

MINING PLAN  
UNITED STATES GOVERNMENT  
LEASE SL-046612  
LEASE SL-066145  
GENEVA COAL MINE  
UNITED STATES STEEL  
CORPORATION

Submitted to the  
United States Geological Survey  
Conservation Branch  
Mining Supervisor's Office  
Salt Lake City, Utah

Engineering Department  
Western District-Coal  
May 17, 1977



Copies:  
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UNITED STATES STEEL  
CORPORATION

MINING PLAN APPROVED BY U.S.G.S.  
BRANCH OF MINING OPERATIONS

Date: 1/23/78

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## INTRODUCTION

The United States Steel Corporation, a Delaware corporation, entitled to operate in the State of Utah, herewith submits a plan for mining coal on U. S. Government Leases Nos. SL-046612 and SL-066145, the named corporation being the lessee of the subject leases and Geneva Coal Mine being the operating mine.

The Western District Coal Operations of the United States Steel Corporation presently operates the Geneva Coal Mine at Horse Canyon, Utah, and the Somerset Coal Mine at Somerset, Colorado. The coals from the mines are blended and washed at the Wellington Coal Cleaning Plant and then shipped to the United States Steel Corporation's Geneva Steel Works near Provo, Utah for use as high-volatile coking coal at the steel plant.

Pursuant to Part 211 of 30 CFR, information is attached with references to paragraphs of Part 211.10(c).

Seven copies are transmitted as required.

(c)(1) RESPONSIBLE PARTY FOR OPERATIONS; SURFACE AND  
MINERAL OWNERS, EXCLUDING U. S. GOVERNMENT

Responsible Party

Name and Title of Party

Paul E. Watson, General Superintendent  
Western District-Coal

Business Address and Telephone

United States Steel Corporation  
P. O. Box 807  
East Carbon, Utah 84520  
801-888-4431

Surface Owners, Other than U. S.

Name and Title of Party

Paul E. Watson, General Superintendent  
Western District-Coal

Business Address and Telephone

United States Steel Corporation  
P. O. Box 807  
East Carbon, Utah 84520  
801-888-4431

Name and Title of Party

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Home Address and Telephone

Price, Utah 84501  
801-637-0071

Name and Title of Party

Lloyd A. Heath, General Manager

Business Address and Telephone

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P. O. Box D  
Sunnyside, Utah 84539  
801-888-4421

Name and Title of Party

George K. Porter, Owner

Home Address and Telephone

East Carbon, Utah 84520  
801-888-5502

Name and Title of Party

Charles Hansen, Director of State Land

Business Address and Telephone

Department of Natural Resources  
Division of State Lands  
105 State Capitol Building  
Salt Lake City, Utah 84104  
801-533-5381

Mineral Owners, Other than U.S. (Coal)

Name and Title of Party

Paul E. Watson, General Superintendent  
Western District-Coal

Business Address and Telephone

United States Steel Corporation  
P. O. Box 807  
East Carbon, Utah 84520  
801-888-4431

Name of Company

American Fuels Corporation

Business Address

7th Floor, Continental Bank Building  
Salt Lake City, Utah 84111

Name of Party

Albert D. Firchau

Business Address

400 Deseret Building  
Salt Lake City, Utah 84111

Name and Title of Party

Lloyd A. Heath, General Manager

Business Address and Telephone

Kaiser Steel Corporation  
P. O. Box D  
Sunnyside, Utah 84539  
801-888-4421

Mineral Owners, Other than U. S. (Oil & Gas)

Name and Title of Party

Herb Mee, Jr., President

Business Address and Telephone

Beard Oil Company  
2000 Classen Center, Suite 200  
Oklahoma City, Oklahoma 73106  
405-528-2323

Name and Title of Party

Joan Chorney, Lessee

Business Address and Telephone

401 Lincoln Tower Building  
1860 Lincoln Street  
Denver, Colorado 80203  
303-573-5858

Name and Title of Party

Jean Oakason, Lessee

Business Address and Telephone

654 S. 900 East  
Salt Lake City, Utah 84102  
801-363-3941

Name and Title of Party

John C. Major, President

Business Address and Telephone

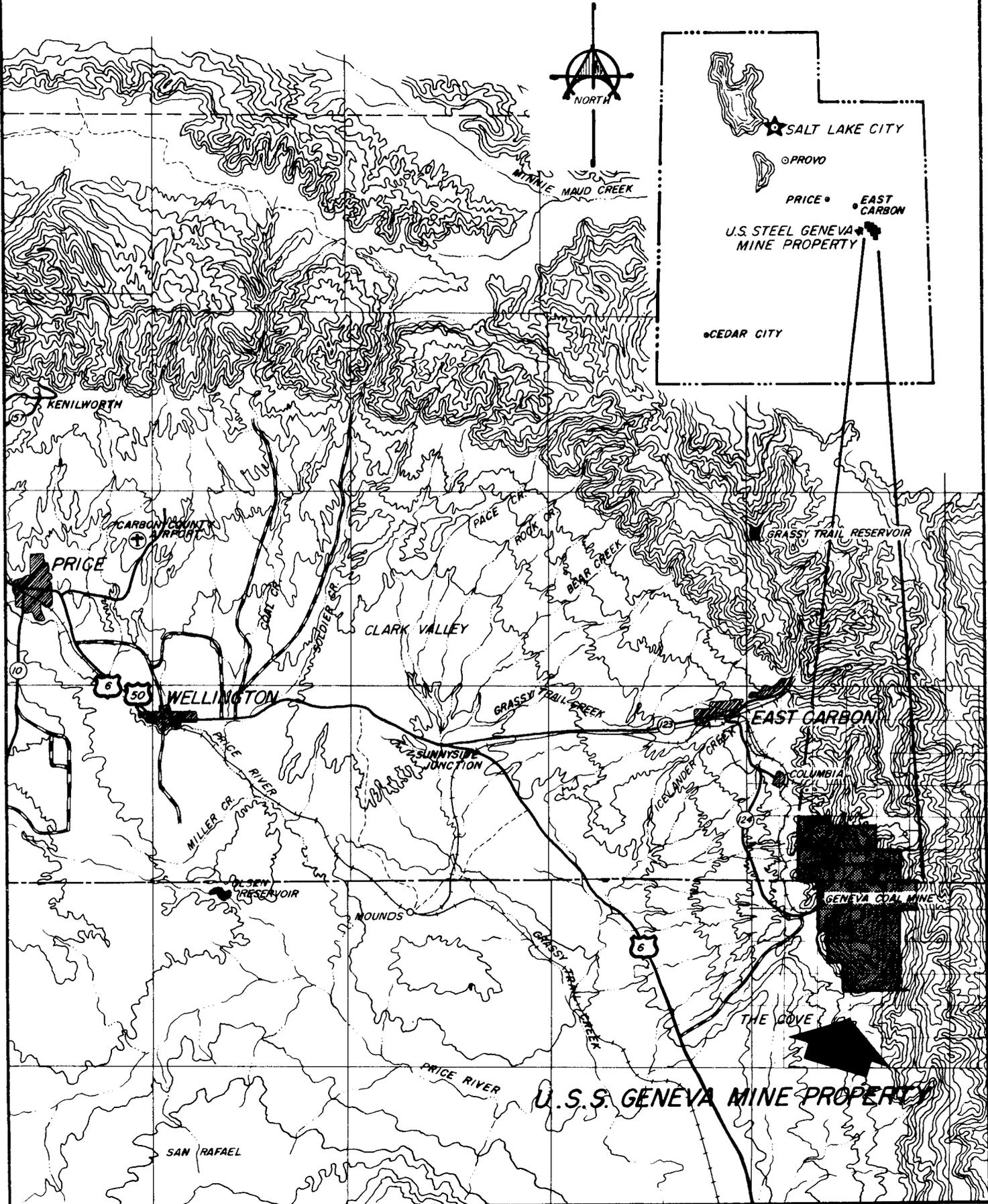
Oil Development Company of Utah  
P. O. Box 12058  
Amarillo, Texas 79101  
806-376-5741

Name and Title of Party

John H. Trigg, Lessee

Business Address and Telephone

P. O. Box 520  
Roswell, New Mexico 88201  
505-623-3140



U.S.S. GENEVA MINE PROPERTY

## DESCRIPTION OF PRESENT ENVIRONMENT

### (c)(2) General Geology

The Book Cliffs form the southern boundary of the Uintah Basin and extend eastward from Castle Gate, Utah to Grand Junction, Colorado. This sinuous feature is approximately 185 miles in length and contains coal seams along its entire length.

The Book Cliffs coal field lies east of the central part of Utah. The northern and western parts of the field are in Carbon County, while the southern portion is in Emery County.

Geneva Coal Mine straddles the Carbon-Emery county line with federal coal lease SL-046612 being in Carbon County and federal coal lease SL-066145 in Emery County. The mine with its fee property and its associated leases is essentially contained with the northeast quarter of the Woodside, Utah 15 minute quadrangle. The property access is some nine miles south of East Carbon, Utah.

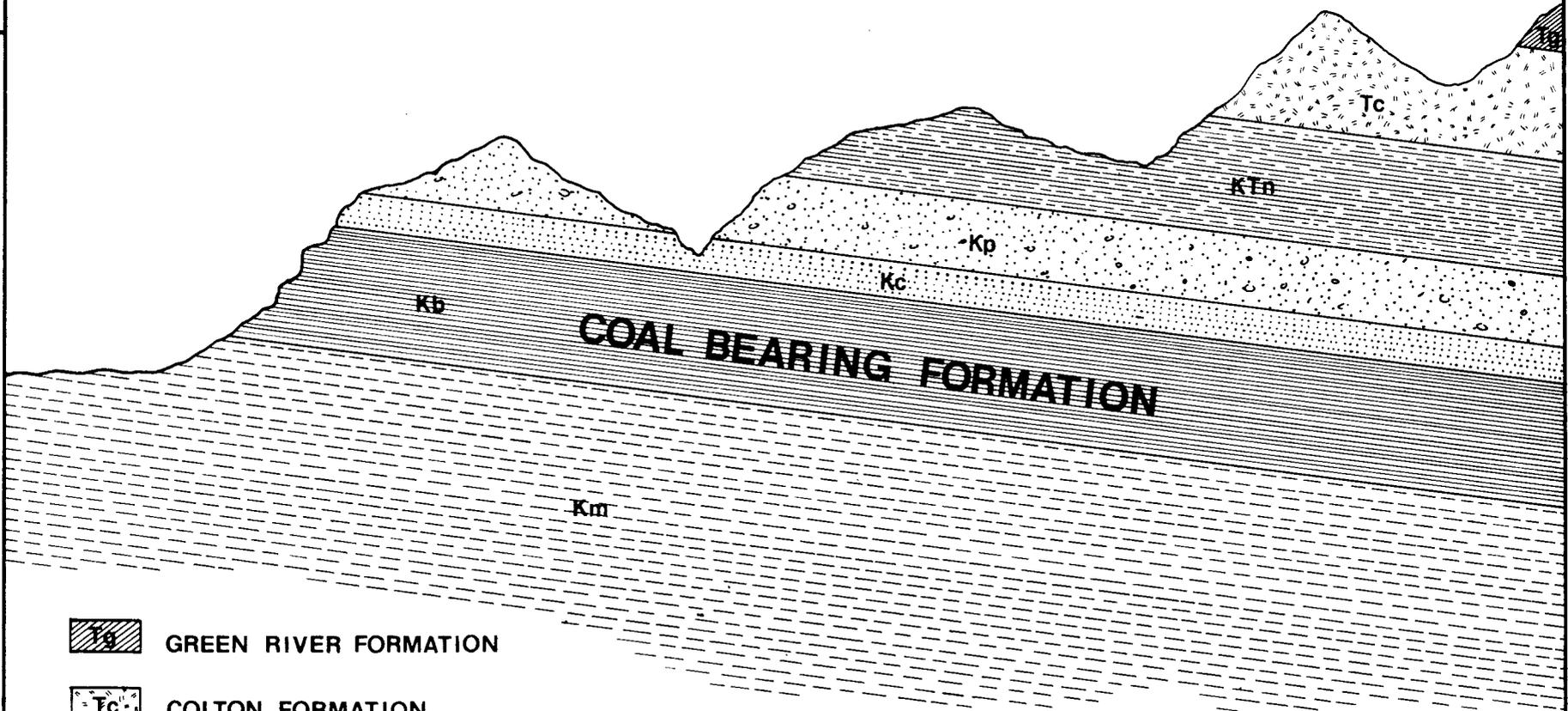
The coal outcrops are located along the cliffs and in the canyons which indent them. The Sunnyside coal seams are exposed between the 6300 and 6800 feet elevations along the face of the cliffs, which rise from 6300 feet to nearly 8000 feet in elevation over the mine. An elevation of almost 10,000 feet is attained just north of the mine. The strata dips from 12 to 16 percent easterly in the mine area.

The major rock units exposed in the area, in descending stratigraphic order, are:

Green River Formation  
Colton Formation  
North Horn Formation  
Price River Formation  
Castle Gate Sandstone  
Blackhawk Formation  
Mancos Shale

The Book Cliff coal seams are contained in the Blackhawk Formation of the Upper Mesa Verde Group (Upper Cretaceous) and are, in the mine area, top to bottom according to their stratigraphic position:

Upper Sunnyside Bed  
Lower Sunnyside Bed  
Kenilworth Bed



-  GREEN RIVER FORMATION
-  COLTON FORMATION
-  NORTH HORN
-  PRICE RIVER FORMATION
-  CASTLEGATE SANDSTONE
-  BLACKHAWK FORMATION
-  MANCOS SHALE

**TYPICAL SECTION  
GENEVA MINE  
COAL PROPERTY**

UNITED STATES  STEEL CORPORATION

**A3-1317**



APPROVED

APPROVED FOR SAFETY

DRAWN E. SANDERSON 3/77 CHECKED

**UPPER CRETACEOUS  
MESAVEERDE GROUP**

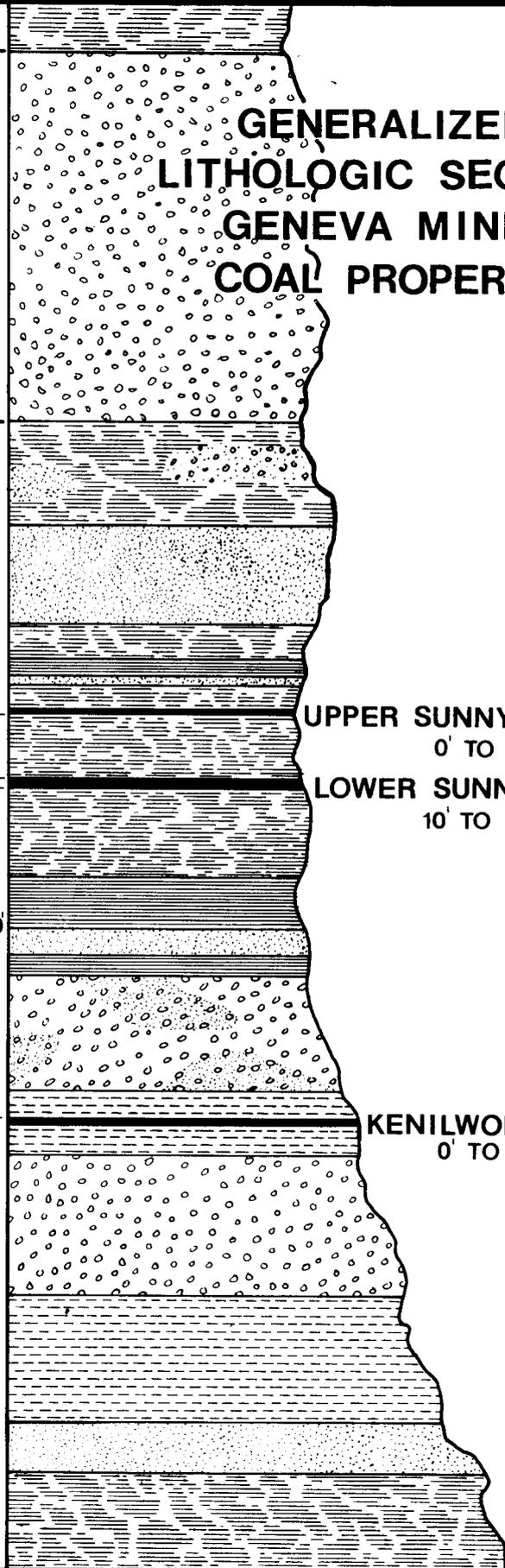
**PRICE RIVER FORM.**

**CASTLEGATE**

**BLACKHAWK FORMATION**

2' TO 21'

240' TO 300'



**GENERALIZED  
LITHOLOGIC SECTION  
GENEVA MINE  
COAL PROPERTY**

**UPPER SUNNYSIDE SEAM  
0' TO 4'**

**LOWER SUNNYSIDE SEAM  
10' TO 16'**

**KENILWORTH SEAM  
0' TO 4'**

REV. DENS.

The Lower Sunnyside seam has the greatest economic importance within the mine area. The Upper Sunnyside seam is below the accepted mineable thickness and the separation between the Upper and Lower Sunnyside seams is insufficient to permit mining of both seams. The Kenilworth seam, which is believed to be of less than mineable thickness throughout the mine area, is approximately 240 to 300 feet below the Lower Sunnyside seam. Occasional thin, localized wild seams which are not of economic extent occur throughout the Blackhawk Formation.

Overburden above the mine workings varies from outcrop to thicknesses of over 3000 feet. Generally, mining is conducted in areas of less than 2000 feet of cover, although some mining has and will occur under cover exceeding 2000 feet.

The Sunnyside fault is a limiting feature to the mine due to the generally large thickness of overburden on the down dip side of the fault and the extreme difficulty of crossing to the downthrow side of the fault.

#### Geologic Hazards

The primary geologic hazards in the mine are faults and coal bumps. The faults do not prohibit mining but only require recognition in the mining plan since they are not closely spaced and are of small displacement (only one fault exceeds 20 feet of vertical displacement). Coal barriers are generally left against the faults due to the hazards involved with the non-continuous roof formed by them.

As the overburden thickness increases, bumping problems also increase. As the cover becomes greater than 1500 feet, bumps may become moderate to severe, particularly under mountain ridges or cliffs. Bumps are controlled by developing pillars of a size which will yield progressively rather than store energy until they yield explosively, by sacrificing strategically located blocks of coal which have become highly stressed, and by reducing the size of large pillars before they enter the abutment zone.

Historically, the mining of the chain and barrier pillars along the main entries has caused very severe bumping problems due to the highly stressed nature of these pillars. As the remaining main entry chain and barrier pillars are mined (providing it is possible to do so without compromising the safety of the miners or mine), all possible efforts will be

made to minimize the bumping potential of the pillars. These efforts will consist of the previously mentioned control techniques and strict adherence to the mining, sequence of mining, and roof control plans, as well as any other innovative techniques which may be developed.

### Topography

The steep escarpment of the Book Cliffs trends in a north-south direction and faces to the west. The mine area, which is along this escarpment, is characterized by steep mountainous terrain dissected by steep, narrow canyons. In the mine area, the ground elevation changes from 6100 feet to 8500 feet in approximately two miles.

This type of topography gives the area the character of being all top and bottom with very little area in between and results in extremes of temperature, growing season, and precipitation within a short distance. Flora and fauna change rapidly from dry salt desert communities to wet fir and aspen communities.

### Subsidence

The coal deposit occurs from zero to over 3000 feet beneath the surface. Some subsidence should be expected for all mining depths; in fact, immediate subsidence will be encouraged to the greatest extent possible. The effects of mining subsidence may be extremely hard to distinguish from natural soils movement in steep or vertical areas. Subsidence has been noted in the mine area principally through isolated tension fracturing and compression buckling, and sloughage of cliff faces.

Subsidence in the Geneva Mine area is discussed by C. Richard Dunrud in "Some Engineering Geologic Factors Controlling Coal Mine Subsidence in Utah and Colorado," USGS Professional Paper 969, 1976, and on an "Engineering Geologic Map of the Geneva Mine Area, Carbon and Emery Counties, Utah," Miscellaneous Geologic Investigation Map I-704, 1972.

A subsidence monitoring system is not planned for installation within the surface areas above the leases. The cost of installation and monitoring such stations in the extremely rugged terrain in areas with no cultural or economic improvements cannot be justified by the benefits to be gained by such a study.

## Soils

The soil survey of the Carbon-Emery area issued in 1970 did not include the mine area. However, the BLM in a soil survey of the Range Creek Planning Unit, which does include the mine, identifies four soils associations which probably compose the subject area. The four are:

### Soil Association #1

Typic Cryoborolls, Argic Cryoborolls, and Mollic Cryoborolls.

These are typical dark-colored soils of the high mountains. This soil is well developed and has an "A" horizon up to 20 inches thick. Vegetative growth is lush, composed mostly of mountain brush, aspen, and spruce fir. Soils are well drained. Permeability is moderate to low and sediment production is low. These soils are in hydrologic group D. Potential for recovery after disturbance is greater than 70 percent.

### Soil Association #6

Typic Argiborolls, Typic Haploborolls, and Lithic Argiborolls.

These are typical dark-colored soils of the mountains and plateaus. The average annual precipitation varies from 14 to 25 inches. Although much of the precipitation occurs as snow in the winter months, a significant amount occurs as rainfall during the summer. Vegetation is mainly pinyon-juniper, aspen, mountain brush, and big sagebrush. Soils are well drained. Permeability is moderate and runoff is low. Sediment production is low. This soil is in hydrologic group B. Potential for recovery after disturbance is between 50 and 70 percent.

### Soil Association #44

Lithic Ustollic Calciorthids, Lithic Ustic Torriorthents, and Ustic Haplargids.

This association consists mostly of light-colored soils typical of valleys, terraces, and mesas. They are usually dry having a mean annual precipitation of 8 to 14 inches with the summer months of July and August receiving the most precipitation. Elevations of this soil type vary from 5,000 to 6,500 feet. The relief is generally smooth to gently undulating. Soil temperatures are quite warm and the frost-free growing season is quite long. These soils are generally used for winter or spring/fall grazing and are typically found on broad mesas, plateaus, mountain foothill

slopes and dissected upland sandstone and shale areas. They vary from very shallow to quite deep depending on cumulation. Soils are often blown or washed off areas and collected in others. These soils are well drained, permeability is moderate, runoff is medium and sediment production is low to moderate. Native vegetation is mainly pinyon-juniper, blue grama grass, galleta grass and Indian ricegrass. These soils are in hydrologic groups B and D. Potential for recovery through normal seeding operations is between 30 and 50 percent.

#### Soil Association #71

Typic Torriorthents, Lithic Calciorthids, and Lithic Natrargids.

These soils are typically light-colored, shallow, clayey soils. They are moderately to strongly saline and contain a strong accumulation of lime. There is also a strong accumulation of exchangeable sodium in the sub-soils. These soils are well-drained, permeability is low, runoff is very rapid, and sediment production is high, especially from intense summer storms. The native vegetation is shadscale, greasewood, salt brush, curlygrass, and Indian ricegrass. These soils are in hydrologic group D. Potential for recovery after disturbance is less than 30 percent. Precipitation varies from 6 to 17 inches annually. These soils are used for range and recreation.

#### Vegetation

Five major vegetative associations occur in the mine area. The changes between associations are due primarily to elevation, exposure, and soil differences. The major associations are:

#### Douglas Fir-Aspen Association

This association is generally found at elevations exceeding 9000 feet; however, it also occurs on north slopes down to elevations of 8000 feet. Trees in this association are generally found in relatively small pockets on steep to very steep slopes and are fairly productive. Good quantities of summer forage are often produced in the aspen groves or where the douglas fir adjoins sagebrush or aspen.

#### Sagebrush-Mountain Shrub Association

This association adjoins the douglas fir-aspen association and is generally found on the slopes of ridges and on lower elevation benches.

The big sagebrush is found on deeper soils and at higher elevations while the black sagebrush is usually found on the shallower soils, on south slopes at higher elevations, and on lower benches. Sagebrush is generally poorly productive. The mountain shrubs are very dense on steep slopes but are somewhat thinner on the more mesic sites.

Pinyon-Juniper-Mahogany Association

This association is found at lower elevations and on very rocky, ledgy, and steep terrain. The upper part is characterized by a sagebrush understory while the lower part has a shadscale and small rabbitbrush understory. Bullgrass, Indian ricegrass, and curlygrass are the major grasses. The vegetative types involved are relatively unproductive on the very rugged terrain but improve somewhat as the ground surface gentles.

Black Sagebrush-Shadscale Association

The lower benchlands support this poorly productive association with the sagebrush generally on the benches and the shadscale on the slopes. Curlygrass, Indian ricegrass, and sand dropseed are the most common grasses.

Mat Saltbrush-Curlygrass Association

This association is found near the mine, generally with the Mancos shales. Shadscale and curlygrass grow on the lowest benches while mat saltbrush grows on the steeper slopes and on the flats where the Mancos soils have not yet developed. This association is also relatively unproductive.

The major vegetative types which make up these associations are:

<u>Type</u>	<u>Sub-type</u>	<u>% Density (Est.)</u>	<u>Major Species</u>	<u>% Composition (Est.)</u>
Conifer	Douglas fir	60	Douglas Fir	35
			Pinyon-Juniper	20
			Bullgrass	10
			Mahogany	10
			Other	25
Aspen	Aspen	75	Aspen	50
			Snowberry	10
			Serviceberry	5
			Pea Vine	5
			Other	30

<u>Type</u>	<u>Sub-type</u>	<u>% Density (Est.)</u>	<u>Major Species</u>	<u>% Composition (Est.)</u>	
Mountain Shrub	Mountain Mahogany	20	Mahogany	35	
			Serviceberry	20	
			Squawbush	20	
			Other	25	
Sagebrush	Big Sagebrush	15	Big Sagebrush	60	
			Black Sagebrush	10	
			Serviceberry	10	
			Bullgrass	10	
			Other	10	
		Black Sagebrush	15	Black Sagebrush	55
				Shadscale	10
				Bullgrass	15
				Curlygrass	5
				Other	15
Pinyon- Juniper	Pinyon-Juniper	10	Pinyon	50	
			Juniper	15	
			Big Sagebrush	5	
			Mahogany	5	
			Other	25	
Saltbrush	Shadscale	12	Shadscale	50	
			Black Sagebrush	15	
			Rabbitbrush	15	
			Curlygrass	5	
			Other	15	
		Mat Saltbrush	10	Mat Saltbrush	20
				Nuttal Saltbrush	50
				Curlygrass	10
				Sand Dropseed	5
				Other	15
	Grass	Short Grass	15	Curlygrass	60
				Indian Ricegrass	10
				Blue Gramma Grass	10
				Other	20

<u>Type</u>	<u>Sub-type</u>	<u>% Density (Est.)</u>	<u>Major Species</u>	<u>% Composition (Est.)</u>
Grass	Mid-grass (bunch)	18	Bullgrass Needle & Thread Big Sagebrush Other	50 5 20 25

### Climate

The following is information received from the Price office of the BLM and covers a much larger area than Geneva Mine. However, the mine area is bracketed by the following description and table:

Climatic conditions vary from semi-arid to wet. Normal precipitation ranges from 24 inches annually in the higher mountainous areas above Argyle and Minnie Maud Creeks to as low as 8 inches per year in the "Cove" near Woodside and on the Green River from the mouth of Range Creek to the Price River. Most of the precipitation in the mountainous areas is received in the form of snow during the winter months. On the lower areas, such as in Nine Mile Creek and the Sunnyside-East Carbon area, precipitation comes mostly in the form of summer thunderstorms in August, September and October. Precipitation is the limiting factor in the area. This is easily seen by observing the more barren south-facing slopes as compared to the more heavily vegetated north slopes. The only major drought to have occurred recently began in the late spring of 1976 and is still continuing. Records also indicate that precipitation below average can be expected for two out of every three years.

Snows are normally received as early as the first of October and may accumulate to a depth of from six feet in the high country to a skiff in the desert areas. Snow may remain as late as July 1 in protected areas.

The area is almost completely surrounded by mountains which act as a barrier to storms approaching from all directions but the south. This results in abundant sunshine and the relatively low annual precipitation throughout the area.

Extremes in temperature are common. In the Sunnyside area temperatures have varied from as high as 98 degrees to as low as minus 16 degrees. Temperatures colder than this undoubtedly occur in the mountains but no records are made of them. Due to the elevation and a predominance of clear skies and dry air, daily temperature ranges are rather large, averaging 23 degrees in winter and 28 degrees in summer.

Temperature and precipitation data are given on Table I.

Air inversions are not common in the area, principally because of the topography and wind factors.

Based on available data, the concentrations of particulates are far below State and Federal air quality standards. The data indicate that 96 percent of the particulates sampled are natural dust particles while the remaining 4 percent consist of fly ash and soot. Data from a Huntington Canyon air study indicate sulfur dioxide concentrations in the area are below the detectable level of 0.005 ppm.

The prevailing wind patterns are not soundly documented. Meteorological records historically have not recorded wind speed or direction and local residents seem unsure when asked for a definite answer regarding wind patterns. It is assumed that the regional wind flows are from west to east or from southwest to northeast with most severe storms moving from south to north. This is complicated locally by diurnal effects of mountain-valley winds originating in the canyons of the Book Cliffs.

Winds generally are light to moderate in all seasons of the year. As a rule, the strongest winds blow in the spring at which time moderate to strong winds may blow for several days at a time. These winds reduce the effectiveness of precipitation in the spring and can literally blow away the moisture from the winter's snowfall. Extremely strong winds are rare and occur with local thunderstorms or storm fronts.

### Fish and Wildlife

Since there are no perennial streams and no open water impoundments in the mine area, there are no waters available to support aquatic life.

The Range Creek Planning Unit contains 36 mammals, 250 species of birds, and 19 amphibians, reptiles, and invertebrates. Many of these species inhabit or visit the mine area. The only threatened species in the planning unit is the American Peregrine Falcon which is reportedly an occasional winter visitor. There are no endangered species in the area.

The major wildlife species which may probably be found in the mine area are:

Mammals

Badger  
Bats  
Black bear  
Bobcat  
Chipmunk  
Coyote  
Deermouse  
Desert cottontail rabbit  
Ground squirrel  
Mountain lion  
Mule deer  
Porcupine  
Striped skunk  
White-tailed jack rabbit

Scientific

Taxidea taxus  
Various species  
Ursus americanus  
Lynx rufus  
Eutamias spp  
Canis latrans  
Peromyscus maniculatus  
Sylvilagus audubonii  
Citellus spp  
Felis concolor  
Odocoileus heminnus  
Erethizon dorsatum  
Mephitis mephitis  
Lepus townsendii

Birds

Black-billed magpie  
Brewers sparrow  
Blue grouse  
Chukar partridge  
Common night hawk  
Common raven  
Golden eagle  
House sparrow  
Lark sparrow  
Mourning dove  
Pinyon jay  
Red-tailed hawk  
Robin  
Sage grouse  
Sparrow hawk  
Turkey vulture  
Vesper sparrow

Pica pica  
Spizella breweri  
Dendragapus obscurus  
Alectoris graeca  
Cordeiles minor  
Corvus brachyrhynchos  
Aquila chrysaetos  
Passer domesticus  
Chondestes grammacus  
Zenaidura macroura  
Gymnorhinus cyanocephalus  
Buteo jamaicensis  
Turous migratorius  
Centrocercus urophasianus  
Falco sparverius  
Cathartes aura  
Poocetes gramineus

Amphibians, Reptiles, Invertebrates

Bull snake  
Northern sagebrush lizard  
Prairie rattlesnake

Pituophis catenifer  
Crotalus viridis

### Game Species

The main game species in and around the mine area are mule deer, black bear, mountain lion, sage grouse, blue grouse, chukar, mourning dove, and cottontail rabbit.

Mule deer are the most important wildlife resource in the area. The Little Park area, which is slightly south of the mine and on top of the first cliffs, is an important winter range for the deer. The mine has no effect on this winter range.

Black bear and mountain lion are both present in the area but little information about them is available.

Lion movement patterns generally tend to follow those of deer herds.

Sage grouse inhabit the sagebrush flats at the foot of the cliffs while blue grouse are found in the vegetated canyons indenting the cliffs. Chukars can be found around the cliffs.

Mourning doves and rabbits are distributed throughout the area.

### Non-game Animals

Several species of small mammals inhabit the area. Predator species such as coyote and bobcat occasionally are found in the area and depend on small rodents and rabbits for their source of food.

### (c)(3)(i) Present Land Use

The land presently has four primary uses:

- 1) Industrial - support of the underground coal mine
- 2) Wildlife habitat
- 3) Livestock grazing
- 4) Outdoor recreation

Forty-five acres of surface are used for the mine support facilities, including buildings; storage, waste, and refuse areas; mine ventilation facilities; and transportation routes. All installations except one ventilating fan are on private land.

Virtually the entire mine surface is wildlife habitat.

Grazing allotments which portions of the mine surface and surrounding lands are in are the Cove (75 AUM's), Fan Canyon (100 AUM's), Horse Canyon (0 AUM's - may be a changed, combined, or canceled allotment), Lila Canyon (54 AUM's), Little Park (35 AUM's), and Mud Springs (2320 AUM's) allotments.

Over the mine area, only narrow corridors along dirt roads are used for outdoor recreation, the primary forms of recreation being enjoyment of the open spaces, hunting, and transportation routes to remote areas. A public road crosses the mine surface facility area and then splits with BLM road No. 7389 going up the left fork of Horse Canyon to Range Creek and BLM road No. 7508 going up the right fork to Little Park and Turtle Canyon. Both roads cross public and private land.

(c)(3)(ii) Capability of Land to Support Alternate Uses

The nature of the land does not lend itself to alternate uses. The lack of water, poor soil, and topography make the area unsuitable for agriculture.

The same three characteristics just mentioned also severely restrict livestock grazing. Not including the Mud Springs allotment, which is a very large unit but includes only a small corner of the mine, the grazing allotments in the area which combine to form a much larger area than the mine can accommodate only 264 animal-unit-months.

Again due to the lack of water, rough terrain and poor roads, the number of people who use the area for any purpose other than mining is small.

## POST MINING LAND USE

### (c)(4) Proposed Post Mining Use

The limited surface disturbance will not alter the area sufficiently to change it from the pre-mining uses of wildlife habitat, grazing, and recreation except that the improved roads to the mine area will provide easier, better access.

The mine area is included in the Range Creek Planning Unit of the BLM. This multiple use plan principally recognizes grazing, mining, wildlife habitat, and recreation as the land uses.

Additionally, that portion of the mine area located in Carbon County is regulated by the county 1974 Revised Zoning Ordinance No. 120, and is designated as an M & G1 area. In an M & G1 (Mining and Grazing) zone, the primary land uses are mining and livestock grazing.

The portion of the mine area located in Emery County is also zoned M & G1 (Mining and Grazing) according to a 1970 ordinance.

It is conceivable that after the mine is abandoned and has filled with water that it may be used as a water reservoir for the city of East Carbon, Utah.

### (c)(5) How Post Mining Use will be Achieved

Post mining land use will be achieved by the operator's not affecting the road which crosses the mine surface facility area and by the reclamation of the Lila Canyon fan site. Some subsidence has occurred at the surface above the mine but does not and should not significantly affect the land use.

No activities or facilities beyond those discussed at other points in this plan are envisioned to achieve post mining land use.

## DESCRIPTION OF OPERATION

### (c)(6)(i) Extent of Deposit

Coal of economic importance occurs in one seam in the mine area. This seam, the Lower Sunnyside, is of mineable thickness over the entire mine area and also probably a much larger area to the northeast, east, and south. This arc is limited by the closed Columbia Coal Mine to the north and by the outcrop to the south.

Much of the outcrop was burned, in some locations to over 1000 feet into the hillside. These fires probably originated from lightning strikes thousands of years ago.

Overburden thickness above the mine frequently exceeds 2000 feet and in isolated areas exceeds 3000 feet. The cover east of the mine generally is between 2000 and 3000 feet, and occasionally exceeds 3000 feet.

The Upper Sunnyside seam overlays the Lower Sunnyside, but is of a smaller thickness. Since it never exceeds 4 feet in thickness and the separation between the seams never exceeds 28 feet, the Upper Sunnyside is considered unmineable.

The Kenilworth seam is probably present on the northern portion of the mine but may disappear in the southern part. In any case, it is believed to be continuously less than 4 feet in thickness.

Occasional wild seams exist in the area but are generally thin, localized, and therefore uneconomic.

The standard washed coal analysis (moisture free) of the Lower Sunnyside seam is:

Ash	5.25%
Sulfur	0.75%
Volatile Matter	39.30%
Fixed Carbon	55.45%

Although no definite analysis of the heat content is available, it is approximately 13,500 BTU/pound. No analysis of inherent moisture is available but it approximates the washed coal standard moisture of 5.25%.

As of January 1, 1977, estimated total recoverable reserves of 2,392,000 tons of federal coal remained in the mine. The actual tonnages which will be mined exceed the estimated recoverable tonnage given since attempts are and will be made to recover coal which is not presently included in the estimated recoverable reserves as it is in barrier, chain, or fault pillars, or is under cover exceeding 2000 feet. Some of these attempts may not be successful.

(c)(6)(ii) Mining Method

Mining is conducted by conventional room and pillar techniques using continuous miners and shuttle cars. All newly exposed roof under which miners are required to work is supported according to a full roof bolting plan. Additionally, many of the bolts installed are of the resin type. All development mining generally involves the driving of entries in the top 8 to 10 feet of the seam. On retreat mining a pillar is mostly extracted and then a ramp off the upper bench is mined into the bottom coal. When as much of the bottom coal has been mined as is feasible without exposing miners to undue hazards, the pillar is attacked again to induce the roof over the pillar to fall. This method of benching is used to recover as much of the coal as possible without unnecessary exposure of the miners to hazards, including high coal ribs. Extraction of the pillars is given priority over recovery of the bottom coal to insure recovery of the larger (upper) portion of the seam through control of roof activity. Pillars or substantial parts of pillars when left unmined induce large, undesirable stresses on adjacent pillars, thereby reducing the possible extraction of these adjacent pillars. Frequently a snowball effect may be realized through this relationship. Additionally, uneven subsidence may be caused with its resultant tensional and compressional surface features. Pillar and entry dimensions may be obtained from map F3-154 which has a scale of 1" = 500'.

Coal is transported within the mine by both track and conveyor belt haulage. All coal is carried out of the mine by conveyor belt to the surface where it is crushed to minus 6-inch size and conveyed overland to the tippie and railroad loading point. The next step is washing at the Wellington Coal Cleaning plant and then shipment to the United States Steel Corporation's Geneva Works at Orem, Utah.

All surface facilities except Lila Canyon fan are located in Horse Canyon or on the flats at the mouth of the canyon. Lila Canyon contains two portals approximately 70 feet apart; one is closed and the other contains the ventilating fan.

All present mining operations are conducted from Third Level and are retreating from the north and south extremities towards the central main slope. Further mining is anticipated down (east) the main slope on State coal lands.

Federal lands upon which mining is currently being conducted (sometimes intermittently) are:

Lease #SL 046612 - T. 15 S., R. 14 E.

Section 33	SE-NE
	SW-NE
	NE-SE
	NW-SE
Section 34	SW-NW

Lease #SL 066145 - T. 16 S., R. 14 E.

Section 11	NE-SW
	SE-SW
Section 14	NE-NW

Federal lands upon which future mining may occur include (in addition to those already listed):

Lease #SL 046612 - T. 15 S., R. 14 E.

Section 34	NW-SW
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Lease #SL 066145 - T. 16 S., R. 14 E.

Section 3	SE1/4
	NE-SW
	Lots 1, 2, 3, 7, 8, 9, 10, 11
Section 10	NE1/4
	SE1/4
	SE-SW
Section 11	NW-SW
	NW1/4

Reserves will be recovered as the mine is retreated in an orderly fashion.

Production will continue at approximately 670,000 clean tons per year through 1982.

(c)(6)(iii) Surface Reclamation

(A) Reclamation of federal leased lands will occur contemporaneously with termination of facility use. The Lila Canyon fan is the only mine facility presently on federal surface and its use will probably not be terminated within the next five years.

(B, C, D, E) The Mining Supervisor in consultation with the authorized officer will approve or may prescribe such reclamation practices as are determined to achieve the desired reclamation results. Since such reclamation is site specific for an underground mine, the requirements for each area will be issued by the authorized officer together with the Mining Supervisor and may include determination of the final topography, drainage system, revegetation methods, seed mixtures, soil treatments, waste disposal, and other practices deemed necessary to successfully rehabilitate the disturbed area.

Since the Lila Canyon fan site is inaccessible from the surface by any means other than foot travel up a rugged canyon, and the surrounding area is virtually devoid of vegetation, it is planned that no efforts be expended on the surface following final sealing of the portals, which will be conducted in accordance with federal and state regulations.

(c)(6)(iv) Engineering Techniques Proposed to be Used in Reclamation

It is not anticipated that any additional roads, ditches, or water retention facilities will be constructed during or following the life of the mine. All drainage facilities as they presently exist are adequate to handle present and anticipated needs.

Any additional surface facilities which may be constructed will be of sound engineering principle and construction. Where necessary, plans will be submitted to and permits received from the proper agencies prior to initiating construction.

(c)(6)(v) Major Equipment List

Underground

Continuous Mining Units

Including:     Continuous Miner  
                  Shuttle Cars  
                  Roof Bolter  
                  Lump Breaker-Belt Feeder

Underground (Cont'd)

Conveyor Belt Systems

Scoop Tractors

Track Haulage System

Including: Locomotives  
Mine Cars  
Personnel Cars  
Mine Service Cars  
Special Equipment Moving Cars  
Ambulance Car

Mine Slope Hoist

Mine Electrical Distribution System

Including: Power Distribution Units  
Rectifiers  
Circuit Breakers  
Disconnect Switches  
Sectionalizing Switches

Mine Pumping System

Section Rock Dust Systems

Surface

Mine Ventilating Fans

Coal Crushing Plant

Conveyor Belt System

Coal Storage Tipple and Unit Train Loading Facility

Front End Loader

Trucks

Electrical Substation

Water Storage Tanks

(c)(6)(vi) Reclamation Cost

Since the federal surface area to be reclaimed is small and inaccessible, no equipment will be used in the reclamation process. It is difficult to estimate the hand labor required since the exact reclamation requirements are not known. Therefore, due to the small area involved, no reclamation cost estimate is made beyond recognizing that it will not be significant.

(c)(6)(vii) Method of Compliance with Obligations and Requirements

211.4 General Obligations

(a) The operator will comply with the obligations and requirements of paragraph 211.4 of Part 211 Coal Mining Operating Regulations, and any special terms of the leases through the application of formal engineering practices, best available technology, and use of modern equipment.

(b) The operator will continue using mining methods and preparing and executing mining plans which are consistent with existing technology, natural physical conditions, and sequence of mining to insure extraction to the maximum possible extent.

It is not anticipated that efforts will be made to recover additional reserves in the Geneva Mine area through resumption of mining following mine abandonment since all reserves in the mine area which are economically and physically recoverable will be mined prior to such abandonment. Therefore, no environmental disturbance associated with the resumption of mining is contemplated.

(c) The most important coal seam within the mine area is the Lower Sunnyside seam and mining plans comprehend maximum extraction. The Upper Sunnyside seam, as previously discussed, is considered unmineable due to the thin bed and proximity to the Lower Sunnyside. The only other known mineral resource in the mine area is the Kenilworth seam which is far enough below the Lower Sunnyside seam that transmitted effects will not adversely affect mining of this seam.

(d) The operator will take the necessary actions to minimize, control, or prevent the following as described:

(1) Soil erosion will be minimized by the use and maintenance of proper and adequate drainage channels.

(2) Air pollution is minimized by the operation of only surface equipment necessary to support the underground operation. This equipment involves no significant air polluters.

(3) Water pollution is controlled by the release of only water which meets required minimum standards. The operator has applied for an NEPA point source discharge permit for the three points of discharge at the mine. Waste water is treated prior to discharge. Ground water pollution, if any, is minimal since the disposal of waste material is in accordance with state and federal regulations.

(4) It is not expected that the flow of water from melting snow or storm runoff will be diminished by underground mining operations. Sufficient pillars will be left in place under stream beds to preclude breaking to the surface when subsidence could be expected to interrupt stream flow.

(5) Since no fish are present in the area, no adverse impact is made on them. There is little to no adverse impact on wildlife except for occasional animals, primarily rabbits, which are struck by vehicular traffic on roads leading to the mine. This is evidenced by the frequent visitations of deer throughout the surface facilities during winter months.

(6) Since only 0.2 acres of federal land have been disturbed by surface facilities, very minimal vegetative growth has been affected by the mine operation. Beneficially, the mine water discharge has encouraged foliage growth along a few miles of Horse Canyon Wash. Since there is no agriculture in the mine area, none may be damaged. There is very little timber, probably none of commercial value, over the mine area. The timber which is present is at higher elevations and does not significantly experience effects of the mine operation.

(7) The creation of unsafe or hazardous conditions is precluded through the continuous inspection and monitoring of operations and conditions by qualified mine inspection, maintenance, production, and engineering personnel. The operator is guided by corporation guidelines as well as by guidelines established by federal and state regulatory agencies.

(8) Damage to improvements is controlled as discussed in subparagraph 7 above.

(9) Damage to recreational values is prevented since only 0.2 inaccessible acres of federal surface are affected by the mine and since public travel across the mine property is not hampered. No known cultural or scientific values are present in the mine area.

The only known historical site on the mine area is the "Sam Gilson Tree" located on lot 12, section 3, T. 16 S., R. 14 E. (which is private land). This Juniper tree, which bears an inscription dated 1878, was protected by a steel fence after the mine was opened. The operator plans to leave this fence in place upon abandonment of the mine.

An occasional Indian arrowhead may be found on virtually any part of the mine area. It is not proposed that any efforts be made to protect them. No other known or suspected archaeological values are in the area. The only known paleontological values in the mine area are fossils and "dinosaur foot prints" which are sometimes found in the exposed roof above the coal seam. Most fossils and prints are of low quality and are very difficult and dangerous to remove from the roof. Also, they are usually broken in the removal process. For these reasons their recovery is not normally considered feasible. In the event that other archaeological or paleontological values are identified, the operator will take the necessary action, in consultation with designated, qualified organizations, to preserve such values.

(10) Adverse impacts on adjacent land uses are minimal due to the nature of the operation and the current limited land use of the area.

Good housekeeping practices are and will be observed at all times.

(e) The operator will monitor point source discharges of water as required by the EPA. The frequency of this monitoring is expected to be monthly.

(f) The operator promptly reports all accidents to the Mining Supervisor as required by the terms of the lease, this Part 211, and other regulations covering operations on federal land.

(g) The operator maintains records and submits such reports as are required by the terms of the lease and regulations.

#### 211.40 Operating and Reclamation Standards

(a) The operator will meet all operating and reclamation performance standards as they pertain to the operation. A description of measures taken follows:

(1) All affected federal surface lands will be reclaimed to a condition capable of supporting all practicable uses which such lands were capable of supporting immediately prior to mining.

(2) This section applies to surface mining only.

(3) The surface area at Lila Canyon fan has been stable since construction of the fan installation in 1953. Rock slides from the naturally steep slope above the fan have occurred, only one of which seriously interfered with the fan. No further protective measures at the site are necessary.

Although some subsidence effects due to mining have been identified on the surface, present and anticipated future land uses should not be adversely affected.

Control of soil erosion and air and water pollution is discussed on pages 27-28 (paragraph 211.4(d)).

In the event of future construction, the operator will stabilize and protect the surface areas involved against soil erosion and air and water pollution.

(4) In the event of future construction on federal surface, the operator will remove topsoil separately, for replacement on the back-fill area or segregate it in a separate pile for later reuse. In the latter case vegetation will be quickly established on the topsoil pile.

(5) No water impoundments as defined in 30 CFR 77.216 exist on the mine area. Should one be required, a plan approved by MESA will be followed in its construction, operation, and maintenance.

(6) The operator does not propose to conduct auger mining of the outcrops from the surface. Steep escarpments of highly fractured and weathered rock and loose talus create geologic conditions unfavorable to this type of mining. Preservation of the outcrop barriers is also necessary for the control of underground ventilation.

(7) The operator does not significantly affect the prevailing quality, quantity, or flow of water in either surface or ground water systems. Since the mine provides virtually no surface disturbance, erosion and deposition conditions of the stream are not affected. During reclamation efforts to the surface, all possible means will be utilized to minimize changes in either erosion or deposition characteristics of the stream.

(i) Discharged mine water is neither acidic nor toxic; therefore, no efforts are made to reduce acidity nor toxicity through restricting water flow, treating the discharge, or casing drill holes.

(ii) Contributions of suspended solids to stream flow is minimal due to the appropriate surface drainage facilities used and the small surface area affected. No modifications of stream channels will be necessary.

(iii) No siltation structures are used in the mine area. Two anti-erosion structures protecting elevated stream crossing abutments which are on private property will be removed as part of the over-all surface reclamation upon permanent cessation of mining operations.

(iv) The protection of water resources is discussed on page 27 (paragraph 211.4(d)).

(8) All rubbish and noxious substances are disposed of in a manner designed to minimize, control, or prevent air and water pollution and the hazards of ignition and combustion. Waste dumps (MESA I. D. Nos. 1211-UT-9-0018 and 19) are compacted in two-foot lifts and sloped so as to facilitate water runoff as required in 30 CFR 77.215. These dumps which are shaped so as to be compatible with the natural surroundings, receive approximately 200 tons of material annually, the majority of the mine refuse being discarded in the mine. Nature will be allowed to cover and revegetate the waste dumps, which are located on privately owned surface.

Liquid wastes are not impounded at the mine nor are wastes which contain coal in quantities such that the coal may later be separated produced at the mine. The only upgrading of the coal occurs at the Wellington Coal Cleaning Plant where coal wastes which are produced at the plant are placed in established coal waste areas.

(9) This section applies to surface mining only.

(10) Underground use of explosives will be carried out in accordance with State and MESA regulations. Otherwise, this section applies to surface mining only.

(11) It is not anticipated that any additional surface facility will be constructed on federal land. However, should such occur, it will be designed, constructed, and maintained according to approved plans. Lila Canyon fan and building, as well as any new surface facility, will be removed and the surface reclaimed as required by the mining plan upon permanent termination of use.

(12)(i) Roads on the mine area are not and will not be (by the mine operator) surfaced with acidic or toxic producing materials.

Although such construction is not anticipated, if any roads are built on federal lands following submission of this mining plan, the plan for such roads will be submitted for approval by the Mining Supervisor prior to the initiation of any construction activities.

(ii) Presently roads exist in or cross Horse Canyon Wash in four places in the mine area. All locations were selected and designed to minimize resultant erosion. Any culverts which might be installed to eliminate these points would be very large or subject to occasional washout, with the accompanying introduced sediment loads. All locations, all of which are on private ground, receive only occasional use. Since no aquatic ecosystem is present, the operator proposes to change neither the type or location of use points nor the frequency of use.

(13) This section is discussed on page 25 (paragraph 211.10 (c)(6)(iii) (D)), page 27 (paragraph 211.4(d)(1)), and page 30 (paragraph 211.40(a)(1)).

(14) The operator does not attempt to place any restrictions on public access to any federal surface except the fan installation and mine openings in Lila Canyon, all of these points being guarded by warning signs.

(15) Coal storage areas are designed and maintained to eliminate fire hazards. Should any fire occur, all steps necessary to extinguish it will be taken.

(16) This section applies to surface mining only.

(17) This section applies to surface mining only.

(c)(6)(viii) Phases of the Mining Operation

The area of the mine leased from the federal government can be divided into nine areas or phases of remaining mining. These areas and their sizes are shown on the included map D3-527. The areas which will be affected by mining within the next five years are:

	<u>Start</u>	<u>Terminate</u>
No. 1 - 3 Level South, 2 West	Mining now	1977
No. 3 - 3 Level South barriers, chains, and below	1978	1982
No. 8 - 3 Level North, 2 East	1981	Post 1982
No. 9 - 3 Level North inby big fault	Mining now	1982

(c)(6)(ix) Compliance with Air and Water Quality Regulations

The operator complies with all federal, state, and local regulations pertaining to air quality control. The operation of an underground coal mine does not significantly affect the air quality of the surface environment. All surface coal handling facilities are enclosed so as to reduce dust emissions. A primary contributor to air quality degradation in the mine area may be public use of the road through the mine yard area.

The operator complies with all federal, state, and local regulations pertaining to water quality control. A permit has been applied for from the NEPA for all water discharge points of the mine operations, including sewage treatment plant. Discharges will be monitored as required by the permit.

(c)(6)(x) Measures for Ensuring the Maximum Practical Recovery of the Resource

Maximum recovery of the resource is recognized in mine planning. Engineered plans and prudent mining practices approved by MESA and the USGS are directed towards optimal resource recovery. This is further discussed on page 27 (paragraphs 211.4(b) and (c) ).

(c)(6)(xi) Method of Abandonment

When the Lila Canyon fan, and any other facility which might be constructed on federal surface, is permanently removed from service, the facility will be removed and the portals sealed (upon termination of their service if later than facility use termination) according to federal and state regulations. Due to its inaccessibility and steep topography the Lila Canyon fan site will be left in its present configuration.

(c)(6)(xii) Logs and Analyses of Overburden

It is assumed that the purpose of logs and analyses of drill holes on 40-acre spacings applies to surface mining only as underground mining does not require removal of overburden strata. Three holes have been drilled through the Lower Sunnyside seam. No analysis was made of one while only coal coking quality analyses were made of the other two. Logs were made while penetrating the overburden strata. Drawings G-1, G-2 and G-3 are included herein. No analysis was made of the overburden strata. Since no surface materials will be removed in Lila Canyon, no segregation can be made.

(c)(6)(xiii) Area Hydrology

There are few intermittent and no perennial streams on the leases. Due to the generally small drainages and lack of rainfall, flow occurs in these streams only during the spring runoff or at times of summer thundershowers. Horse Canyon Wash presently carries mine discharge water a few miles into the desert on a nearly full-time basis. This flow will be terminated upon abandonment of the mine but may possibly reappear some years later if the mine is filled by natural inflow. Total flow of these discharges varies from 0.94 cfs to 1.12 cfs.

As discussed on pages 27 (paragraph 211.4(d)(3)), and 30 (paragraph 211.4(e)), and 31 (paragraph 211.40(a)(7)), a point source discharge permit has been applied for and water discharges will be monitored as required. The water discharges do not appear to degrade the stream flow an acceptable quality level.

A ground water study has not been conducted in the mine area but the presence of water in the mine is evidence of an aquifer in the area. It has been suggested that an 1800-foot section of saturated strata containing about 50 percent sandstone rests on top of the Mancos shale. The sandstone members are recharged at their updip edges by the intermittent streams on the face of the Book Cliffs. The terrace gravels that occur intermittently along the front of the Book Cliffs lie on top of irregular eroded surfaces of Mancos shale and do not represent potential groundwater sources. All water which is used at the mine is from this aquifer and should have the same approximate analysis as the mine discharge. An average of 83 gpm is used by the mine on days which it is operating.

No data is available regarding dissolved or suspended solids under seasonal flow conditions in the mine area.

Mining impacts the area hydrology by collecting groundwater in the mine workings and by discharging a portion of the collected water into the surface drainage pattern. Although no definite water table elevation has been determined since the level varies across the mine area and with seasonal and annual precipitation changes, it is possible that mining has lowered the water table. The original water table level should be regained through natural filling of the mine following its abandonment. Most of the mine water has only been recently tapped following the mine's approach to the Sunnyside fault in 1972-75. The surface discharge is beneficial in that it provides water for downstream cattle and deer.

(c)(6)(xiv) Plans for Protection of Oil, Gas and Water Wells and Resources

There are no known oil, gas, or water wells in the mine area located above the Lower Sunnyside seam; and no known oil or gas resources are located in the overburden strata to be affected by the mining of coal. However, all federal mineral lands in the mine area are either open for oil and gas leasing or are leased. As has been previously discussed, the presence of ground water is known in the strata above the mine. Some of this water is brought into the mine as a result of mining activity, but due to the intermittent layers of porous sandstones and impermeable shales, large portions of this ground water are not affected by mining.

In the event that oil or gas drilling is conducted which might result in the placement of a well through the mine prior to the cessation of mining, methods will be used to protect the wells such that the applicable regulations are complied with.

(c)(6)(xv) Maximum Practical Recovery

Based on the USGS guidelines of a minimum 28-foot seam separation and minimum 4-foot seam thickness, the Upper Sunnyside seam is not mineable as it meets neither criteria.

The Kenilworth seam may not be continuous across the mine area and is believed to be less than 4 feet thick at all locations in the mine area.

It is the objective of the operator to effect maximum recovery of the coal resources. However, since only the Lower Sunnyside seam is considered mineable, recovery is restricted to that seam. Recovery is and will be further

detrimentally affected by factors beyond the operator's control. These factors are chiefly local ground conditions unfavorable to the safety of personnel or the mine or unfavorable to the economic recovery of the resource, but may also include other conditions such as MESA directives governing the mining operation.

(c)(7) Maps

Maps included in the appendix are:

USGS 15-minute quadrangle map of the area indicating the mine area.

- |               |  |
|---------------|--|
| D3-525        | Surface Property, Geneva Mine area showing surface ownership throughout the mine area.   |
| D3-529        | Coal Ownership, Geneva Mine area showing ownership, both federal lease and other, of coal in the mine area.  |
| D3-526        | Oil and Gas Ownership, Geneva Mine area showing holders of oil and gas leases in the mine area.  |
| F3-154        | 5-year Forecast, Geneva Mine showing the mining forecast of federal coal through 1982. Strike and dip symbols and drill hole locations are emphasized.                 |
| G-1, G-2, G-3 | Drill hole logs. G-3 is the churn drill hole indicated on F3-154.  |
| D3-524        | Water Resources, Geneva Mine, indicating water well and water discharge locations and the estimated water table.   |
| E3-314        | Topography, Lila Canyon Portal, showing the topography and arrangement of Lila Canyon Fan. Also shown are the proposed seal locations.                                 |
| D3-527        | Mining Operation Phases, Geneva Mine, showing blocks of federal coal yet to be mined (as of January 1, 1977) and their sizes. Overburden isopach lines are emphasized. |
| F3-153        | Refuse Dumps and Sewer Treatment, Geneva Mine showing locations of these facilities.   |

## APPENDICES

TABLE I  
 TEMPERATURE AND PRECIPITATION DATA\*  
 SUNNYSIDE, UTAH

Period of Record 1958 - 1975

Month	T E M P E R A T U R E							P R E C I P I T A T I O N T O T A L S ( I N C H E S )					
	M E A N S			E X T R E M E S				G r e a t e s t			S N O W		
	Daily Max.	Daily Min.	Monthly	Record High	Year	Record Low	Year	Mean	Daily	Year	Mean	Max. Monthly	Year
Jan.	35.6	13.6	24.6	60	1971	-16	1963	0.71	1.46	1969	10.2	24.0	1969
Feb.	42.1	20.5	31.3	59	1963	-11	1962	0.92	1.63	1969	12.3	41.0	1969
Mar.	46.4	23.1	34.8	65	1969	0	1971	0.89	0.85	1968	6.0	15.8	1969
Apr.	54.8	29.4	42.1	81	1962	4	1975	0.91	1.09	1969	2.0	8.0	1968
May	67.0	40.2	53.6	88	1967	20	1975	0.97	1.10	1969	0.5	7.0	1974
June	77.1	49.1	63.6	95	1968	30	1974	1.08	1.60	1970	0.0		
July	86.6	57.1	71.9	95	1969	32	1968	1.05	0.89	1973	0.0		
Aug.	83.7	54.2	69.0	98	1969	35	1968	1.35	1.20	1968	0.0		
Sept.	74.1	45.8	60.0	92	1967	29	1968	1.36	1.12	1961	0.0		
Oct.	60.7	35.7	48.2	80	1960	10	1975	1.40	1.25	1972	0.8	4.0	1970
Nov.	47.9	25.0	36.5	67	1960	5	1975	0.63	0.76	1960	2.7	13.0	1961
Dec.	37.3	16.0	26.7	62	1966	-6	1967	0.68	0.70	1966	6.5		
Annual	66.1	34.1	50.1	98	1969	-16	1963	1.00	1.63	1969	3.4	41.0	1969

\*Utah State Climatologist



*United  
States  
Steel  
Corporation*

PAUL E. WATSON  
GENERAL SUPERINTENDENT

WESTERN DISTRICT COAL OPERATIONS  
P. O. BOX 807  
EAST CARBON, UTAH 84520

October 4, 1977

Mr. Jackson W. Moffitt  
Area Mining Supervisor  
Conservation Division  
8426 Federal Building  
125 South State Street  
Salt Lake City, Utah 84138

Dear Mr. Moffitt:

The United States Steel Corporation's Western District-Coal submits the attached discussions and the Subsidence and Hydrologic Monitoring Plans for Geneva Coal Mine Leases SL-046612 and SL-066145.

Sincerely,

Paul E. Watson  
General Superintendent

Attach.

## Subsidence

The United States Steel Corporation, Western District - Coal's Geneva Mine has been in continuous operation for 34 years since it was opened in 1942 and has produced over 28,000,000 tons of coal. The remaining recoverable reserves are estimated at 5,000,000 tons or 15% of the starting reserve of 33,000,000 tons. During this time there has been no reported adverse effect on the land use or value of the surface above the mined area of Geneva Mine.

The Western District - Coal has carefully studied the remaining reserves in our Geneva Mine Federal Coal Leases SL-046612 and SL-066145 and the requirement for monitoring of subsidence on these leases considering the guidelines included with your letter of June 20, 1977.

The remaining reserves in these leases are contained in four identifiable areas that are bounded by mined areas, fee owned coal, state owned coal and faults. The remaining reserves of coal in these blocks will vary from 68 to 100 acres as of July 1978. The reserves outside these four areas are contained in development entry chain and barrier pillars. It is probable that the angle of draw from the adjacent mined areas has reduced the undisturbed surface areas above these unmined blocks of coal. (See Geneva Mine Map No. D3-533 for unmined blocks and the probable undisturbed surface area.)

The stated purpose of the requirement for a subsidence monitoring system is to permit a balance of the maximum recovery of the coal resource with provisions for maintaining the value and use of surface lands.

We have reviewed the remaining reserves in the federal coal leases and have considered the purpose of subsidence monitoring and the possible effect that information collected from such monitoring could be used in developing future mining plans for the area.

Considering that the extraction of coal in Geneva Mine and the incidental effect of our mining on the surface to date has not adversely affected the value and use of the surface lands above Geneva Mine, it appears unlikely that the completion of mining of the remaining unmined areas in Geneva Mine will adversely affect or alter the present or future value and use of these surface lands.

A discussion of the remaining federal coal lease reserves in Geneva Mine follows:

Area I - 3 Level North 3 West

This area includes approximately 93 acres of unmined coal in Federal Lease SL-046612. The area has been mined on all sides with varying degrees of extraction and it can be presumed that subsidence has taken place in these mined areas and that the angle of draw has further reduced the undisturbed surface area above this coal. The area is presently being mined with development entries and retreating rooms and pillars. The cover is a nominal 1000 feet. The mine forecast shows that mining of federal coal in this lease will be completed in 1982.

Surface improvements in the area are an unimproved road traversing the area and horse corrals. The surface topography is extremely rugged and limits the present land uses to grazing and recreation.

Since this area is mined on all sides, it is logical to assume that portions of the unmined surface have already been affected by subsidence caused by the adjacent mining, if we consider the effect of the indicated angle of draw. The mining plan for the final extraction of these reserves is committed with little latitude for change and by the time that adequate information from a subsidence monitoring net could be collected and evaluated to effect a change, the mining in this area will be completed. We can see no benefit in the installation of subsidence stations and the subsequent monitoring of these stations as pertains to the stated purpose of such stations over this block of coal. It is our opinion that the maximum subsidence that will occur with the final extraction of these coal reserves will not change the value and use of the surface area above these reserves.

We plan to monitor the effect of subsidence in this area through a ground reconnaissance at least two times per year.

Area II - 3 Level South 2 Dip

This area is adjacent to unmined areas North and East and contains some 78 acres of unmined coal. The West boundary is a mined area and the South boundary is a fault system that will separate this area from a mined area. The cover in this area varies from 1700 feet to 2500 feet. The North boundary of the lease for this area is Utah Coal Lease 1680. Mining to the North on the lease will be limited by the fault that is near and parallels this boundary.

The mine forecast projects mining to start in this area in 1979 which will be completed in 1983 if we are successful in the mining of these deep cover reserves located between two fault systems.

The surface topography is extremely rugged with some timber areas. The remote area and extremely rugged topography limits this land use to grazing and recreation.

The relatively small area that is bounded on the North and South by fault systems and the West by a mined area limits the mining plan to either a system of strike entries off a dip heading or a series of room entries down dip. The angle of draw from the adjacent mined area will reduce the undisturbed surface area above this block of coal. Once the mining plan is committed, the opportunity and/or desirability for change will be limited.

The information that would be gained from subsidence monitoring stations in this area would not be timely to permit evaluation and adoption of changes that would or could alter the final effect on the surface. In any event, the maximum subsidence that can occur with mining of the block of coal is not expected to adversely change the value and use of the surface area above and adjacent to this block of coal when mining is completed.

We plan to monitor the effect of subsidence in this area through a ground reconnaissance at least two times per year.

#### Area III - 3 Level South 1 Raise

This area contains approximately 68 acres and is located between the 2nd and 3rd Levels in the south mine between two fault systems and includes a development raise and strike entries. The cover varies from 1000 to 1700 feet. The area by the end of 1978 will be mined on all sides. The mining of this area is projected for 1984-1985.

The man improvements in the area include an unimproved road and an abandoned cabin that is in an advanced state of ruin.

The present surface land use is grazing and recreation which should not change in the future.

With the relatively narrow reserve area bounded North and South by fault systems and with the area along the West boundary mined and the East boundary mined by the time extraction of this block will begin, we do not feel that subsidence monitoring stations within the area will be of any value in changing the end value and use of the surface above this block of coal. The faults and mined areas will largely dictate the mining plan with little latitude for change.

We plan to monitor the effect of subsidence in this area through a ground reconnaissance of the surface area at least two times per year.

Area IV - 3 Level North 2 East  
- 3 Level North Barriers and Chains

The unmined area totals some 93 acres of coal traversed by development entries of 1st East, 2nd East and 3rd Level North. The angle of draw from the adjacent mined areas will reduce the undisturbed surface area above this block of coal. The area contains some faulting which can be expected to limit mining to isolated blocks. The mining in this area will be intermittent after we start mining in 1981. When mining begins in this area it will be largely surrounded by mined areas of state, fee and federal coal.

The man improvement in the area is an unimproved road that crosses the area.

This area, with mining completed on all sides and fault systems crossing the area, is expected to be difficult to mine and in most cases allows little latitude in the selection of a mining plan. The value of information collected at subsidence monitoring stations will be insignificant and would be untimely in developing changes in the mining plan that might alter the final value and use of the surface as opposed to not having such information available. It is our conclusion that a ground reconnaissance of the surface two times per year to survey the surface effects of subsidence, if any, due to mining will be adequate for this area.

Area V - 2 Level North Barriers and Chains  
- Main Slope Barriers and Chains  
- 2 Level South Barriers and Chains

These reserves are contained in some 10,000 lineal feet of development entry chain and barrier pillars with a width of some 800 feet. The coal on each side of the barriers is already mined and subsidence has taken place.

The man improvements are mine facilities and unimproved roads. The land use is grazing, recreation and mining. The overburden varies from 500 to 1900 feet and the topography varies from extremely rugged to moderate. If it is assumed that the angle of draw is 30 to 40 degrees, the majority of the surface above these chains and barriers is already disturbed.

The narrow corridors containing these reserves, with mining on both sides, limits the latitude for the selection and variation of a mining plan. We do not see where subsidence monitoring stations can be located that will provide timely information which would dictate a change in a mining plan that would alter or change the value and use of the surface area above these reserves.

We plan to monitor the surface effects of subsidence, if any, through a twice per year ground reconnaissance of the mined area.

It is the conclusion of the United States Steel Corporation's Western District - Coal that the installation of subsidence monitoring stations over the relatively small blocks of the unmined federal coal leases will not provide any information which, after evaluation, would be timely and sufficient for changing mining plans. This is particularly true in view of the fact that the remaining life of the mine is less than 10 years. It is concluded that the end result would not improve the value or change the end use of these surface lands above and/or adjacent to these unmined areas.

It is the objective of the Western District - Coal to maximize the recovery of the coal resource consistent with the mine conditions, safety of the work force, recognition of the surface improvements and protection where necessary of stream channels. The Western District - Coal plans to monitor the surface effects of subsidence through a two times per year ground reconnaissance of the areas to observe, record and map the surface effects, if any, of our mining activities.

For the foregoing reasons and in view of the shortness of the remaining life of Geneva Mine as well as the unique physical characteristics of the small isolated areas to be mined, we would hope that less than full scale subsidence monitoring be deemed to suffice in this case.

#### Hydrology

The United States Steel Corporation's Western District - Coal conducted a hydrologic survey over the surface of the lease areas which included at least 1/4 mile outside the lease boundaries. The survey confirmed that there are no perennial streams, natural ponds or lakes and that the hydrologic resources are limited to runoff, a few springs and seeps.

The survey located three springs and several seeps in the area above the federal leases which are herein discussed:

1. Redden Spring

This spring is located in Lot 8 Section 3 T16S R14E SLBM. The flow from this spring is approximately 8 gpm which disappears into the stream bed approximately .6 miles from the source. It is suspected that the underground workings of Geneva Mine have intercepted this stream since Geneva Mine receives underground water at the point of disappearance of the stream flow.

2. Unnamed Spring

This spring, which is in the same formation as Redden Spring, is located in NE 1/4 SW 1/4 Section 34 T15S R14E SLBM. The approximate flow is 3 gpm which disappears into the streambed approximately .3 miles from the source. This water is not identified in our mining operations and the flow is reported as typical of that prior to underground mining.

3. Unnamed Spring

This spring is in a lower formation in the NW 1/4 SW 1/4 Section 34 T15S R14E SLBM. The flow is 3 gpm and disappears into the streambed with the flow from the spring identified in Paragraph 2 above.

Water Seeps

The survey located water seeps at the base of all 20-foot or thicker sandstones with a shale basal member and outcropping below approximately 7000 feet elevation. These sandstones occur both above and below the Lower Sunnyside Coal horizon. The presence of water in these seeps updip from the mine workings indicates that these aquifers have not been intercepted by mine related activity.

Hydrologic Monitoring Plan

1. Map

Provide a map that will show: (D3-524 attached)

1.1 Location of water wells within the area.

- 1.2 Estimated elevation of the water table.
- 1.3 Location of springs within the area.
- 1.4 Location of mine discharges.
- 1.5 Location of USGS monitoring station (when installed).

2. Ground Water

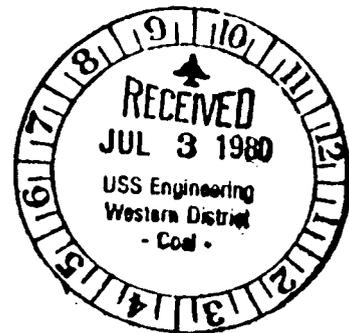
- 2.1 Monitor and report on the mine water discharge from Geneva Mine. We have applied to the NEPA for a point source discharge permit and are sampling this discharge on a periodic basis for both volume and analysis. We will furnish copies of these analyses to the USGS.
- 2.2 Measure the flow from the three identified springs within the area, collect samples and report analyses two times per year.

3. Surface Water

- 3.1 Since there are no natural ponds, lakes or perennial streams in the area, the requirement for survey and analysis of these surface waters does not apply.
- 3.2 The USGS Water Resources Division is scheduled to install a stream flow measuring station in Horse Canyon that will measure the total flow. This flow will include the mine discharge and any stream flow caused by storms or snow melt. We will report the data received from this measuring station.

# Revegetation Study

STATE OF UTAH  
DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF OIL, GAS AND MINING  
1588 West North Temple  
Salt Lake City, Utah 84116  
(801) 533-5771



VEGETATION INFORMATION GUIDELINES FOR  
PERMANENT PROGRAM SUBMISSIONS FOR COAL MINES  
\* \* \* \* \*

Pursuant to SMC 779.19 and UMC 783.19 Requirements

These guidelines are only intended to provide a suggested format for the submittal of vegetation information to be included in the mining and reclamation plans for coal. The purpose of submitting such information is as follows:

1. To approximate and describe the condition of the land prior to mining.
2. To aid in the prediction of revegetation potential for the site.
3. To identify and describe important wildlife habitat in the mine plan area and the development of corresponding mitigation plans.
4. The primary goal of vegetation studies is to establish valid reference areas which must be utilized to measure the success of revegetation for the purpose of bond release. Reference areas must be set up for each vegetation type which has been or will be disturbed at the mine. Measurements must be taken in the reference areas to describe species composition and cover. Productivity measurements in the reference areas are not useful until revegetation of the disturbed areas occurs.

These vegetation information guidelines have been drawn up at the request of coal operators in Utah. They may best be utilized as a checklist for the submittal of required information.

Should problems or questions arise concerning these guidelines, contact the Division of Oil, Gas and Mining.

SUGGESTED STEPS IN PREPARING VEGETATION INFORMATION

1. If available, use aerial photography to delineate and map the existing vegetation types found within the permit area and adjacent areas.  
(Scale of 1:24,000)(UMC 783.19)

VEGETATION GUIDELINES  
PAGE TWO

2. On the same map as above show the locations and boundaries of the disturbed areas as well as any areas proposed to be disturbed .  
(UMC 784.23(b)(2))
3. Determine and list the acreages of each vegetation type and their percentages of the total permit area acreage.
4. Determine and list the acreages of each vegetation type found in the disturbed areas (or areas to be disturbed) and their percentages of the total acreage of each type in the permit area. Also note the total acreage of surface disturbance within the permit area.
5. For existing mines - For each vegetation type which was determined to have existed within the disturbed areas prior to mining, described each by visually dominant species and list the major species assumed to have been present within each vegetation type by common and botanical name. List the species by plant groupings, ie; trees, shrubs, forbs, grasses. Make disturbed areas on the map. (See step 2).
6. For each vegetation type which is found within any areas of new disturbance-
  - a. Sample randomly for cover and productivity. For stands of trees, density and diameter at breast height (dbh) measurements should be made. Productivity measurements need not include the following: trees, officially designated weeds or noxious plants and dense mountain shrub thickets. Number sample sites and show numbered sample locations on the map,
  - b. Demonstrate sample adequacy,
  - c. In a narrative, describe each vegetation type by visually dominant species, and describe the condition and relative stage of maturity of the vegetation type. Note any past perturbations in the area such as fire, chaining, reseeding, previous mining, cultivation, etc. Discuss any present use by wildlife or livestock,
  - d. List the major species present within each vegetation type by common and botanical name. List the species by plant groupings, ie; trees, shrubs, forbs, grasses,
  - e. Identify, describe and show the map location of any endangered or threatened plants. Make a negative declaration if these are not found in the area.
  - f. Map these areas on contour maps of 1:6000 (1"-500') scale or larger. Mark these maps so that referral may be made back to the permit area (1:24,000) map. (See step 2)

7. Identify reference areas , preferably within the permit area, which will not be disturbed but which are of the same vegetation type as those which occurred on the areas to be disturbed, or occur in areas of proposed disturbance.
  - a. mark off the proposed areas in the field,
  - b. sample randomly for cover and species composition. Number sample sites and show numbered sample locations on the map,
  - c. demonstrate sample adequacy,
  - d. list the species present within each vegetation type by common and botanical name. List the species by plant groupings, ie; trees, shrubs, forbs, grasses.
8. Show by table, or other simplified format, the similarity between reference areas and areas of disturbance (or proposed disturbance). Similarity must be shown between species composition, total aerial cover, productivity, geology, soils, slope and aspect. One reference area may represent more than one disturbance site if the reference areas meet the above requirements for each site. Labeled sites would allow for simplified referral between the maps and test. (UMC 700.5)
9. Submit to the Division the copies of the data sheets from the sampling of areas to be disturbed and potential reference sites.

Approval of reference areas by the Division may be obtained prior to approval of the permit application. If prior approval is desired, submittals should be made to allow time for field verifications by the Division.
10. Permanently mark off the approved reference areas in the field and show these locations on the 1:24,000 vegetation map. (See step 1)
11. All technical data submitted in the application shall be accompanied by:
  - a. the names of persons or organizations which collected and analyzed such data,
  - b. the dates of the collection and analyses,
  - c. descriptions of methodology used to collect and analyze the data, and
  - d. the name, address and position of officials of each private or academic agency consulted by the applicant in preparation of the information. (UMC 771.23)

SUMMARY OF MAP GUIDELINES

- A. A vegetation map of the permit area is not required if specifically exempted by the Division.
- B. A vegetation map of the entire permit area on a scale of 1:24,000 is required if not otherwise exempted by the Division. Include sufficient adjacent areas to the permit area to allow for evaluation of wildlife habitat. Adjacent areas shall be decided upon with the Division of Oil, Gas and Mining. The use of aerial photography taken prior to site disturbance would be most helpful in mapping the site.
1. The 1:24,000 contour map should:
    - a. show the legal description and surface ownership of the permit area,
    - b. show the boundaries of the permit area,
    - c. show the location and boundaries of any surface area(s) already disturbed by mining and any which are proposed to be disturbed. Labeled sites would allow for simplified referral between the maps and text,
    - d. show the location and boundaries of proposed reference area(s). If reference areas will be located outside of the permit area shown on the map, then submit a separate map for the reference area(s). Label the sites for referral to text.
    - e. show the boundaries of existing vegetation types (a.k.a. community types, vegetative response units), including riparian habitats for the entire permit and adjacent areas,
    - f. show the numbered locations of sampling sites.
  2. The 1:6000 (1"=500'), or larger, contour map for the areas to be disturbed should:
    - a. give reference points back to the 1:24,000 map, including the legal description,
    - b. show the existing vegetation types. Label the sites for referral to text.
    - c. show the locations of any endangered plants,
    - d. show the numbered locations of sampling sites.

GENEVA MINE  
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UMC 783.19 Vegetative Information

The disturbed areas at Geneva Mine total some 45 acres of surface lands.

The disturbed areas concerns three soil types as follows:

- 1. GLC - 40.4 acres
- 2. RWG - 3.6 acres
- 3. N6F2 - .6 acres

Soil Type GLC

Soil type GLC comprises the greatest portion of the disturbed area at Geneva Mine. This is a unique soil type in this vicinity with the closest known similar soil type at Hiawatha, some 30 miles distant and in the Cedar Mountain area, some miles distant. The original disturbance in the Geneva Mine area occurred in 1906 with added disturbance in 1942. It is assumed that the GLC soil type pre-existed the mining activity and the predisturbance vegetation was a result of the soil type and the climatic factors that affected the vegetation in this area. Since this is a unique local soil type, a reference area that is representative of the disturbed area is not available. The following description of the predisturbed vegetation is based on a Soil Conservation Service potential Native Plant Community associated with this soil type under and classified as a Big Sagebrush Community (034).

<u>Common Plant Name</u>	<u>Plant Symbol</u>	<u>Scientific Name</u>	<u>Percent</u>
Indian Ricegrass			20
Galleta			10
Blue Grama			5

<u>Common Plant Name</u>	<u>Plant Symbol</u>	<u>Scientific Name</u>	<u>Percent</u>
Salina Wildrye			5
Other Perennial Grasses			10
Globemallow			6
Locoweed			0
Aster			1
Pale Evening Primrose			1
Other Forbes			6
Big Sagebrush			15
Shaoscale			4
Fourwing Salt Bush			6
Winterfat			5
Other Shrubs			5

Soil Type RWG

Soil type RWG comprised a relatively minor portion of the disturbed area at Geneva Mine totaling 3.6 acres. The appraisal of the predisturbance vegetation is based on a Soil Conservation Service potential native plant community associated with this soil type under a Juniper-Pinyon Community (034, E47)

<u>Common Plant Name</u>	<u>Percent</u>
Salina Wildrye	
Muttongrass	
Indian Wildrice	

Common  
Plant Name

Percent

Needle and Thread

Other Perennial Grasses

Penstemon

Locoweed

Other Annual Foxes

Pinyon Pine

Utah Juniper

Birchleaf Mountain Mahogoney

Cliffrose

Torrey Mormon Tea

Other Shrubs

Soil Type N6F2

Soil type N6F2 comprises a .6 acre portion of the disturbed area at Geneva Mine. The appraisal of the predisturbance vegetation is based on a Soil Conservation Service potential native plant community associated with this soil type and a Juniper-Pinyon Community (034, E47).

Common  
Plant Name

Salina Wildrye

Needle and Thread

Indian Ricegrass

Galleta

Common  
Plant Name

Other Perennial Grasses

Whitehaired Crazyweed

Locoweed

Other Annual Foxes

Birchleaf Mountain Mahogany

Cliffrose

Mat Eriogonum

Low Sagebrush

Pinyon

Utah Juniper

Other Shrubs

784.13(5) Plan for Revegetation

(i) Schedule of revegetation:

The seeding and planting of the disturbed areas will begin during the first normal period for favorable planting conditions after site preparation which will be in the fall for the local area.

(ii) Species and amounts per acre of seeds and seedlings to be used:

<u>Seed</u>	<u>Lbs.</u>
<u>Species</u>	<u>1 Acre</u>

<u>Plant</u>	<u>Plants</u>
<u>Species</u>	<u>Per Acre</u>

(iii) Methods to be used in Planting and Seeding

Slope preparation will consist of contour terraces and potholes to collect water and facilitate percolation. The terraces will be installed so as to stop surface water movement every 25 to 50 feet. The terraces will have tops one to one and one-half feet wide. The potholes will be placed on a grid spaced to at least meet the vegetative density required with allowances for failure of some plants to live.

It is planned to take transplant stock from the surrounding area and/or federal lands as transplant stock is available. If insufficient transplants are not available from these sources, nursery stock will be purchased for transplanting.

Native grass seed will be collected by hand stripping just before the seed skatters in fall. Shrub and tree seeds will also be collected from under the desired plants. In the event such seed is not available, the necessary seed will be purchased from a commercial supplier.

The seed will be broadcast by hand and raked under the surface approximately one-half inch.

PRELIMINARY ASSUMPTIONS FOR VEGETATION  
STUDY AT HORSE CANYON FOR PERMIT APPLICATIONS

I. Vegetative types, communities and potential productivity is determined by the soil types.

A. Source

1. BLM - Michel Abbey

2. Soil Conservation Service - Gary Monreau, G. Cook

Note: A variation in the climate will alter productivity, from year to year.

II. The disturbed areas in Horse Canyon that coincide with mining were all established without records of pre-existing conditions.

A. Original mining in Horse Canyon 1906

B. Geneva Mine's surface facilities open in the 1940's

Comment: The priorities for Horse Canyon should be based on maximizing the return for wild life, not researching and developing an assumed prior condition.

III. The construction of surface facilities and storage yards developed a unique soil type to the Horse Canyon area.

A. GLC type soil does not exist in any of the adjacent canyons.

B. A reference area for GLC will be of limited size and scope.

Note: GLC is potentially a very beneficial soil type for wild life.

IV. U. S. Steel should not have to duplicate BLM research on non disturbed areas in the permit area.

A. BLM and SCS have spend 2 years researching a very detailed grazing and vegetative study that is inclusive of our permit area.

B. The Report to date has not been published.

Note: A letter from the Price office of Bureau of Land Management stating what areas their grazing report covers can be submitted until the report is released.

Comments on "Steps in Preparing Vegetation Information"

Note: Comment number corresponds with step number in guidelines.

1. Infrared and optical aerial photo graphs were used to assist the Bureau of Land Management in their vegetation maps. This map will be obtained when BLM's Grazing Report is released.
2. There will be no new disturbed areas, and present disturbed areas are mapped.
3. This information maybe obtained from BLM's Grazing Report when it is released.
4. This data will be collected by U. S. Steel with a field survey.
5. The vegetative types and grouping can be determined from soil type. Soil Conservation Service have tabulated vegetative types to soil types.
6. There will be no new areas of disturbance.

Note: If there becomes a need for more disturbed area, the BLM Grazing Report and field data will furnish this needed data.

7. Upon approval of reference area by the Division of Oil, Gas, and Mining:
  - a. Areas will be marked off.
  - b. Field samples taken by U. S. Steel under BLM sampling guidelines.
  - c. Division of Oil, Gas, and Mining needs to state which method for "sample adequacy" they want.

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## SOIL LEGEND

<u>Soil Symbol</u>	<u>Soil Mapping Unit Name</u>
GLC	Glenberg-Very Fine Sandy Loam 3-6 percent slopes
RWG	Rock Outcrop-Rubble Land-Sunup Complex 60-70 percent slopes
NGF2	Shingle Extremely Stony Loam-20 to 50 percent slopes eroded

## DESCRIPTION OF THE SOILS

### GLC GLENBERG VERY FINE SANDY LOAM, 3 TO 6 PERCENT SLOPES

This Glenberg soil is very deep and well drained. It occurs on nearly level and gently sloping valley floors and terraces at elevations of 5,500 to 6,900 feet. This soil formed in alluvium derived mainly from sandstone and shale.

The average annual precipitation is 10 to 12 inches. Mean annual air temperature is 47° to 49° F, mean annual soil temperature is 49° to 51° F, and the average freeze-free season is 115 to 140 days. This soil occurs in the Horse Canyon area. Slopes are 3 to 6 percent and occur on all aspects. They are long in length and single in shape.

Vegetation is dominantly big sagebrush, blue grama, bullgrass, greasewood, fourwing saltbush and globemallow.

Included in mapping are small areas of Haverson loam, 3 to 8 percent slopes; and Haverson loam, 1 to 3 percent slopes.

In a representative profile the surface layer is pale brown very fine sandy loam about 4 inches thick. The underlying layers are pale brown and brown very fine sandy loam and loam to a depth of 60 inches or more.

Permeability is moderate. Available water capacity is about 7.0 to 10.0 inches to a depth of 60 inches. The water supply capacity is about 6 to 7 inches. Organic matter content in the surface layer is very low. Effective rooting depth is 60 inches or more. Surface runoff is slow and erosion hazard is moderate. The Erosion Condition Class is slight-34.

This soil is used for rangeland, wildlife habitat and recreation.

Taxonomic classification is coarse-loamy, mixed (calcareous), mesic Ustic Torrifuvents.

A representative pedon of Glenberg very fine sandy loam, 3 to 7 percent slopes was described and in the south storage yard of Geneva Mine.

A1 - 0 to 4 inches; pale brown (10 YR 6/3) very fine sandy loam, very dark grayish brown (10YR 3/2) when moist; weak medium granular structure; soft, very friable, slightly sticky, nonplastic; common very fine and medium roots; strongly calcareous, carbonates are disseminated; strongly alkaline (pH 8.6) abrupt smooth boundary.

C1 - 4 to 10 inches; pale brown (10YR 6/3) very fine sandy loam, dark grayish brown (10YR 4/2) when moist; massive; soft, very friable, nonsticky, nonplastic; common very fine, fine and medium roots; strongly calcareous, carbonates are disseminated; moderately alkaline (pH 8.4); abrupt wavy boundary.

Alb - 10 to 14 inches; brown (10YR 5/3) loam, dark brown (10YR 4/3) when moist; weak medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; common very fine, fine and medium roots; few fine pores; strongly calcareous, carbonates are disseminated; strongly alkaline (pH 8.8); abrupt wavy boundary.

C2 - 14 to 46 inches; pale brown (10YR 6/3) fine sandy loam, dark brown (10YR 4/3) when moist; massive; soft, very friable, nonsticky, nonplastic; common very fine and fine roots; common fine pores; (this horizon contains a 1 inch thick organic layer) strongly calcareous, carbonates are disseminated; strongly alkaline (pH 8.9); clear smooth boundary.

C3 - 46 to 60 inches; pale brown (10YR 6/3) loam, dark grayish brown (10YR 4/2) when moist; weak medium subangular blocky structure; hard, firm, slightly sticky, slightly plastic; common very fine and fine roots; many fine pores; strongly calcareous, carbonates are in veins; strongly alkaline (pH 9.0).

The A horizon has hue of 10YR and 2.5Y value of 5 or 6 dry and chroma of 2 or 3. It is typically very fine sandy loam but may include fine sandy loam and loamy fine sand. The A horizon is slightly to strongly calcareous and moderately to strongly alkaline. It is 2 to 4 inches thick.

The C horizon has hue of 7.5YR, 10YR or 2.5Y, value of 5 or 6 dry and chroma of 2 to 4. It is typically loam but ranges to very fine and fine sandy loam. The C horizon is mainly massive but may include weak and moderate subangular blocky structure. It is slightly to strongly calcareous and is moderately to strongly alkaline.

## RWG ROCK OUTCROP-RUBBLE LAND-SUNUP COMPLEX 60 TO 70 PERCENT SLOPES

This complex consists of about 35 percent Rock outcrop; 30 percent Rubble land; 25 percent Sunup very gravelly fine sandy loam, high rainfall, 60 to 70 percent slopes; and 10 percent other soils.

It occurs on canyon walls, escarpments from mesas, and on mountain side slopes. The Sunup soil is intermixed with the Rock outcrop and Rubble land on these landscapes. Elevations are 4,350 to 8,700 feet. The soils formed in colluvium derived from sandstone.

The average annual precipitation is 12 to 14 inches. Mean annual air temperature is 45° to 50° F, mean annual soil temperature is 47° to 52° F, and the average freeze-free season is 100 to 150 days. This complex occurs on the Book Cliffs. Slopes are 50 to 70 percent and occur on all aspects.

Vegetation is dominantly Utah juniper, pinyon pine, salina wildrye and galleta.

Included in mapping are small areas of Ildefonso very stony loam, 50 to 70 percent slopes, on colluvial slopes; Shingle extremely stony loam, 50 to 70 percent slopes, eroded; and areas where this Sunup soil has an extremely stony surface.

This complex is used for wildlife habitat.

### Rock Outcrop

Rock outcrop is exposed bedrock consisting of sandstone, conglomerate sandstone, and limestone.

Rock outcrop is in Capability Subclass VIIIs, and is not rated for an ecological site.

### Rubble Land

Rubble land is areas of stones and boulders virtually free of vegetation except for lichens.

Rubble land is in Capability Subclass VIIIs, and is not placed in an ecological site.

### Sunup Very Gravelly Fine Sandy Loam, 60 to 70 percent slopes

This soil is shallow and excessively drained.

In a representative profile the surface layer is brown very gravelly fine sandy loam about 2 inches thick. The underlying layer is brown gravelly fine sandy loam over conglomerate at a depth of about 6 inches.

Permeability is moderately rapid. Available water capacity is about 1.0 inch. Water supplying capacity is about 2.0 inches. Organic matter content in the surface layer is very low. Effective rooting depth is about 5 to 20 inches. Surface runoff is very rapid and erosion hazard is high. The Erosion Condition Class is slight-37.

Taxonomic classification is loamy-skeletal, mixed (calcareous), mesic Lithic Ustic Torriorthents.

A representative profile of Sunup very gravelly fine sandy loam, high rainfall, 3 to 15 percent slopes on the west slopes of Horse Canyon near the tipple.

A1 - 0 to 2 inches; brown (7.5YR 5/4) very gravelly fine sandy loam, dark brown (7.5YR 4/4) when moist; weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; few very fine roots; few very fine pores; 60 percent gravel; moderately calcareous, carbonates are disseminated; moderately alkaline (pH 8.4); abrupt smooth boundary.

C1 - 2 to 6 inches; brown, (7.5YR 5/4) gravelly very fine sandy loam, dark brown (7.5YR 4/4) when moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; few very fine roots; few very fine pores; 30 percent gravel; moderately calcareous, carbonates are disseminated; moderately alkaline (pH 8.2); abrupt smooth boundary.

R - 6 inches; conglomerate.

Depth to conglomerate ranges from 5 to 20 inches. The range in other characteristics of this soil has not been determined.

NGF2 SHINGLE EXTREMELY STONY LOAM, 20 TO 50 PERCENT SLOPES, ERODED

This Shingle soil is shallow and well drained. It occurs on bench and fan terrace sideslopes at elevations of 6,200 to 6,400 feet. This soil formed in colluvium derived mainly from sandstone and shale over residuum derived mainly from shale.

The average annual precipitation is 12 to 14 inches. Mean annual air temperature is 45° to 47° F, mean annual soil temperature is 47° to 49° F, and the average freeze-free season is 100 to 120 days. Slopes are 20 to 50 percent and occur on all aspects. They are short in length and concave-convex in shape.

Present vegetation is dominantly pinyon, juniper, salina wildrye, skeleton locoweed, buckwheat and birchleaf mountainmahogany.

Included in mapping are small areas of Idlefonso very stony loam, 8 to 30 percent slopes and Badland.

In a representative profile the surface layer is light grayish brown, extremely stony loam about 7 inches thick. The underlying layer is gray and light brown ish gray silt loam overlying soft shale at depth of about 19 inches. The horizon over the shale has about 40 percent very soft shale fragments.

Permeability is moderately slow. Available water capacity is about to 3.0 inches above the shale. Water supply capacity is about 3 to 6 inches. Organic matter content in the surface layer is low. Effective rooting depth is about 15 to 20 inches. Surface runoff is rapid and erosion hazard is high. The Erosion Condition Class is moderate-54. The erosion occurs as numerous small flow patterns and pedestals.

This soil is used for wildlife habitat.

Taxonomic classification is loamy, mixed (calcareous), mesic, shallow Ustic Torriorthents.

A representative pedon of Shingle extremely stony loam, 20 to 50 percent slopes, eroded, is adjacent to the South Fan in Horse Canyon.

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

C1 - 7 to 16 inches; gray (10YR 6/1) silt loam, dark grayish brown (10YR 4/2) when moist, massive; hard, friable, sticky, plastic; common very fine, few medium and coarse roots; 35 percent very soft shale fragments; strongly calcareous, carbonates are disseminated; strongly alkaline (pH 8.6) clear smooth boundary.

C2 - 16 to 19 inches; light brownish gray (10YR 6/2) silt loam, grayish brown (10YR 5/2) when moist; massive; hard, friable, slightly sticky, plastic; few very fine and fine roots; 40 percent very soft shale fragments, strongly calcareous, carbonates are disseminated; strongly alkaline (pH 8.6); clear smooth boundary.

C3r - 19 inches; partly weathered shale.

Depth to weathered shale ranges from 15 to 20 inches.

The A horizon has hue of 10 YR or 7.5YR, value of 5 or 6 dry, and chroma of 2 to 4. It is extremely stony loam or very stony silt loam. Rock fragments range from 50 to 70 percent. The A horizon ranges from 2 to 8 inches thick.

The C horizon has hue of 10YR, 2.5Y or 5Y, value of 5 to 7 dry, and chroma of 1 to 4. It is silt loam, silty clay loam, and loam. Some pedons have a small amount of gravel (less than 10 percent). The C horizon is slightly to strongly calcareous.

TABLE 9: Plants for revegetation of the Geneva Mine site.

<u>SHRUBS</u>	<u>LBS/ACRE*</u>		<u>#/ft<sup>2</sup></u>	
Artemisia nova**	.50	907	10,41	(453)
Atriplex canescens**	1.00	55	1.3	55
Ephedra viridis	.50	25	.3	12.5
Purshia tridentata**	.50	15	.2	7.5
Ribes aureum**	.25	356	2.04	89
Rosa woodsii**	.50	45	1.5	22.5
<u>FORBS</u>				
Balsamorhiza sagittata	.50	55	.6	
Hedysarum boreale	1.00	33	.8	
Linum perenne	.50	290	3.3	
Penstemon pachyphyllus	.25	500	2.8	
Penstemon palmeri	.25	500	2.9	
Senecio multilobatus	.50			
			<u>10.4</u>	
<u>GRASSES</u>				
Agropyron trachycaulum	1.00	160	3.7	
Agropyron spicatum	1.00	117	2.7	
Agrostis stolonifera	1.00			
Elymus salina	1.00	380	8.7	
Oryzopsis hymenoides	1.00	188	4.3	
Sporobolus cryptandrus	1.00	5100	117.1	÷ 4
			<u>136.5</u>	
TOTAL	12.25			

640

\* Application rates are for drill seeding methods of pure live seed. Double rates for broadcast seeding areas.

\*\* Species recommended for containerized planting.

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UMC 783.19 Vegetative Information

The disturbed areas at Geneva Mine total some \_\_\_ acres of surface lands. The disturbed areas concerns four soil types as follows:

- 1. GLC - \_\_\_ acres
- 2. RWG - \_\_\_ acres
- 3. NGF2 - \_\_\_ acres
- 4. IEE - \_\_\_ acres

Soil Type GLC

Soil type GLC comprises the greatest portion of the disturbed area at Geneva Mine. This is a unique soil type in this vicinity. The original disturbance in the Geneva Mine area occurred in 1906 with added disturbance in 1942. It is assumed that the GLC soil type pre-existed the mining activity and the predisturbance vegetation was a result of the soil type and the climatic factors that affected the vegetation in this area. Since this is a unique local soil type, a reference area that is representative of the disturbed area is not available. The following description of the predisturbed vegetation is based on a Soil Conservation Service potential Native Plant Community associated with this soil type under a classified as a Big Sagebrush Community (034) and personal communication with the Bureau of Land Management.

<u>Common Plant Name</u>	<u>Plant Symbol</u>	<u>Scientific Name</u>	<u>Percent</u>
Indian Ricegrass	ORHY	<u>Oryzopsis hymenoides</u>	20
Galleta	HIJA	<u>Hilaria jamesii</u>	10
Blue Grama	BOGR2	<u>Boutelous gracilis</u>	5
Salina Wildrye	ELSA	<u>Elymus salinus</u>	5

<u>Common Plant Name</u>	<u>Plant Symbol</u>	<u>Scientific Name</u>	<u>Percent</u>
Other Perennial Grasses	PPGG		13
Globemallow	SPCO	<u>Sphaeralcea coccinea</u>	6
Aster		<u>Erigeron spp.</u>	1
Pale Evening Primrose	OENOT	<u>Oenothera spp.</u>	1
Other Forbes			6
Big Sagebrush	ARTR2	<u>Artemisia tridentata</u>	15
Shadscale	ATCO		4
Fourwing Salt Bush	ATCA2	<u>Atriplex canescens</u>	8
Other Shrubs	SSSS		5

#### Soil Type RWG

Soil type RWG comprised a relatively minor portion of the disturbed area at Geneva Mine totaling 3.6 acres. The appraisal of the predisturbance vegetation is based on a Soil Conservation Service potential native plant community associated with this soil type under a Juniper-Pinyon Community (034, E47) and personal communication with the Bureau of Land Management.

<u>Common Plant Name</u>	<u>Plant Symbol</u>	<u>Scientific Name</u>	<u>Percent</u>
Salina Wildrye	ELSA	<u>Elymus salinus</u>	13
Indian Ricegrass	ORHY	<u>Oryzopsis hymenoides</u>	7
Needle and Thread	STCO4	<u>Stipa comata</u>	6

<u>Common Plant Name</u>	<u>Plant Symbol</u>	<u>Scientific Name</u>	<u>Percent</u>
Other Perennial Grasses			10
Penstemon	PEWST	<u>Penstemon spp.</u>	1
Other Annual Forbs	A AFF		6
Pinyon Pine	PIED	<u>Pinus edulis</u>	19
Utah Juniper	JUOS	<u>Junipens osteosperma</u>	16
Birchleaf Mountain Mahogoney	CEM02	<u>Cercocarpus montanus</u>	3
Cliffrose	COME5	<u>Cowania mexicana</u>	5
Torrey Mormon Tea	EPTO	<u>Ephedra torreyanna</u>	5
Other Shrubs	SSSS		9

#### Soil Type NGF2

Soil type NGF2 comprises a .6 acre portion of the disturbed area at Geneva Mine. The appraisal of the predisturbance vegetation is based on a Soil Conservation Service potential native plant community associated with this soil type under a Juniper-Pinyon Community (D34, E47) and personal communication with the Bureau of Land Management.

<u>Common Plant Name</u>	<u>Plant Symbol</u>	<u>Scientific Name</u>	<u>Percent</u>
Salina Wildrye	ELSA	<u>Elymus salinus</u>	5
Needle and Thread	STCO4	<u>Stipa comata</u>	5
Indian Ricegrass	ORHY	<u>Oryzopisis hymenoides</u>	10

<u>Common Plant Name</u>	<u>Plant Symbol</u>	<u>Scientific Name</u>	<u>Percent</u>
Galleta	HIJA	<u>Hilaria jamesii</u>	10
Other Perennial Grasses	PPGG		10
Whitehaired Crazyweed	OXLA3	<u>Oxytropis lambertii</u>	1
Other Annual Forbs	AAFF		9
Birchleaf Mountain Mahogany	CEMO2	<u>Cercocarpus montanus</u>	3
Cliffrose	COME5	<u>Cowania mexicana</u>	2
Mat Eriogonum	ERCA8	<u>Eriogonum caespitosum</u>	1
Pinyon Pine	PIED	Pinus edulis	19
Utah Juniper	JUOS	<u>Juniperus osteosperma</u>	20
Other Shrubs	SSSS		5

#### Soil Type IEE

Soil type IEE comprises a 0. — acre portion of the disturbed area at Geneva Mine. The appraisal of the predisturbance vegetation is based on a Soil Conservation Service potential native plant community associated with this soil type, and a Juniper Pinyon Community (D34, E47).

<u>Common Plant Name</u>	<u>Plant Symbol</u>	<u>Scientific Name</u>	<u>Percent</u>
Salina Wildrye	ELSA	<u>Elymus salinus</u>	7
Indian Ricegrass	ORHY	<u>Oryzopsis hymenoides</u>	7
Western Wheatgrass	AGSM		7

<u>Common Plant Name</u>	<u>Plant Symbol</u>	<u>Scientific Name</u>	<u>Percent</u>
Needle and Thread	STCO4	<u>Stipa comata</u>	3
Blue Grama	BOGR2	<u>Bouteloua gracilis</u>	3
Other Perennial Grasses	PPGG		8
Globemallow	SPCO	<u>Sphaeralcea coccinea</u>	1
Penstemon	PEWST	<u>Penstemon spp.</u>	1
Other Perennial Forbs	PPFF		3
Birchleaf Mountain Mahogany	CEMO2	<u>Cercocarpus montanus</u>	7
Black Sagebrush	ARARN		7
Pinyon Pine	PIED	<u>Pinus edulis</u>	15
Utah Juniper	JUOS	<u>Juniperus osteosperma</u>	15
Torrey Mormon Tea	EPTO	<u>Ephedra torreyana</u>	2
Other Shrubs	SSSS		14

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SOIL LEGEND

Soil Symbol

Soil Mapping Unit Name

GLC

Glenberg-Very Fine Sandy Loam 3-6 percent Slopes

RWG

Rock Outcrop-Rubble Land-Sunup Complex 60-70 percent Slopes

NGF2

Shingle Extremely Stony Loam 20 to 50 percent Slopes Eroded

IEE

~~Ildefonso~~ Very Stony Loam

DESCRIPTION OF THE SOILS 8 to 30 Percent Loam

GLC GLENBERG VERY FINE SANDY LOAM, 3 TO 6 PERCENT SLOPES

This Glenberg soil is very deep and well drained. It occurs on nearly level and gently sloping valley floors and terraces at elevations of 5,500 to 6,900 feet. This soil formed in alluvium derived mainly from sandstone and shale.

The average annual precipitation is 10 to 12 inches. Mean annual air temperature is 47° to 49° F, mean annual soil temperature is 49° to 51° F, and the average freeze-free season is 115 to 140 days. This soil occurs in the Horse Canyon area. Slopes are 3 to 6 percent and occur on all aspects. They are long in length and single in shape.

Vegetation is dominantly big sagebrush, blue grama, bullgrass, greasewood, fourwing saltbush and globe mallow.

Included in mapping are small areas of Haverson loam, 3 to 8 percent slopes; and Haverson loam, 1 to 3 percent slopes.

In a representative profile the surface layer is pale brown very fine sandy loam about 4 inches thick. The underlying layers are pale brown and brown very fine sandy loam and loam to a depth of 60 inches or more.

Permeability is moderate. Available water capacity is about 7.0 to 10.0 inches to a depth of 60 inches. The water supply capacity is about 6 to 7 inches. Organic matter content in the surface layer is very low. Effective rooting depth is 60 inches or more. Surface runoff is slow and erosion hazard is moderate. The Erosion Condition Class is slight-34.

This soil is used for rangeland, wildlife habitat and recreation.

Taxonomic classification is coarse-loamy, mixed (calcareous), mesic Ustic Torrifuvents

A representative pedon of Glenberg very fine sandy loam, 3 to 7 percent slopes was described and in the south storage yard of Geneva Mine.

A1-0 to 4 inches; pale brown (10 YR 6/3) very fine sandy loam, very dark grayish brown (10 YR 3/2) when moist; weak medium granular structure; soft, very friable, slightly sticky, nonplastic; common very fine and medium roots; strongly calcareous, carbonates are disseminated; strongly alkaline (pH 8.6) abrupt smooth boundary.

C1-4 to 10 inches; pale brown (10 YR 6/3) very fine sandy loam, dark grayish brown (10 YR 4/2) when moist; massive; soft, very friable, non-sticky, nonplastic; common very fine, fine and medium roots; strongly calcareous, carbonates are disseminated; moderately alkaline (pH 8.4); abrupt wavy boundary.

A1b - 10 to 14 inches; brown (10 YR 5/3) loam, dark brown (10 YR 4/3) when moist; weak medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; common very fine, fine and medium roots; few fine pores; strongly calcareous, carbonates are disseminated; strongly alkaline (pH 8.8); abrupt wavy boundary.

C2 - 14 to 46 inches; pale brown (10 YR 6/3) fine sandy loam, dark brown (10 YR 4/3) when moist; massive; soft, very friable, nonsticky, nonplastic; common very fine and fine roots; common fine pores; (this horizon contains a 1 inch thick organic layer) strongly calcareous, carbonates are disseminated; strongly alkaline (pH 8.9); clear smooth boundary.

C3 - 46 to 60 inches; pale brown (10 YR 6/3) loam, dark grayish brown (10 YR 4/2) when moist; weak medium subangular blocky structure; hard, firm, slightly sticky, slightly plastic; common very fine and fine roots; many fine pores; strongly calcareous, carbonates are in veins; strongly alkaline (pH 9.0).

The A horizon has hue of 10 yr. and 2.5 Y value of 5 or 6 dry and chroma of 2 or 3. It is typically very fine sandy loam but may include fine sandy loam and loamy fine sand. The A horizon is slightly to strongly calcareous and moderately to strongly alkaline. It is 2 to 4 inches thick.

The C horizon has hue of 7.5 YR, 10 YR or 2.5Y, value of 5 or 6 dry and chroma of 2 to 4. It is typically loam but ranges to very fine and fine sandy loam. The C horizon is mainly massive but may include weak and moderate subangular blocky structure. It is slightly to strongly calcareous and is moderately to strongly alkaline.

RWG ROCK OUTCROP-RUBBLE LAND-SUNUP COMPLEX 60 TO 70 PERCENT SLOPES

This complex consists of about 35 percent Rock outcrop; 30 percent Rubble land; 25 percent Sunup very gravelly fine sandy loam, high rainfall, 60 to 70 percent slopes; and 10 percent other soils.

It occurs on canyon walls, escarpments from mesas, and on mountain side slopes. The Sunup soil is intermixed with the Rock outcrop and Rubble land on these landscapes. Elevations are 4,350 to 8,700 feet. The soils formed in colluvium derived from sandstone.

The average annual precipitation is 12 to 14 inches. Mean annual air temperature is 45° to 50° F, mean annual soil temperature is 47° to 52° F, and the average freeze-free season is 100 to 150 days. This complex occurs on the Book Cliffs. Slopes are 50 to 70 percent and occur on all aspects.

Vegetation is dominantly Utah juniper, pinyon pine, salina wildrye and galleta.

Included in mapping are small areas of Ildefonso very stony loam, 50 to 70 percent slopes, on colluvial slopes; Shingle extremely stony loam, 50 to 70 percent slopes, eroded; and areas where this Sunup soil has an extremely stony surface.

This complex is used for wildlife habitat.

Rock Outcrop

Rock outcrop is exposed bedrock consisting of sandstone, conglomerate sandstone, and limestone.

Rock outcrop is in Capability Subclass VIII's, and is not rated for an ecological site.

Rubble Land

Rubble land is areas of stones and boulders virtually free of vegetation except for lichens.

Rubble land is in Capability Subclass VIII's, and is not placed in an ecological site.

Sunup Very Gravelly Fine Sandy Loam, 60 to 70 Percent Slopes

This soil is shallow and excessively drained.

In a representative profile the surface layer is brown very gravelly fine sandy loam about 2 inches thick. The underlying layer is brown gravelly fine sandy loam over conglomerate at a depth of about 6 inches.

Permeability is moderately rapid. Available water capacity is about 1.0 inch. Water supplying capacity is about 2.0 inches. Organic matter content in the surface layer is very low. Effective rooting depth is about 5 to 20 inches. Surface runoff is very rapid and erosion hazard is high. The Erosion Condition Class is slight-37.

Taxonomic classification is loamy-skeletal, mixed (calcareous), mesic Lithic Ustic Torriorthents.

A representative profile of Sunup very gravelly fine sandy loam, high rainfall, 3 to 15 percent slopes on the west slopes of Horse Canyon near the tipple.

A1 - 0 to 2 inches; brown (7.5 YR 5/4) very gravelly fine sandy loam, dark brown (7.5 YR 4/4) when moist; weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; few very fine roots; few very fine pores; 60 percent gravel; moderately calcareous, carbonates are disseminated; moderately alkaline (pH 8.4); abrupt smooth boundary.

C1 - 2 to 6 inches; brown, (7.5 YR 5/4) gravelly very fine sandy loam, dark brown (7.5 YR 4/4) when moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; few very fine roots; few very fine pores; 30 percent gravel; moderately calcareous, carbonates are disseminated; moderately alkaline (pH 8.2); abrupt smooth boundary.

R - 6 inches; conglomerate.

Depth to conglomerate ranges from 5 to 20 inches. The range in other characteristics of this soil has not been determined.

NGF2 SHINGLE EXTREMELY STONY LOAM, 20 TO 50 PERCENT SLOPES, ERODED

This Shingle soil is shallow and well drained. It occurs on bench and fan terrace sideslopes at elevations of 6,200 to 6,400 feet. This soil formed in colluvium derived mainly from sandstone and shale over residuum derived mainly from shale.

The average annual precipitation is 12 to 14 inches. Mean annual air temperature is 45° to 47° F, mean annual soil temperature is 47° to 49° F, and the average freeze-free season is 100 to 120 days. Slopes are 20 to 50 percent and occur on all aspects. They are short in length and concave-convex in shape.

Present vegetation is dominantly pinyon, juniper, salina wildrye, skeleton locoweed, buckwheat and birchleaf mountainmahogany.

Included in mapping are small areas of Idlefonso very stony loam, 8 to 30 percent slopes and Badland.

In a representative profile the surface layer is light grayish brown, extremely stony loam about 7 inches thick. The underlying layer is gray and light brownish gray silt loam overlying soft shale at depth of about 19 inches. The horizon over the shale has about 40 percent very soft shale fragments.

Permeability is moderately slow. Available water capacity is about 3.0 inches above the shale. Water supply capacity is about 3 to 6 inches. Organic matter content in the surface layer is low. Effective rooting depth is about 15 to 20 inches. Surface runoff is rapid and erosion hazard is high. The Erosion Condition Class is moderate-54. The erosion occurs as numerous small flow patterns and pedestals.

This soil is used for wildlife habitat.

Taxonomic classification is loamy, mixed (calcareous), mesic, shallow Ustic Torriorthents.

A representative pedon of Shingle extremely stony loam, 20 to 50 percent slopes, eroded, is adjacent to the South Fan in Horse Canyon.

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

C1 - 7 to 16 inches; gray (10 YR 6/1) silt loam, dark grayish brown (10 YR 4/2) when moist, massive; hard, friable, sticky, plastic; common very fine, few medium and coarse roots; 35 percent very soft shale fragments, strongly calcareous, carbonates are disseminated; strongly alkaline (pH 8.6) clear smooth boundary.

C2 - 16 to 19 inches; light brownish gray (10 YR 6/2) silt loam, grayish brown (10 YR 5/2) when moist; massive; hard, friable, slightly sticky, plastic; few very fine and fine roots; 40 percent very soft shale fragments, strongly calcareous, carbonates are disseminated; strongly alkaline (pH 8.6); clear smooth boundary.

C3r - 19 inches; partly weathered shale.

Depth to weathered shale ranges from 15 to 20 inches.

The A horizon has hue to 10 YR or 7.5 YR, value of 5 or 6 dry, and chroma of 2 to 4. It is extremely stony loam or very stony silt loam. Rock fragments range from 50 to 70 percent. The A horizon ranges from 2 to 8 inches thick.

The C horizon has hue of 10 YR, 2.5 Y or 5 Y, value to 5 to 7 dry, and chroma of 1 to 4. It is silt loam, silty clay loam, and loam. Some pedons have a small amount of gravel (less than 10 percent). The C horizon is slightly to strongly calcareous.

IEE ILDEFONSO VERY STONY LOAM, 8 TO 30 PERCENT SLOPES

This Ildefonso soil is very deep and well drained. It occurs on benches, dissected outwash plains and toe slopes at elevations of 6,200 to 7,300 feet. This soil formed in glacial outwash and alluvium derived mainly from sedimentary rocks.

The average annual precipitation is 12 to 14 inches. Mean annual air temperature is 45° to 47° F., mean annual soil temperature is 47° to 49° F., and the average freeze-free season is 100 to 140 days. This soil occurs around the foot of the mountains from Horse Canyon to Huntington Canyon. Slopes are 8 to 30 percent and occur on all aspects. They are medium in length and convex-concave in shape.

Present vegetation is dominantly pinyon, juniper, salina wildrye, Indian ricegrass, black sagebrush, and birchleaf mountainmahogany.

Included in mapping are small areas of Shingle extremely stony loam, 20 to 50 percent slopes, eroded; a soil similar to Featherlegs stony loam, 3 to 8 percent slopes except the slopes are 8 to 30 percent; and a soil similar to Sedillo very stony fine sandy loam, 3 to 8 percent slopes, eroded except the slopes are 8 to 30 percent.

In a representative profile the surface layer is pinkish gray very stony loam about 5 inches thick. The underlying layer is light gray very cobbly loam and very pale brown very stony loam about 42 inches thick. The next layer is very pale brown very cobbly coarse sandy loam to a depth of 60 inches or more. A horizon of secondary carbonate accumulation occurs at depth of about 5 inches.

Permeability is moderately rapid. Available water capacity is about 3.75 to 5.0 inches to depth of 60 inches. Water supplying capacity is about 5 to 6 inches. Organic matter content in the surface layer is low. Effective rooting depth is greater than 60 inches. Surface runoff is medium and erosion hazard is moderate. The Erosion Condition Class is slight-32.

The soil is used for rangeland and wildlife habitat.

The potential plant community consists of an overstory of pinyon pine and Utah juniper with a canopy cover of about 30 percent. The natural vegetation consists of about 35 percent grasses, 5 percent forbs, 30 percent shrubs and 30 percent trees. Important plants are salina wildrye, Indian ricegrass, western wheatgrass, needleandthread, penstemon, owl clover, globemallow, birchleaf mountainmahogany, cliffrose, Torrey mormontea, sagebrush spps, juniper and pinyon pine.

The pinyon pine and Utah juniper are in Site Class III, the site index is  $38 \pm 8$  and Woodland Suitability Group is 3x. The average production is less than 4 cords of wood per acre. The potential for fence posts and Christmas trees is poor.

Practices needed to maintain or improve the vegetative cover include grazing for the proper percent of plant use, good water distribution, and a well planned system of grazing.

For maximum forage production the pinyon pine and Utah juniper can be chained or burned and the site managed for forage. Where stones or cobbles are on the surface, or steep slopes do not interfere excessively, new plants can be seeded and established. The clearing of pinyon pine, juniper and other competitive plants is necessary along with good seed-bed preparation for the most successful seeding. Plants that can be successfully seeded include Siberian wheatgrass, crested wheatgrass and Russian wildrye.

This soil is in Capability Subclass VII<sub>s</sub>, nonirrigated ; Upland Stony Loam (Pinyon-Juniper) D34, E47 ecological site.

Taxonomic classification is loamy-skeletal, mixed, mesic Ustollic Calciorthis.

A representative pedon of Ildefonso very stony loam, 3 to 8 percent slopes in mapping unit IEC located in an area southeast of Hiawatha; about 1,900 feet south and 2,300 feet west of the NE corner of Section 1, T. 16 S., R. 8 E. SLBM (Photo No. & Coord. 2-83, H-5) is used to represent this soil.

A1--0 to 5 inches; pinkish gray (7.5YR 6/2) very stony loam, dark grayish brown (7.5YR 4/2) when moist; weak fine granular structure; slightly hard, friable, slightly sticky, slightly plastic; common fine and many coarse roots; common very fine and few fine pores; 20 percent gravel, 10 percent cobbles, 15 percent stones and boulders; strongly calcareous, carbonates are disseminated; strongly alkaline (pH 8.6); gradual wavy boundary.

Clca--5 to 17 inches; light gray (10YR 7/2) very cobbly loam, grayish brown (10YR 5/2) when moist; massive; hard, friable, slightly sticky, slightly plastic; common fine and many coarse roots; few very fine pores; 10 percent gravel, 20 percent cobbles and 10 percent stones; strongly calcareous, carbonates are veined; strongly alkaline (pH 8.6); gradual wavy boundary.

C2ca--17 to 47 inches; very pale brown (10YR 7/3) very stony loam, brown (10YR 5/3) when moist; massive; hard, friable, slightly sticky, slightly plastic; few fine and medium roots; many very fine and few fine pores; 15 percent gravel, 25 percent cobbles and 20 percent stones; strongly calcareous, carbonates occur as powdery soft masses; strongly alkaline (pH 8.8); gradual wavy boundary.

C3--47 to 60 inches; very pale brown (10YR 8/4) very cobbly coarse sandy loam, light yellowish brown (10YR 6/4) when moist; massive; slightly hard, very friable; few fine roots; few fine pores; 20 percent gravel, 20 percent cobbles and 5 percent stones; strongly calcareous, carbonates are disseminated; strongly alkaline (pH 8.8).

The range in characteristics is not determined for this soil.

Plan for Revegetation

Geneva Mine

2-17-81

FOR SEEDING

Waste pile

(i) It is projected that preparation of the surface will occur during the fourth year after the decision to abandon the operation. See paragraph (4) above. It is anticipated that seeding will be accomplished as late as possible in the fall with additional seeding in the spring if weather, moisture and soil conditions indicate and improves probability of success with additional seeding. Re-seeding will be done in year 5 and subsequent years as required to achieve the projected level of revegetation.

(ii) The species and amounts per acre of seeds and seedlings to be used are based on Soil Conservation Service soil type and the vegetative types associated with the identified soil. Four soil types have been identified in the permit area with the Glenburg (GLC) comprizing \_\_\_\_\_ acres or \_\_\_\_\_ percent of the Geneva Mine disturbed area. The remaining three soil types RWG with \_\_\_\_\_ acres and \_\_\_\_\_ percent, NGF2 with \_\_\_\_\_ acres and \_\_\_\_\_ percent, and IEE with \_\_\_\_\_ acres and \_\_\_\_\_ percent. It is planned to seed the prepared areas as follows:

Glenberg (GLC) Soil

<u>Seed</u>	<u>Lbs/ Acre</u>	<u>Total Lbs</u>
-------------	----------------------	----------------------

- Grasses  
 Indian Rice Grass  
 Galleta  
 Blue Grama *Gramma*  
 Salina Wildrye  
 Blue Burch Wheatgrass  
 Western Wheatgrass  
 Slender Wheatgrass

<u>Seed</u>	<u>Lbs/ Acre</u>	<u>Total Lbs</u>
-------------	----------------------	----------------------

Forbs

Globemallow

Aster

Pale Evening Rose

Shrubs

Big Sagebrush

Shadscale

Fourwing Saltbush

Winterfat

Rock Outcrop-Rubble Land-Sunup Complex RW6

Grass

Salina Wildrye

Multon grass

Indian Ricegrass

Needle and Thread

Forbs

Penstemon

Shrubs

Pinion pine

Utah Juniper

Birchleaf Mountain Mahogany

Cliffrose

Torry Mormon Tea

Shingle Extremely Stony Loam N6F2

Grass

Saline Wildrye  
Needle and Thread  
Indian Ricegrass  
Galleta

Forbs

Whitehaired Crazyweed

Shrubs

Birchleaf Mountain Mahogany  
Cliffrose  
Mat Eriogonum  
Low Sagebrush  
Pinyon  
Utah Juniper

*Ildefonso Very Stony Loam (addition next page)*

- (iii) The areas that are accessible will be seeded using a range drill. Areas that are too steep for seeding by range drill will be seeded by hand broadcast and the seed raked into the soil.
- (iv) The seeded areas will be straw mulched at a rate of one ton per acre.
- (v) Irrigation of the seeded areas is not a part of the reclamation plan. There are no plans for disease or pest control.
- (vi) The success of revegetation will be determined by the use of technical procedures published by USDA or USDI for assessing ground cover and productivity, and shall be considered successful when the revegetated area has attained at least 90 percent ground cover productivity of the technical guides listed above.

Ildefonso Very Stony Loam IEE

<u>Grass</u>	<u>lbs/acre</u>	<u>Total lbs</u>
--------------	-----------------	------------------

Salina Wildrye

Indian Ricegrass

Western Wheatgrass

Needle and Thread

Blue Grama

Forbs

Globemallow

Penstemon

Shrubs

Birchleaf Mountain Mahogany

Black Sagebrush

Pinyon

Utah Juniper

Torrey Mormon Tea

(vii) The seed bed will be tested prior to seeding to determine soil admendments if any, that are necessary to insure establishment of the proposed vegetation cover.

(6) Measures being used to maximize the use and conservation of the coal Resource

~~The operator conducts coal extraction~~ <sup>THE COAL MINING OPERATION</sup> in accord with engineering mining plans that are based on the maximum recovery of the resource in accord with economics and the safety of the working force. These mining plans are approved by District and mine management and governmental agencies as necessary prior to execution.

(7) The non-coal wastes that are generated at the mine are placed in a land fill. The non-coal waste landfill construction, location and operation are in accord with permit approved by the Utah State Department of Health, Division of Environmental Health.

The mine practice recognizes the disposal of mine waste rock in underground locations on a space available basis. The operator will dispose of any mine waste rock that comes out of the mine in the Road Junction Refuse Pile in accord with the approved plan. It has been determined that this waste material is non-toxic and non-acid forming. See Map F3-171

(8) The mine portals will be sealed in accord with Print No. A8-1368 when the mine operation is terminated and all equipment has been removed from the mine. The operator does not plan the drilling of exploration holes, drill holes, boreholes or wells for the projected life of Geneva Mine. One cased bore hole connects the underground with the surface and is used to carry water from underground to the storage tanks on the surface. This bore hole will be plugged with cement when no longer required for operation of the mine.

(9) The operator has NPDES point source discharge permits to discharge mine water without treatment to the Horse Canyon Wash. The discharges are sampled and analyzed and reported as required by the discharge permit.

The point source discharge for the sewage treatment plant is also permitted under the NPDES.

need to add  
Waste Pile re-use to the



**APPENDIX G**

**VEGETATION STUDY**

**RECEIVED**

AUG 22 1983

**DIVISION OF  
OIL, GAS & MINING**

VEGETATION AND RECLAMATION  
OF THE  
GENEVA MINE

Prepared by  
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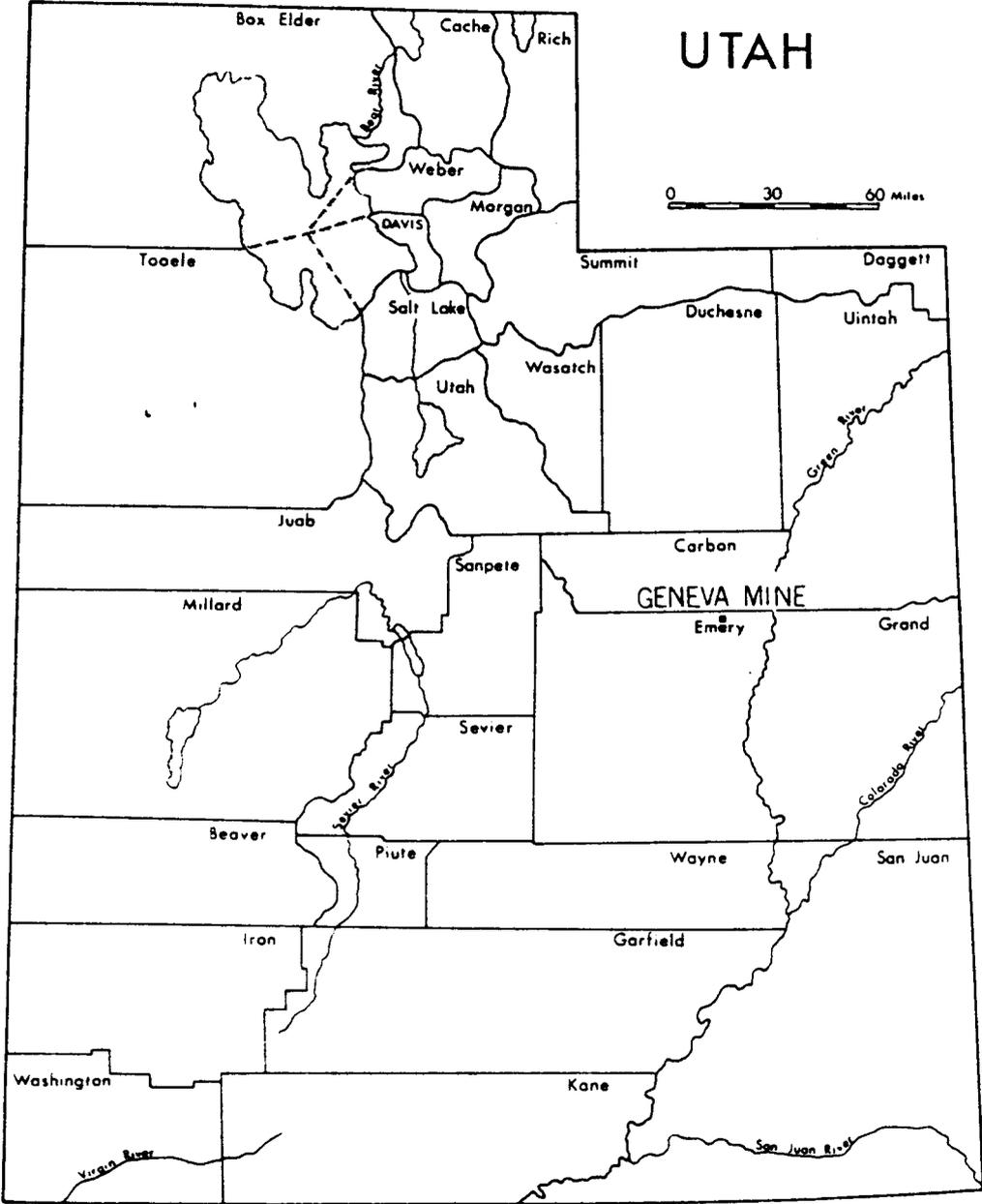
for  
U.S. STEEL MINING CO., INC.  
P.O. Box 807  
East Carbon, Utah 84520

Report: Patrick D. Collins, Ph.D.  
Fieldwork: Patrick D. Collins, Ph.D.  
Ronald Kass, M.S.

Date: August 1983

# UTAH

0 30 60 Miles



## SCOPE

The following is a report of the vegetation at and adjacent to the Geneva Coal Mine, Emery County, Utah. The primary purpose of this report is to provide meaningful and scientific data that will provide accurate standards for post-mine reclamation. A reclamation plan is also outlined. Also contained herein are additional soils data pursuant to recommendations of the State of Utah, Division of Oil, Gas and Mining.

The METHODS section describes the scientific methodology used in obtaining the data. The GENERAL SITE DESCRIPTION section gives the reviewer an idea of the physical appearance of the area and some general information that may be helpful.

The RESULTS section describes the plant communities and gives the data summaries from ecological and soil field sampling. Vegetative communities, sampling locations, legal descriptions and other pertinent information are shown on the enclosed three maps of the mine area.

## INTRODUCTION

### General Site Description

The Geneva Mine site is an area where previous mining activity has somewhat altered the natural contour and landscape. Maintained buildings and mining equipment are present on the mine site itself (Map C). The elevation above sea level of the permit area is between 6,100 ft. (1,859 m) and 6,500 ft. (1,981 m). Average annual temperature for the area is 53.0°F and the average annual precipitation is 19.02 inches (National Oceanic and Atmospheric Administration 1980).

The plant community affected by mining activity was a Pinus-Juniperus-Agropyron community (Map A, B). Average slope of the predisturbance and sample area was between 55-60% and were predominately east and west exposures (Maps A thru C). Douglas fir (Pseudotsuga menziesii) trees are intermixed with the Pinus-Juniperus-Agropyron communities on some of the higher slopes above the permit area. An ephemeral stream dissects the mine but supports few riparian species. For a general plant species list of the permit area see Table 5. The area is used by big game as a winter range according to the Utah Division of Wildlife Resources.

## SAMPLING METHODS

Quantitative and qualitative data were taken on and adjacent to the Geneva Mine site. Due to previous mining activity and disturbance, adjacent areas were selected for ecological sampling. These areas were selected on the basis that they closely resembled the plant communities of the mine site prior to disturbance. Bidirectional random placement of sampling plots were designed to provide unbiased accuracy of the data compiled. Cover estimates were implemented using ocular methods with meter square quadrats. Species composition and relative frequency were also assessed from the quadrats. Also recorded at each of the sample locations were estimated precipitation, percent slope, exposure, soil depth, grazing use, animal disturbance and other appropriate notes. The mean soil depth was recorded from each sample location using a soil penetrometer. Annual above-ground production was estimated by clipping the plots in the field and drying and weighing them in the laboratory.

Density of woody plant species was accomplished by 100 ft. belt transects. Vegetational species lists were composed by field identifications and collections from the mine area. Voucher specimens for many of the species were filed at the Brigham Young University herbarium. A grid system covering the entire permit area was used

to survey threatened and endangered plant species.

Plant species nomenclature follows Welsh et al. (1981).

Sampling adequacy for cover, density and production was achieved by using Snedecor and Cochran (1980), insuring that 80% of the samples were within 10% of the true mean for the shrub communities of the mine site or by sampling the maximum number required by the State Division of Oil, Gas and Mining. All means, standard deviations and sample sizes are included in this report to enable the reviewer to apply further statistical tests if desired.

Soil sampling was also done on and adjacent to the mine area. Topsoil, subsurface and disturbed samples were collected and analysed at a soils laboratory. Maps showing all vegetative and soil sample locations, community types, disturbed areas, permit boundaries and legal discriptions were drafted.

## SAMPLING RESULTS

### Pinus-Juniperus-Agropyron Community

The pinyon pine (Pinus edulis)-Utah juniper (Juniperus osteosperma) - blue bunch wheatgrass (Agropyron spicatum) community was the only community significantly disturbed by mining activity. This disturbed area lies primarily on and between east and west-

facing slopes. Vegetative sampling was accomplished on both exposures. Because species composition was similar and revegetation procedures will be identical for both exposures, the samples were combined for the summaries. Within the general mine area there are several slight changes in slope exposure and soil-water relationships. Isolated patches of dense to sparse stands of pinyon-juniper and on the drier exposures, almost pure stand of Salina wildrye (Elymus salina), can be found. Vegetative sampling was accomplished where exposures and species composition most accurately simulated those that were affected by the previous mining activity. This insures more accurate standards for future revegetation.

The mean total living cover of this community was 36.80% (Table 1). Rock cover was a major constituent and composed 43.20% of the total ground cover. Bare-ground and litter estimates were 10.70% and 9.96%, respectively. Grass species constituted 70% of the total living cover while trees/shrubs were 20% and forbs were almost 8% (Table 1).

The dominant tree and shrub species were Utah juniper (Juniperus osteosperma), pinyon pine (Pinus edulis), and fourwing saltbush (Atriplex canescens). The dominant grass species were blue bunch wheatgrass

(Agropyron spicatum), Salina wildrye (Elymus salina), Indian ricegrass (Oryzopsis hymenoides) and chetgrass (Bromus tectorum). No one forb species received more than a 1% mean cover value, therefore playing a relatively less significant role in this community. For cover and frequency values by species refer to Table 2.

Woody plant species density measurements were taken in three areas: the east exposure, the west exposure and in a relatively dense stand of the dominant trees (pinyon pine and Utah juniper). Data were summed separately and shown on Tables 3A and 3B. The density values that most closely represents the mine area prior to mining disturbance are shown on Table 3A. The total density of woody plant species was 1,144 per acre (463/ha).

Annual above-ground production measurements of the Pinus-Juniperus-Agropyron community were (1) shrubs-60 lbs/acre (67 kg/ha), (2) forbs-23 lbs/acre (26 kg/ha), (3) grasses-339 lbs/acre (380 kg/ha). The total annual production for the community was 422 lbs/acre (473 kg/ha). For all production measurements, sample sizes and standard deviations, refer to Table 4. For a plant species list of the permit area that includes common names for all species refer to Table 5. Range site condition could be listed as fair-good using the Soil Conservation Service methods.

### Disturbed Community

As mentioned earlier, the area is the site of previous mining activity. Consequently, the natural contour has been somewhat altered, soils have been compacted, and the native plant community disturbed. Presently, the disturbed soils of the mine site are often dominated by noxious, annual and weedy species i.e. African mustard (Malcomia africa), bindweed (Convolvulus arvensis) and Halogeton (Halogeton glomeratus). For a more complete list of the species in the disturbed area refer to Table 6.

### Previously Seeded Areas

Four different areas were previously seeded by the coal company in the area. These areas are marked a-d on Maps A and B. The species presently growing on these areas are listed on Table 8 in descending order by dominance. Much of the present growth is volunteer and weedy.

### Threatened and Endangered Species

No sensitive, rare, endemic, threatened or endangered species were found on or near the Geneva Mine site.

### Total Acreage

The total acreage of the mine permit area is 3,780 acres. The total area of the surface disturbance within the permit area is 50 acres, all of which are in the Pinus-Juniperus-Agropyron plant community.

## Soils

Soils have been classified and described in previous sections of the Mining and Reclamation Plan of the Geneva Mine. However, as an aid for composing a successful plan for future revegetation, soil samples were collected in the field and analysed for their physical and chemical properties in the laboratory. The following analyses were accomplished on the soil samples: 1) nitrogen (%), 2) phosphorus (ppm), 3) potassium (ppm), 4) cation exchange capacity (meg/100g), 5) pH, 6) sodium absorbtion ration (SAR), 7) texture, 8) organic matter (%), 9) calcium magnesium and sodium (ppm), 10) total nitrogen (NO<sub>3</sub>), 11) saturation (%), and 12) carbonates (%). The result of these analyses are given on Table 7 and are discussed in the REVEGETATION section.

## REVEGETATION PLAN

### Contemporaneous Reclamation

Stockpiled topsoil has been seeded in the past and will continue to be seeded on future disturbances for stabilization. If cover proves to be inadequate in the future to stabilize these soils, they will be reseeded. Species selected for the topsoil stockpiles will be native grass and legume species (i.e. Agropyron smithii, Agropyron trachycaulum and hedysarum boreale).

### Physical Manipulation of Soils

The natural contour of the area has been altered moderately due to mining activity. The disturbed soils and soil stockpiles will be recontoured and distributed over the disturbed area as soon as mining activity permanently terminates. Much of the mine area soils have been heavily compacted due to heavy equipment, right-of-ways, buildings, parking lots, and other mining activities. Subsequent to the recontouring and soil distribution of the area, the compacted soils will be ripped and harrowed/disked to provide adequate soil structure for seedbed preparation.

### Seeding and Planting

In the first fall following the completion of soil manipulation, the area will be seeded (for revegetation species list see Table 9). Drill seeding methods will

be employed whenever possible however, the natural terrain is often steep-sloped and rocky. When the terrain prohibits equipment use, broadcast seeding methods will be implemented.

Because revegetation of woody species is often difficult by seeding methods in the semiarid west, containerized seedlings will be planted the following spring. Containerized plants will be planted at the rate of 500-1,000 plants/acre. Since this area is "high priority" as big game winter range, plant species were selected for valuable cover and forage for wildlife species as well as other revegetative qualities. Standards for revegetation were made by ecological sampling. The results can be found on the previous pages.

#### Soil Amendments and Fertilization

Physical and chemical analyses were performed on samples from the disturbed, subsurface and surface undisturbed soils. Results from laboratory analyses showed existing mine soils to be adequate for revegetation in the following properties: electrical conductivity, soil texture, pH, organic matter, saturation percentage, carbonates, cation exchange capacity, potassium, calcium and sodium (Table 7). However, only two samples (numbers 9D and 11S) showed problems with the sodium

absorbtion ratio (SAR). Sample number 9D was collected from a disturbed, heavily compacted road and sample number 11S was a subsurface sample (20 ft deep). It is not anticipated that either of these samples will be surface soil following physical manipulation of the terrain. In the event that they are used near the surface, application of gypsum as a soil amendment should alleviate the problem (% CaCO<sub>3</sub> was adequate).

Results from soil sample analyses did show a nutrient deficiency in some soils, therefore, fertilization will be accomplished on the mine site at rates of 50 lbs/acre nitrogen, 40 lbs/acre phosphorus and 40 lbs/acre potassium.

#### Mulching

Because much of the post-mine site will be recontoured and sloped and because revegetation is often difficult in dry areas, a mulch layer will be applied to the entire disturbed area following seeding. Wood fiber or straw will be held to the ground surface by ground stables, asphalt emulsion, netting or other current, appropriate method. The mulch layer will decrease evaporation of available soil moisture, protect seedling and stabilize the soil.

### Revegetation Monitoring

After revegetation procedures, constant monitoring will be done to insure successful establishment of appropriate rangeland forage. Initial monitoring will be done twice a year (spring and fall) for the first two years and once a year thereafter for ten years. Sampling methods will be the same as described in the METHODS section of this report. Special attention will be given to successful growth and establishment of "desirable" species. If desirable species are not being established appropriate efforts will be taken.

FOOTNOTES

<sup>1</sup>Sample adequacy formula:  
where s= standard deviation and  
 $\bar{x}$ = mean

$$n \text{ min} = \frac{1.28(s)}{(\bar{x})(.1)}^2$$

## LITERATURE CITED

- National Oceanic and Atmospheric Administration. 1980. Annual summary for Utah. Climatological Data. 82(13):1-14.
- Snedecor, G.W. and W.G. Cochran. 1980. Statistical methods: seventh edition. Iowa State University Press. Ames, IOWA. 507p.
- Welsh, S.L., N.D. Atwood, S. Goodrich, E. Neese, K.H. Thorne and B. Albee. 1981. Preliminary index of Utah vascular plant names. Gt. Basin Naturalist 41:1-108.

TABLE 1: The Pinus-Juniperus-Agropyron community of the Geneva Mine site. The table shows the mean percent cover and composition with standard deviations and sample size.

<u>TOTAL COVER</u>	<u>% MEAN COVER</u>	<u>STANDARD DEVIATION</u>	<u>SAMPLE SIZE</u>
Total Living Cover*	36.80	18.39	50
Litter	9.96	10.52	50
Rock	43.20	21.16	50
Bareground	10.70	11.99	50
 <u>COMPOSITION</u>			
Trees/Shrubs	20.16	30.93	50
Forbs	7.76	11.62	50
Grasses	70.08	30.68	50

\* Sample size insures 80% accuracy within 10% of the true mean (refer to "FOOTNOTES" page for formula).

TABLE 2: Mean percent covers, standard deviations, samples size and relative frequency (by species) of the Pinus-Juniperus-Agropyron community of the Geneva Mine site.

<u>SPECIES</u>	<u>% MEAN COVER</u>	<u>STANDARD DEVIATION</u>	<u>SAMPLE SIZE</u>	<u>RELATIVE FREQUENCY</u>
Artemisia bigelovii	.04	.28	50	2.00
A. tridentata	.12	.72	50	4.00
Atriplex canescens	1.76	5.76	50	16.00
Chrysothamnus nauseosus	.34	2.13	50	4.00
Ephedra viridis	1.54	5.12	50	8.00
Juniperus osteosperma	4.70	16.79	50	8.00
Pinus edulis	1.80	8.96	50	4.00
Xanthocephalum sarothrae	.12	12.00	50	12.00
Arabis sp.	.38	1.01	50	20.00
Caulanthus crassicaulis	.26	.72	50	12.00
Chenopodium fremontii .	.08	.44	50	4.00
Crytantha humilus	.08	.27	50	8.00
Echinocereus triglochidiatus	.02	.14	50	2.00
Erigeron speciosus	.16	.58	50	8.00
Lepidium montanum	.30	1.57	50	4.00
Leptodactylon pungens	.02	.14	50	2.00
Macheranthera grindelioides	.04	.28	50	2.00
Opuntia polycantha	.04	.28	50	2.00
Schoenocrambe linifolia	.38	1.59	50	12.00
Agropyron spicatum	10.04	14.83	50	46.00
Bromus tectorum	2.86	5.26	50	38.00
Elymus salina	9.10	14.52	50	40.00
Hilaria jamesii	.74	1.97	50	10.00
Oryzopsis hymenoides	1.78	5.00	50	22.00
Poa secunda	.44	1.31	50	12.00
Sporobolus crytandrus	.02	.14	50	4.00

TABLE 3: Woody species density of the Geneva Mine site. Density of woody species in a moderately pinyon-juniper stand is represented in A. and relatively dense stand is represented in B.

A.	<u>No./acre*</u>	<u>No./ha*</u>
Artemisia tridentata	98.0	39.7
Atriplex canescens	239.6	97.0
Brickellia spp.	21.8	8.8
Ephedra viridis	87.1	35.3
Juniperus osteosperma	141.6	57.3
Lepidium montanum	98.0	39.7
Leptodactylon pungens	98.0	39.7
Pinus edulis	87.1	35.3
Xanthocephalum sarothrae	272.3	110.2
<hr/>	<hr/>	<hr/>
TOTAL	1,143.5	463.0
B.		
Artemisia nova	436.0	176.5
Artemisia tridentata	87.2	35.3
Chrysothamnus depressus	21.7	8.7
Ephedra viridis	21.7	8.7
Juniperus osteosperma	152.6	61.7
Pinus edulis	239.8	97.1
Symphoricarpos oreophilus	65.4	26.4
<hr/>	<hr/>	<hr/>
TOTAL	1,024.4	414.4

\* Sample size for densities was sixty - 100 ft. belt transects and satisfies sample adequacy or maximum samples required by the D.O.G.M.

TABLE 4: Dry weight annual production for the Pinus-Juniperus-Agropyron community of the Geneva Mine site.

<u>LIFEFORM</u>	<u>MEAN g/m<sup>2</sup></u>	<u>STANDARD DEVIATION</u>	<u>SAMPLE* SIZE</u>	<u>LBS/ACRE</u>	<u>KG/HA</u>
Shrubs	6.75	21.44	40	60	67
Forbs	2.55	3.31	40	23	26
Grasses	38.01	37.06	40	339	380
<hr/>					
TOTAL PRODUCTION	47.28	45.89	40	422	473

\* Sample size fulfills maximum requirement given by the D.O.G.M.

TABLE 5: General plant species list of the Geneva Mine site.

TREES AND SHRUBS

Amelanchier alnifolia	Serviceberry
Artemisia biglovii	Bigelow sagebrush
Artemisia nova	Black sagebrush
Brickellia spp.	Brickellia
Cercocarpus montanus	Mountain mohogany
Chrysothamnus nauseosus	Rubber rabbitbrush
Clematis occidentalis	Western clematis
Cowania mexicana	Cliffrose
Ephedra viridis	Green ephedra
Echinocerus triglochidatus	Echinocereus
Juniperus osteosperma	Utah juniper
Opuntia polyacantha	Plains pricklypear
Philadelphus microphyllus	Littleleaf mockorange
Pinus edulis	Pinyon pine
Populus deltoides	Eastern cottonwood
Pseudotsuga menziesii	Douglas fir
Purshia tridentata	Bitterbrush
Rhus trilobata	Squawbrush
Symphoricarpos oreophilus	Snowberry
Tamarix ramosissima	Tamarisk
Yucca harrimaniae	Harriman yucca
Xanthrocephalum sarothrae	Broom snakeweed

FORBS

Antennaria spp.	Pussytoes
Arabis holboellii	Holboell rockcrest
Arenaria spp.	Sandwort
Astragalus coltonii	Colton locoweed
Astragalus convallarius	Timber poisonvetch
Astragalus mollissimus	Woolly milkvetch
Astragalus tenellus	Looseflower milkvetch
Calochortis nuttallii	Sego lily
Caulanthus crassicaulis	Wildcabbage
Cirsium spp.	Thistle
Convolvulus arvensis	Bindweed
Cystopteris fragilis	Brittle bladderfern
Cryptantha humilis	Cryotantha
Eriogonum alatum	Wing eriogonum
Eriogonum corybosum	Corymbed eriogonum
Erigeron utahensis	Utah fleabane
Grindelia squarrosa	Gumweed
Halogeton glomeratus	Halogeton
Hedysarum boreale	Northern sweetclover
Helianthus uniflora	Sunflower
Hymenoxys acqulis	Stemless hymenoxys
Hymenoxys richardsonii	Pingue hymenoxys

TABLE 5: Continued

FORBS

Lactuca serriola	Prickly lettuce
Lappula redowski	Annual stickseed
Leptodactylon pungens	Prickly flox
Leucelene ericoides	Heath aster
Machaeranthera grindelioides	Machaeranthera
Malcomia africa	African mustard
Marrubium vulgare	Common horehound
Melilotus officinalis	Yellow sweetclover
Orobanche spp.	Broomrape
Penstemon comarrhenus	Dusty beardtongue
Penstemon pachyphyllus	Thickleaf beardtongue
Physaria acutifolia	Common twinpod
Salsola kali	Russian thistle
Schoenocranbe linifolia	Schoenocranbe
Senecio multilobatus	Lobeleaf groundsel
Sphaeralcea grossulariifolia	Globemallow
Stanleya pinnata	Desert princesblume
Streptanthus cordatus	Heartleaf twist flower
Townsendia incana	Hoary townsendia
Tragopogon dubius	Goatsbeard
Verbena bracteata	Bigbract verbena

GRASSES

Agropyron cristatum	Crested wheatgrass
Agropyron spicatum	Bluebunch wheatgrass
Agropyron trachycaulum	Slender wheatgrass
Agrostis stolonifera	Carpet bentgrass
Bouteloua gracilis	Blue grama
Elymus canadensis	Canada wildrye
Elymus cinereus	Gt. Basin wildrye
Elymus salina	Salina wildrye
Hilaria jamesii	Galleta
Hordeum jubatum	Foxtail barley
Koeleria macrantha	Junegrass
Oryzopsis hymenoides	Indian ricegrass
Poa secunda	Sandberg bluegrass
Sporobolus cryptandrus	Sand dropseed
Stipa comata	Needle-and-thread

TABLE 6: Plants of the disturbed community of the Geneva Mine.

SHRUBS

Artemisia tridentata  
Chrysothamnus nauseosus

FORBS

Cirsium spp.  
Convolvulus arvensis  
Grindelia squarrosa  
Halogeton glomerata  
Helianthus uniflora  
Lactuca serriola  
Lappula redowski  
Malcomia africa  
Marrubium vulgare  
Melilotus officinalis  
Stanleya pinnata  
Verbena bracteata

GRASSES

Bromus tectorum  
Oryzopsis hymenoides

TABLE 8: Previously seeded areas of the Geneva Mine. Species are listed in descending order by dominance. Area letters correspond to map locations.

Area a.

Malcomia africa  
Oryzopsis hymenoides  
Chrysothamnus nauseosus  
Hymenoxys richardsonii  
Penstemon comarrhenus  
Astragalus spp.  
Senecio multilobatus  
Grindelia squarrosa  
Astragalus convallarius  
Townsendia incana  
Trifolium sp.

Area b.

Chrysothamnus nauseosus  
Oryzopsis hymenoides  
Melilotus officinalis  
Hordeum jubatum  
Sphaeralcea grossulariifolia  
Grindelia squarrosa  
Stipa comata

Area c.

Salsola kali  
Chrysothamnus nauseosus  
Bromus tectorum  
Grindelia squarrosa  
Ambrosia artemisiifolia

Area d.

Machaeranthera sp.  
Salsola kali  
Ambrosia artemisiifolia  
Artemisia tridentata  
Oryzopsis hymenoides  
Malcomia africa  
Astragalus sp.  
Bahia dissecta

TABLE 7: Soil laboratory report for the Geneva Mine site.\*

Sample	ppm P	ppm K	% N	EcX 10 <sup>3</sup>	ppm Ca	ppm Mg	ppm Na	SAR
1T	9.91	108.0	.081	.71	130.0	8.84	21.1	.482
2S	2.11	6.4	.043	1.8	112.0	68.7	112.0	2.05
3B	2.58	108.0	.045	4.23	576.0	195.0	345.0	3.16
4T	3.29	41.6	.071	.69	113.0	16.3	62.8	1.45
5T	4.29	54.4	.090	.768	126.0	28.3	24.6	.514
6T	3.76	54.4	.050	.578	97.5	10.4	13.7	.353
7D	1.89	73.6	.031	4.82	182.0	386.0	632.0	6.04
8D	7.50	144.0	.048	.89	117.0	29.1	39.5	.844
9D	8.02	86.4	.020	7.0	362.0	128.0	1459	16.6
10D	4.24	41.6	.020	.457	43.4	41.6	44.8	1.16
11S	6.07	28.8	.015	35.0	231.0	3061	14049	52.8
12D	13.3	112.0	.023	1.04	107.0	307.0	60.9	.673
13D	3.28	28.8	.014	.65	55.1	33.2	52.1	1.36
14D	2.11	147.0	.032	.569	94.8	12.8	28.8	.734
15D	7.50	32.0	.043	.78	88.3	12.1	174.0	4.59
16D	6.47	262.0	.034	.861	118.0	18.4	65.1	1.46

\* Physical and chemical analyses were done at the Brigham Young University Soils Laboratory.

TABLE 7: Continued

Sample	pH	% O.M.	% Moisture	% CaCO <sub>3</sub>	% Sand	% Clay	% Silt	ppm NO <sub>3</sub>	Cat. Ex.C.
1T	7.9	2.03	30.67	15.68	62.5	13.6	23.8	2.32	13.5
2S	8.2	.934	27.77	11.42	68.5	15.6	15.8	1.24	11.4
3D	7.8	.568	29.45	13.78	50.5	20.0	29.4	8.75	9.29
4T	7.7	2.62	24.94	13.77	66.5	13.2	20.1	1.37	10.6
5T	7.3	1.98	28.60	.370	62.9	11.6	25.4	1.24	16.1
6T	7.6	1.10	27.62	15.74	58.9	18.0	23.0	2.74	9.59
7D	8.2	1.18	29.22	10.06	58.5	30.0	11.4	9.01	10.9
8D	8.1	1.42	23.95	33.86	66.5	10.0	23.4	2.04	10.0
9D	8.9	1.39	19.27	16.20	66.2	12.0	21.8	2.60	7.66
10D	8.6	.341	25.65	8.34	53.8	19.6	26.5	1.50	10.9
11S	8.5	.227	22.45	5.21	65.8	6.72	27.4	2.32	11.0
12D	8.5	.689	19.95	4.54	61.8	16.0	22.1	2.04	10.6
13D	8.3	.205	23.88	10.98	58.5	20.3	21.0	1.11	11.1
14D	8.2	1.47	29.89	11.37	62.5	16.0	21.4	1.91	15.1
15D	8.4	1.20	26.20	14.22	54.9	18.0	27.0	4.63	9.99
16D	8.5	.764	22.71	13.99	62.9	16.0	21.0	5.09	9.10

DATA SUMMARY SHEET

COMPANY: CU SPUR - BCCC

VEGETATION TYPE: Shadescale

AFFECTED (Disturbance) AREA

REFERENCE AREA

	$\bar{X}$	S	N	N <sub>min</sub>	$\bar{X}$	S	N	N <sub>min</sub>	t-value
Cover	18.8	5.465	5	13.8	17.6	3.18	2	6	
Shrub Density (plants/acre)					6252/acre 15,516/ha	3513	16	10	
Tree Density (plants/acre)									
Productivity	110.9 g/m <sup>2</sup>				85.8 g/m <sup>2</sup> (390)				450 lbs 505
					Range condition good				
Aspect:	Slope				Aspect	Slope			
Soils									
Geology									

% Similarity: 70%

$\bar{X}$  = Sample Mean; N = Sample Size; S = Sample Standard Deviation;  
N<sub>min</sub> = Minimum sample Size (for statistical adequacy)

Table 3.2  
Final 300 d May

check table 3-3 into, ?  
diverse, ?

Table 3-2

PERMANENT RECLAMATION SEED MIXTURE

<u>Name</u>	<u>Rate (Pounds PLS Per Acre)</u>
<u>Grasses</u>	
Galleta ( <u>Hilaria jamesii</u> )	2
Thickspike wheatgrass ( <u>Agropyron dasystachyum</u> )	4
Indian ricegrass ( <u>Oryzopsis hymenoides</u> )	3
Alkali scaton ( <u>Sporobolus airoides</u> )	.75
Inland saltgrass ( <u>Distichlis spicata</u> )	1
<u>Forbs</u>	
Globemallow ( <u>Sphaeralcea grossulariaefolia</u> )	.5
Sunflower ( <u>Helianthus annuus</u> )	4
Palmer Penstemon ( <u>Penstemon palmeri</u> )	.5
Yellow sweetclover ( <u>Melilotus officinalis</u> )	2
<u>Shrubs</u>	
Winterfat ( <u>Ceratoides lanata</u> )	3
Shadscale ( <u>Atriplex confertifolia</u> )	4
Matbush ( <u>Atriplex corrugata</u> )	4
Whitestem rubber rabbitbrush ( <u>Chrysothamnus nauseosus</u> var. <u>albicanlis</u> )	1.5
Four-wing saltbrush ( <u>Atriplex canescens</u> )	<u>3</u>
TOTAL (for broadcast or hydroseeding)	<u>33.25</u>

( $\frac{1}{2}$  rate for drill seeding.)

		Table	$\bar{x}$	SD	$N_{min}$	80%/10%	$n$
Cover	AS	9-4	18.8	5.51		14.1	5
	Ref	9-4	17.5	3.18		5.4	2
production	AS	9-3	167.9	198.9		230	25
	Ref	9-4	85.8	76.7		131.3	35

DATA SUMMARY SHEET

COMPANY: Beaver Creek Coal Co — CV Spur Prep. Plant

VEGETATION TYPE: Salt Desert — Shadscale phase

AFFECTED (Disturbance) AREA

REFERENCE AREA

	$\bar{X}$	S	N	$N_{min}$	$\bar{X}$	S	N	$N_{min}$	t-value
Cover	P 9-4 18.870 Table 9-2 19.370 " 9-4 18.870	— — 5.51	— — 5	— — 1.52	P. 9-15 17.8 17.5	3.18	2	1.56	.302
Shrub Density (plants/acre)	9-8 no	Affected Area	Disturb		9-8 67.2/40m <sup>2</sup> 6801.6/ac.	17.158	10	10.7	
Tree Density (plants/acre)	none								
Productivity	Table 9-3 167.9 g/m <sup>2</sup> 9-4 110.9 g/m <sup>2</sup>	= 679757.085 g/ac. = 198.874 150.4	25 65	498.581 g/ac. 230 65	9-7 85.78 9-4 85.8	76.74 76.7	35 35	131.5 131.3 (25)	2.4474
Aspect: <u>Flat</u>	Slope: _____				Aspect: _____	Slope: _____			
Soils									
Geology	<u>Monocot Shale</u>								

(t-value 1.697 not similar)

% Similarity: \_\_\_\_\_

126.1 acres to be affected (P. 9-11 ≠ 9-5)

$\bar{X}$  = Sample Mean; N = Sample Size; S = Sample Standard Deviation;  
 $N_{min}$  = Minimum sample Size (for statistical adequacy)

Cover — 50-20 x 50 cm quadrats / 50m  
 transect 1 transect = 1 sample  
 " random  
 productivity — 25m<sup>2</sup> random plots  
 density 10 random 2m x 20m plots

Mining and Reclamation Plan  
 Castle Valley Spur Coal Processing and Loadout Facility Permit Application

Table 3-2

PERMANENT RECLAMATION SEED MIXTURE

Seed Mix - Castle Valley Spur			Acreage 1	Number	seed/ft <sup>2</sup>	
			PLS lbs./acre	Seeds/lb.		
	Galleta	35-50 <sup>¢</sup>	80	2 lbs. PLS	159,000	4
	Rubber Rabbitbrush	*62 <sup>¢</sup>	62	1 lb. PLS	335,000	8
I	Intermediate Wheatgrass	1.50	16.00	10 lbs. PLS	93,000	21
Same	Streambank Wheatgrass	5.35	42.80	4 lbs. PLS	160,000	15
	Thickspike Wheatgrass	5.35		4 lbs. PLS	186,000	17
I	Pubescent Wheatgrass	1.20	6.00	5 lbs. PLS	90,000	10
	Indian Rice	9.00	27.00	3 lbs. PLS	188,000	13
I	Yellow Sweetclover	1.53	1.04	2 lbs. PLS	260,000	12
	Alkali Sacaton	4.25	4.25	1 lb. PLS	1,750,000	40
	Shadscale	9.30	9.30	1 lb. PLS	65,000	1.5
			248.34	33 lbs. PLS		141.5

\*Drill seed at half the above rates.

S = 87.70  
 F = 80.  
 G = 177.09  
 # = 40  
 # 57,120

		seed/ft <sup>2</sup>		
Galleta	2 lbs PLS	7	\$141.59	80.00
Thickspike wheatgrass	4 lbs PLS	16		21.40
Indian Ricegrass	3 lbs PLS	13		27.00
Alkali Sacaton	.75 lbs PLS	30	\$74.04	3.19
Inland Sattgrass	1 lb PLS	14		10.00*
Globe mallow	.5 lb PLS	6	\$289.20	20.00
Sunflower	4 lbs PLS	5		48.00
Penstemon	.5 lb PLS	7	\$509.83	10.00*
Yellow sweet clover	2 lbs PLS	12		1.04
Winterfat	2 lbs PLS	5		75.00
Shadscale	4 lbs PLS	6		37.20
White top	1.5 lbs PLS	14		93.00
Rubber rabbit brush	4 lbs PLS	5		84.00
Mat sabbush	3 lbs PLS	4		
4 wing				

RESOURCE RECOVERY AND  
PROTECTION PLAN

GENEVA COAL MINE  
U.S. STEEL MINING COMPANY, INC.

U.S. GOVERNMENT COAL LEASES  
SL-046612 AND SL-0666145

Submitted to: Minerals Management Service  
U. S. Department of Interior

March 22, 1983



**U. S. Steel  
Mining Co., Inc.**

a Subsidiary of United States Steel Corporation

P O BOX 807  
EAST CARBON, UTAH 84520  
801 / 888-4431

WESTERN DISTRICT

March 22, 1983

Mr. Jackson W. Moffitt  
District Mining Supervisor  
Minerals Management Service  
2040 Administration Building  
1745 West 1700 South  
Salt Lake City, Utah 84104

Re: Geneva Coal Mine  
U.S. Govt. Leases  
SL-046612 and SL-066145

Dear Mr. Moffitt:

In reply to your letter of October 12, 1982, and subsequent telephone conversations with Mr. Boyd McKean of your office, the materials requested are herein submitted. The attached information and referenced materials are considered to be the "Resource Recovery and Protection Plan" for Geneva Mine. Please note that the plan is for two leases but that no Logical Mining Unit has been formed.

Your review and approval of this plan is requested. Should you have any questions, please call us at 888-4431.

Sincerely,

R. E. Yourston  
General Superintendent

REY:CWW:cs  
Enc.

ATTACHMENT TO GENEVA MINE  
RESOURCE RECOVERY AND PROTECTION PLAN

30CFR 211.10(c) (1) Updated information to that included in the Mining and Reclamation Plan submitted to the Utah DOGM (pg. 782-3) is:

The mine operator is:

U. S. Steel Mining Company, Inc.  
Western District  
East Carbon, Utah 84520  
Telephone (801)888-4431

The resident agent of the operator is:

Mr. L. Paul Clark, Superintendent  
Geneva Mine  
U. S. Steel Mining Company, Inc.  
Western District  
East Carbon, Utah 84520  
Telephone (801)888-3349

(3)(ii) . The mining sequence is shown on accompanying Map J-3C. Geneva Mine is currently idle. When mining is resumed, it is anticipated that production will return to that given at page 784-2 of the Mining and Reclamation Plan (Utah DOGM).

No federally owned surface acreage will be affected by surface facilities.

Approximately 616 acres of federally owned coal may yet be mined.

(4)(i) Adjacent abandoned underground mines are shown on the accompanying Map J-3C. No surface mining has occurred in the area and there are no adjacent operating mines.

(4)(v)(A) The planned sequence of mining in Geneva Mine is shown on the accompanying Map J-3C.

(4)(v)(B) The location of mine workings, including barrier pillars, is shown on the accompanying Map J-3C.

(4)(v)(C) Accompanying mine Map J-3C shows areas where pillars and other coal have not been mined. Recovery of all of this coal depends upon the mining and economic conditions at the time of recovery.

Pillars which definitely will be left are barrier pillars separating panels. These are used to control ventilation and to minimize spontaneous combustion.

- (4)(v)(D) Accompanying Drawing A3-1422 shows typical panel entry systems. Main entry development on federal lands has been completed.
- (4)(v)(E) Accompanying Drawings A3-1423 and A3-1424 show typical panel recovery plans.

Coal Mine Geneva Mine Plan Date \_\_\_\_\_ Date Received \_\_\_\_\_

Current Resource Recovery and Protection Plan Approval Date \_\_\_\_\_

Regulation	Separate Items	Included In Plan	Adequate	Comments
(1) Names, addresses, and telephone numbers of persons responsible for operations to be conducted under the approved plan to whom notices and orders are to be delivered; names and addresses of operators/lessees; Federal lease serial numbers; Federal license serial numbers, if appropriate and names and addresses of surface and subsurface coal or other mineral owners of record, if other than the United States.	Operations	Attached		<u>Reference Legend</u> U.78 -Pg=Mining & Rec. Plan Submitted to Ut. DOGM 211: Pg=Mining Plan submitted to US Geol. Survey (5-13-77) GMO=Report submitted to US Geol. Sur. pursuant to General Mining Order No. 1 Att=Attached to this submittal. A3-# C3-# E3-# Maps or Drawings F3-# J-3C Mine Map (attached)
	Lessees	Attached		
	Lease Numbers	SL-046612 SL-066145		
	Surface Owners	U.782-5		
	Mineral Owners	U.782-5		
	Lease Numbers	U.C3-1203		
	MSHA I.D. #	42-00100-0		
(2) A general description of geologic conditions and mineral resources, with appropriate maps, within the area where mining is to be conducted.	Geologic Conditions	211: 7-11 U.783-7,8,10,72		
	Mineral Resources	211:22 U.783-72,74		
	Maps	U.783-73 Att. J-3C U.E3-3326 GMO F3-3265		
(3) A description of the proposed mining operation, including: (i) Sufficient coal analyses to determine the quality of the minable reserve base in terms including, but not limited to, Btu content on an as-received basis, ash, moisture, sulphur, volatile matter, and fixed carbon content.	Coal Analyses	211:22		
	Coal Quality	-		
	Btu	211:22		
	Ash	211:22		
	Moisture	211:22		
	Sulphur	U.783-10 211:22		
	Volatile Matter	211:22		
	Fixed Carbon	211:22		

\* The Resource Recovery and Protection Plan under 30 CFR 211.10(c) provides for the requirements of the Mineral Leasing Act (MLA) and shall be submitted to the District Mining Supervisor as required under

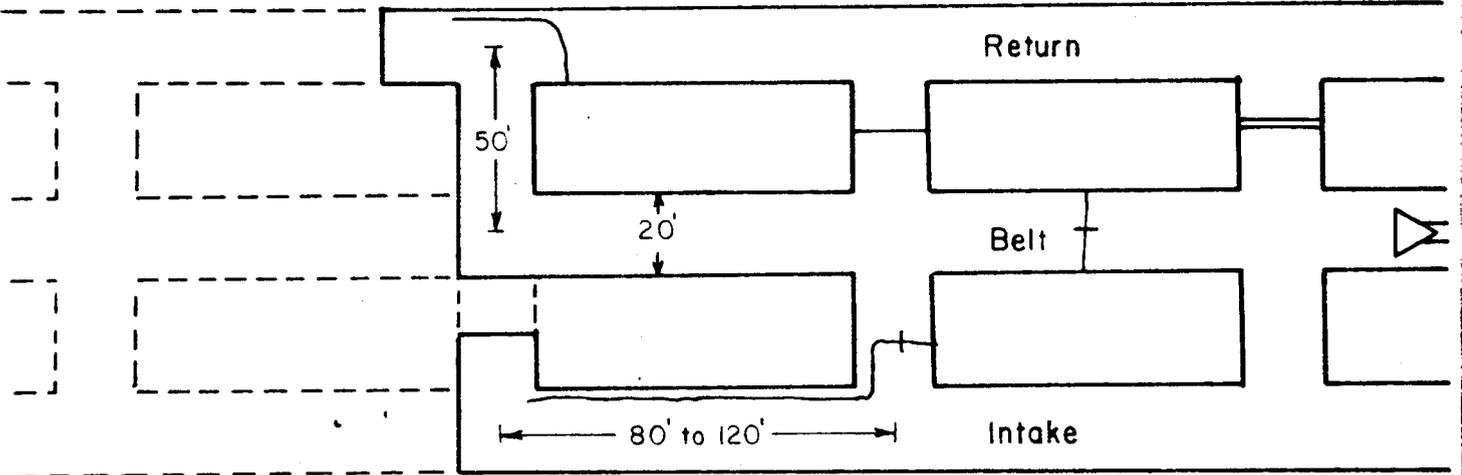
Regulation	Separate Items	Included In Plan	Adequate	Comments
(ii) The methods of mining and/or variation of methods, basic mining equipment and mining factors including, but not limited to, mining sequence, production rate, estimated recovery factors, stripping ratios, highwall limits, and number of acres to be affected.	Mining Methods	211:23-24		
	Mining Equipment	211:25-26		
	Mining Sequence	Att. J-3C		
	Production Rate	Att. U.784-2		
	Stripping Ratios	DNA		
	Highwall Limits	DNA		
	Acres Affected	Attached		
(iii) An estimate of the coal reserve base, minable reserve base, and recoverable coal reserves for each Federal lease included in the resource recovery and protection plan. If the resource recovery and protection plan covers an LMU, recoverable coal reserves will also be reported for the non-Federal lands included in the resource recovery and protection plan.	For each Fed. lease	GMO		
	For LMU	DNA		
	Coal Reserve Base	GMO		
	Minaible Reserve Base	GMO		
	Recov. Coal Reserves	GMO		
(iv) The method of abandonment of operations proposed to protect the unmined recoverable coal reserves and other resources.	Protect Coal Reserves	211:27,36-37		
	Protect Other Resources	211:27, 36		
(4) Maps and cross sections as follows: (i) A plan map of the area to be mined showing the following: (A) Federal lease boundaries and serial numbers; (B) LMU boundaries, if applicable; (C) Surface improvements, and surface ownership and boundaries;	Plan Map(s)	Att. J-3C		
	A	U.782-56		
	B	DNA		
	C	U. E3-171 U. E3-3334 U. C3-1202		

Regulation	Separate Items	Included In Plan	Adequate	Comments
(D) Coal outcrop showing dips and strikes; and, (E) Locations of existing and abandoned surface and underground mines.	D	U. 783-74 U. E3-3326 Att. J-3C		
	E	Att. J-3C		
(ii) Isopach maps of each coal bed to be mined and the overburden and interburden.	Coal Isopach Maps	GMO		
	Overburden	GMO		
	Interburden	GMO		
(iii) Typical structure cross sections showing all coal contained in the coal reserve base.	Cross Sections	U. 783-72 GMO E3-3265		
(iv) General layout of proposed surface or strip mine showing: (A) Planned sequence of mining by year for the first 5 years, thereafter in 5-year increments for the remainder of mine life; (B) Location and width of coal fenders; and, (C) Cross sections of typical pits showing highwall and spoil configuration, fenders, if any, and coal beds.	Gen. Layout Surface			
	A			
	B			
	C			
(v) General layout of proposed underground mine showing: (A) Planned sequence of mining by year for the first 5 years, thereafter in 5-year increments for the remainder of mine life; (B) Location of shafts, slopes, main development entries and barrier pillars, panel development, bleeder entries, and permanent barrier pillars;	General Layout Underground	Att. J-3C		
	A	Att. J-3C		
	B			

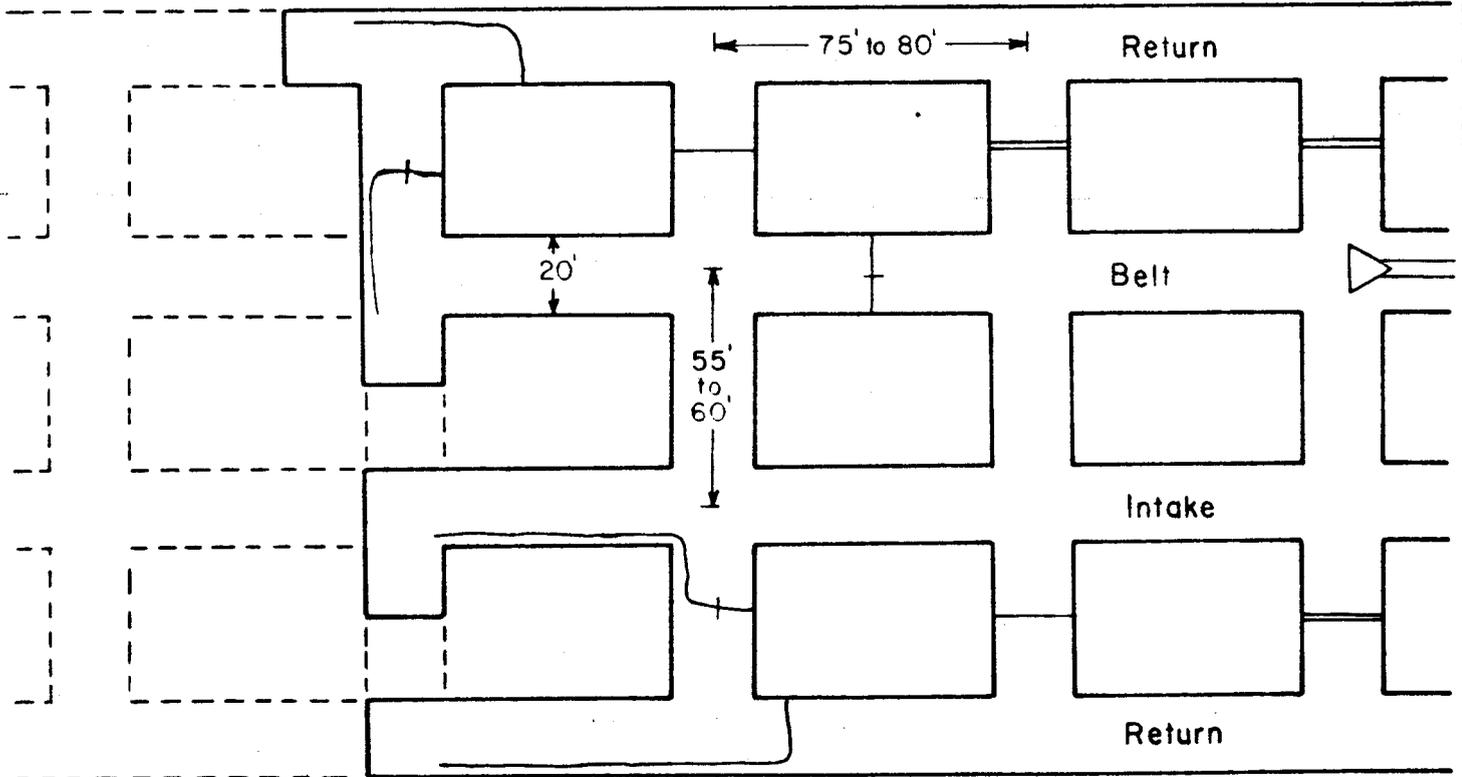
Regulation	Separate Items	Included In Plan	Adequate	Comments
<p>(C) Location of areas where pillars will be left and an explanation why these pillars will not be mined;</p> <p>(D) A sketch of a typical entry system for main development and panel development entries showing centerline distances between entries and crosscuts;</p> <p>(E) A sketch of typical panel recovery (e.g., room and pillar, longwall, or other mining method) showing, by numbering such mining, the sequence of development and retreat.</p>	C	Attached		
	D	Att. A3-1422		
	E	Att. A3-1423 Att. A3-1424		
<p>(vi) For auger mining:</p> <p>(A) A plan map showing the area to be auger mined and location of pillars to be left to allow access to deeper coal;</p> <p>(B) A sketch showing details of operations including coal bed thickness, auger hole spacing, diameter of holes and depth or length of auger holes.</p>	Auger Mining			
	A			
	B			
<p>(5) A general reclamation schedule for the life-of-the-mine. This should not be construed as meaning duplication of a permit application in a permit application package under SMGRA. The resource recovery and protection plan may cross-reference, as appropriate, a permit application submitted under SMGRA to fulfill this requirement.</p>	General Schedule	U.784-18,20,23		
	Included			
	Cross-Referenced	Yes		

Regulation	Separate Items	Included In Plan	Adequate	Comments
<p>(6) Any required data which are clearly duplicated in other submittals to the regulatory authority or Mine Safety and Health Administration may be used to fulfill the requirements of the above paragraphs provided that the cross-reference is clearly stated. A copy of the relevant portion of such submittals must be included in the resource recovery and protection plan.</p>	MSHA Approvals	Available in MMS Office		
	Included			
<p>(7) Explanation of how MER of the Federal coal will be achieved for the Federal coal leases included in the resource recovery and protection plan. If a coal bed, or portion thereof, is not to be mined or is to be rendered unminable by the operation, the operator/lessee shall submit appropriate justification to the District Mining Supervisor for approval.</p>	MER	U.784-27 GMO 211:27,34		

GENEVA MINE  
TYPICAL DEVELOPMENT SYSTEMS



TYPICAL 3-ENTRY PANEL DEVELOPMENT



TYPICAL 4-ENTRY PANEL DEVELOPMENT

APPROVED GHS 3-21-83

APPROVED FOR SAFETY

CHECKED

2-21-83

JAWN CWW

REVISIONS

ENGINEERING DEPARTMENT  
WESTERN DISTRICT COAL



GENEVA MINE

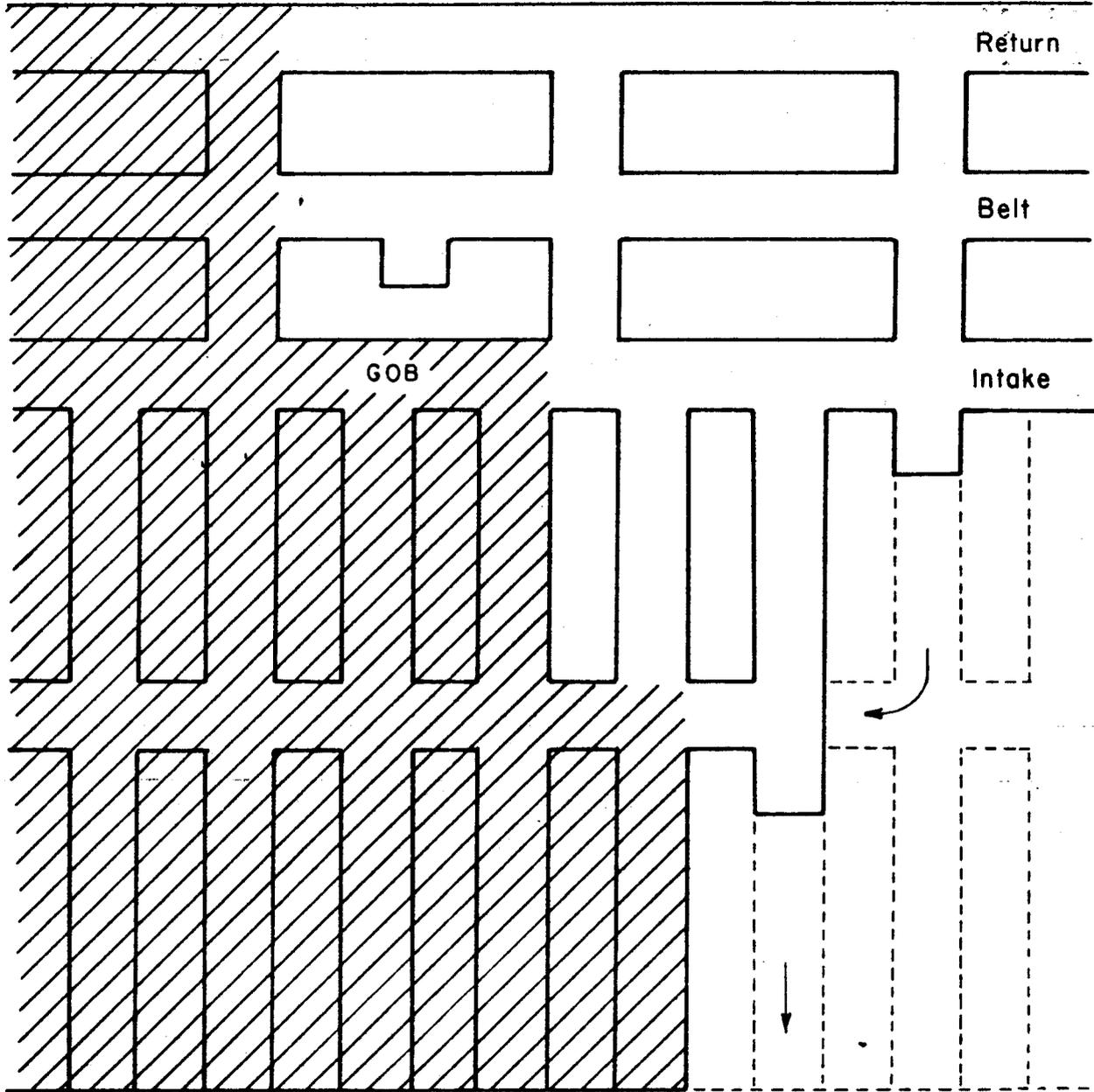
ENGINEERING DEPARTMENT  
WESTERN DISTRICT COAL

APPROVED GHS 3-21-83

APPROVED FOR SAFETY

CHECKED

RAWN C.W.W 3-17-83



TYPICAL 3-ENTRY PANEL RECOVERY

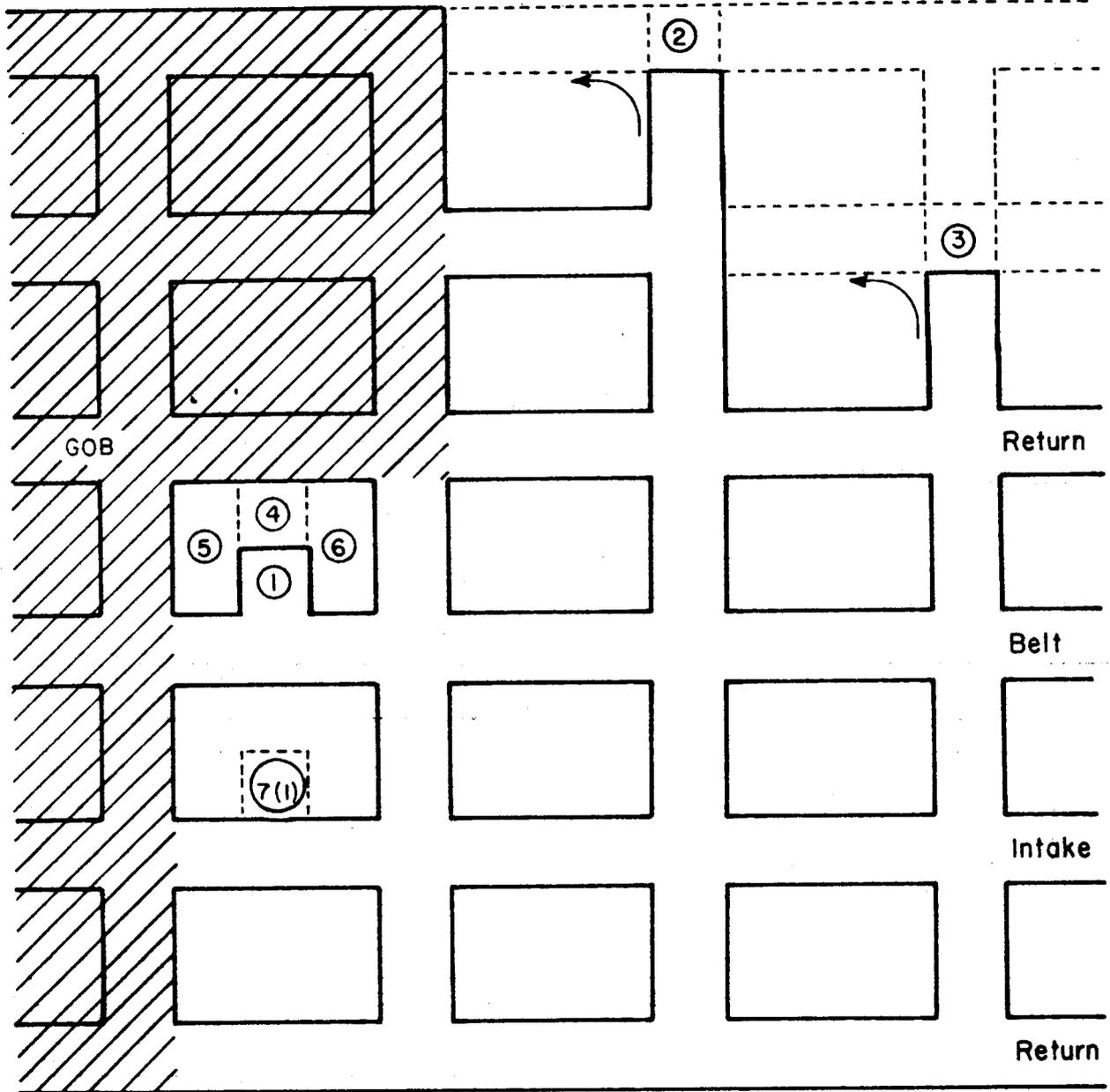
Retreat pillars one row at a time while developing new rooms.

↓ Direction of room development.

REVISIONS



# GENEVA MINE



### TYPICAL 4-ENTRY PANEL RECOVERY

#### LEGEND

- ① Sequence of mining  
(repeats with each pillar)
- ↪ Direction of room development

REVISIONS

ENGINEERING DEPARTMENT WESTERN DISTRICT COAL  
 APPROVED GHS 3-21-83  
 APPROVED FOR SAFETY  
 CHECKED  
 C.W.M. 3-17-83