 8,000 feet. Average annual precipitation ranges from 8 to 14 inches, and average annual air temperature ranges from 45 to 50 degrees F.

These soils are loamy, mixed (calcareous), mesic, shallow Ustic Torriorthents.

Typical pedon of a Gerst extremely stony loam in an area of Gerst-Strych-Badland complex, 50 to 70 percent slopes, about 5 miles northwest of East Carbon City, about 2,400 feet south and 1,200 feet west of the northeast corner of Sec. 16, T. 14 S., R. 13 E.

A1-- 0 to 7 inches; light brownish gray (10YR 6/2) extremely stony loam, dark brown (10YR 4/3) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, few fine, and many coarse roots; many fine and few medium pores; 30 percent pebbles, 10 percent cobbles, and 30 percent stones and boulders; strongly calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.2); clear smooth boundary.

C1-- 7 to 16 inches; gray (10YR 6/1) channery silt loam, dark grayish brown (10YR 4/2) moist; massive; hard, friable, sticky and plastic; common very fine roots and few medium and coarse roots; 15 percent shale fragments; strongly calcareous; disseminated calcium carbonate; strongly alkaline (pH 8.6); clear smooth boundary.

C2-- 16 to 19 inches; light brownish gray (10YR 6/2) channery silt loam, grayish brown (10YR 5/2) moist; massive; hard, friable, slightly sticky and plastic; few very fine and fine roots; 20 percent shale fragments; strongly calcareous; disseminated calcium carbonate; strongly alkaline (pH 8.6); clear smooth boundary.

Cr-- 19 inches; partly weathered shale.

Paralithic contact is at a depth of 8 to 20 inches.

A Horizon: Value is 4 or 5 when moist, and chroma is 2 or 3. Texture is very channery loam, cobbly loam, or extremely stony loam. Reaction is moderately alkaline or strongly alkaline.

C Horizon: Hue is 10YR or 2.5Y, value is 4 or 5 when moist, and chroma is 1 or 2. Texture is channery loam, channery silt

loam, or channery clay loam. Clay content is 18 to 32 percent. Rock fragment content is 15 to 25 percent.

Guben Series

The Guben series consists of very deep, well drained moderately permeable soils on canyonsides and mountain slopes. These soils formed in colluvium derived dominantly from sandstone and shale. Slope is 15 to 75 percent. Elevation is 5,000 to 9,500 feet. Average annual precipitation ranges from 14 to 20 inches, and average annual air temperature ranges from 38 to 45 degrees F.

These soils are loamy-skeletal, mixed Typic Calciborolls.

Typical pedon of Guben extremely bouldery loam in an area of Cabba family-Guben-Rock outcrop complex, in Prickly Pear Canyon, about 1,200 feet south and 2,000 feet east of the northwest corner of Sec. 14, T. 12 S., R. 15 E.

O1-- 0.5 inch to 0; pine needles and grasses.

A1-- 0 to 7 inches; grayish brown (10YR 5/2) extremely bouldery loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; 15 percent pebbles, 10 percent cobbles, 5 percent stones, and 10 percent boulders; moderately calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.2); clear wavy boundary.

B2-- 7 to 15 inches; pale brown (10YR 6/3) very stony loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; 10 percent pebbles, 15 percent cobbles, and 20 percent stones; moderately calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.4); clear wavy boundary.

C1ca- 15 to 30 inches; very pale brown (10YR 6/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots and few fine, medium, and coarse roots; few very fine and fine pores; 10 percent pebbles, 20 percent cobbles, 20 percent stones, and disseminated calcium carbonate; strongly alkaline (pH 8.6); clear smooth boundary.

C2-- 30 to 60 inches; light yellowish brown (10YR 6/4) very stony loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine, fine, and medium roots; few very fine and medium pores and common fine pores; 10 percent pebbles, 20 percent cobbles, 25 percent stones, and 5 percent boulders;

moderately calcareous; disseminated calcium carbonate; strongly alkaline (pH 9.0).

The mollic epipedon is 7 to 10 inches thick. The solum is 15 to 24 inches thick. The particle-size control section is 35 to 60 percent rock fragments. Secondary calcium carbonate is at a depth of 11 to 24 inches.

A Horizon: Value is 4 or 5 when dry, and chroma is 2 or 3. Texture is extremely bouldery loam, extremely stony loam, or extremely bouldery fine sandy loam. Reaction is mildly alkaline or moderately alkaline. Calcium carbonate equivalent is 11 to 19 percent.

B Horizon: Hue is 10YR or 7.5YR, value is 5 or 6 when dry and 3 or 4 when moist, and chroma is 2 to 4. Texture is very stony loam or very cobbly loam. Clay content is 17 to 22 percent. Rock fragment content is 35 to 55 percent. Reaction is mildly alkaline or moderately alkaline. Calcium carbonate equivalent is 20 to 25 percent.

Cca Horizon: Hue is 7.5YR or 10YR, value is 6 or 7 when dry and 5 or 6 when moist, and chroma is 2 to 4. Texture is very stony loam or very cobbly fine sandy loam. Clay content is 17 to 25 percent. Rock fragment content is 35 to 60 percent. Reaction is moderately alkaline or strongly alkaline. Calcium carbonate equivalent is 20 to 38 percent.

C Horizon: Texture is very stony loam or very cobbly fine sandy loam. Clay content is 17 to 24 percent. Reaction is moderately alkaline or strongly alkaline Calcium carbonate equivalent is 19 to 30 percent.

Midfork Family

The Midfork family consists of very deep, well drained, moderately permeable soils is mountain slopes. These soils formed in gravelly colluvium derived dominantly from calcareous sedimentary rock. Slope is 50 to 70 from calcareous sedimentary rock. Slope is 50 to 70 percent. Elevation is 7,000 to 9,500 feet. Average annual precipitation ranges from 20 to 25 inches, and average annual air temperature ranges from 34 to 38 degrees F.

These soils are loamy-skeletal, mixed Typic Croborolls.

Reference pedon of a Midfork family bouldery loam, in an area of Midfork family-Comodore complex, about 16 miles east of Sunnyside, about 1,600 feet north and 950 feet east of the southwest corner of Sec. 15, T. 15 S., R. 16 E. (No general land office survey has been made.)

02- 2 inches to 0; partially decomposed twigs, leaves, and needles.

A11-- 0 to 4 inches; brown (10YR 4/3) bouldery loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; soft, very friable; few very fine and fine roots; 5 percent channers, 5 percent flagstones, and 20 percent boulders; neutral (pH 7.2); abrupt smooth boundary.

A12-- 4 to 7 inches; brown (10YR 4/3) bouldery loam, dark brown (10YR 3/3) moist; weak medium prismatic structure parting to weak medium granular slightly hard, firm, slightly sticky and slightly plastic common fine and few medium roots; few very fine and fine pores; 10 percent fine pebbles, 5 percent cobbles, and 5 percent boulders; mildly alkaline (pH 7.8); clear smooth boundary.

C1-- 7 to 17 inches; yellowish brown (10YR 5/4) very channery loam, brown (10YR 4/3) moist; massive; slightly hard, firm, slightly sticky and slightly plastic; common fine and few medium roots; 10 percent pebbles, 30 percent channers, and 5 percent cobbles; slightly calcareous; disseminated calcium carbonate; mildly alkaline (pH 7.8); gradual smooth boundary.

C2-- 17 to 60 inches; yellowish brown (10YR 5/4) very gravelly loam, brown (10YR 4/3) moist; massive, soft, friable, slightly sticky and slightly plastic; few fine roots; 25 percent pebbles and 10 percent channers; slightly calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.4)

The mollic epipedon is 7 to 15 inches thick. The particle-size control section is very gravelly loam or very channery loam. Clay content is 18 to 24 percent. Rock fragment content of the particle-size control section is 35 to 65 percent.

A Horizon: Chroma is 2 or 3. Reaction is neutral or mildly alkaline.

C Horizon: Chroma is 2 or 3. Reaction is mildly alkaline or moderately alkaline.

Pathead Series

The Pathead series consists of moderately deep, well drained, moderately permeable soils on benches, ridges, canyonsides, and mountain slopes. These soils formed in colluvium and residuum derived dominantly from sandstone and shale. Slope is 15 to 70 percent. Elevation is 5,900 to 9,000 feet. Average annual precipitation is 14 to 20 inches, and average annual air temperature is 38 to 45 degrees F.

These soils are loamy-skeletal, mixed (calcareous), frigid Typic Ustorthents.

Typical pedon of a Pathead extremely stony loam in an area of Pathead-Curecanti family association, about 2 miles north and 4 miles west of Helper, about 1,100 feet north and 400 feet west of the southeast corner of Sec. 6, T. 13 S., R. 9 E.

A1-- 0 to 3 inches; brown (10YR 5/3) extremely stony loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine roots; few very fine pores; 5 percent pebbles, 15 percent cobbles, 40 percent stones, and 5 percent boulders; moderately calcareous; disseminated calcium carbonate; strongly alkaline (pH 8.6); abrupt smooth boundary.

C1-- 3 to 14 inches; pale brown (10YR 6/3) very cobbly loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine roots and few fine and medium roots; many very fine pores; 20 percent pebbles and 5 percent cobbles; moderately calcareous; disseminated calcium carbonate; strongly alkaline (pH 8.8); clear smooth boundary.

C2-- 14 to 26 inches; pale brown (10YR 6/3) very cobbly loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; soft, friable, slightly sticky and slightly plastic; common very fine and few fine roots; few very fine pores; 20 percent pebbles, 25 percent cobbles, and 5 percent stones; moderately calcareous; disseminated calcium carbonate; strongly alkaline (pH 8.8); clear smooth boundary.

R-- 26 inches; sandstone.

Bedrock is at a depth of 20 to 40 inches. The particle-size control section is 35 to 60 percent rock fragments.

A Horizon: Value is 5 or 6 when dry and 3 to 5 when moist, and chroma is 2 or 3. Texture is gravelly loam, cobbly loam, extremely stony fine sandy loam, extremely stony loam, or

extremely bouldery fine sandy loam. Reaction is moderately alkaline or strongly alkaline.

C Horizon: Hue is 10YR or 2.5Y, value is 6 or 7 when dry and 3 to 5 when moist, and chroma is 2 to 4. Texture is very cobbly loam, extremely cobbly loam, or very stony fine sandy loam. Clay content is 18 to 27 percent. Calcium carbonate equivalent is 11 to 28 percent. Reaction is moderately alkaline or strongly alkaline.

Perma Family

The Perma family consist of very deep, well drained, moderately rapidly permeable soils on mountain slopes. These soils formed in colluvium derived dominantly from sandstone and shale. Slope is 15 to 80 percent. Elevation is 7,200 to 8,800 feet. Average annual precipitation ranges from 16 to 20 inches, and average annual air temperature ranges from 38 to 45 degrees F.

These soils are loamy-skeletal, mixed Typic Haploborolls.

Reference pedon of a Perma family very stony sandy loam in an area of Perma family-Datino complex, about 1.5 miles north and east of Geneva Coal Mine; 2,400 feet north and 600 feet east of the southwest corner of Sec. 35, T. 15 S., R. 14 E.

A11-- 0 to 7 inches; dark brown (7.5YR 4/2) very stony sandy loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; soft, very friable; many very fine and coarse roots, common fine roots, and few medium roots; common very fine pores; 10 percent pebbles, 10 percent cobbles, and 20 percent stones; neutral (pH 6.8); clear smooth boundary.

A12-- 7 to 15 inches; dark brown (7.5YR 4/2) cobbly sandy loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine roots, common fine and coarse roots, and few medium roots; common very fine pores; 10 percent pebbles, 15 percent cobbles, and 5 percent stones; neutral (pH 6.8); abrupt smooth boundary.

B21-- 15 to 22 inches; brown (7.5YR 5/3) cobbly sandy loam, dark brown (7.5YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and few fine roots; few very fine and fine pores; 15 percent pebbles and 15 percent cobbles; neutral (pH 7.0); clear smooth boundary.

B22-- 22 to 35 inches; brown (7.5YR 5/3) very cobbly sandy loam, dark brown (7.5YR 4/3) moist; moderate medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few very fine, fine, coarse, and very coarse roots; common very fine pores; 25 percent pebbles and 20 percent cobbles; neutral (pH 6.6); clear smooth boundary.

C1-- 35 to 60 inches; brown (7.5YR 5/3) very stony sandy loam, dark brown (7.5YR 4/3) moist; massive; soft, very friable, slightly sticky and slightly plastic; few very

fine and fine roots and common coarse roots; many very fine pores; 15 percent pebbles, 15 percent cobbles, and 20 percent stones; neutral (pH 6.6)

A Horizon: Value is 4 or 5 when dry and 2 or 3 when moist, and chroma is 2 or 3.

B2 Horizon: Hue is 7.5YR or 10YR, value is 4 or 5 when moist, and chroma is 2 or 3.

C Horizon: Hue is 7.5YR or 10YR.

Shupert Series

The Shupert series consists of very deep, well drained, slowly permeable soils on narrow valley and canyon floors. These soils formed in alluvium derived from sandstone and shale. Slope is 1 to 8 percent. Elevation ranges from 4,600 to 7,200 feet but commonly is 5,200 to 6,400 feet. Average annual precipitation is 12 to 16 inches, and average annual air temperature is 43 to 45 degrees F.

These soils are fine-loamy, mixed (calcareous), frigid Typic Ustifluvents.

Typical pedon of a Shupert gravelly loam in an area of Shupert-Winetti complex, about 4 miles north of Whitmore Park, about 1,000 feet south and 2,000 feet west of the southeast corner of Sec. 32, T. 12 S., R. 12 E.

A1-- 0 to 3 inches; pale brown (10YR 6/3) gravelly loam, olive brown (2.5Y 4/3) moist; weak thin platy structure parting to moderate very fine subangular blocky; soft, very friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots and few coarse roots; common very fine and fine random tubular pores; 30 percent pebbles; slightly calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.2); clear smooth boundary.

C1-- 3 to 9 inches; pale brown (10YR 6/3) clay loam, brown (10YR 4/3) moist; weak fine and medium subangular blocky structure; soft, friable, slightly sticky and slightly plastic; common very fine and fine roots and few medium and coarse roots; common very fine and fine random tubular pores; slightly calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.2); clear wavy boundary.

IIC2-- 9 to 21 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots and few medium and coarse roots; common very fine and fine and few medium random tubular pores; 15 percent pebbles; slightly calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.4); clear smooth boundary.

IIC3-- 21 to 34 inches; light yellowish brown (10YR 6/4) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots and few medium and coarse roots; common very fine

and fine and few medium random tubular pores; 10 percent pebbles; slightly calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.4); clear wavy boundary.

IIC4-- 34 to 49 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine and fine and few medium random tubular pores; 10 percent pebbles; slightly calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.4); clear smooth boundary.

IIC5-- 49 to 60 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine, fine, and medium random tubular pores; 5 percent pebbles; slightly calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.4).

The particle-size control section is 0 to 15 percent rock fragments.

A Horizon: Hue is 10YR or 2.5Y, value is 5 or 6 when dry and 4 or 5 when moist, and chroma is 2 or 3.

C Horizon: Hue is 10YR or 2.5Y, value is 5 to 7 when dry ad 4 or 5 when moist, and chroma is 2 to 4. Texture is clay loam, but in some pedons there are thin lenses of gravelly clay loam and gravelly loam.

Travessilla Series

The Travessilla series consists of shallow, well drained, moderately permeable and moderately rapidly permeable soils on mesas, benches, canyonsides, mountain slopes, and foot slopes. These soils formed in residuum and colluvium derived dominantly from sandstone and interbedded shale. Slope is 1 to 80 percent. Elevation is 5,000 to 8,700 feet but is dominantly 5,500 to 6,500 feet. Average annual precipitation is 10 to 14 inches, and average annual air temperature is 45 to 50 degrees F.

These soils are loamy, mixed (calcareous), mesic Lithic Ustic Torriorthents.

Typical pedon of a Travessilla fine sandy loam in an area of Travessilla-Rock outcrop complex, about 5 miles west of Price, about 2,400 feet north and 2,500 feet east of the southwest corner of Sec. 15, T. 14 S., R. 9 E.

A1-- 0 to 2 inches; brown (10YR 5/3) fine sandy loam, dark yellowish brown (10YR 4/4) moist; weak thick platy structure; soft, very friable; few fine and medium roots; few fine pores; slightly calcareous; mildly alkaline (pH 7/6); clear smooth boundary.

C1-- 2 to 5 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 4/3) moist; weak medium subangular blocky structure parting to weak fine subangular blocky; soft, very friable; few fine and medium roots; few fine pores; 15 percent channers; mildly alkaline (pH 7/5); clear smooth boundary.

C2-- 5 to 10 inches; brown (10YR 5/3) fine sandy loam, dark yellowish brown (10YR 4/4) moist; massive; few fine and medium pores; 15 percent channers; moderately calcareous; mildly alkaline (pH 7/6); abrupt wavy boundary.

R-- 10 inches; sandstone.

Bedrock is at a depth of 7 to 20 inches.

A Horizon: Hue is 7.5YR or 10YR, value is 5 or 6 when dry and 3 or 4 when moist, and chroma is 3 or 4. Texture is sandy loam, very gravelly fine sandy loam, fine sandy loam, or extremely boundary loam. Reaction is mildly alkaline or moderately alkaline.

C Horizon: Hue is 7.5YR or 10YR, value is 5 to 7 when dry and 4 to 6 when moist, and chroma is 3 or 4. Texture is sandy loam, fine sandy loam, very fine sandy loam, or loam. Rock fragment content is 0 to 15 percent. Reaction is mildly alkaline or moderately alkaline.

Winetti Series

The Winetti series consists of very deep, well drained, moderately rapidly permeable soils on narrow valley and canyon floors. These soils formed in alluvium derived from sandstone and shale. Slope is 1 to 8 percent. Elevation is 4,600 to 7,200 feet but commonly is 5,200 to 6,400 feet. Average annual precipitation is 12 to 16 inches, and average annual air temperature is 43 to 45 degrees F.

These soils are loamy-skeletal, mixed (calcareous), frigid Typic Ustifluvents.

Typical pedon of a Winetti bouldery sandy loam in an area of Shupert-Winetti complex, about 2.5 miles north of Sunnyside Mine, about 1,800 feet south and 2,500 feet west of the northeast corner of Sec. 20, T. 14 S., R. 14 E.

A1-- 0 to 6 inches; grayish brown (10YR 5/2) bouldery sandy loam, dark grayish brown (10YR 4/2) moist; moderate medium granular structure; soft, very friable; common very fine, fine, and medium roots and few coarse roots; 4 percent cobbles, 15 percent stones, and 10 percent boulders; slightly calcareous; disseminated calcium carbonate; mildly alkaline (pH 7.6); abrupt smooth boundary.

C1-- 6 to 11 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; common fine pores; 10 percent pebbles; strongly calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.2); clear wavy boundary.

C2-- 11 to 26 inches; pale brown (10YR 6/3) very bouldery loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; common fine pores; 10 percent pebbles, 5 percent cobbles, 10 percent stones, and 15 percent boulders; strongly calcareous; coatings of calcium carbonate on the underside of rock fragments; moderately alkaline (pH 8.4); abrupt smooth boundary.

C3-- 26 to 34 inches; brown (10YR 5/3) very bouldery loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; common fine pores; 10 percent pebbles, 5 percent cobbles, 10 percent stones, and 15 percent boulders; strongly calcareous; coatings of calcium carbonate on the underside of rock fragments; moderately alkaline (pH 8.4); abrupt smooth boundary.

C4-- 34 to 60 inches; pale brown (10YR 6/3) very gravelly sandy loam, brown (10YR 5/3) moist; single grain; loose, very friable slightly sticky; few very fine and fine roots; 40 percent pebbles, 5 percent cobbles, and 5 percent boulders; strongly calcareous; coatings of calcium carbonate on the underside of rock fragments, moderately alkaline (pH 8.4).

The particle-size control section is 35 to 50 percent rock fragments.

C Horizon: Value is 5 or 6 when dry and 4 or 5 when moist, and chroma is 2 or 3. Texture is mainly very bouldery loam or very gravelly sandy loam, but there are thin layers of very bouldery sandy clay loam in some pedons. Clay content is 14 to 17 percent.

APPENDIX C Carbon County, Utah Lease

SRS, Inc.
Sunnyside Reclamation & Salvage, Inc.
P.O. Box 99 — Sunnyside, Utah 84539

April 13, 1989

T14S R14E SLBM
SECTION 21: NE1/4

Mr. Lowell P. Braxton
Division of Oil, Gas & Mining
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203

Dear Mr. Braxton:

Re: County Lease, Township 14 South, Range 14 East, SLBM

Following your phone conversation with Bill Balaz, I have enclosed a copy of the Lease Agreement with the Carbon County commissioners.

This executed lease shows that SRS, Inc. has right of entry for the incidental bounday change (IBC) referred to in your letter dated April 10, 1989.

Your prompt resolution to this request will be greatly appreciated.

If you have any questions, please feel free to contact me.

Sincerly yours,

Karl R. Houskeeper

Karl R. Houskeeper
Environmental Coordinator

KRH:th

cc: Bill Balaz

Enclosure

LEASE

This Lease and Agreement becoming effective as of the 22nd day of March, 1989, by and between Carbon County, a body politic of the State of Utah, acting by and through its Board of Commissioners, made and adopted on June 10, 1981, hereinafter called Lessor, and Sunnyside Reclamation and Salvage, Inc., a Colorado Corporation, hereinafter called Lessee;

WITNESSETH:

1. Lessor, for and in consideration of the royalties, covenants, and agreements hereinafter to be paid, kept, and performed by Lessee, has demised, leased, and let, and by these presents does demise, lease, and let unto Lessee all coal in the following described real property ("Premises"):

Township 14 South, Range 14 East, SLBM

- Section 21: NE1/4

2. The terms of this Lease shall be five (5) years from the effective date hereof ("Primary Term") and as may be terminated or extended as provided herein.

3. Lessee shall pay to Lessor a production royalty equal to four percent (4%) of the value on every ton of 2,000 pounds of coal mined, removed, and sold from the Premises during the term of this Lease. Lessee shall make payment for the same on the 18th day of each month for the preceding month's production. In no case shall the production royalty payable be less than One and No/100 Dollars ($1.00) per ton. It is understood and agreed that if said royalties do not amount to Ten Dollars ($10.00) per month, in any calendar month, Lessee shall nevertheless pay said amount of Ten Dollars ($10.00) per month as a minimum royalty on the 18th day of each month during the term of this Lease; said payments shall be made at the office of the Treasurer of Carbon County at Price, Utah. As evidence of the amount of coal mined and sold, Lessee shall furnish to the County Clerk of Carbon County at his office at Price, Utah, upon his request and on a confidential basis, copies of the applicable production and sale records relating to this Lease, the Premises, and the coal mined therefrom.

4. The Lessee shall engage in the diligent development of the coal resources subject to the Lease.

5. Lessee shall operate and mine the Premises in a workmanlike manner in accordance with good and economical mining with due regard to the safety, development, and preservation of said premises, and shall comply with the laws of the State of Utah, the Industrial Commission of the State of Utah, the United States Government, and with all other applicable rules, regulations, and laws which may hereafter be enacted or promulgated in the interest of safety and workmanlike operations of the Premises.

6. Lessor may, at reasonable times and at its sole risk and expense, enter upon the Premises for the purpose of inspection; and Lessee shall, at all reasonable times, leave the Premises and mine open to such inspection. Lessee further agrees, upon demand of Lessor, to furnish within a reasonable time a detailed plat, or working plan, of its operations on the Premises.

7. Lessee shall pay, when due, all taxes lawfully assessed by the State of Utah upon improvements or output of coal on or from the Premises.

8. Lessee shall keep books of account showing the amount of coal mined and sold from the Premises; and said books of account shall, on a confidential basis, be open to the inspection of Lessor at all reasonable times. Upon demand of Lessor, the Lessee shall make a report of tonnage mined by the 15th day of each month covering all production from the Premises for the previous month.

9. Lessee shall furnish a copy of the Utah State Mine Inspection Report to Lessor upon request within a reasonable time after such inspection is made.

10. Lessee shall indemnify Lessor from any and all liability, including attorney's fees and court costs, which may occur as a result of Lessee's activities upon the Premises.

11. It is mutually agreed that in the event of labor strikes, fires, floods, and other causes beyond the reasonable control of the Lessee, production may be suspended so long as necessary by the exigence

of said conditions, provided that this is not to be construed as changing the provisions for minimum royalty payments as outlined in Section 3 of this Agreement.

12. Upon the expiration of this Lease, or upon the failure to pay the royalties when due, or upon failure to comply within a reasonable time with the written request of Lessor with any of the terms and conditions of this Lease, the same shall terminate thirty (30) days after Lessor gives written notice to Lessee of the grounds for termination; and Lessor may enter upon and take possession of the Premises without process of law or court action; and Lessee agrees to pay all expenses, including a reasonable attorney's fee for the enforcement of the provisions of this Lease. Lessee shall have a period of ninety (90) days from the termination or expiration of this Lease to remove any personal property from the Premises.

13. Lessor hereby grants unto Lessee the right and option to renew this Lease for one (1) successive five (5) year term after the termination hereof under the same terms and conditions herein stated; provided, however, that the amount of royalty shall be renegotiated at the end of the Primary Term, said renegotiation to be based upon the rate charged by the Federal Government on coal lands leased in the area; and, provided further, that any increase in royalty renegotiated shall not exceed the rate charged by the Federal Government in such instances. The minimum granted royalty of Ten Dollars ($10.00) per month shall not be renegotiated. Said option to renew shall be exercised by Lessee giving its written notice to Lessor of its intent to renew at least sixty (60) days prior to the end of the Primary Term.

14. Lessee shall not assign this Lease, or any portion of the Premises, without first receiving the written consent of the Lessor to do so. Such consent shall not be unreasonably withheld.

15. This Lease is issued only under such title as the Lessor may hold; and if Lessor is hereafter divested of such title, Lessor shall not be liable for any damages sustained by Lessee, nor shall Lessee be entitled to or claim any refund of rentals or royalties or other monies theretofore paid to Lessor. It is now agreed that if any acreage here-

under is deleted because of failure of title in Lessor, such deletion shall be deducted from the total acreage of 40 acres and the minimum monthly royalty shall be reduced accordingly on a pro-rata basis.

16. Notices provided herein shall be given to the parties as follows:

If to the Lessor:
Carbon County Courthouse
Price Utah 84501
Attention: _____

If to the Lessee:
Sunnyside Reclamation & Salvage, Inc.
P. O. Box 99
Sunnyside, Utah 84539
Attention: Mine Manager

17. This Agreement shall be binding upon the heirs, successors, and assigns of Lessee.

IN WITNESS WHEREOF, Lessor has caused this instrument to be subscribed by the Board of Commissioners of Carbon County, State of Utah, and the Lessee has hereunto set its hand and seal:

This Agreement is memorialized on the 12th day of April, 1989.

CARBON COUNTY, a body politic of the State of Utah

By William P. Krompel

By Emma L. Kingsendall

By Lynda C. Barnes

ATTEST:

Jean A. Winters, Deputy
Clerk of Carbon County,
State of Utah

SUNNYSIDE RECLAMATION & SALVAGE, INC.
a Colorado Corporation

By James T. Cooper
Vice President

STATE OF UTAH)
: SS
COUNTY OF CARBON)

On this _____ of _____, 1989, personally appeared before me _____, _____, _____, and _____, the signers of the above lease between Carbon County and Sunnyside Reclmation & Salvage, Inc. who duly acknowledged to me that they executed the same.

_____
NOTARY PUBLIC

My Commission Expires:

_____

Residing At:

_____