CO-OP MINING CO.

P.O. Box 15809
Salt Lake City, Utah 84115
Phone (801) 467-4003

May 7, 1983

BEAR CANYON PERMIT MODIFICATION

The following pages contain the Co-op Mining Company response to the letter from DOGM listing the deficiency in the modifications for the Bear Creek Canyon Mine of Feb. 3, 1983, refered to in a letter of May 2, 1983.

Technical data in the following has been supplied by Viking Engineering, Environmental Industrial Supply, and Dames and Moore - Professional Engineers.

RECEIVED
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DIVISION OF
OIL, GAS & MINING

UMC 783.14 Geology Description

The following report was prepared for the Co-op Mining Company by;

Viking Engineering Services
630 North Windsor
Price, Utah 84501

SECTION UMC 783.14
Geology of the Bear Canyon Mine
ACT/015/025

I. SCOPE

This section describes the general geological conditions at the Bear Canyon permit area, and the adjacent areas. This section will cover the following subjects: methodology, regional geology, stratigraphy, coal reserves, coal quality and characteristics of the adjacent units.

II. METHODOLOGY

The information used in preparing the geology section includes available literature, coupled with field data from Sanders Exploration, Limited and Viking Engineering Services. Physical and chemical analyses were extracted from U.G.M.S. and U.S.G.S. published reports.

III. REGIONAL GEOLOGY

The mine site lies in the south west edge of the Hiawatha N.E. quadrangle in Emery County, Utah: located approximately 12 miles west northwest along State Highway 31, from the town of Huntinton. [Township 16 South, Range 7 East, S.L.B.M.]. The Hiawatha N.E. quadrangle is located in the north central part of the Wasatch Plateau Coal Field, and centered around the south half of the Gentry Mountain. The landscape is rugged and cliffy to steep. The only flat land is on the top of the Gentry Mountain, which lies 9,250 and 9,750 feet above sea level. The Wasatch Plateau is a transition zone containing geologic structures common to both the Colorado Plateau Province and the Basin and Range Province to the west.

The Bear Canyon Mine site is located near the center of the Wasatch Plateau Coal Field. Rock types at the site are late Cretaceous in age and are generally composed of sandstone of fine to medium grain size, interbedded with subordinate gray and dark gray carbonaceous shale and coal seams. These represent continental and or transsitional sediments. Marine sediments occur below the sequence and are exposed to the east of the escarpment in Castle Valley.

Table 1 gives the generalized stratigraphic sequence and unit description for the Wasatch Plateau. The oldest rocks are of early Upper Cretaceous age. The major commercial coal seams occur in the Blackhawk Formation and are of the Campanion age.

Structurally, the strata in the Wasatch Plateau generally dip southerly [slightly southeast or southwest] at angles of 1 to 3 degrees. Three major north-south trending fault zones have been defined in the Wasatch Plateau Coal Field. Each zone is the product of a high block fault with extensive minor fracturing within the graben. The Bear Canyon Mine is located in the Pleasant Valley Fault Zone. The Pleasant Valley Fault Zone is approximately 3 to 5 miles wide, with vertical displacement between a few feet and 200 feet plus. The Bear Canyon Fault is the major fault that separates the Bear Canyon Mine for the Trail Canyon Mine. [Note: Geotechnical section and the mine map for Bear Canyon are located in the appendix.] Displacement on this particular fault is extimated to be 220 feet. During the mining of the Bear Canyon Seam several minor faults were discover in the

Trail Canyon Mine. These faults may effect the mining of other seams. The extent of the Bear Canyon Fault forced the Co-Op Mining Company to develop the Bear Canyon Mine.

IV. STRATIGRAPHY

All of the geologic formation exposed on or adjacent to the permit area are Cretaceous members of the Mesaverde group, with the exception of the North Horn Formation, which is Tertiary. The minable coal seams are located in the Upper Cretaceous Blackhawk Formation.

Star Point Sandstone

The Star Point Sandstone is the basal formation of the Mesaverde group (Doelling, 1972), is a light-colored, massive, medium- to fine grained sandstone (Spieker, 1931). The sandstone is relatively impermeable with groundwater movement occurring mainly in fractures.

Blackhawk Formation

Overlying the Star Point is the Blackhawk Formation which is the middle and coal-bearing division of the Mesaverde group. The Blackhawk consists of alternating sandstone, shale, and coal beds and is approximately 700 to 800 feet thick with the valuable coal seams located within the lower 400 feet (Doelling, 1972).

The sandstone beds are fine to medium-grained (Spieder, 1931) and yellow-gray to tan in color (Doelling, 1972). The sands of the Blackhawk are cemented by calcium carbonate or silicawith the exception of a few localized areas in which the cement consists almost entirely of clay. Iron is also present in the cement of all but the pure white sandstones (Spieker, 1931). The generally discontinuous nature of the Blackhawk and apparent low specific yield (Cordova, 1964) indicates that the water yielding capabilities of the Blackhawk are only of local importance.

Spieker (1931) identifies three general types of shale in the Blackhawk Formation: ordinary clay shale, carbonaceous shale, and smoke-gray shale (all continental in origin). The ordinary clay shale is gray to greeen, granular and normally soft at the outcrop; the carbonaceous shale is brown to black, massive and laminated; and the smoke-gray shale is tough and leathery, and in its unweathered state is hard and homogenous (Spieker, 1931). The presence of shale acts as a significant barrier to the vertical movement of water within the Blackhawk Formation.

Castlegate Sandstone

The Castelgate Sandstone, generally is considered a member of thePrice River Formation (Spieker, 1931), consist of massive, highly resistant, medium- to coarse-grained sandstone beds, containing in places conglomerate with a matrix of grit (Doelling, 1972). Although the Castlegate overlies the Blackhawk Formation, it appears to be barren of coal in the permit area.

Price River Formation

The lithologic characteristics of both the Price River Formation and the underlying Castlegate Sandstone are similar. The Castelgate member is separated from the Price river due to its cliff-forming

characteristic (Spieker, 1931). Like the Castlegate, the Price River Formation consists of medium- to coarse-grained sandstone beds with occasional lenses of shale. Although the unit has a high porosity, its apparent low permeability (Cordova, 1964) reduces its water-yielding capabilities except through fractures.

North Horn Formation

The youngest geologic formation within the mine plan area is the North Horn Formation. The North Horn is the lowermost member of the Wasatch Group, consisting of variegated shales, irregular beds of gray, brown, or cream-colored sandstone of various texture, and thin beds of steel gray and cream-colored limestone (Spieker, 1931). Like the Blackhawk Formation, the presence of shales in the Castlegate, Price River, and North Horn Formations act as significant barriers to the vertical movement of water within the formations. Therefore, asignificant portion of the water which reaches these underlying formations probably percolates downward until encountering a shale layer, which then causes horizontal movement to the surface of another "drain" (i.e. sandstone finger within the formation).

V. COAL

Multiple coal seams are found in the lower 350 feet of the Blackhawk Formation as was previously determined. The ascending order of the jaor coal seams are: Hiawatha and Bear Canyon. Upper coal seams were found to be burned and of little importance in the Bear Canyon permit area. The Blind Canyon seam is not considered minable on the Trail Canyon side of the Bear Canyon Fault; but the Bear Canyon Mine has plans to mine the Blind Canyon seam. The Hiawatha and the Bear Canyon seams were measured and observed at various points in the mine area by H. H. Doelling. Note the enclosed coal sections numbered 45, 46 (Bear Canyon), 109,110, 111, 112, 113 (Hiawatha Seam) Limited traceability of the upper seams is attributed to the lenticular nature of the seams, and the extent of slope debris acting as cover for depositional irregularities.

Coal Quality

Please note the permit application and current sales analysis for coal quality.

Generalized Section of Rock Formations, Wasatch Plateau Coal Field*

	Series	Stratigraphic Unit		Thickness (feet)	Description
Tertiary	Eocene	Green River Formation		-	Greenish lacustrine shale and siltstone
	Paleocene	Wasatch Group	Colton Formation	300-1,500	Varicolored shale with sandstone and limestone lenses
			Flagstaff Limestone	200-1,500	Gray freshwater limestone, evenly bedded with minor sandstone, shale, and volcanic ash
			North Horn Formation (Lower Wasatch)	500-2,500	Variegated shales with sandstone, conglomerate, and freshwater limestone
Cretaceous	Maestrichthian	Mesaverde Group	Price River Formation	600-1,000	Gray sandstone interbedded with subordinate shale and conglomerate
			Castlegate Sandstone	150-500	White, coarse-grained, often conglomeratic sandstone
			Blackhawk Formation Major Coal Seams	700-1,000	Yellowish, fine-to-medium-grained sandstone interbedded with subordinate carbonaceous shale and several thick coal seams.
	Campanian		Star Point Sandstone	90-1,000	Yellow-gray massive cliff-forming sandstone, often in several tongues separated by Masuk Shale.
	Santonian	Mancos Shale	Masuk Shale	300-1,300	Blue-gray shale, slope former.
			Emery Sandstone Coal (?)	50-800	Yellow-gray friable sandstone tongue or tongues, may contain coal. (?)
	Coniacian		Blue Gate Member	1,500-2,400	Blue-gray nodular and marine mudstone and siltstone with arenaceous beds.
	Turonian		Ferron Sandstone Member Major Coal Seams	50-950	Alternating yellow-gray sandstone, sandy shale, and gray shale with important coal beds of Emery coal field.
	Cenomanian		Tununk Shale Member	400-650	Blue-gray to black sandy marine mudstone.
	Albian	Dakota Sandstone Minor Coal		0-60	Variable assemblages of yellow-gray sandstone, conglomerate, shale, and coal.

*Adapted from Doelling, 1972.

AVERAGE COAL ANALYSES, HIAWATHA NE QUADRANGLE

	No. Analyses	As-received (percent) Average	Range
BEAR CANYON BED			
Moisture	6	6.8	4.5-10.9
Volatile matter	6	43.8	37.4-46.0
Fixed carbon	6	45.7	44.9-46.0
Ash	6	4.5	3.8- 5.8
Sulfur	6	0.53	0.5- 0.6
Btu/lb	6	13,014	10,840-13,530
BLIND CANYON BED			
Moisture	10	4.8	3.8- 5.3
Volatile matter	9	41.7	40.2-44.7
Fixed carbon	9	44.3	39.2-48.3
Ash	10	8.9	5.8-12.4
Sulfur	8	0.58	0.5- 0.6
Btu/lb	9	12,392	11,700-13,080
HIAWATHA BED			
Moisture	370	5.6	0.7 -11.0
Volatile matter	357	42.3	36.3 -46.4
Fixed carbon	357	45.7	38.3 -52.7
Ash	359	6.2	3.3 -11.2
Sulfur	330	0.61	0.29- 1.1
Btu/lb	365	12,719	11,521-13,600

TABLE 2 (AFTER DOELLING, 1972)

TABLE II-3.--Average (arithmetic mean) composition and observed range of 10 major and minor oxides and 20 trace elements in coal ash, and contents of seven additional trace elements in 48 Wasatch Plateau field coal samples

[Source: Hayes, and others, 1977. All samples were ashed at 525°C; <, less than]

Oxide or element	Average (arithmetic mean)	Observed range	
		Minimum	Maximum
Major and minor oxides in ash (percent)			
Ash	11.45	1.8	36.6
Silica (SiO_2)	53	21	84
Aluminum oxide (Al_2O_3)	16	6.2	29
Calcium oxide (CaO)	6.1	.86	25
Magnesium oxide (MgO)	1.05	.42	2.53
Sodium oxide (Na_2O)	3.64	.11	8.41
Potassium oxide (K_2O)	.75	.062	2.2
Ferric oxide (Fe_2O_3)	3.9	.83	12
Manganese oxide (MnO)	.010	.003	.026
Titanium dioxide (TiO_2)	.92	.42	1.7
Sulfur trioxide (SO_3)	4.2	.66	10
Trace elements in ash (parts per million)			
Boron (B)	1,000	200	3,000
Barium (Ba)	700	70	3,000
Beryllium (Be)	15	<3	50
Cadmium (Cd)	.9	1.0	2.0
Cobalt (Co)	15	<10	50
Chromium (Cr)	100	30	200
Copper (Cu)	95	32	266
Gallium (Ga)	30	10	70
Lithium (Li)	111	15	288
Molybdenum (Mo)	10	<7	20
Niobium (Nb)	20	<20	50
Nickel (Ni)	50	10	200
Lead (Pb)	55	<25	195
Scandium (Sc)	20	<10	50
Strontium (Sr)	1,000	100	5,000
Vanadium (V)	100	70	300
Yttrium (Y)	70	30	300
Ytterbium (Yb)	7	3	15
Zinc (Zn)	84	19	237
Zirconium (Zr)	200	100	500
Trace elements in whole coal (parts per million)			
Arsenic (As)	1.0	<0.5	3
Fluorine (F)	70	<20	240
Mercury (Hg)	.05	.01	.21
Antimony (Sb)	.3	<.1	.7
Selenium (Se)	1.7	.8	5.7
Thorium (Th)	1.7	<3.0	5.2
Uranium (U)	1.3	.2	3.5

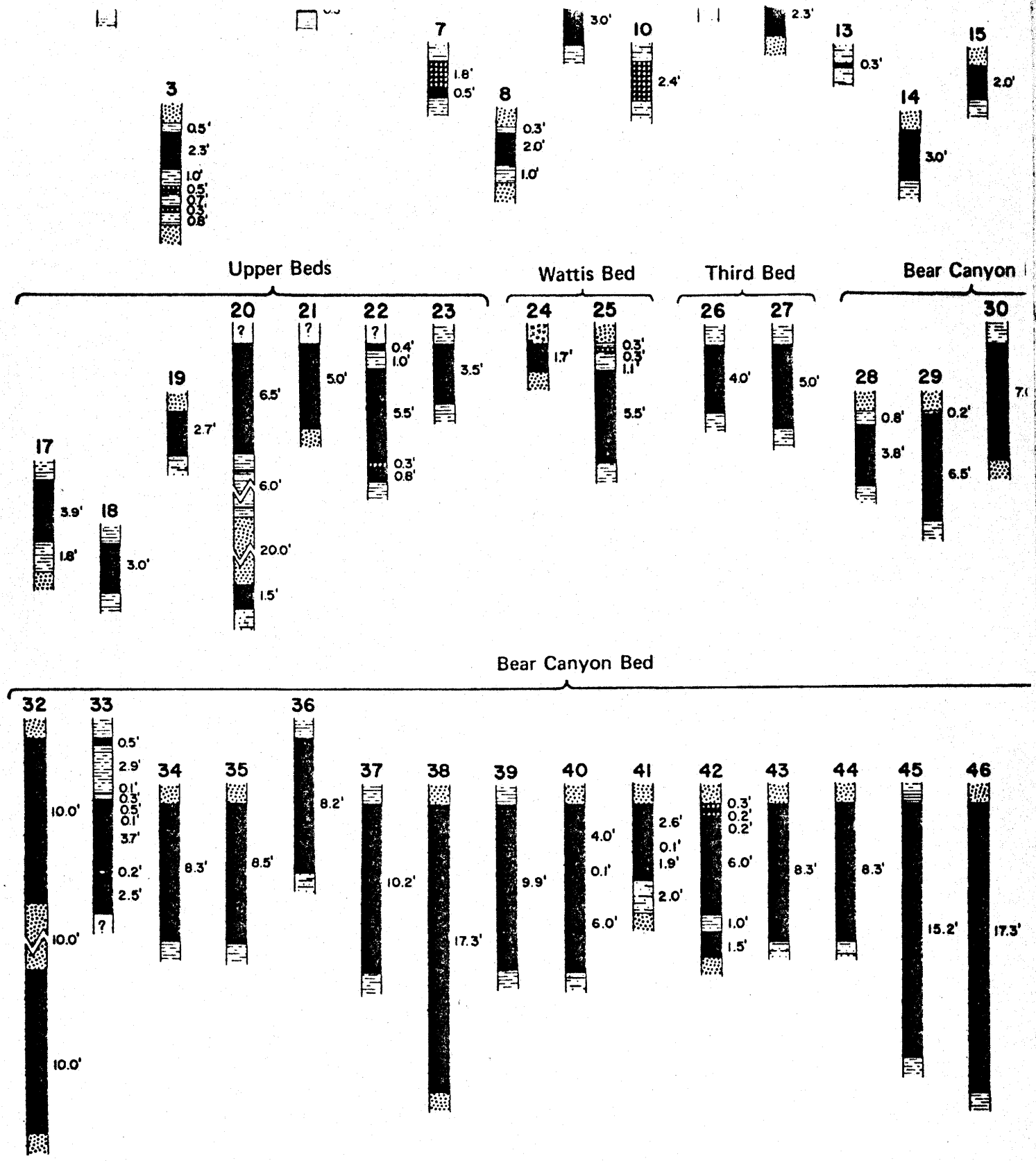
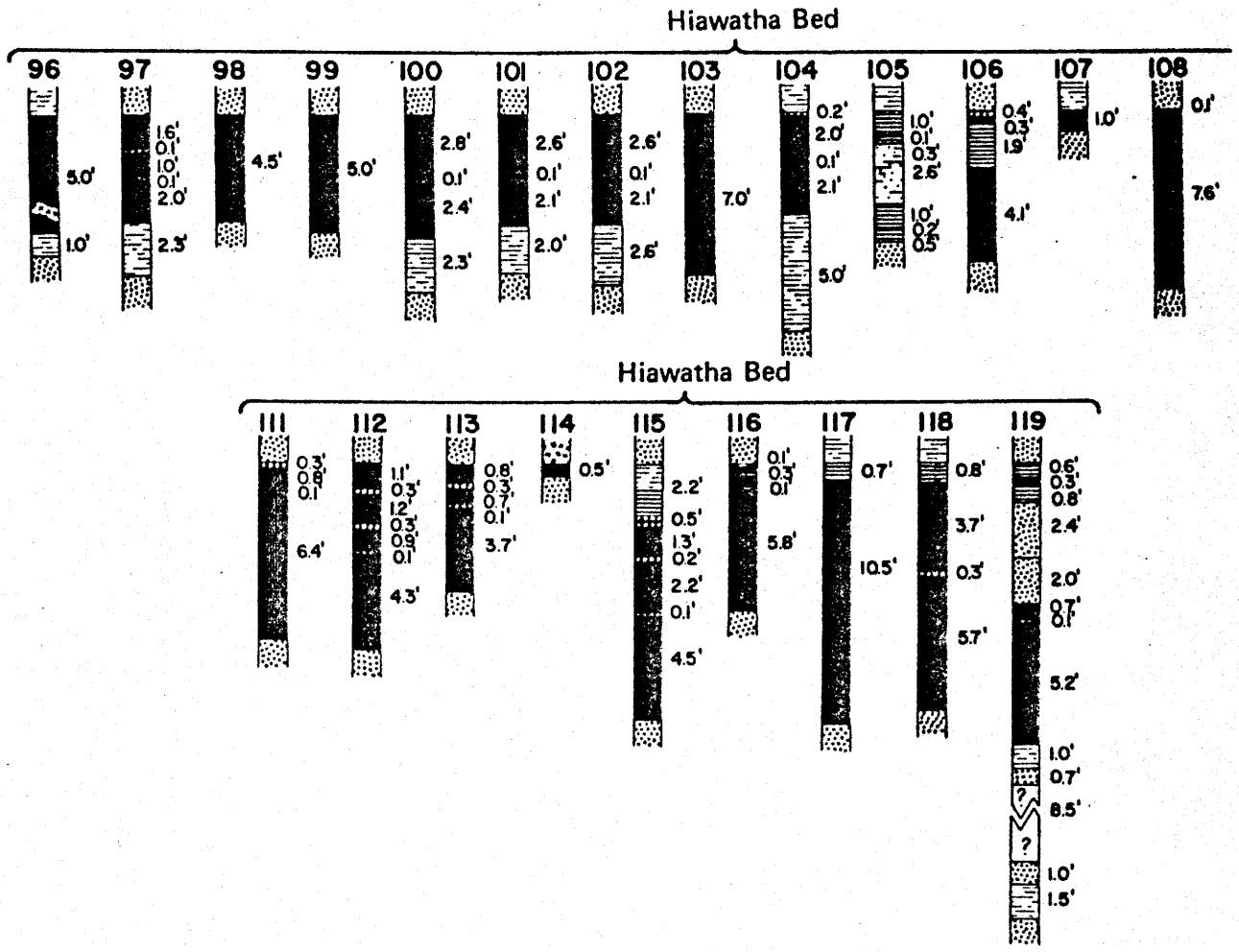
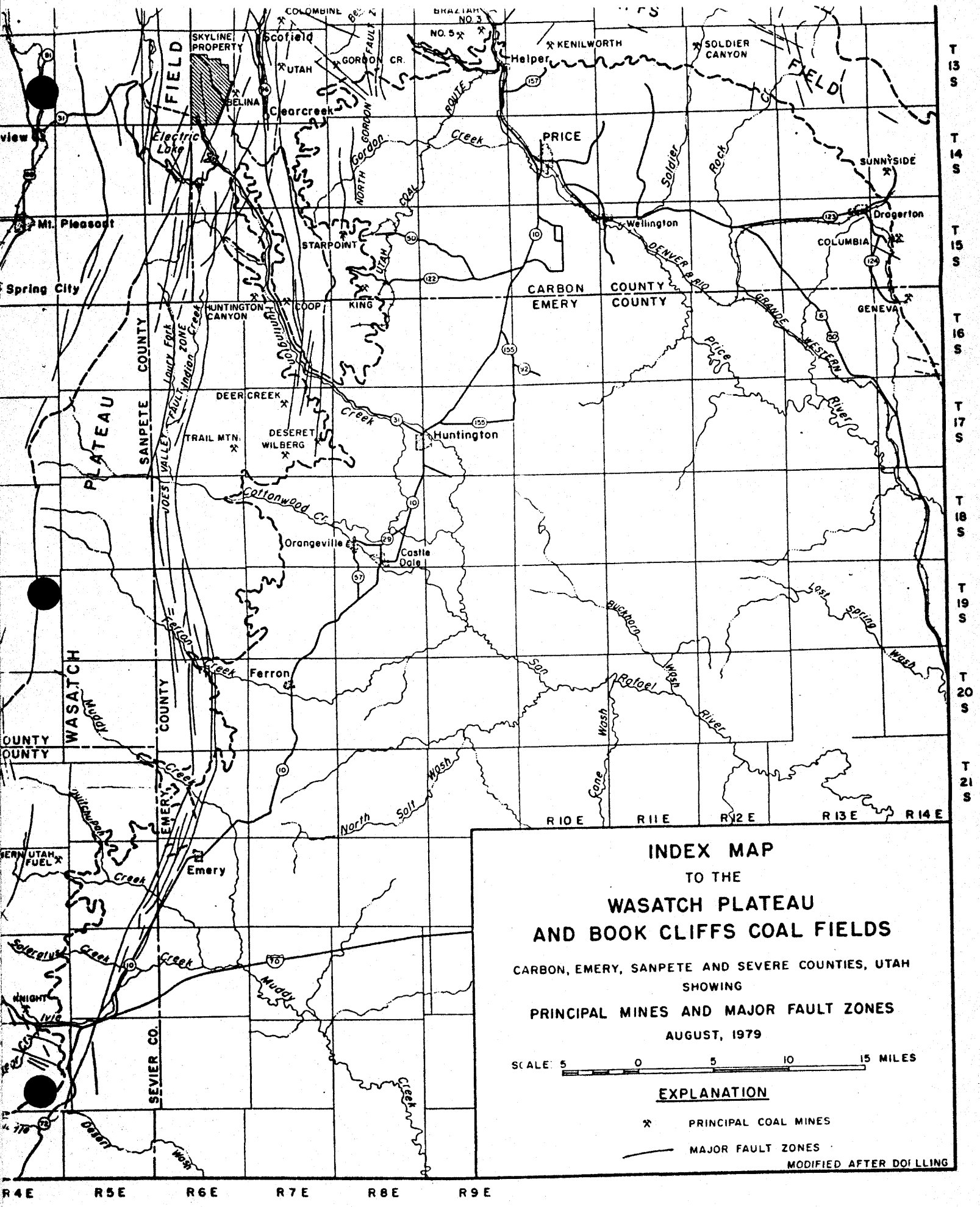


Figure 41. Coal sections of Hiawatha NE quadrangle (vertical scale: 1 inch = 8 feet).


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


INDEX MAP
TO THE
WASATCH PLATEAU
AND BOOK CLIFFS COAL FIELDS
CARBON, EMERY, SANPETE AND SEVERE COUNTIES, UTAH
SHOWING
PRINCIPAL MINES AND MAJOR FAULT ZONES
AUGUST, 1979
SCALE: 5 0 5 10 15 MILES
EXPLANATION
PRINCIPAL COAL MINES
MAJOR FAULT ZONES
MODIFIED AFTER DOILLING
SKYLINE PROPERTY
Scofield
UTAH
BELINA
Clearcreek
Electric Lake
Mt. Pleasant
Spring City
HUNTINGTON CANYON
COOP
KING
STARPOINT
DEER CREEK
TRAIL MTN.
DESERET
WILBERG
Huntington
Orangeville
Castle Dale
Ferron
Emery
KNIGHT
COLUMBINE
BRAZTAH NO. 3
NO. 5
GORDON CR.
Helper
KENILWORTH
SOLDIER CANYON
PRICE
SUNNYSIDE
Wellington
Dragerton
COLUMBIA
GENEVA
CARBON COUNTY
EMERY COUNTY
SANPETE COUNTY
SEVIER CO.
WASATCH PLATEAU
FIELD
T 13 S
T 14 S
T 15 S
T 16 S
T 17 S
T 18 S
T 19 S
T 20 S
T 21 S
R 4 E
R 5 E
R 6 E
R 7 E
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R 11 E
R 12 E
R 13 E
R 14 E

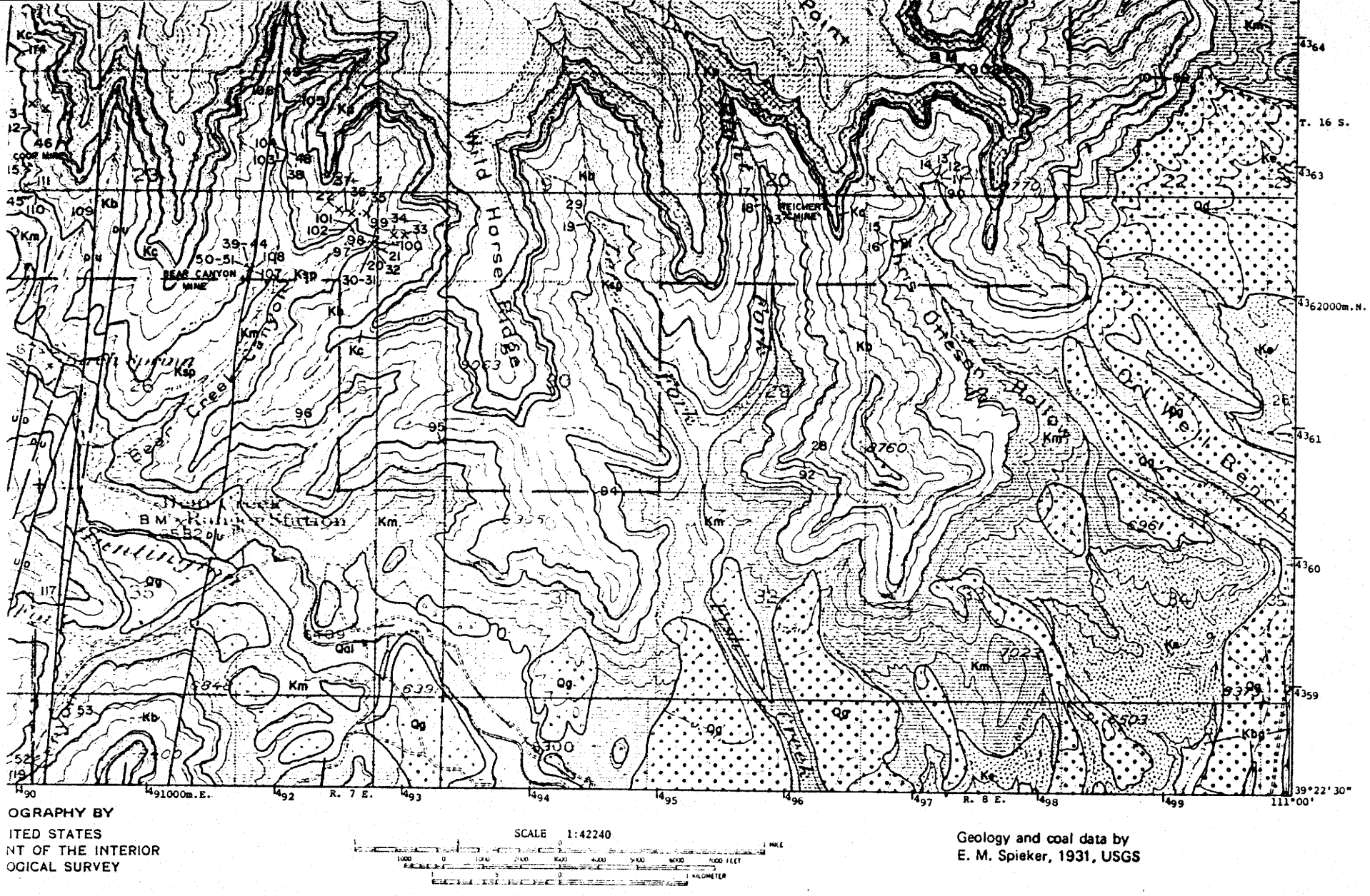


Figure 40. Coal and geology map, Hiawatha NE quadrangle (explanation pages 136-137).

UMC 783.25 Cross-Section, Maps and Plans

Cross-Section and maps are included in the Reclamation Plan prepared for the Co-op Mining Company by Environmental Industrial Supply. Berm and drainage detail on thes maps are complete for the scale and upper pad areas only. The berm and drainage detail for the entire disturbed area is to be included in the completed permit application.

UMC 784.11 Operation Plan: General Requirements

The narrative explaining the maintenance of roads included the use of ammonium chloride by mistake. The writer intended the use of magnesium chloride as suggested by the Division.

UMC 784.11 (b) Removal of structures

Structures will be dismantled at the time of final reclamation and disposed of as salvage. Remaining foundations will be covered to a depth of at least four feet.

UMC 784.13 Reclamation Plan: General Requirements

The following Reclamation Plan has been prepared for the Co-op Mining Company by:

Environmental Industrial Supply
P.O. Box 358
Elmo, Utah 84521

Tha Co-op Mining Company has contracted with Environmental Industrial Supply to collect vegitation data and establish reference areas. We request a meeting with DOGM and Mel Coonrod of E I S in this regard.

E I S

ENVIRONMENTAL INDUSTRIAL SUPPLY

P.O. Box 358 - Elmo, Utah 84521 - Telephone (801) 653-2606

Mel Coonrod - Reclamation Specialist
Hydro Seeding & Planting - Field Consultants
Complete Reclamation Supplies

May 5, 1983

Utah Division of Oil, Gas, & Mining
424 State Office Building
Salt Lake City, Utah 84114

To Whom It May Concern:

Mr. Wendell Owen of the Co-Op Mining Company has contracted with E.I.S. (Environmental, Industrial Supply Co.) to establish a number of vegetation reference areas in both Bear, and Trail Canyons. The locations and methodology to evaluate the reference areas will be subject to DOGM review and approval prior to work commencing.

Upon completion of the reference area, an interum and permanent reclamation plan for the balance of the disturbance in association with the Co-Op's mining activities will be finalized.

Sincerely,

Melvin A. Coonrod
Reclamation Specialist

MC/njc

Where is Attach # 1 map? Rick

RECLAMATION PLAN

BEAR CANYON SCALE HOUSE AND ASSOCIATED DISTURBANCE

Ref: February 3, 1983 letter modification - Bear Canyon Mine

UMC 784.13

The following procedures are designed to revegetate and control erosion. They should, to a large degree, satisfy the commitments made by Co-Op Mining Company in their permit. Also, satisfy DOGM regulations as pertaining to interim reclamation and final reclamation for those areas which will be utilized after mining operations are concluded.

The area in question is along and adjacent to the Bear Canyon Mine access road, and will be of a permanent nature. (See attachment #1 map).

The actual ground involved comprises approximately 2 acres of road and deck area. The actual procedures involve a four (4) phase program; (1) Earthwork, (2) To hydromulch the entire area to supplement revegetation and control run-off until stabilization is complete, (3) To prepare a site which will be stable enough for a period of time to allow vegetation to become established, and (4) To plant seedings to further stabilize the soil and to provide necessary wildlife, hydrological and aesthetic commitments as detailed in mine reclamation permit.

Phase 1 Earthwork, Original Contour

The road and pad can be brought back to a reasonable configuration by implementation of a large backhoe unit in conjunction with a crawler tractor (JD450). The actual method will involve the pulling of material from approximately ten feet below the road cut up onto the road surface and spreading and compacting this material with the crawler tractor, at the same time pulling the leading edge of the high wall down to lessen the degree and angle of the high wall. All work done both above and below the road should take into consideration existing

vegetation and all effort should be made to minimize disturbance where possible. When there is no alternative other than disturbance, an effort can be made to relocate earth and maintain existing vegetation in place, attempting to relocate the vegetation in the proximity of the road disturbance. (See attachment # 2). The material redistributed to regain original contour should be compacted to approximately 95% of the original or adjacent undisturbed soil. Upon completion of this step of spreading and compacting, the unconsolidated native material will approach the original configuration of the site prior to disturbance. The native topsoil which was removed from the area will be redistributed to a depth of 25 centimeters, as indicated by Soil Survey March 1980. (See attachment 3 and 3b soils map). Upon redistribution of the A horizon soil, all associated compaction resulting from spreading will be alleviated by ripping the entire area to a depth of 20 centimeters to enhance the revegetation effort.

Phase 2 Seeding and Mulching

The entire area of disturbance should be drill and hydroseeded during the first Fall following the complete abandonment and earth work. (September through November, 2016).

The largest portion of the recontoured site will facilitate drill seeding. In order to lessen compaction, a rangeland drill seeder pulled behind a small crawler tractor would be utilized. A tentative estimate of the area to drill seed is approximately 1.5 acres. The balance of the area would then be hydroseeded. The seed mix and rate of application is attached. (See attachment 4).

In combination with the seed, the following rates of tackifyer should be utilized:

(Rates of Tac were developed with respect to velocity and erosive power of water which is proportional to the spuare root of the slope.) An emperical factor was determined from laboratory and field studies to arrive at the minimum Tac fiber ratio. Thus, 60 lbs. of Tac per ton of fiber is about minimum for slopes up to 20% and the emperical factor is determined as $60 \div \sqrt{25\%} = 12$. A 25% slope is about maximum for the mimimum amount of Tac. For a 100% slope (1:1 or 45°) the ratio of Tac

to fiber is calculated as:

$$(\sqrt{100\%})\ (12) = 120 \text{ lbs.}$$

Suggested ratios of Tac to fiber for
Hydroseeding and Hydromulching to serve as mulch or soil binder

Slope Angle	Slope Ratio	Percent Slope	lbs. Tac per Ton fiber	Ratio Tac to fiber
	rise:run			
14°	1 : 4	25%	60 (minimum) *	1 : 30
26°	1 : 2	50%	80	1 : 25
33°	1 : 1½	66%	100	1 : 20
45°	1 : 1	100%	120	1 : 16
57°	1½ : 1	150%	140	1 : 14
64°	2 : 1	200%	160 (minimum)	1 : 12

* 60 pounds is suggested as a minimum to insure excellent stabilization; however, in many conditions 40 pounds of Tac per acre has given excellent results on a 1 : 4 or less slope.

The minimum specifications for both Tac and mulch are included under attachment 5.

Following the seeding effort, the entire area of disturbance well be hydromulched and fertilized. The rate of application of the mulch is:

1,200 to 1,500 lbs/acre on 1 : 1 slopes
2,000 to 2,500 lbs/acre on 3 : 1 slopes

The mulch should also be fortified with Tac as previously indicated according to slope. Incorporated in the mulch slurry, the following rate of fertilizer will be applied per acre:

80 lbs. N/acre
100 lbs. P_2O_5/acre
100 lbs. K_2O_5/acre

Approximately 50% of the above application can be incorporated in the mulch and the balance be added as an over spray the following Fall. Recommendation on fertilizer requirements based on soils test (See attachment 6).

Phase 3 Site Preparation

Site stability will be largely accomplished through the grading, compacting, and the utilization of a tackifying agent. However, on those areas with slopes of more than 2 : 1, the following proceedures will add an additional parameter of stability and enhance the revegetation efforts.

Site preparation is both general and specific in proceedures. The sites and methods detailed in Illustration (see attachment 7 & 7A) provide a multitude of purposes and to a large degree are residual for several years. First and foremost, they effectively decrease the angle of repose of the slope in question. In accomplishing this, you effectively modify the site and change those conditions which preclude vegetation from becoming established. Second, you change the severity of erosion, and in fact, use those surface waters which heretofore were destructive in nature. This is accomplished by creating basins wherein the water has time to soak in and thus can be utilized by vegetation.

This in turn, decreases the impact on adjacent watersheds and improves quality of surface waters. Those areas which are terraced provide a more favorable ecosystem than that of an equivalent slope. It facilitates better utilization of grasses and forage for grazing animals; to some degree it modifies climate, in that severity of wind and weather is somewhat diminished. Also, the cut face acts in much the same as a snow drift fence does, in trapping and causing small areas of snow retention.

Phase 4 Planting

The planting of seedlings will be done within 2 years of the seeding effort in order to evaluate the number and species of seedlings necessary to insure both composition and stocking of woody species to maximize utilization by wildlife and domestic grazing.

The species and numbers of individual plants will be correlated to the reference area which will be established during July of 1983.

PLANTING PROCEDURE

Planting will be done utilizing a powered auger with a capability of drilling a 3"+ diameter hole to a depth of 16". The roots of the seedling will be arranged in as near natural position as possible paying special attention not to "J" the root tips. (See attachment 8)

By holding the seedling at the root crown, soil should be compacted back around the roots being careful to leave no air pockets or loose dirt (which would constitute settling). The tree should be firm when light pressure is exerted on the needles and standing in an errect position. Only hands shall be used to pack soil around the tree - the use of a stick or foot is strictly forbidden.

At all times the trees will be protected from direct sun light, and special care will be exhibited when lifting the seedling from the planting bag to the prepared hole.

FIELD STORAGE

Field storage facilities are illustrated in Attachment 8A. In the event snow is not available, a similar cache can be constructed using wet burlap and damp straw.

The mine will have to maintain a sorting, packaging and storing tent at the cache site. A sorting table will need to be set up in one tent. Each seedling must be examined and all that do not have a 2 to 1 crown to root relationship, or are damaged must be discarded. The seedlings then need to be dipped in a vermiculite slurry and then rolled in wet burlap and placed in canvas planting bags.

The trees can only be left in the bags for twenty-four hour periods and then must be repacked following the same procedures.

The field handling of packed trees requires the crowns be kept moist and the bags covered with insulated tarps and stored in shaded areas.

During breaks, - lunch, etc, - the crews planting bags must be placed in shaded areas. At the end of each operational day, all bags must be

unpacked and the trees redipped in vermiculite and rerolled in wet burlap and repackaged to be used first the succeeding day.

Upon completion, the reclaimed area will be monitored to determine when bond release prameters are achieved. If, the monitoring indicates inadaquacies, the area will be supplemented with additional efforts..

The monitoring procedures will be the same sampling methodologies which will be inporporated in establishment of reference areas.

ESTIMATE OF RECLAMATION COSTS ON

BEAR CANYON SCALE DISTURBANCE

All costs are based on known costs - contract amount on work either in progress or completed in the preceeding 12 months.

Type of Activity	Cost Per Acre
Hydromulching & Seeding:	
Application of seed & tackifyer equipment and labor only	$ 175.00 / acre
Application of mulch, fertilizer, and tac equipment and labor only	275.00 / acre
Mobilization (UtahArea)	Job 500.00
mulch	380.00 / acre
Tac @ $1.60/# 140#/acre	224.00 / acre
fertilizer @ $23.00/100#	23.00 / acre
Drill Seeding	240.00 / acre
JD 450 crawler @ $45.00/hr.	
• estimate 8 hr/acre	360.00 / acre
Case 580 Backhoe @ $35.00/hr. estimate 24 hr./acre	840.00
Seed	
variable - current quote	165.00 / acre
planting and site preparation	93.00 / acre
nursery stock .50 each	

ESTIMATE OF TOTAL COST ON RECLAMATION
Approximately 2 acres

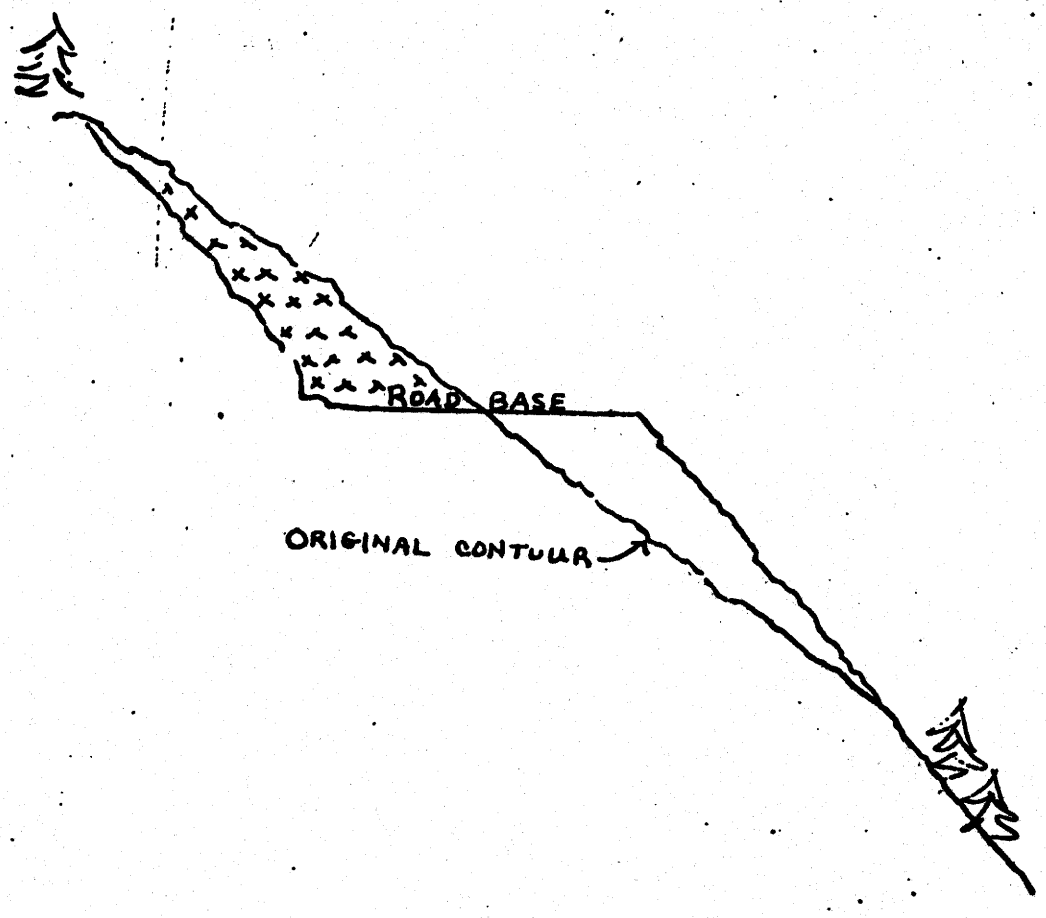
5 acres hydroseeding	$ 87.50
2 acres hydromulching & fertilizing	1,804.00
Mobilization in Utah	500.00
Drill seeding	360.00
Crawler tractor	720.00
Backhoe 560 Case	1,680.00
Seed (current bid-Maple leaf supply)	330.00
Planting & site preparation	186.00
Nursery stock $1,500/acre	3,000.00
TOTAL	$ 8,667.50

Cost comparables received from:

USFS Fishlake National Forest
Plateau Mining Co. Test plot data
Kaiser Mining Co. Slaughter Canyon Road
Getty Coal CV Ridge Reclamation
B & R Reclamation Co. Kennelworth, Ut

1. Soldier Creek Sewage Pond
2. Trail Mountain Reclamation
3. Plateau - Wildlife enhancement area
4. Mountain Resources - Drill Site Reclamation

RECONTOURING



(Attachment #2)

SOIL LEGEND

Soil Symbol	Soil Mapping Unit Name
D2E	Datino bouldery fine sandy loam, 5 to 20 percent slopes
D1G	Datino very stony fine sandy loam, 55 to 70 percent slopes

DESCRIPTION OF THE SOILS

D2E Datino bouldery fine sandy loam, 5 to 20 percent slopes.

This Datino soil is very deep and well drained. It occurs on moderately steep alluvial fans and some sloping flood plains at elevations of 7,100 to 7,140 feet (2,165 to 2,177 meters). This soil formed in alluvium and colluvium derived mainly from sandstone and shale. The average annual precipitation is 14 to 16 inches (36 to 41 centimeters). Mean annual air temperature is 42 to 45 degrees F. (5 to 7 degrees C.), mean annual soil temperature is 44 to 47 degrees F. (6 to 8 degrees C.), and the average freeze-free season is about 80 to 110 days.

Slopes are 5 to 20 percent and mostly east facing. They are short and concave-convex.

Vegetation is dominantly pinyon, Utah juniper, salina wildrye, squirreltail, big sagebrush, Douglas-fir, and Rocky Mountain juniper.

Included in mapping are small areas of a similar soil except with 20 percent gravel and cobbles in the surface layer.

In a typical profile the surface layer is brown, bouldery fine sandy loam and cobbly loam about 10 inches (25 centimeters) thick. The subsoil is light brown very stony loam about 28 inches (71 centimeters) thick. The substratum is light reddish brown cobbly fine sandy loam to a depth of 60 inches (1.5 meters) or more.

Permeability is moderate. Available water capacity is 6 inches (15 centimeters) to a depth of 60 inches (1.5 meters). Organic matter content in the surface layer is 4 percent. Effective rooting depth is about 60 inches (1.5 meters). Surface runoff is medium and erosion hazard is moderate under potential native vegetation and high if vegetation is removed and the soil is left bare. Erodibility is low. This soil is used for range, wildlife habitat, and mining operations.

A#3

MINIMUM SPECIFICATION FOR MULCH

P H	4.8 to 7
Chemical properties	
Chemical Name:	Cellulose
Chemical Family:	Wood Cellulose
Chemical Formula:	$(C_6H_{10}O_5)n$
Physical Properties	
Physical State:	Light brown, fibrous material
Bulk Density:	8.4 lb./cu. ft.
Moisture Content	10% $\pm$ 3
Use or Property	Used in hydraulically planting grass stolen or in the hydraulic mulching of grass seed or seeds.
Application	1,200 - 1,500 lbs./acre on 1 : 1 slopes 2,000 lbs. plus on 3:1 and over
Health Hazard	No health hazards
Biotic Properties	Weed free, fungus free, and resistant to mildew
Water Holding grams of water/100 grams fiber	1,000 minimum

TACKIFYING AGENT - SPECIFICATIONS

P H	6 - 7
Viscosity	1% suspension - 1650 centipoises on a Brookfield Viscometer R.T.V. with a #3 spindle at 70 degrees. One hour viscosity of 1900 CPS under the same conditions.
Particle Size	Silicate powder and polymers: Maximum 20%, 325 mesh screen

Attachment # 5

SOIL TEST REPORT

NO. 7406.0

AGRICULTURAL CONSULTANTS, INC.
P.O. DRAWER 507 — 240 S. FIRST AVENUE
BRIGHTON, COLORADO 80601
303/659-2313

DATE RCVD 11-[illegible]-82

REPORTED 11-23-82

REPORT TO: CO-OP MINING COMPANY ATTN: MR. OWEN

BILL TO: SAME

GROWER: SAME

SAMPLE ID: SCALES BEAR

TEXTURE si=silt, silty sn=sand, sandy lo=loam, loamy cl=clay	pH		CEC Meq /100g	SALT Mmhos /cm	Na Meq /100g	Lime %	OM %	Org N Lbs	AVAILABLE NUTRIENTS ppm (1)										
	H_2O	Buf							NO_3	P(2)	K(2)	Ca	Mg	S(2)	B	Zn	Fe	Mn	Cu
N LO	8.3	7.0	11.1	1.0	0.2	8.6	1.3	45.5	8	3	99	3400	210	31	0.6	0.6	3.8	2.0	0.3

CROP	YIELD GOAL	CROP RESIDUE T/A	MNR T/A	RECOMMENDATIONS POUNDS PER ACRE											
				N	P_2O_5	K_2O	Elem Sulfer	Lime	Mg	SO_4-S	Boron	Zinc	Iron	Mn	Cu
DL Native Grasses	Average	–	0	40	50	50	0	0	0	0	0	0	0	0	0

1.ppm=parts per million or lbs element per million lbs soil. ppm x 2 = lbs/acre 6-7" depth. ppm x 3.5 = lbs/acre feet. 2. P x 2.3 = P_2O_5 K x 1.2 = K_2O S x 3 = SO_4

Values reported but without specific remarks are considered to be within growth range of intended crop.

If poor moisture conditions reduce fertilization accordingly.

Supervised by Diane Lansing

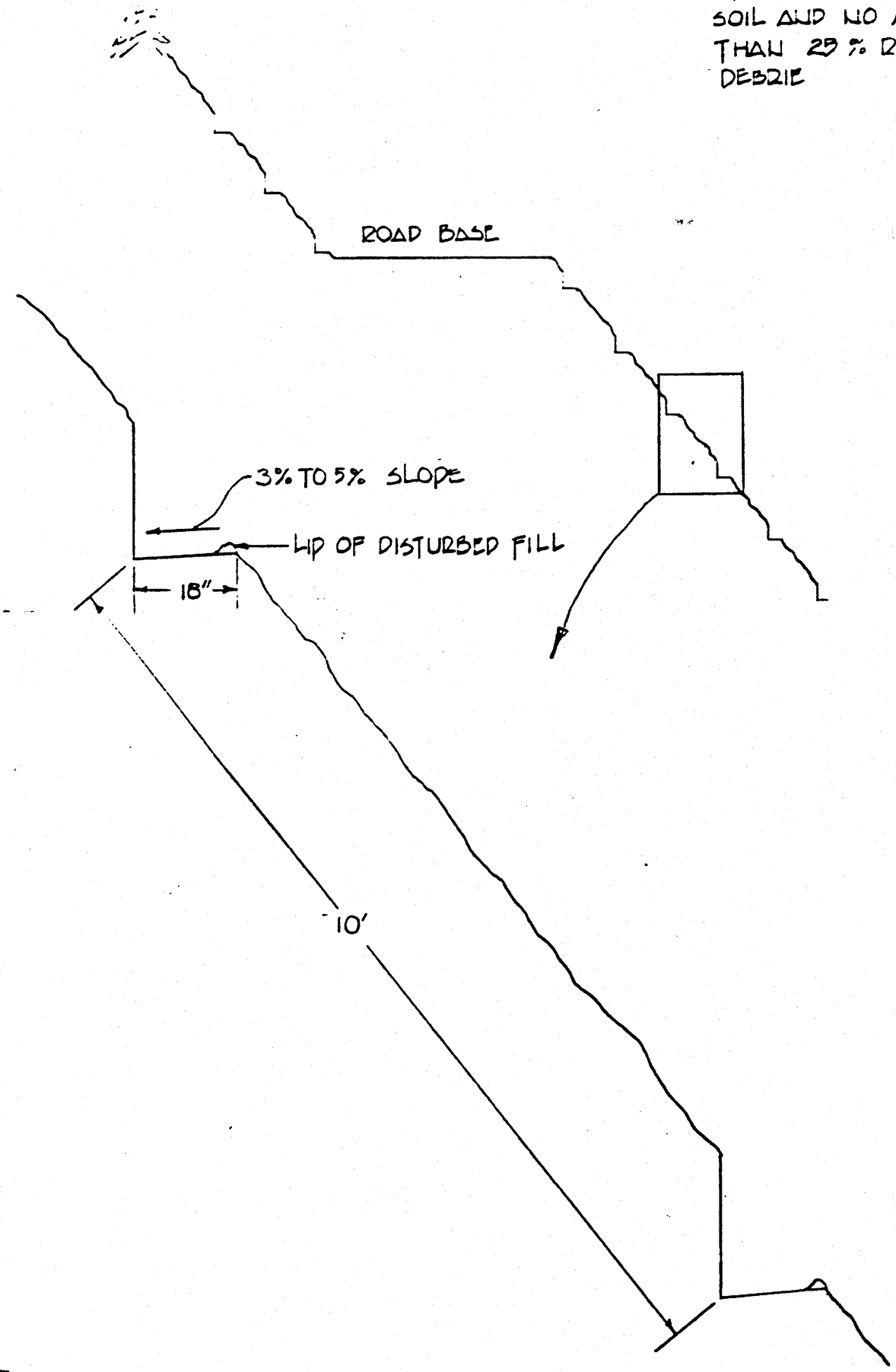
AH 6

AH 6

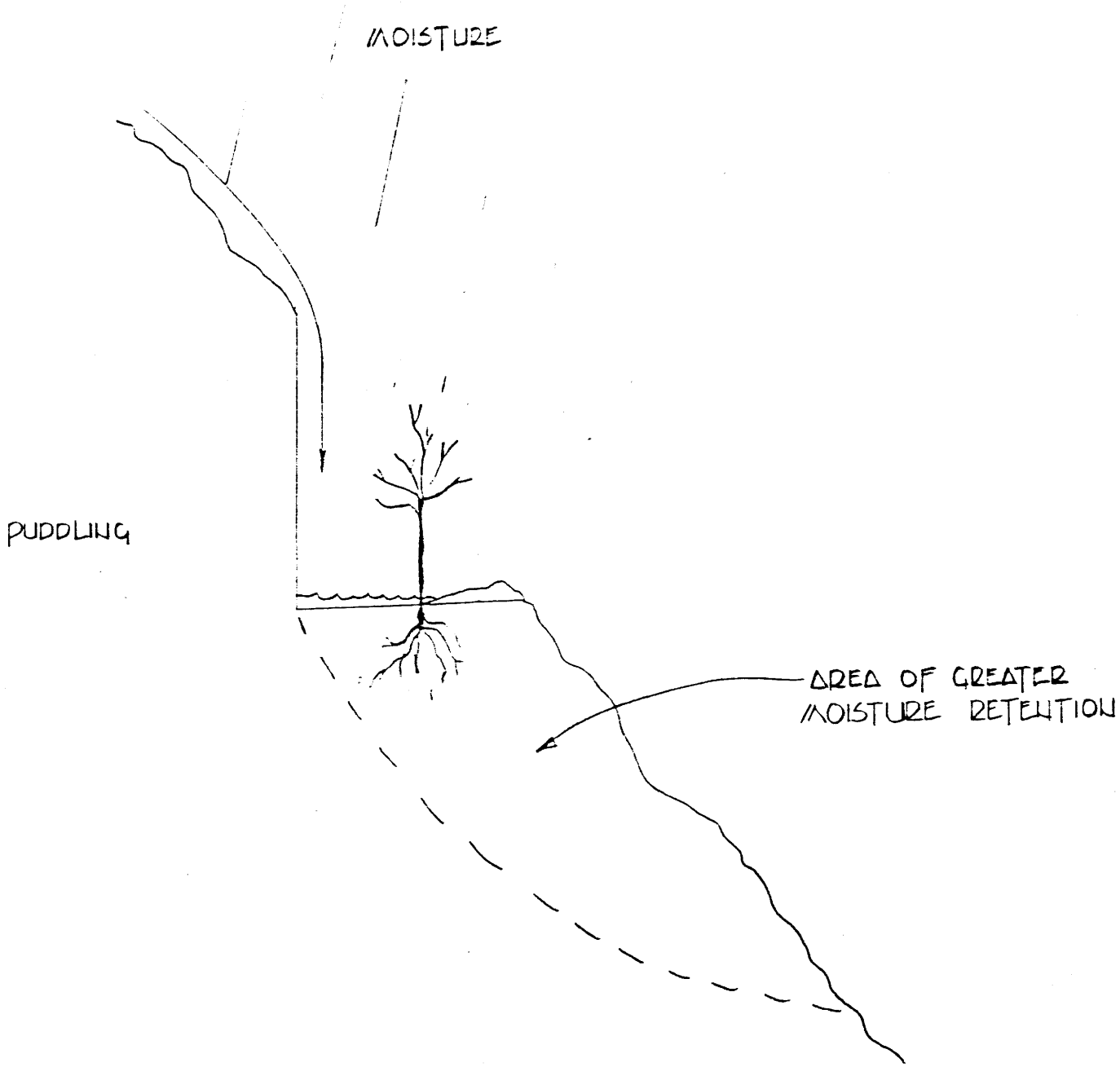
PROPOSED SITE PREPARATION

1991 DECLARATION

FOR SLOPES IN EXCESS OF 60% WITH 75% SOIL AND NO MORE THAN 25% ROCK AND DEBRIE



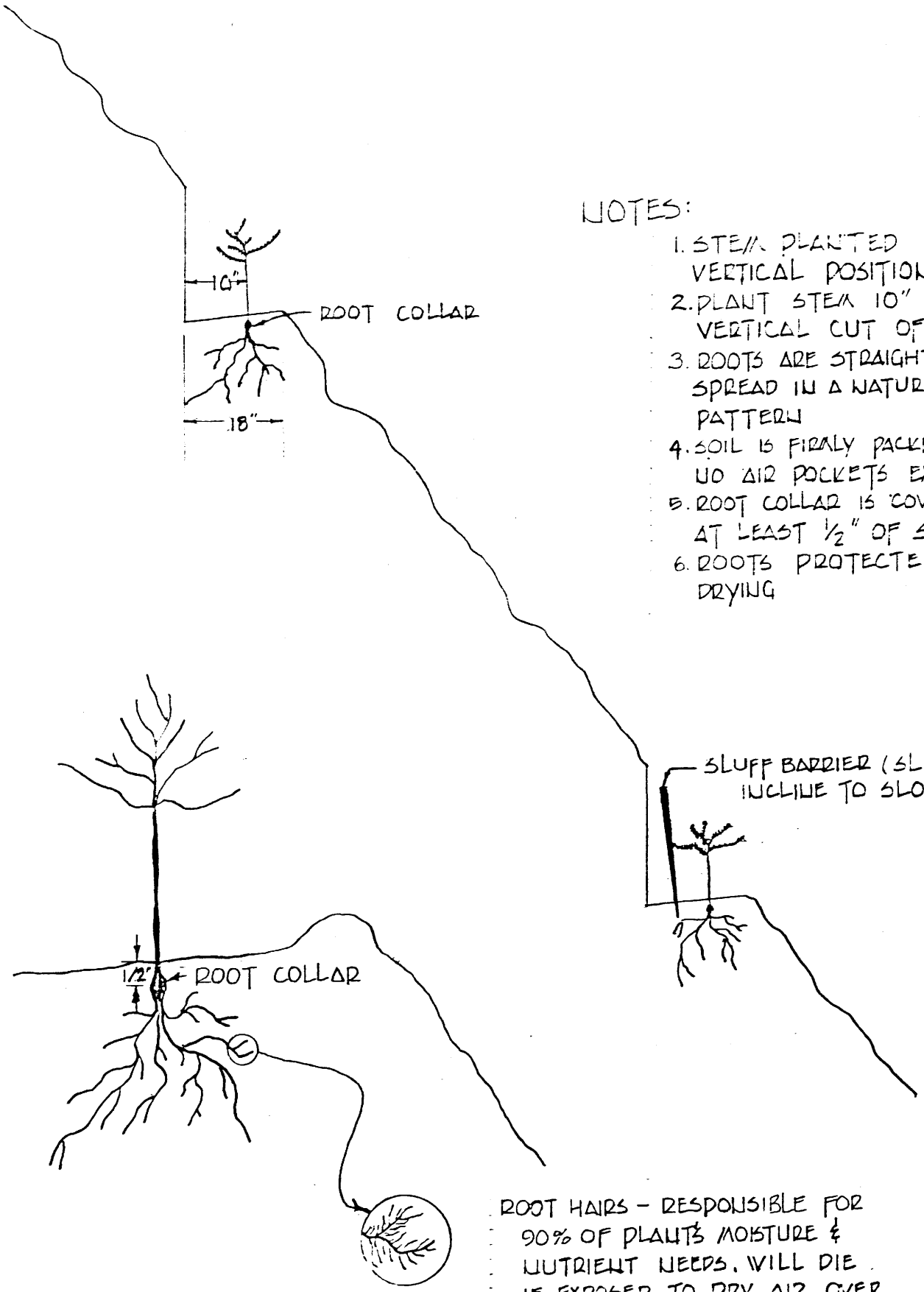
MOISTURE RETENTION PLAN



AH 7A

CORRECT PLANTING PROCEEDURE

(PREPARED SLOPES)



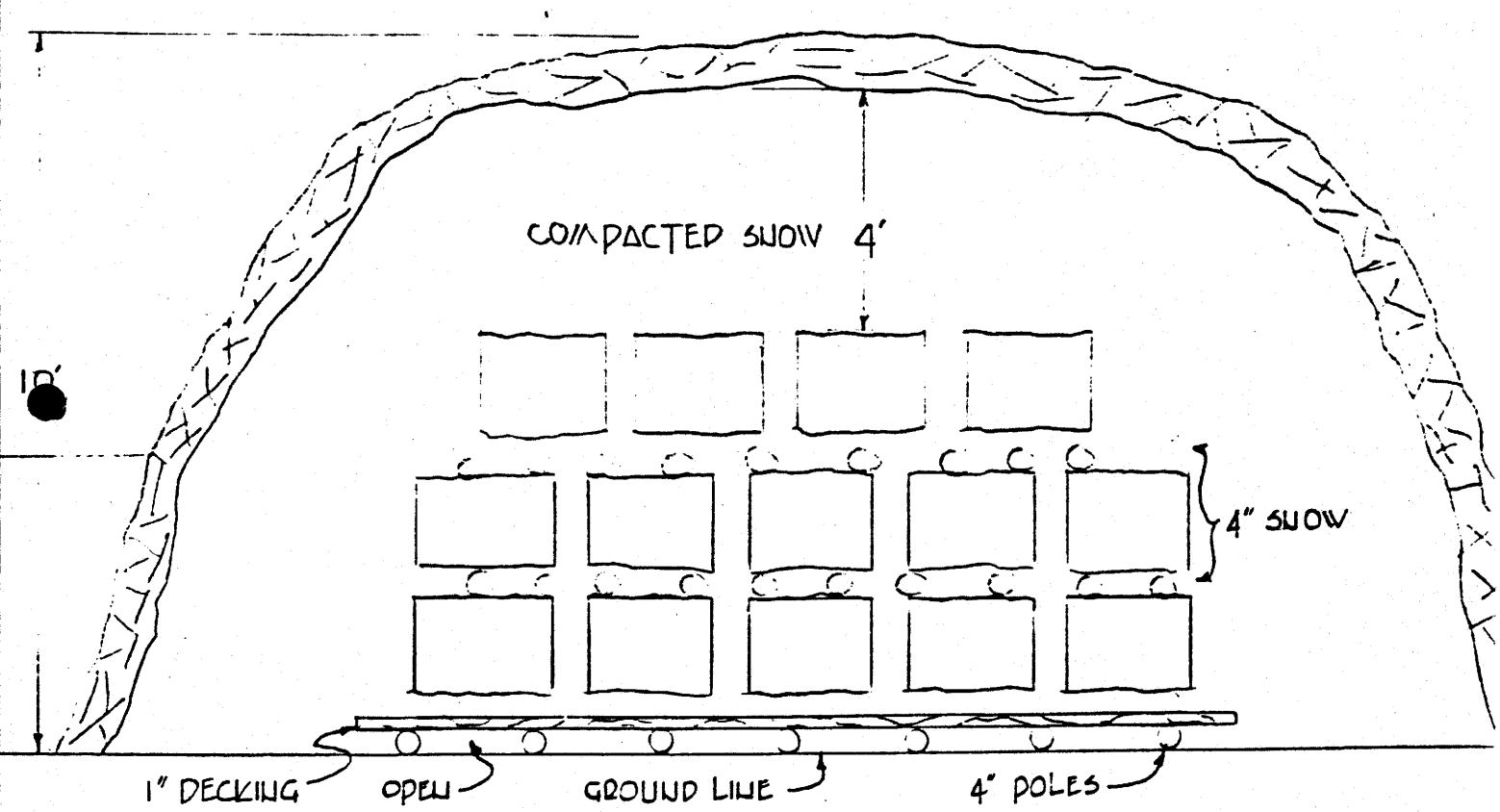
NOTES:

1. STEM PLANTED IN VERTICAL POSITION
2. PLANT STEM 10" FROM VERTICAL CUT OF SCALP
3. ROOTS ARE STRAIGHT AND SPREAD IN A NATURAL PATTERN
4. SOIL IS FIRMLY PACKED SO NO AIR POCKETS EXIST
5. ROOT COLLAR IS COVERED BY AT LEAST ½" OF SOIL
6. ROOTS PROTECTED FROM DRYING

ROOT HAIRS – RESPONSIBLE FOR 90% OF PLANT'S MOISTURE & NUTRIENT NEEDS. WILL DIE IF EXPOSED TO DRY AIR OVER 15 SECONDS

AH 8

Seedling Storage



SNOW CACHE WILL MAINTAIN SEEDLINGS AT 32°F. AND REALATIVE HUMIDITY OF 100%. SEEDLINGS SHOULD BE PLACED IN A COOL SHADED AREA 24 HOURS PRIOR TO PLANTING.

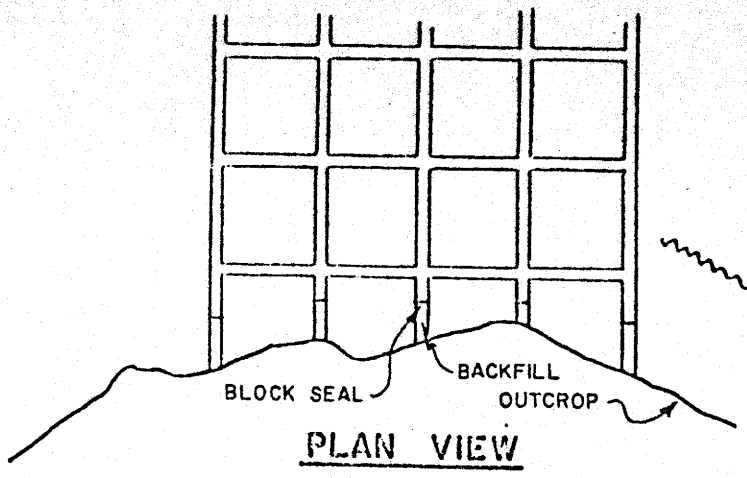
Att 8A

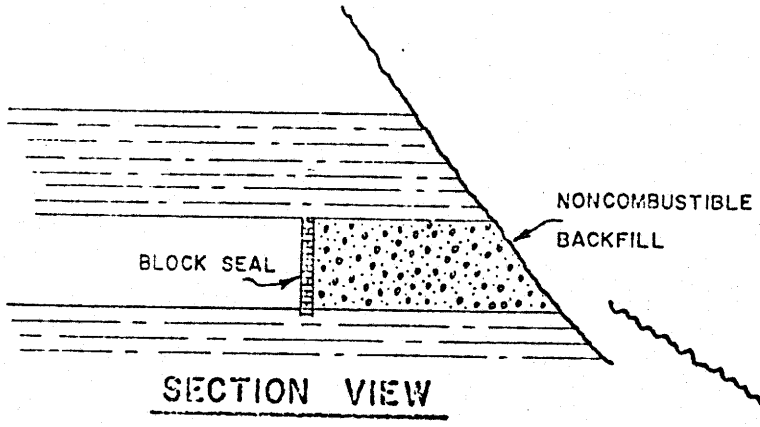
UMC 784.13 (8) Mine Openings

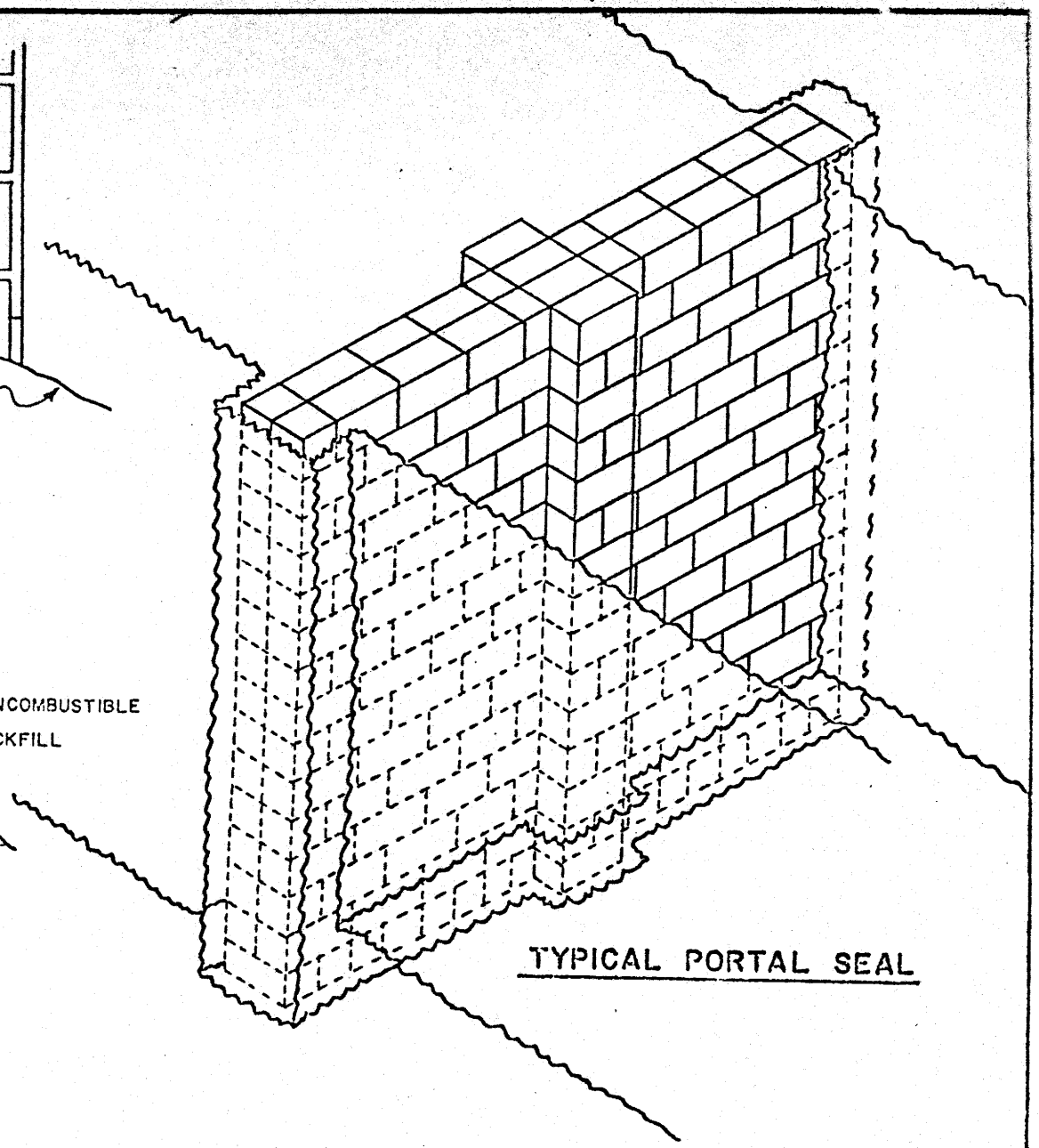
The following plan to manage mine openings has been prepared for Co-op Mining Company by Environmental Industrial Supply.

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

Seals will be installed in the following manner: The seal will be recessed at least 16 in. deep into the rib and 12 in. deep into the floor. No recess will be made into the roof. The blocks will be at least 6 in. high, except in the top course, and 8 in. wide. The blocks will be laid and mortared in a transverse pattern. In the bottom course, each block will be laid with its long axis parallel to the rib. The long axis in succeeding courses will be perpendicular to the long axis block in the preceding course. An interlaced pilaster will be constructed in the center. The seals will have a total thickness of 16 in. Where conditions permit, the portal seals will be graded to conform with existing surface contours and planted. In those instances where sizable highwalls established in preparing the portal site cannot be returned to original contours, the opening in front of the wall will be filled with noncombustible material as above, and the portal and entire exposed seam on the highwall will be covered with 6 to 8 ft. of noncombustible material, graded, covered with suitable material, and seeded. For illustration of a typical seal, see Figure 1.







PORTAL SEALS

UMC 784.16 Ponds

Design for the collection basin has been prepared by Viking Engineering.

SEDIMENTATION CONTROL STRUCTURE CALCULATIONS

Design Data CATCH BASIN BELOW SCALE HOUSE

Site elevation:	7100 feet
Runoff Area:	2.8 acres
Average Slope Length:	90 feet
Average Slope Gradient:	6 %
6 hour - 10 yr Storm:	1.4 inches
Soil Charecteristics:	27% silt, 30 % fine sand, 39% sand, 9% organic matter, fine graded soil, moderage permeability

Calculations

Use uniform Soil Loss Equation A = RKLSCP

R: the rainfall factor, is the number of erosion - index unit computed from the charecteristics of rainfall during a normal year. From "Universal Soil Loss Equation" SCS, Jan. 1976, use R = 20

K: the soil erodibility factor, from "a soil erodability nomograph ..." where % silt plus % fine sand. K = 0.51

LS: slope-length and gradient factor. From Table 1, Universal Soil Loss Eqn." SCS, Jan 1976 for slope of 6% at 90 feet. LS = 0.64.

C: Assume bare ground, use C = 1.0

P: Assume no erosion control, use P = 1.0

thus A = (20)(0.51)(0.64)(1)(1) = 6.53 TONS/ACRE/YEAR

for 2.8 acres, the 3 year sediment level for soil = 90 lbs/ft^3 would be:

2.8 acres x 6.53 T/ac/yr x 3 yrs x 2000lbs/T / 90 lbs/ft^3

Three year silt level = 1218 cubic feet

Runoff from disturbed area for 10 year - 24 hour storm

Calculation

Use CN = 80 for area around scale house. From Table 9.1 "SCS National Engineering Handbook" Section 4, Hydrology" Runoff from figure 10.1 for 2.25 inches precip = 0.72

thus Volume of runoff = 2.8acres x 43560 ft^2/acre x 0.72 in x 1/12in/ft

= 7318 cubic feet

Volume of Sediment Pond including 3 yr Sed. level = 8536 cubic feet

UMC 784.22 Diversions

The design criteria for culverts, diversions and etc. for the control of hydrological balance are currently being reviewed by the hydrologist with Viking Engineering and Dave Darby of DOGM. When complete, these plans will written and forwarded to the Division and will be implemented at the mine site.

UMC 784.24 Transportation Facilities

Cross Section of haul roads are included with dimensions on the map for the scale house modification (III-8-b), included in the reclamation packet.

The following geotechnical analysis for steep outslopes was prepared for the Co-op Mining Company by Dames and Moore, Professional Engineers.

Dames & Moore

540 East Broadway, Suite 300
Salt Lake City, Utah 84111
(801) 521-9255
TWX: 910-925-5692 Cable address: DAMEMORE

SITE CONDITIONS

The general location of the Bear Creek Portal Access Road is shown on Plate 1, Plot Plan. Side-cast cut and fill areas as determined by others are also indicated on Plate 1. The slopes in the area of the Bear Creek Portal are generally steeper than 20 degrees and the access road has been constructed by conventional side-cast methods. The material being excavated and forming this side-cast cut and fill typically consists of fine and coarse gravel and cobble sized pieces of silty sandstone in a sandy and silty clay matrix. Calcium carbonate derived from the cement in the sandstone is also present.

The surface of the side-cast material is quite firm, which we believe to be related to the composition of clay and calcium carbonate in the soil. The clay acts as a binder and gives the soil cohesive strength and the calcium carbonate tends to cement the soil particles together. As discussed in our previous letter, the calcium carbonate cement in the soil probably provides a significant component of the factor of safety of the side-cast fill material. However, the determination of a numerical value for the influence of the calcium carbonate cementation would be very difficult to accurately determine.

SOIL PROPERTIES

Based on the results of laboratory tests performed on samples of the side-cast cut and fill material from the Bear Creek Portal

site and our experience with similar soils, we have assumed the following soil properties:

Side-Cast Fill Material

Angle of Internal Friction	$\phi = 26^{o}$
Cohesion	C = 350 psf
Unit weight soil	δ = 98 pcf

Natural Soils

Angle of Internal Friction	$\phi = 26^{o}$
Cohesion	C = 700 psf
Unit weight soil	δ = 120 pcf

SLOPE STABILITY ANALYSIS

To aid in evaluating the stability of the side-cast cut and fill material of the Bear Creek Portal Access Road, a computer slope stability analysis was performed. The computer analysis utilized a simplified Bishop's Method in computing the long-term static factor of safety of the slopes. Due to the limited laboratory and field data, and the uncontrolled method in which side-cast cut and fill materials are placed, ultra conservative soil strength parameters were used in the computer analysis. A Geometric cross-section of a critical section utilized in the analysis is shown on Plate 2, Slope Cross Section. It was also assumed that a phreatic water surface would not develop in the slopes of the embankment.

The computer program analyzed the slope stability by searching a specified coordinate grid area for the center of the circle

having the lowest factor of safety. The slope stability analyses was performed using a total of four separate coordinate grid areas. The number of trial failure arc centers analyzed in each of these four areas varied from 12 to 63. As indicated on Plate 2, this analysis indicated a minimum static factor of safety varying from 1.43 to 2.15.

Copies of the results of the computer analysis for each coordinate grid area are included with this report.

DISCUSSIONS AND RECOMMENDATIONS

GENERAL

Supporting data upon which our recommendations are based have been presented in the previous sections of this report and in the previous Dames & Moore report dated December 29, 1980.

SLOPE STABILITY

The computer slope stability analysis indicates a minimum static factor of safety varying from 1.43 to 2.15 for the trial arcs analyzed.

It should be noted that the factor of safety of the trial arc which cuts deep into the slope does not consider the presence of bedrock, increasing strength of the natural soils with depth, or the effect of the calcium carbonate cementation in the soil. If the above were incorporated into the analysis, the factor of safety would be significantly higher.

Stability of the slopes will be influenced by the degree of saturation of the existing soils. Therefore, surface drainage must be channeled to minimize runoff over the slopes. However, during wet periods of the year, small localized slides and sloughs should be anticipated along the slopes. However, these occurrences should be minor. The performance of these side-cast cut and fill slopes is anticipated to be similar to virtually identical side-cast cut and fill slopes along the nearby road leading to the Trail Canyon Portal. These slopes have been stable since their construction, varying from 10 to 25 years ago.

Based on our slope stability analysis and observations made during our reconnaissance visit to the site, it is our opinion that the side-cast fill material located along the Bear Creek Portal Access Road generally has a long-term static factor of safety of 1.5 or greater and will perform in a satisfactory manner.

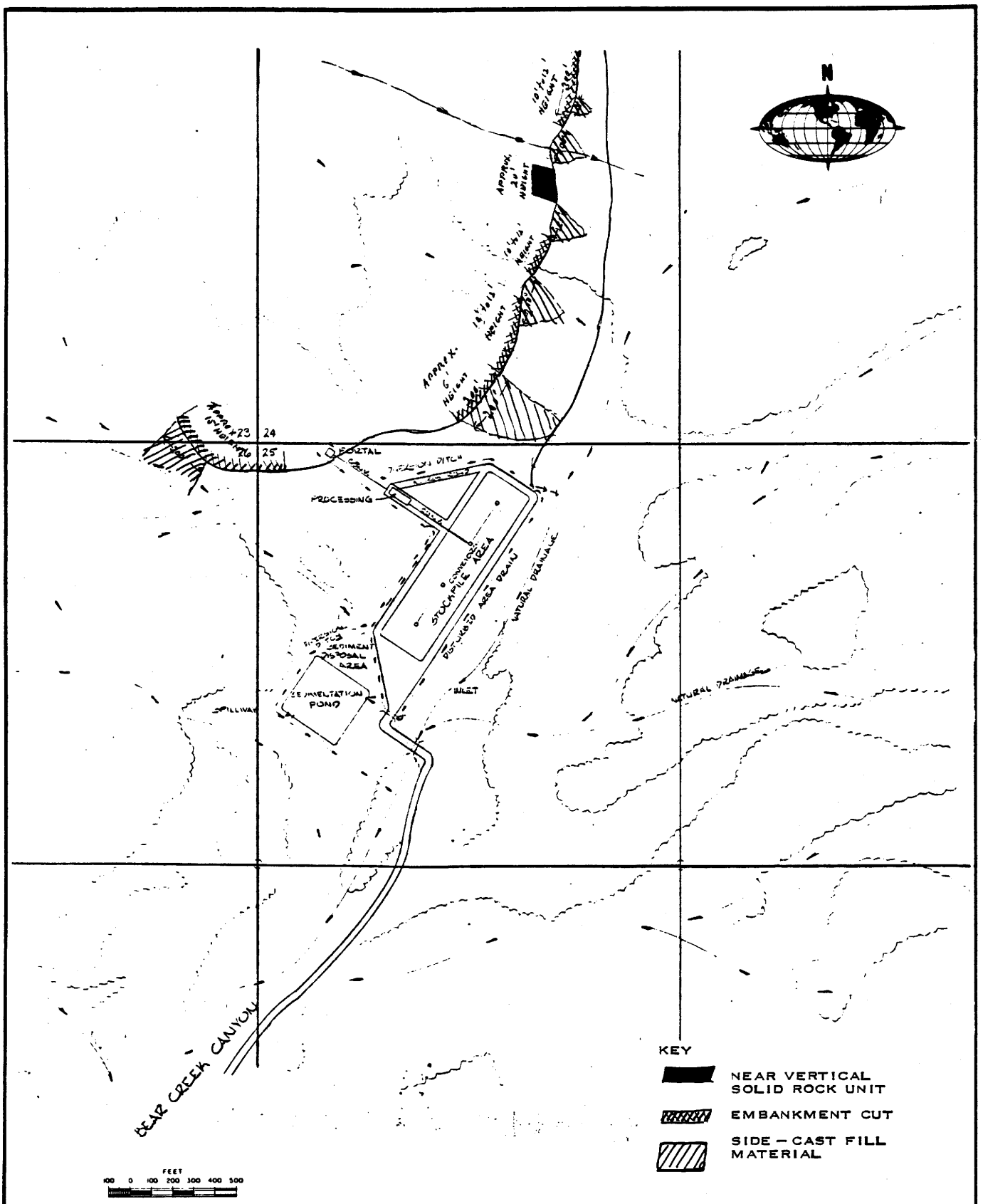
oOo

REVISIONS BY _____ DATE _____

FILE _____

BY _____ DATE _____

CHECKED BY _____

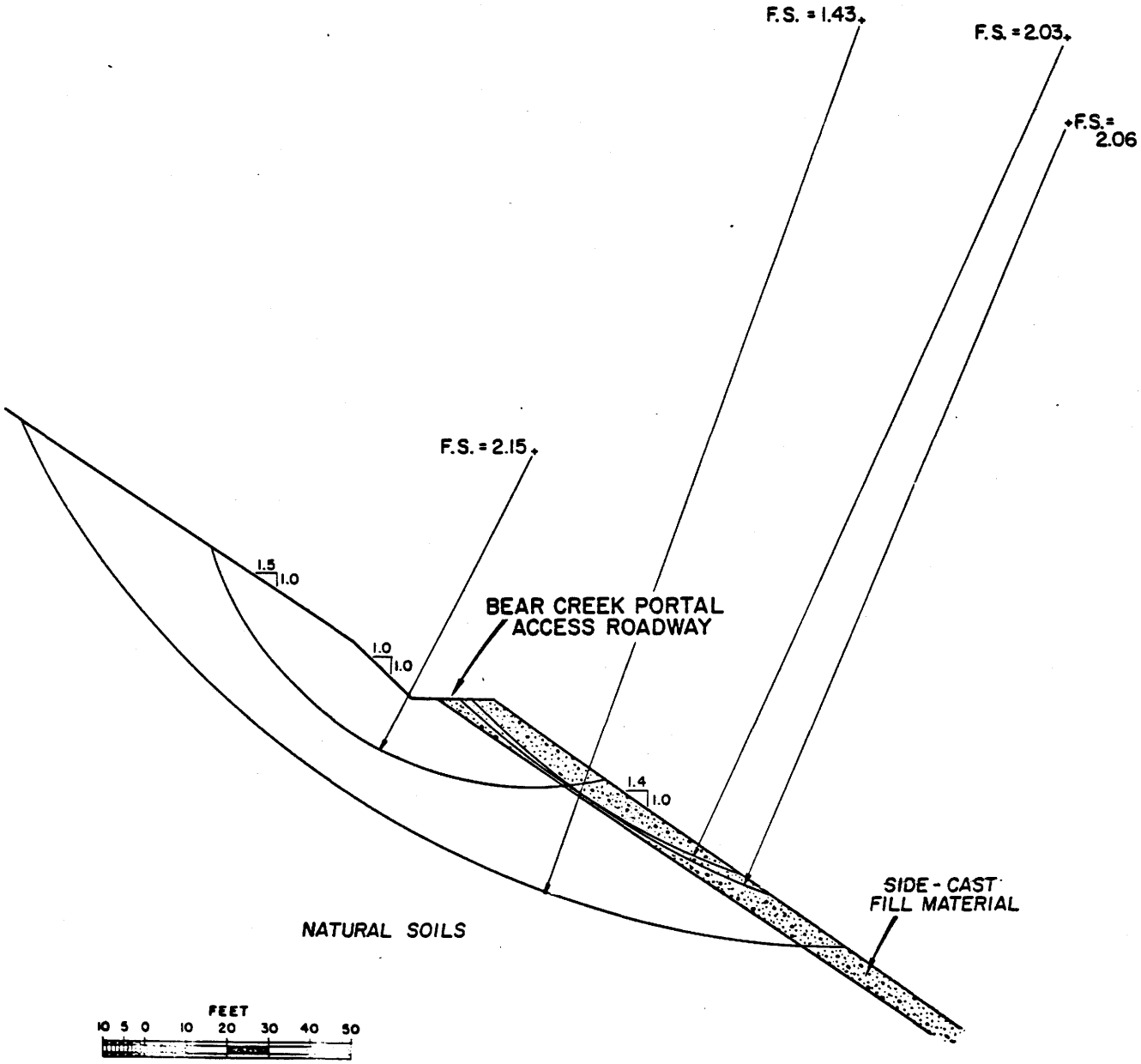


PLOT PLAN

REFERENCE
ADAPTED FROM PRINT
SUPPLIED BY OTHERS.

DAMES & MOORE

PLATE 1



SLOPE CROSS SECTION

DAMES & MOORE

PLATE 2

DAMES AND MOORE PROGRAM EP1 (SLOPEB)

SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP'S METHOD

DATE OF LAST REVISION - DEC 11 78

DATE RUN - 02/19/81 TIME RUN - 19.00.45

0546101206 6093 GMB 022081 STABILITY ANALYSIS CUTSLOPE PARTIAL FILL

==========

DATA INPUT MODE = 1
EARTHQUAKE COEFFICIENT = 0.000
PORE PRESSURE IS DEFINED BY WATER LINE DATA
TOTAL NUMBER OF SOIL LINES = 6 NUMBER OF WATER LINES = 0

OSLOPE GEOMETRY DATA

LINE NO	COORDINATES LEFT-X	LEFT-Y	RIGHT-X	RIGHT-Y	SOIL DATA WT BELOW LINE-PSF	FRICT.ANGLE(DEG) (OR C/P-RATIO**) ABOVE	BELOW	COHESION-PSF ABOVE	BELOW	PORE PRESSURE RATIO ABOVE	BELOW	NEW BELOW	NUU ABOVE	NUU BELOW
1	1018.00	1180.00	1086.00	1134.00	120.0	0.00	26.00	0.0	700.0	0.000	0.000	0	0	0
2	1086.00	1134.00	1100.00	1120.00	120.0	0.00	26.00	0.0	700.0	0.000	0.000	0	0	0
3	1100.00	1120.00	1106.00	1120.00	120.0	0.00	26.00	0.0	700.0	0.000	0.000	0	0	0
4	1106.00	1120.00	1120.00	1120.00	98.0	0.00	26.00	0.0	350.0	0.000	0.000	0	0	0
5	1120.00	1120.00	1232.00	1040.00	98.0	0.00	26.00	0.0	350.0	0.000	0.000	0	0	0
6	1106.00	1120.00	1220.00	1042.00	120.0	26.00	26.00	350.0	700.0	0.000	0.000	0	0	0

NOTE: IF(NEW.EQ.1) SOIL IS NEWLY PLACED AND DOES NOT CONSOLIDATE LAYERS WITH NUU=1
IF(NUU.EQ.1) SOIL WILL BE LOADED UNDER UNDRAINED CONDITIONS BY NEWLY PLACED LAYERS
VALUES MARKED WITH ** ARE C/P RATIOS FOR LAYERS WITH NUU=1

UNIT WEIGHT OF WATER = 62.40 NUMBER OF COLUMN LOADS = 0

MODE OF PROGRAM OPERATION = 3

CENTER VARIATIONS	MIN-X	MAX-X	MIN-Y	MAX-Y	DX	DY
	1240.00	1260.00	1250.00	1280.00	10.00	10.00

RADIUS TANGENTS MAX= 1058.00 MIN= 1062.00 INCR= 1.00

1 RESULTS

==========

INTR NO	RAD	CENTER COORDINATES		CIRCLE	FACTOR OF SAFETY	SUMWS	SUM1	SUM2	XR	XL	ARC	NN	TRIAL
	N060.26	170.08		2									

TRM
RDY
EDIT,OLD,GMB
UNIEDIT 3.32 READY ? WIDTH=/132/$FIND:/TABUL/$P.1}*

1 TABULATION OF MINIMUM SAFETY FACTORS
(CRITICAL RADIUS IN PARENTHESES)

Y COORDINATES	X COORDINATES 1240.0	1250.0	1260.0
1280.0	1.802 (222.)	2.111 (222.)	2.026 (219.)
1270.0	1.877 (212.)	2.034 (212.)	2.108 (210.)
1260.0	1.953 (202.)	2.114 (202.)	2.065 (202.)
1250.0	1.954 (191.)	2.084 (188.)	2.575 (192.)

READY ? END
RDY-FOR
BYE
CT = 00.23 SU-A = 1.9
KCH = 7
D034008 LOG OFF. 19.04.00.

2/$FIND:/TABUL/$P.1}*
TABULATION OF MINIMUM SAFETY FACTORS
(CRITICAL RADIUS IN PARENTHESES)

Y COORDINATES	X COORDINATES 1210.0	1215.0	1220.0	1225.0	1230.0	1235.0	1240.0
1310.0	1.534 (240.)	1.504 (244.)	1.478 (248.)	1.451 (252.)	1.495 (252.)	1.549 (252.)	1.617 (252.)
1305.0	1.512 (237.)	1.486 (241.)	1.431 (247.)	1.467 (247.)	1.515 (247.)	1.569 (247.)	1.646 (247.)
1300.0	1.462 (236.)	1.440 (240.)	1.445 (242.)	1.485 (242.)	1.531 (242.)	1.594 (242.)	1.672 (242.)
1295.0	1.449 (233.)	1.427 (237.)	1.460 (237.)	1.501 (237.)	1.552 (237.)	1.619 (237.)	1.701 (237.)
1290.0	1.437 (230.)	1.441 (232.)	1.477 (232.)	1.518 (232.)	1.575 (232.)	1.643 (232.)	1.734 (232.)
1285.0	1.426 (227.)	1.456 (227.)	1.491 (227.)	1.538 (227.)	1.595 (227.)	1.670 (227.)	1.766 (227.)
1280.0	1.440 (222.)	1.471 (222.)	1.509 (222.)	1.559 (222.)	1.618 (222.)	1.699 (222.)	1.802 (222.)
1275.0	1.455 (217.)	1.485 (217.)	1.528 (217.)	1.577 (217.)	1.645 (217.)	1.727 (217.)	1.836 (217.)
1270.0	1.468 (212.)	1.503 (212.)	1.545 (212.)	1.600 (212.)	1.669 (212.)	1.759 (212.)	1.877 (212.)

1 TABULATION OF MINIMUM SAFETY FACTOR
(CRITICAL RADIUS IN PARENTHESES)

Y COORDINATES	X COORDINATES 1140.0	1145.0	1150.0	1155.0	1160.0
1180.0	2.425 (82.)	2.675 (82.)	3.063 (82.)	3.269 (81.)	2.729 (80.)
1175.0	2.536 (77.)	2.819 (77.)	3.262 (77.)	2.883 (73.)	2.744 (75.)
1170.0	2.662 (72.)	2.982 (72.)	3.294 (70.)	2.867 (68.)	2.604 (71.)
1165.0	2.811 (67.)	3.167 (67.)	3.041 (67.)	2.703 (64.)	2.479 (67.)
1160.0	2.984 (62.)	3.235 (60.)	2.997 (62.)	2.565 (60.)	2.519 (62.)

TABULATION OF MINIMUM SAFETY FACTORS
(CRITICAL RADIUS IN PARENTHESES)

Y COORDINATES	X COORDINATES 1120.0	1125.0	1130.0	1135.0	1140.0
1180.0	5.342 (82.)	2.219 (78.)	2.146 (82.)	2.260 (82.)	2.425 (82.)
1175.0	5.061 (77.)	2.173 (76.)	2.225 (77.)	2.352 (77.)	2.536 (77.)
1170.0	2.181 (71.)	2.220 (72.)	2.315 (7[illegible].)	2.456 (72.)	2.662 (72.)
1165.0	2.241 (67.)	2.314 (67.)	2.421 (67.)	2.577 (67.)	2.811 (67.)
1160.0	2.344 (62.)	2.425 (62.)	2.543 (62.)	2.718 (62.)	2.984 (62.)

UMC 817.22 Topsoil Removal

Topsoil has been removed and stockpiled in the scales area.

Co-op Mining Company requests a varience from the DOGM for the upper pad area. See next paragraph (817.22 (e)) for proposed method for topsoil substitute.

UMC 817.22(e) Topsoil Substitute

It is the contention of the Co-Op Mining Company that by utilizing the following methodology, that a substitute source of top soil will not be necessary. However, in the event that the subsequent soils analysis indicate deficiencies, the Co-Op will build a suitable substitute soil by incorporating sawdust and sewage sludge which are both readily available.

Methodology

The pad can be brought back to a reasonable configuration by implementation of a hydra unit. The actual method will involve the pulling of refuse material from the road surface and berm and placing it against the opposing highwall. This refuse will then be covered with approximately 1 ft. of top soil by pulling material from about 20 ft. below the pad cut up onto the pad surface and spreading and compacting this material with the bucket, at the same time pulling the leading edge of the highwall down to lessen the degree and angle of the highwall. All work done both above and below the pad should take into consideration existing vegetation and all effort should be made to minimize disturbance and utilize existing vegetation. When there is no alternative other than disturbance, an effort can be made to relocate earth and maintain existing vegetation in place, attempting to relocate the vegetation in the proximity of the pad disturbance.

UMC 817.25 Fertilization and Neutralization

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

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

Chemical analysis for micronutrients may be conducted by testing soil extracts with DTPA solution and measured by use of an atomic absorption analyzer. Ammonium acetate may be used to extract potassium, calcium, and magnesium for atomic absorption analysis. Phosphorus may be determined with sodium bicarbonate extraction and colorimetric analysis. The Kjeldahl method may be used for determination of total nitrogen. Soil texture may be determined by a Bouyoucus hydrometer method (sodium herametaphosphate dispersing agent). Soil pH may be determined on a 1:1 soil/water mixture tested with an electrode pH meter. Salinity may be analyzed by using a Wheatstone conductivity cell on an extract of each soil sample.

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

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OIL, GAS & MINING

UMC783.14 Geology Description

We have not yet received the contour maps or the results of the test samples for the development of the upper storage pad, so we are requesting an extension of time for that portion only of the modified plan. We agree to not enter or use that portion of the permit area for any purpose, for mining operations or further construction untill that portion of the modification has been completed.

UMC 783.25 Cross- sections, Maps and plans

(k) Please refer to Plate III-8-b-1 and III-9-b-2

Roads. Please refer to 784.24 of this package.

Surface structures will consist of; a shop, parts warehouse, bath house, mine offices, lamp house, truck scales, weighmans office, caretaker dwelling, mine run coal receiver bin, crushing and sizing structure, truck load-out bins, stockpile towers, and conveyors to carry coal to the storage and loadout sites. These structures will have cement footings and will be constructed with cincrete blocks and/or steel. These will each be used for the purpose as designed (shop for repair and maintenance of equipment, bath house for showers and lockers, etc.). They will be maintained by painting and repairing as needed. Moving parts such as conveyors will be maintained by regular greasing and by replaceing worn parts as needed.

Upon completion of mining operations, all structures will be removed, including the cement footings and the land will be returned to the approximate original configuration in preperation for final reclamation.

UMC 784.13 Reclamation Plan

(b)(4) Prior to disturbance of areas used for mining operations, the topsoil has been removed, or in the case of possible additional disturbance will be removed and stockpiled for future use. An example of procedure for removal is the area of modification for the truck scales. Por tions of this area were extremely rocky, while other portions had a topsoil depth of about 18 inches. The entire depth of topsoil was removed from the better areas, and enough topsoil saved to cover the entire area to a depth of at least 8 inches at the time of final reclamation. A berm has been made at the bottom of the stockpile. a sign has designated it as topsoil and it will be reseeded to protect it from wind and water erosion.

(b)(4)(vii) Applicant requests a meeting with the Division to discuss guidlines and help in deviseing a sampleing program as suggested in the ACR. (See ACR 817.116).

(b)(1) In order that roads may be used for access to remove and reclaim all of the other facilities, the roads will be the last area to be reclaimed. When all other r eclamation is completed, the roads will be reclaimed except if any portion of the road or roads are needed for post mining land use

(b)(3) Final configuration will be as near as possible to the original contour of the area before disturbance. For maps and cross-sections see Plate III-8-b and III-8-b-1.

(b)(5) Contemporaneous reclamation for embankments, topsoil stockpiles, and etc. will include the following seed amounts and procedures;

Crested wheat grass	6# PLS per A.
Yellow sweet clover	6# PLS per A.

The best results in reseeding that we have attained in this area has been to scarify the ground, broadcast the seed and harrow the seed in lightly, as late as possible in the fall and still have the planting under the winter snow. The proper time for this is the first week in November. Any snow that falls before that time will melt off again before winter. This method has been very successful without the use of mulch, as the seed germinates immediately after the melting of the snow from the moisture of the snow melt. The use of yellow sweet clover in the seed mix adds to the success of the planting as it is very easy to get started under almost any condition, provides a cover to assist the other plants in starting, and adds to the nutrients of the soil. It is often used as a rotation crop by farmers as a soil builder. It is bi-ennial and helps control erosion while the perennials get a full stand and native plants from adjacent areas spread into the reseeded area. Irrigation will not be used due to nature of the terrain as results would be spotty at best. It is not needed if the planting is under the snow as described above. The on ly exception will be in the case of small areas near a building that has water pressure for sprinkling. Contemporaneous reclamation of these small areas will take place at any time of the year as soon as the earthwork is completed. For these plantings a straw mulch will be used and irrigation will be by sprinkling.

Soil samples have been collected from various topsoil sites and tested by agriculture consultants. The results of these analyses and recommended nutrient additives are included under this cover as 'Exibit #1'.

UMC 784.13 (b)(5) cont.

2. Final abandonment

Upon completion of mining operation, the portal(s) shall be permanently sealed to prevent entry. Permanent seals will be designed to withstand any anticipated water pressure that may develop.

All machinery, equipment, and structures shall be removed from the permit area in not more than six months from the date of the completion of mining operations.

Dams, ponds, and diversions will be regraded to the approximate original contour of the land; except if that diversion is a barrow pit adjacent to, or a part of a road or pack trail that is to be left as a permanent road or trail.

Backfilling and grading

Disturbed areas will be backfilled and graded in not more than six months from the date of completion of the removal of surface structures, snow depth and weather permitting, or six months from the date the work can begin.
Backfilled material shall be pleced to minimize adverse effects on ground water, minimize off-site effects, and to support the postmining use.

Highwalls will be removed or reduced except where the highwall is permanently stable and/or said removal will endanger the life of the machine operator attempting the removal.

Backfilled areas shall be restored to a contour that is compatible with the natural surroundings and is capable of supporting the post mining land use. Where practicable and appropriate, such contour shall the approximate original contour.

Cut and fill terraces will be used where required in order to conserve soil moisture, ensure stability, and control erosion on final graded slopes. Terraces will meet the requirements of UMC 817.101 (4) (i) thruogh (iv).

Redistribution of soil will include covering all debris, coal or other materials constituting a fire hazard, in a place and manner designed to prevent contamination of ground or surface water. Soil will be compacted or otherwis stabilized in preparation for reseeding.

Revegitation.

The soil that has been redistributed and compacted will be covered with the surface material from the stockpiles, or other soil that has been tested and found to be suitable and able to support vegitative cover. Soil will be prepared for seeding by harrowing or final grading.

A description of the vegetation prior to surface disturbance is as shown on the following inventory taken by the Soil Conservation Service. Most of the disturbed area is along the boundary line between Pit 1 and Pit 2 of the SCS survey and would be a blending of the two rather than a distinct line. The seed mixture as shown in Chapter III Exibit 'h' in our permit application (also here enclosed) was chosen because it was recommended to us by the Utah State Experimental Station as being readily adaptable to the local climatic and soil conditions, having good potential for rapid development of cover, and contributing to possible post mining land use such as grazing or wildlife use. The plants from these seeds are not poisonous or noxious.

We have also enclosed a copy of appendix B table 1 of Utah Division of Wildlife resources 'Fish and wildlife Resource Information' of recommended seed mixtures that will benefit wildlife. Many of the plant species are the same on both seed mixture lists, but if in the opion of the OGM Division it would be better to modify the plan to use the seed mixture in table 1 in place of the one in Exibit 'h' we would be glad to do so.

CHAPTER III _ Exibit 'h'

SEED MIXTURE

Crested wheat grass	6# per acre
Luna pubescent wheat grass	2# per acre
Russian wild rye	6# per acre
Yellow sweet clover	6# per acre
Ladac alfalfa	2# per acre
Small burnet	2# per acre
Sage brush	1/4# per acre
Rabbit brush	1/4# per acre
Four wing salt brush	1/4# per acre

Amounts are given in PLS.

DESCRIPTION OF PRESENT VEGETATION

Upland Stony Loam (Pinyon-Juniper) Ecological Site

Two inventories of the Upland stony loam (P-J) ecological sites in the Bear Canyon area recorded the following vegetation as a percentage of air dry weight:

1) Pit 1, SW¼, Sec. 24, T16S, R7E. This site relates to the D1G soil.

2) Pit 2, NW¼, Sec. 25. T16S, R7E. This site relates to the D2E soil.

	Percent	
Grass and Grass-like Plants	Pit 1	Pit 2
Indian ricegrass	5	5
Salina wildrye	25	10
Squirreltail		10
Sedge		2
Needleandthread		2
Muttongrass	T	1
Forbs		
Buckwheat	1	
Mustard	1	2
Aster	1	2
Other	2	2
Crytantha		2
Stickseed		2
Trees and Shrubs		
Rubber rabbitbrush		5
White fir	5	
Douglas fir	5	5
Pinyon pine	30	25
Juniper	10	10
Rocky Mountain juniper	10	5
Curlleaf mountainmahogany	5	
Big sagebrush		5
Elderberry		5
Total annual Production (estimated in pounds/acre)	900	1500
Ecological rating	Good	Good

Table 1. Recommended seed mixtures that will benefit wildlife through enhancement of moderately disturbed shrublands habitats of the montane ecological association. Also included are acceptable alternatives if seed for a plant species is not available. Alternatives marked with an asterisk (*) are for use in special treatments such as erosion control or roadbank stabilization. If disturbance was severe and total reclamation is needed, increase amount of seed by a factor of 2 to 3 times. Information assembled from Plummer, A.P., D.R. Christensen and S.B. Monsen. 1968. Restoring big game range in Utah. Utah Division of Fish and Game (now Utah Division of Wildlife Resources) Publication No. 68-3. 183 pp. Also from personal contacts with A. Perry Plummer.

Species	North exposures and shady areas		Sunny exposures (south, west, east)	
	Broadcast	Drilled	Broadcast	Drilled
	-Pounds per acre-			
Grasses:				
Fairway crested wheatgrass	2	1	2	1
Smooth brome (southern strains)	4	2	2	1
Intermediate wheatgrass	4	2	2	1
Pubescent wheatgrass	0	0	2	1
Bluestem wheatgrass	0	0	1	1/2
Orchardgrass	1	1/2	1	1/2
Russian wildrye	0	0	1	1/2
Tall oatgrass	1	1/2	0	0
Forbs:				
Alfalfa (Nomad, Rambler, Travois, Ladak-equal parts)	2	1	2	1
Chickpea milkvetch	0	0	1	1/2
Utah sweetvetch	0	0	1	1/2
Yellow sweetclove	0	0	1	1/2
Arrowleaf balsamroot	1	1/2	1	1/2
Pacific aster	1	1/2	1	1/2

Mixture for tall mountain brush type, shaded sites.	
Species	Seeding per acre
	Pounds
Grasses:	
Smooth brome (southern strain)	5
Fairway crested wheatgrass	1
Intermediate wheatgrass	3
Orchardgrass (Utah grown)	2
Tall oatgrass	1
Mountain brome	1
Forbs:	
Alfalfa (creeping strains or Ladak)	1
Pacific aster	1/4
Oneflower hellanthella	1/2
Showy goldeneye	1/4
Totals	15

Table 1. Continued

Species	North exposures and shady areas		Sunny exposures (south, west, east)	
	Broadcast	Drilled	Broadcast	Drilled
	-Pounds per acre-			
Shrubs:				
Rubber rabbitbrush	1/2	1/4	1/2	1/4
Douglas rabbitbrush	1/2	1/4	1/2	1/4
Big sagebrush	0	0	1/2	1/4
Fourwing saltbush	0	0	1	1/2
Totals	17	8 1/2	20 1/2	10 1/4
Shrubs for pits, major disturbance areas, cleat marks, and drilled areas:				
Antelope bitterbrush	1	1/2	2	1
Golden currant	1/2	1/4	1/2	1/4
Birchleaf mountain mahogany	1	1/2	1/2	1/4
Curlleaf mountain mahogany	0	0	1/2	1/4
Cliffrose	0	0	1/2	1/4
Green ephedra	1/2	1/4	1/2	1/4
Fourwing saltbush	0	0	1	1/2
Woods rose	1	1/2	1/2	1/4
Saskatoon serviceberry	0	0	1	1/2
Totals	4	2	7	3 1/2

UMC 784.16, .22, .23

1-Plate III-9-b (please note that additions have been made to this map that includes the information asked for that was not on the original map turned in f or the modification).

2- Plate III-7-b

Size of catch basin

10 year 24 hour rainfall experience	2.4 in.	.2 ft.
75% runoff		.15 ft.
Acres draining into catch basin		1.2
Water storage required		.18 A. ft.
Sediment storage required		.12 A. ft.
Basin area	2,000 sq. ft.	25 ft. X 80 ft.
Height sed. storage	2.6 ft.	
Height water storage	4 ft.	
Freeb oard	1.4 ft.	

Culvert

Length	100 ft.
Diameter	60 in.

UMC 784.23 Operation plan: Maps and Plans

Cross-section of topsoil stockpile. See Plate 8-b-1

Upper storage pad. Request extention (refer to heading 783.14 of this package).

UMC 784.24 Transportation Facilities

Topographic map of roads and parking. Plate III-8-b

(a) Cross sections: Haul road Plate III-9-b (modification)
Supply road Plate III-8-b-1 Section B-B
Road cut and fill embankment III-13-b
Culvert III-12-b
Drainage ditch III-8-b-1 Section C-C

Haul roads will be a width of 30 feet road surface, not including the width of drainage and/or diversion ditches at the side of the road.

Supply and equipment roads will be 20 to 25 feet wide, not including the width of drainage and/or diversion ditches at the side.

The access road to the portal was constructed with a dozer by the cut and fill method. The average grade is 8% with sections of not more than 200 feet of up to 12%. Culverts are placed at the points were the natural drainages in the mountain intersect the road to minimize the amount of water that will flow down the divirsion ditch that was constructed along the side of the road. When completed, the road will be surfaced with a crushed road base material and treated with ammonium chloride for dust control. This road will be used by the people going to and from work and for vehicles hauling supplies to the mine. The access road to the screenage plant was an old existing road that has been graded and restored, and will be finished in the manner described above. It will be used by the people going to and from work at the screenage plant and for repair andmaintenance vehicles. These roads will be maintained by grading and reapplication of water and/or chemicals if needed. The main haulage road was an old existing road gradedand restored and when completed, will be surfaced with a crushed road base material and treated with ammonium chloride for dust control. The average grade is 4%, which remains consistant throughout the entire length of the road without steeper streches. Culvert are placed at the points where tha natural drainages intersect the road, but not exceeding 800 feet spacing. This road will be used for access to the minesite and to transport coal away from the mine.
For reclamation please refer to 784.13.

There is no public road within 100 feet of the permit area, except where the mine haul road joins t hat right of way.
Conveyor systems consist of covered belts which carry the coal from the screenage plant to the stockpile area. Maintenance includes regular servicing and replacing of worn parts when necessary. This will be included in the maintenance program we have for the entire operation. For dust control measures see 784.25.

784.25 Fugitive dust control plan

A copy is included, of a dust control plan that has already been submitted and approved by the Bureau of Air Quality, in the Bear Canyon permit application. Please seeChapter XI, Exibit XI-b

CO-OP MINING COMPANY _____DUST CONTROL (BEAR CANYON) May 5, 1980

	UNCONTROLED		FACTOR	CONTROLED	
HAUL ROADS	23.17 T. PER YEAR		85%	3.476 T. PER YEAR	
ACCESS ROADS	3.59	"	85%	.54	"
COAL STORAGE	5.25	"	50%	2.625	"
CONVEYORS	20	"	99%	.2	"
CRUSHER	2	"	99%	.02	"
SCREENS	10	"	99%	.1	"
PRODUCT REMOVAL	5	"	50%	2.5	"
TOTAL	69.01	"		9 461	"

CO-OP MINING COMPANY_____DUST CONTROL (BEAR CANYON) May 5, 1980

STORAGE PILE (COAL)

AVERAGE SIZE OF PILE 5,000 T. (10,000 T. CAP. — NORMALLY LESS THAN 1,000 T.)

THROUGH PUT 200,000 T. PER YEAR

E = 9.125

s = 20

d = 175 (HIAWATHA WEATHER STATION — 151 DAYS SNOW COVER —39 ADDITIONAL DAYS .01 IN. OR MORE OF RAINFALL)

$E = .05 \cdot \frac{20}{1.5} \cdot \frac{175}{235} \cdot \frac{15}{15} \cdot \frac{9.125}{90} = .0525 \cdot 200{,}000 \text{ T.} = 5.25 \text{ T. PER YEAR}$

CONTROL — COAL IS SPRAYED WITH WATER AS IT IS BEING MINED IN ORDER TO MEET UNDERGROUND DUST CONTROL REQUIREMENTS. ADDITIONAL SPRAY EQUIPMENT WILL BE INSTALLED AT THE STORAGE SITE TO USE IF NEEDED.

CRUSHING (PRIMARY ONLY) 200,000 T. • .02 = 4,000# = 2 T. PER YEAR

CONTROL — ENCLOSED AND VENT TO BAG HOUSE

SCREENING 200,000 T. • .1 = 20,000# = 10 T. PER YEAR

CONTROL — BAG HOUSE

CONVEYORS AND TRANSFER POINTS 200,000 T. • .2 = 40,000# = 20 T. PER YEAR

CONTROL — ENCLOSED AND VENT TO BAG HOUSE

ROADS (HAUL) — s = 15
S = 20
W = 190

E = 5 • .47945 = 2.39725 @ 19333.33 MILES PER YEAR = 23.17 T. PER YEAR

CONTROL — CHEMICAL STABILIZATION

ROADS (ACCESS) s = 15
S = 10
W = 190

E = 2.5 • .479452 = 1.1986 @ 6000 MILES PER YEAR = 3.59 T. PER YEAR

CONTROL — CHEMICAL STABILIZATION

PRODUCT REMOVAL 200,000 T. PER YEAR • .05 = 5 T. PER YEAR

CONTROL — WATER SPRAY

UMC 817.22 Topsoil removal

Please refer to 784.13 (b)(4) of this package.

Area of scale area modification 1.2 acres.

Area of upper pad modification, please refer to 783.14 of this package.

Results of analysis of soil; please refer to Exibit '1'.

UMC 817.23

Please refer to 784.13 (b)(4) and (b)(5) of this package.

UMC 817.24

Upon final reclamation, topsoil will be applied to a depth of 3 to 4 in.

Umc 817.25 Soil nutrients will be added to the topsoil as needed as indicated by the above analysis.

EXIBIT '1' Bear Canyon ACR and Modification of Scale area and Upper pad area.

Exibit '1' is incomplete as we have not yet received all the necessary information on soil nutrients needed. We are enclosing a copy of the soil analyses for the topsoil of the scale house ares and for the upper pad area, and will forward plan for nutrients to be added to the Division within 10 days.

SOIL TEST REPORT

NO. 7404.0

AGRICULTURAL CONSULTANTS, INC.
P.O. DRAWER 507 — 240 S. FIRST AVENUE
BRIGHTON, COLORADO 80601
303/659-2313

DATE RCVD 11-12-82

REPORTED 11-23-82

REPORT TO: CO-OP MINING COMPANY ATTN: MR. OWEN

BILL TO: SAME

GROWER: SAME

SAMPLE ID: BEAR UPPER PAD

TEXTURE si=silt, silty sn=sand, sandy lo=loam, loamy cl=clay	pH		CEC Meq /100g	SALT Mmhos /cm	Na Meq /100g	Lime %	OM %	Org N Lbs	AVAILABLE NUTRIENTS ppm (1)										
	H_2O	Buf							NO_3	P(2)	K(2)	Ca	Mg	S(2)	B	Zn	Fe	Mn	Cu
SN LO	8.3	7.0	9.5	1.9	0.2	8.7	0.9	31.5	9 3.5	1 3.5	44	2700	250	58	0.2	0.4	1.5	1.1	0.3

CROP	YIELD GOAL	CROP RESIDUE T/A	MNR T/A	RECOMMENDATIONS POUNDS PER ACRE											
				N	P_2O_5	K_2O	Elem Sulfer	Lime	Mg	SO_4-S	Boron	Zinc	Iron	Mn	Cu

1.ppm=parts per million or lbs element per million lbs soil. ppm x 2 = lbs/acre 6-7" depth. ppm x 3.5 = lbs/acre feet. 2. P x 2.3 = P_2O_5 K x 1.2 = K_2O S x 3 = SO

Values reported but without specific remarks are considered to be within growth range of intended crop.

Supervised by Diane Lansing

SOIL TEST REPORT

NO. 7406.0

AGRICULTURAL CONSULTANTS, INC.
P.O. DRAWER 507 — 240 S. FIRST AVENUE
BRIGHTON, COLORADO 80601
303/659-2313

DATE RCVD 11-12-82

REPORTED 11-23-82

REPORT TO: CO-OP MINING COMPANY ATTN: MR. OWEN

BILL TO: SAME

GROWER: SAME

SAMPLE ID: SEALES BEAR

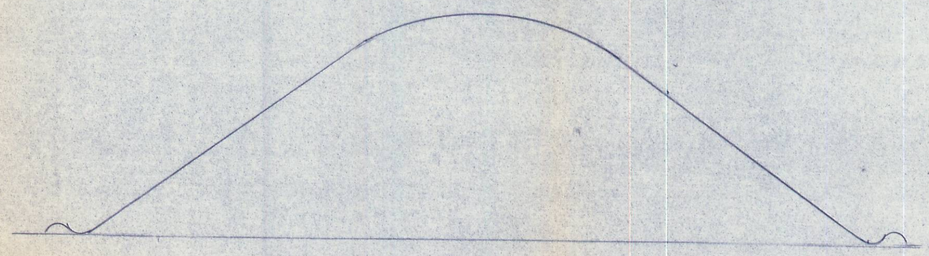
TEXTURE si=silt, silty sn=sand, sandy lo=loam, loamy cl=clay	pH		CEC Meq /100g	SALT Mmhos /cm	Na Meq /100g	Lime %	OM %	Org N Lbs	AVAILABLE NUTRIENTS ppm (1)										
	H_2O	Buf							NO_3	P(2)	K(2)	Ca	Mg	S(2)	B	Zn	Fe	Mn	Cu
SN LO	8.3	7.0	11.1	1.0	0.2	8.6	1.3	45.5	8	3	99	3400	210	31	0.6	0.6	3.8	2.0	0.3
									78 lb	[illegible]	3%								

CROP	YIELD GOAL	CROP RESIDUE T/A	MNR T/A	RECOMMENDATIONS POUNDS PER ACRE												
				N	P_2O_5	K_2O	Elem Sulfer	Lime	Mg	SO_4-S	Boron	Zinc	Iron	Mn	Cu	

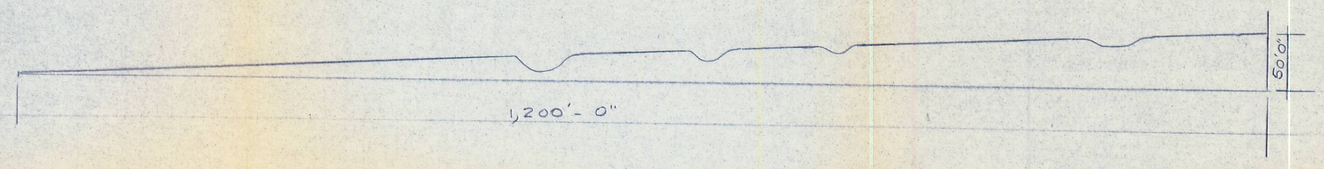
1.ppm=parts per million or lbs element per million lbs soil. ppm x 2 = lbs/acre 6-7" depth. ppm x 3.5 = lbs/acre feet. 2. P x 2.3 = P_2O_5 K x 1.2 = K_2O S x 3 = SO_4

Values reported but without specific remarks are considered to be within growth range of intended crop.

Supervised by Dean Lynning



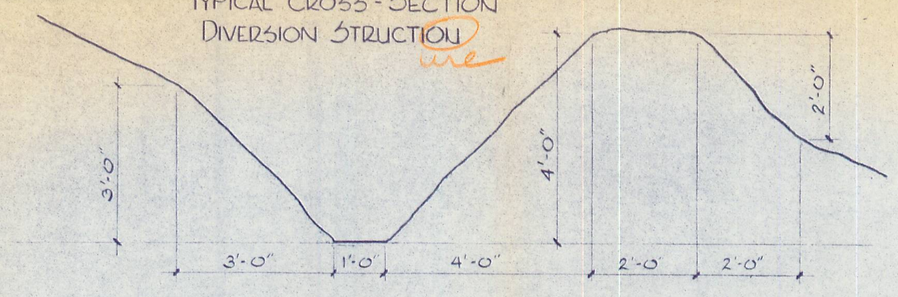
TYPICAL STOCKPILE SECTION



CROSS SECTION D-D

SCALE 1" = 100'-0"

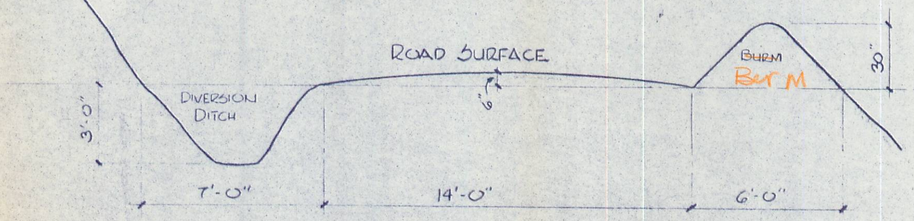
TYPICAL CROSS-SECTION DIVERSION STRUCTURE



CROSS SECTION C-C

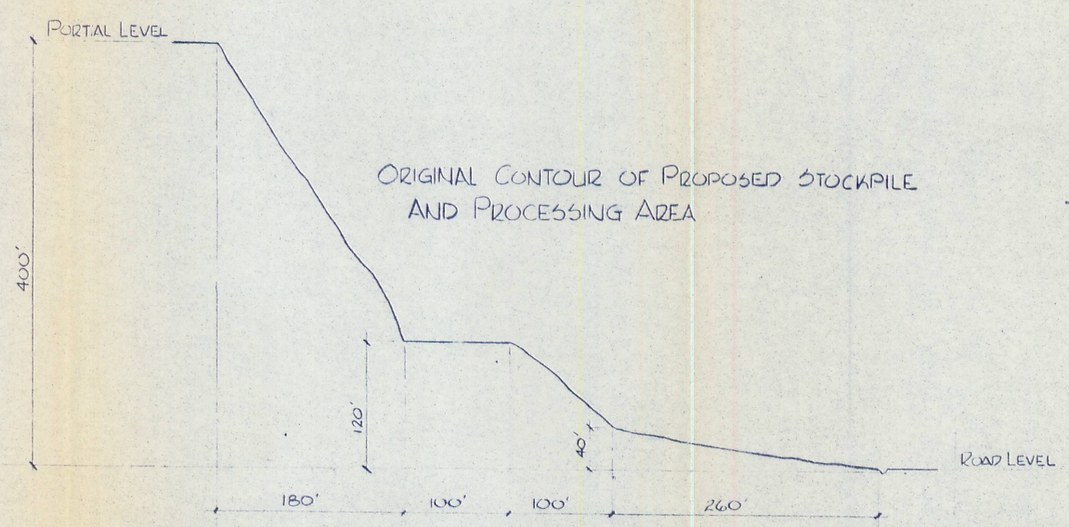
SCALE: ½" = 1'-0"

TYPICAL CROSS-SECTION OF MINE ACCESS ROAD AND DIVERSION STRUCTURE



CROSS SECTION B-B

SCALE: ¼" = 1'-0"



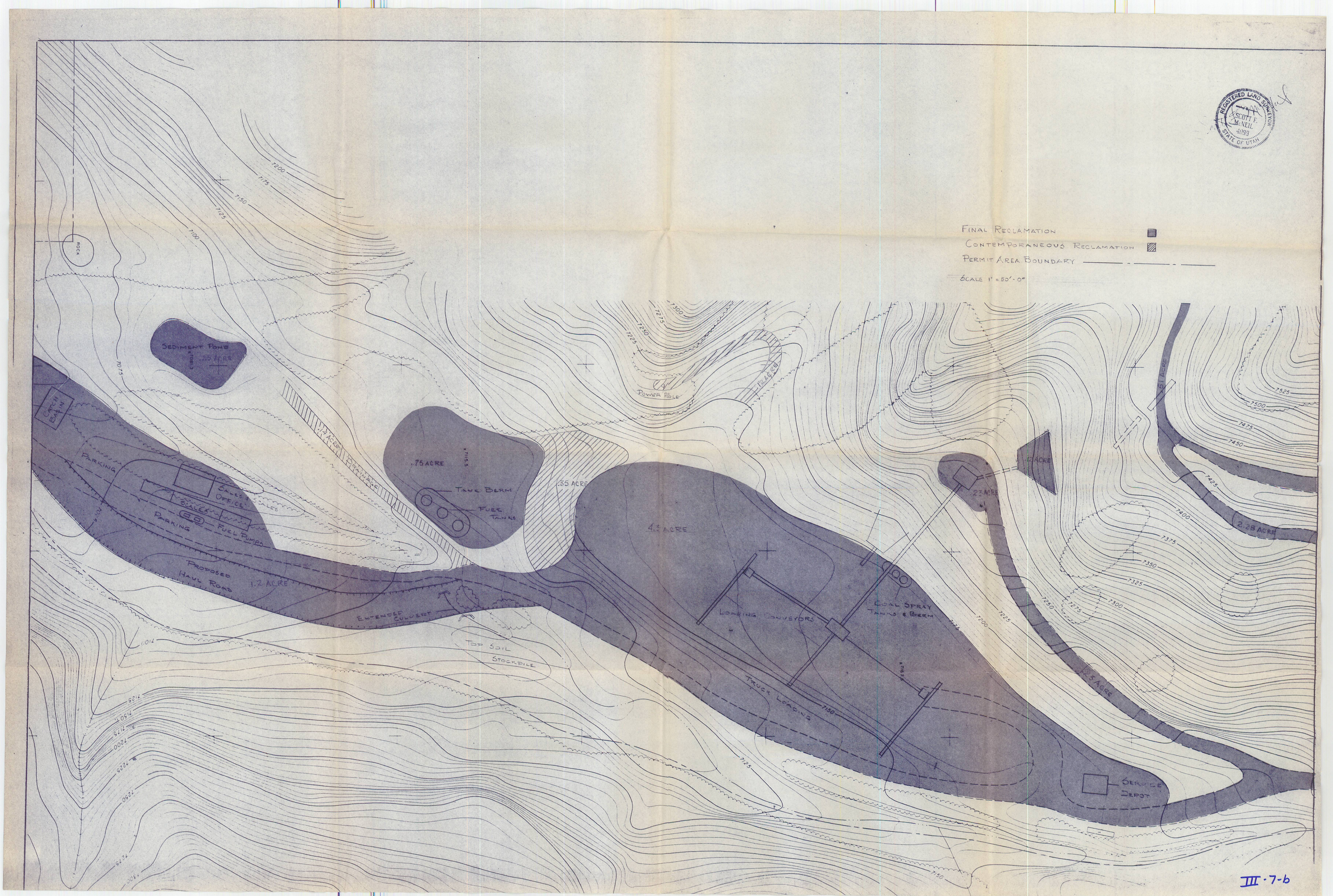
ORIGINAL CONTOUR OF PROPOSED STOCKPILE AND PROCESSING AREA

CROSS SECTION A-A

SCALE: 1" = 100'-0"

REGISTERED PROFESSIONAL ENGINEER No. 4413 SCOTT F. McNEIL STATE OF UTAH

PLATE III 8B1

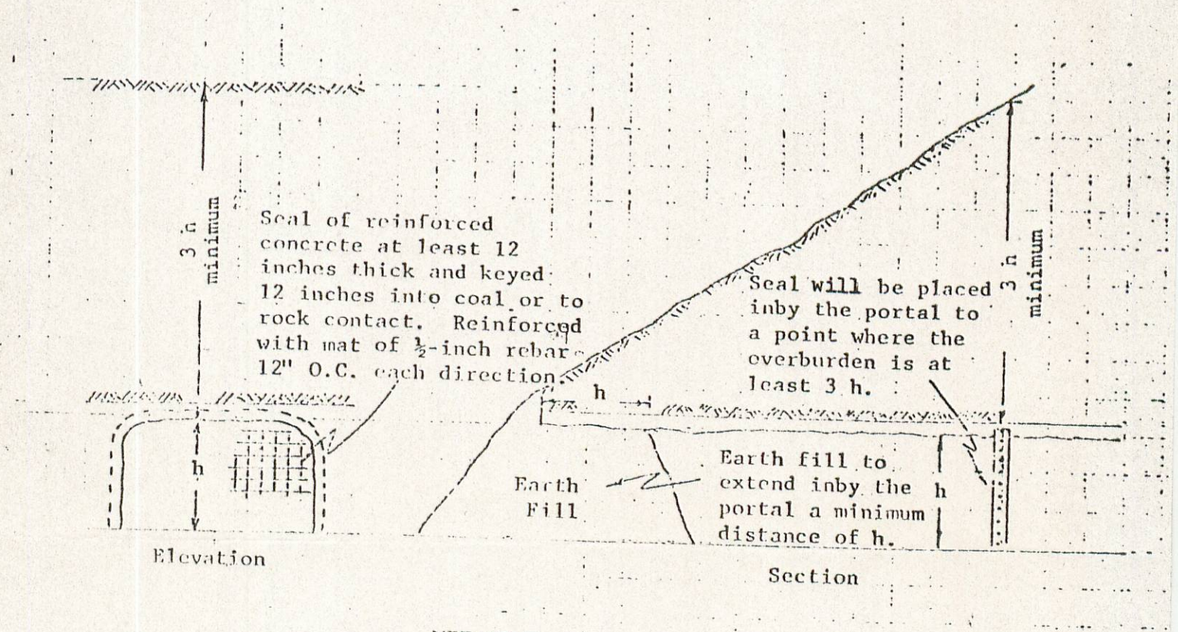

FINAL RECLAMATION
CONTEMPORANEOUS RECLAMATION
PERMIT AREA BOUNDARY
SCALE 1" = 50'-0"
REGISTERED LAND SURVEYOR
SCOTT E. O'NEIL
4099
STATE OF UTAH
SEDIMENT POND
.25 ACRE
ROCK
CATCH BASIN
PARKING
SCALES
OFFICE
SCALES
FUEL PUMPS
PARKING
PROPOSED HAUL ROAD
1.2 ACRE
EXTENDED CULVERT
.12 ACRE DRAINAGE
.75 ACRE
TANK BERM
FUEL TANKS
.35 ACRE
4.3 ACRE
TOP SOIL STOCKPILE
POWER POLE
.12 ACRE
LOADING CONVEYORS
COAL SPRAY TANKS & BERM
TRUCK LOADING
.23 ACRE
.12 ACRE
.61 ACRE
2.28 ACRE
1.3 ACRE
SERVICE DEPOT

III-7-b

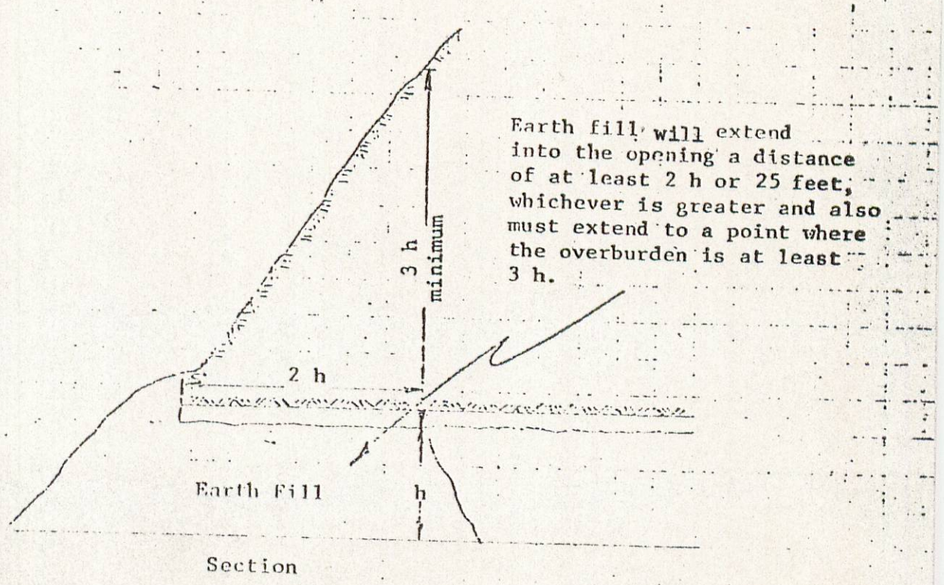
UMC 784.13 (b)(8) Portal seals

Upon final abandonment of the mine, the portals will be sealed by either method I or method II as shown in the accompanying print.

GENERAL SPECIFICATIONS
PERMANENT CLOSURE OF DRIFT OPENINGS
WESTERN ROCKY MOUNTAIN REGION
BRANCH OF MINING OPERATIONS



METHOD I



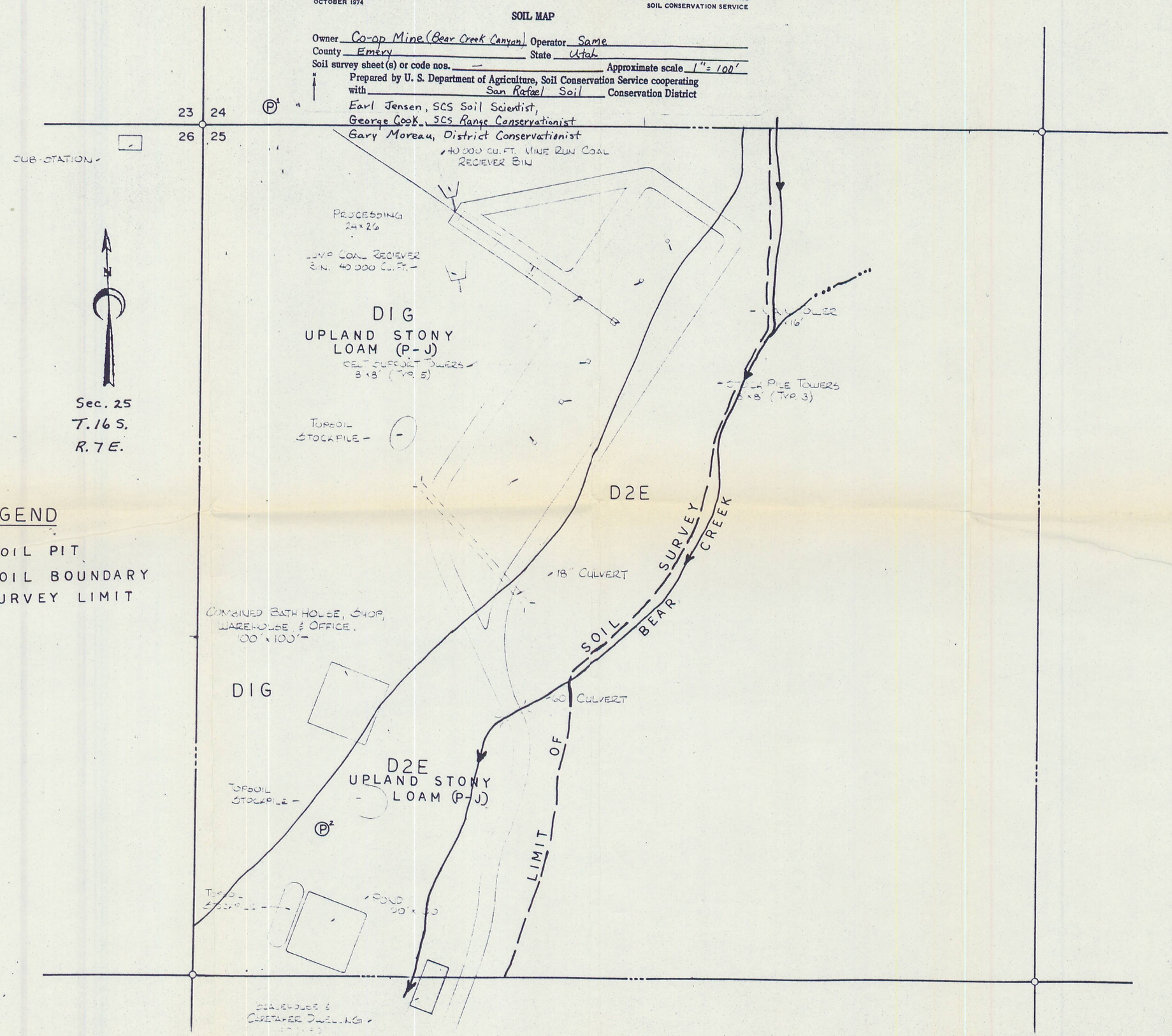
METHOD II

SCS-CONS-15
OCTOBER 1974

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL MAP

Owner Co-op Mine (Bear Creek Canyon) Operator Same
County Emery State Utah
Soil survey sheet(s) or code nos. — Approximate scale 1" = 100'
Prepared by U. S. Department of Agriculture, Soil Conservation Service cooperating with San Rafael Soil Conservation District
Earl Jensen, SCS Soil Scientist,
George Cook, SCS Range Conservationist
Gary Moreau, District Conservationist



LEGEND

- Ⓟ SOIL PIT
- SOIL BOUNDARY
- SURVEY LIMIT

A# 38

SCS-CONS-15
OCTOBER 1974

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL MAP

Owner Co-op Mine (Bear Creek Canyon) Operator Same
County Emery State Utah
Soil survey sheet(s) or code nos. — Approximate scale 1" = 100'
Prepared by U. S. Department of Agriculture, Soil Conservation Service cooperating with San Rafael Soil Conservation District
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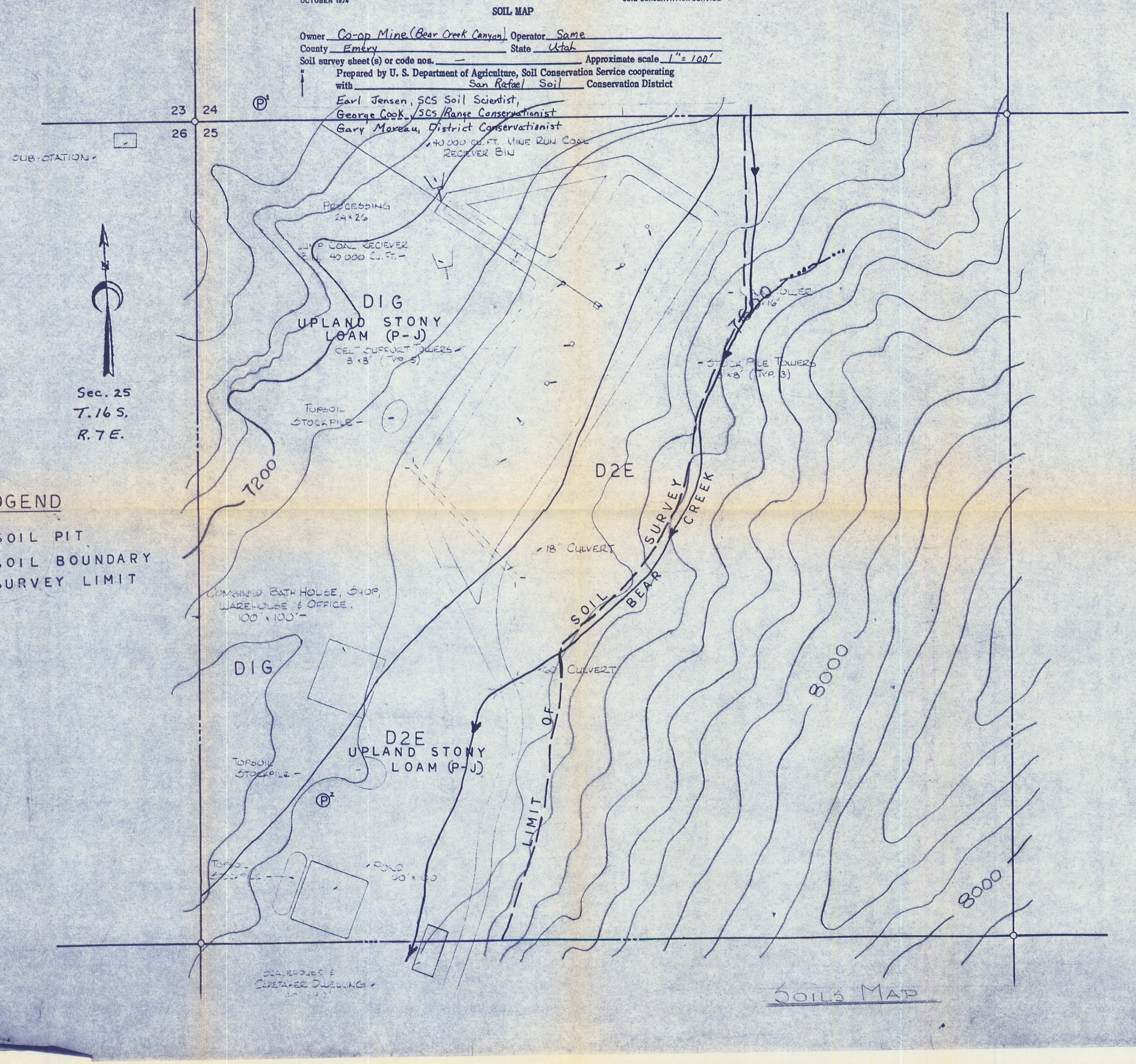
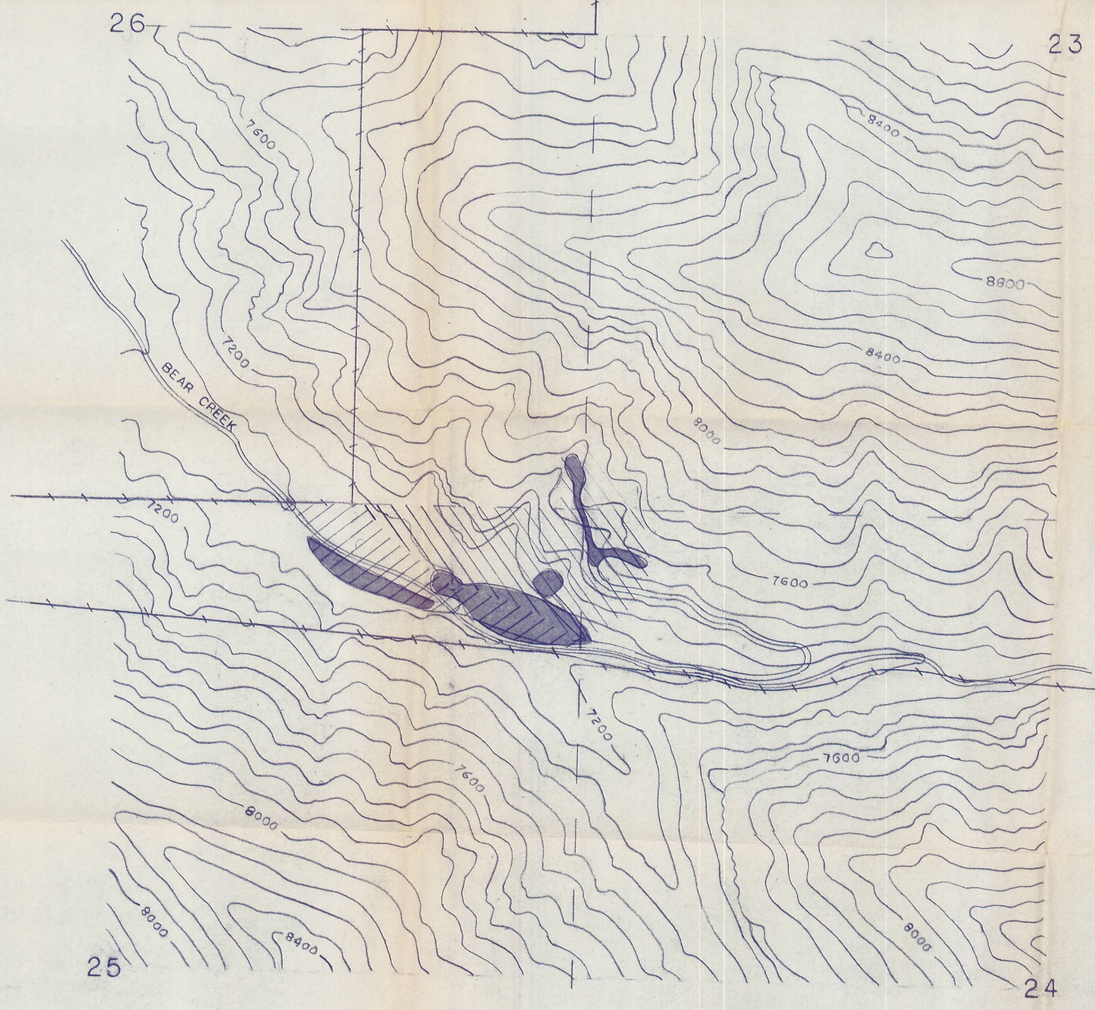


SOILS MAP



PIT 1 PIT 2
DISTURBED AREA
PERMIT AREA BOUNDARY

BEAR CANYON MINE

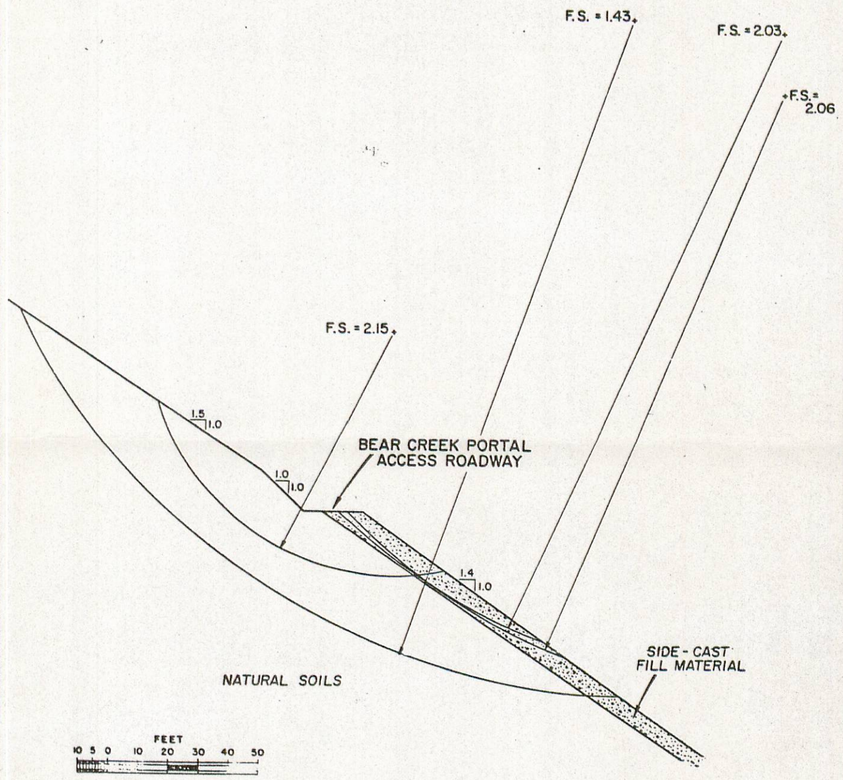
SCALE: 1" = 400'-0"	APPROVED BY:	DRAWN BY:
DATE:		REVISED

VEGETATION MAP

R7E/T16S/SLM

DRAWING NUMBER IX-1

22 X 34 PRINTED ON NO. 1000H CLEARPRINT

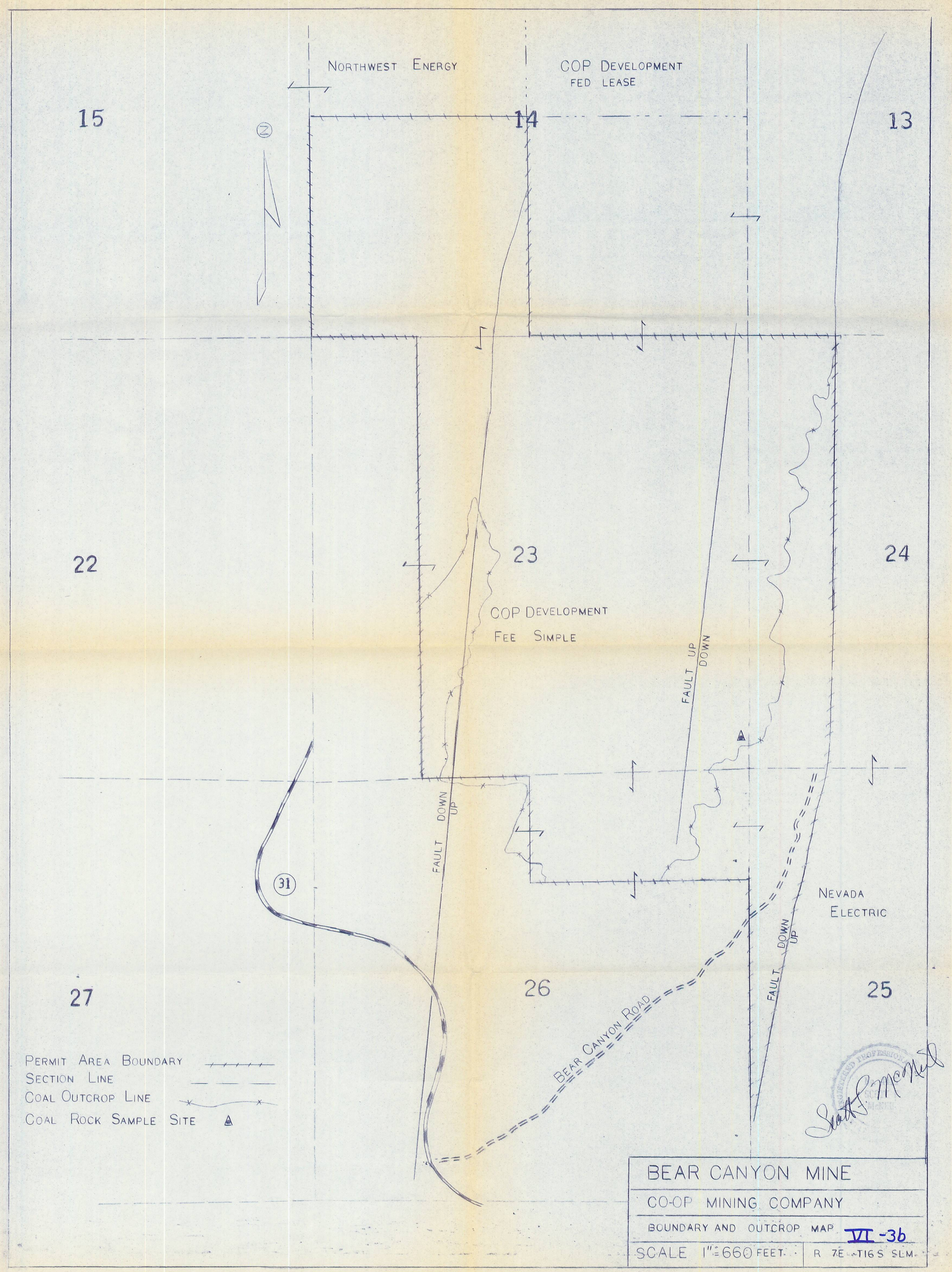


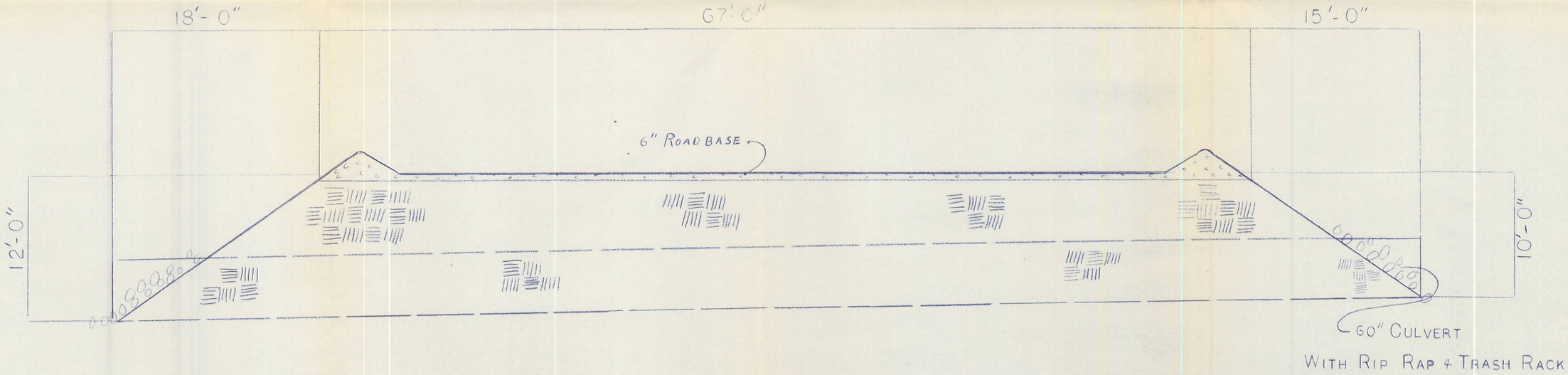
SLOPE CROSS SECTION

DAMES & MOORE

III - 13-b

PLATE 2


NORTHWEST ENERGY
COP DEVELOPMENT
FED LEASE
15
14
13
N
22
23
24
COP DEVELOPMENT
FEE SIMPLE
FAULT UP DOWN
FAULT DOWN UP
31
NEVADA
ELECTRIC
FAULT DOWN UP
27
26
25
BEAR CANYON ROAD
PERMIT AREA BOUNDARY
SECTION LINE
COAL OUTCROP LINE
COAL ROCK SAMPLE SITE
BEAR CANYON MINE
CO-OP MINING COMPANY
BOUNDARY AND OUTCROP MAP
VI-3b
SCALE 1" = 660 FEET
R 7E T16S SLM



CULVERT SECTION

MAIN STREAM CROSSING (BEAR)

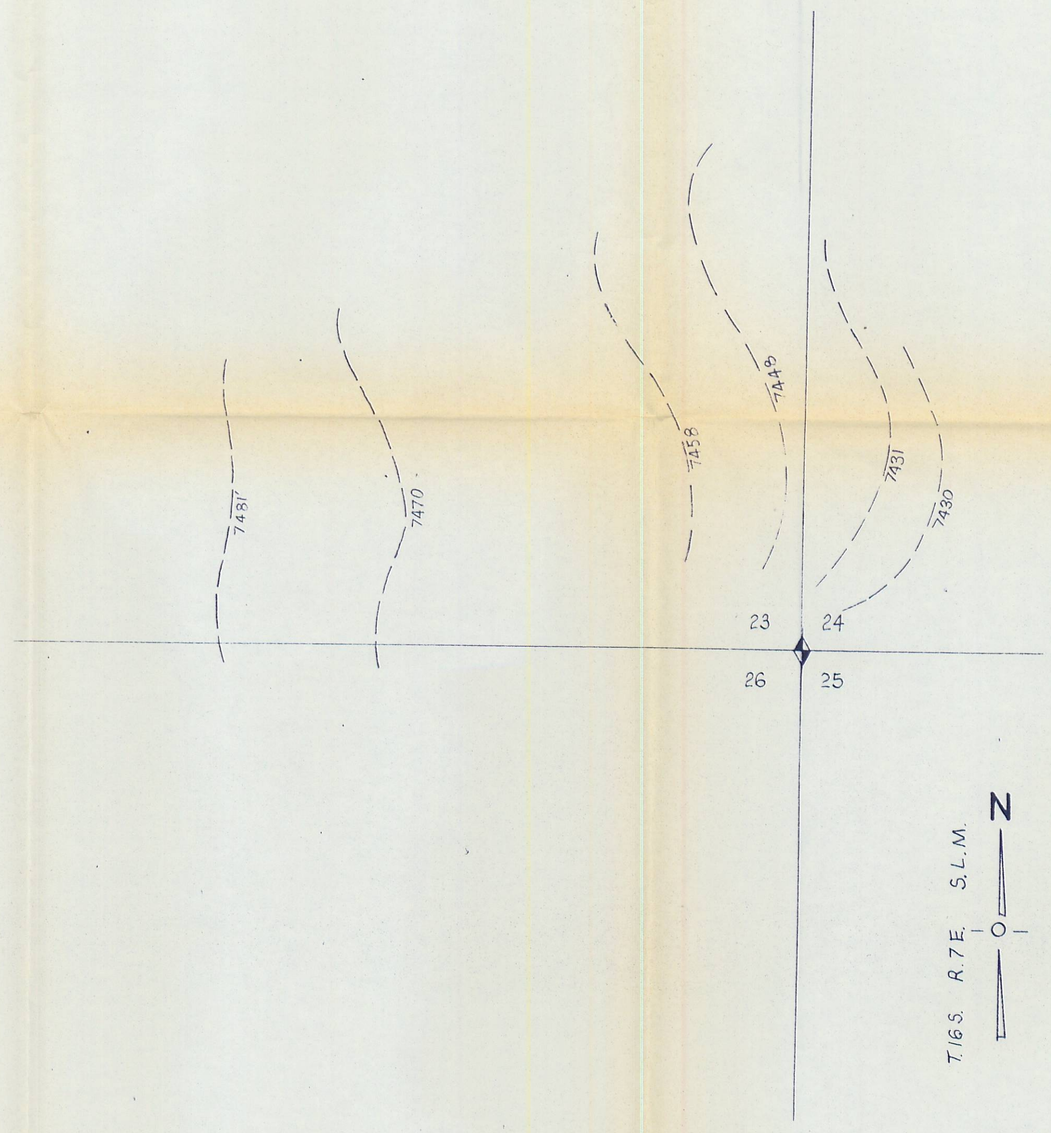
TYPICAL ALL CULVERTS

BEAR CANYON MINE

SCALE 1" = 6'

III-12-b

CO-OP MINING CO.



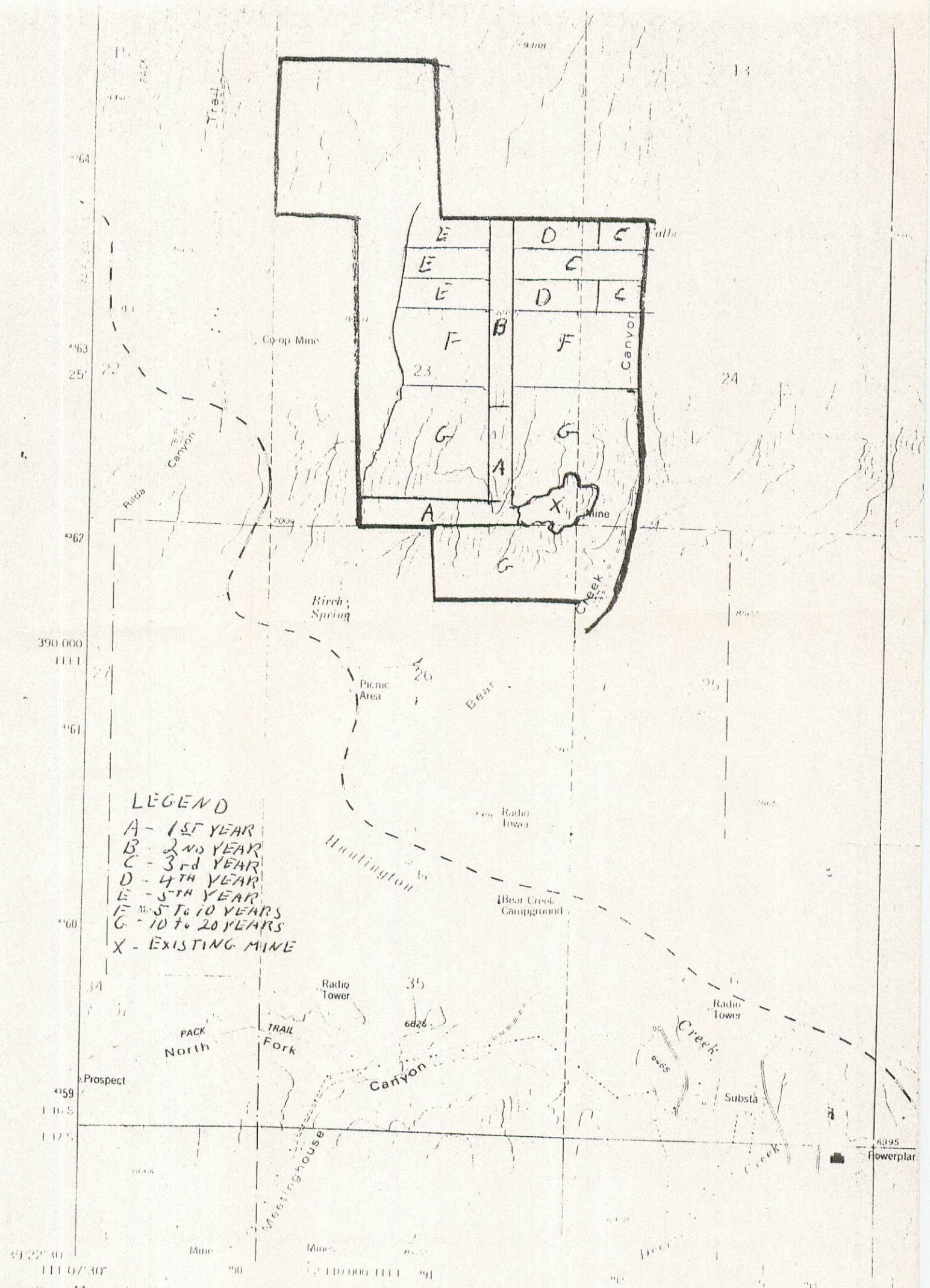
REGISTERED LAND SURVEYOR
SCOTT F. McNEIL
4099
STATE OF UTAH

CO-OP MINING COMPANY #2
BOX 300 HUNTINGTON
EMERY COUNTY, UTAH 84528

SCALE : 1 IN. = 200 FT.
SURVEYED BY :
PAGE : 2 of 2

AUGUST 25, 1982
DRAWN BY : KCM

III-10-b-2



Mapped, edited, and published by the Geological Survey

Control by USGS, NOS/NOAA, and U.S. Forest Service

Topography by photogrammetric methods from aerial photographs taken 1970. Field checked 1974. Map edited 1978

Projection and 10,000-foot grid ticks: Utah coordinate system, central zone (Lambert conformal conic)
1000-meter Universal Transverse Mercator grid ticks, zone 12, shown in blue. 1927 North American datum

Fine red dashed lines indicate selected fence lines

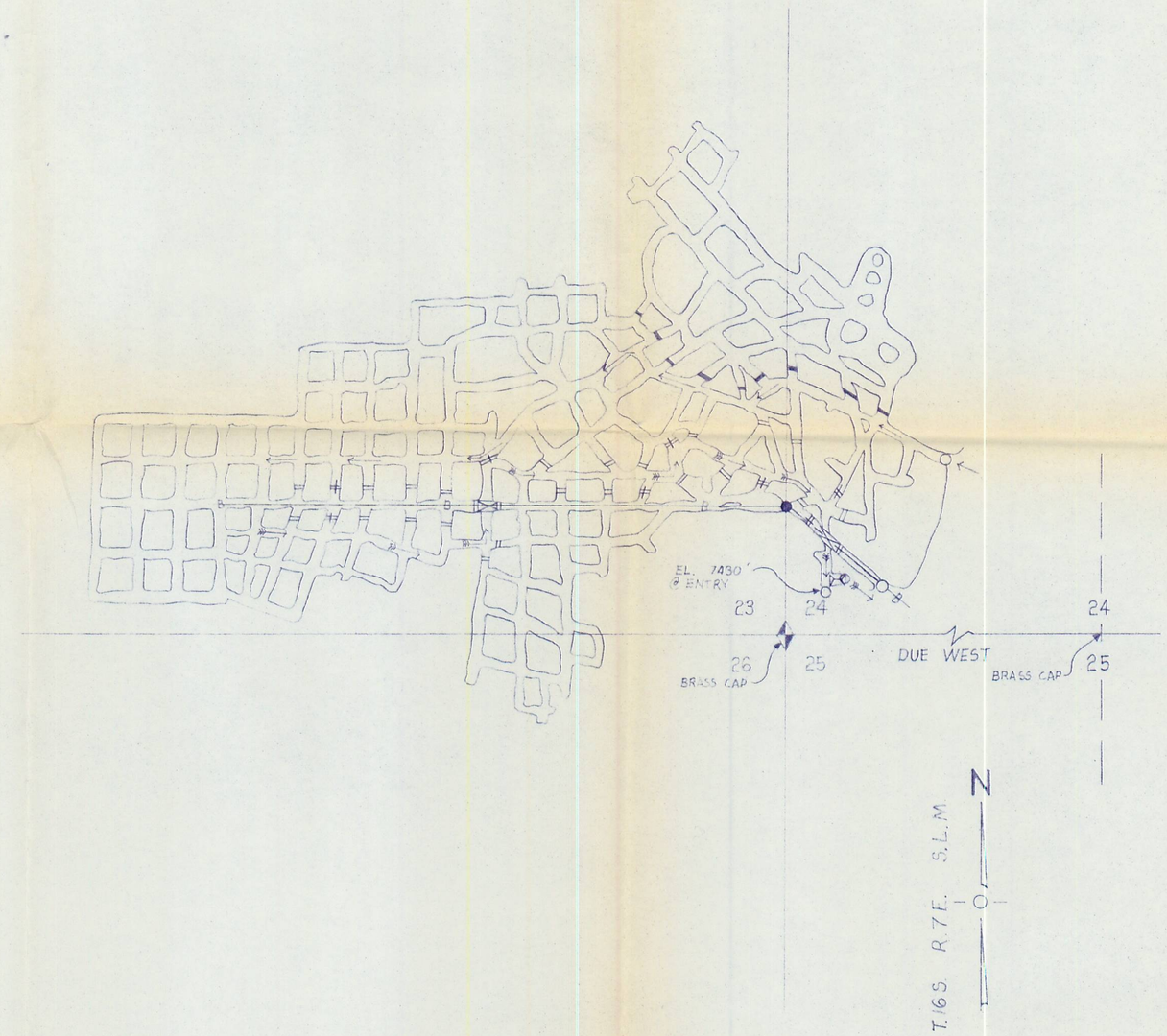
There may be private inholdings within the boundaries of the National or State reservations shown on this map

UTM GRID AND 1978 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

FOR SALE BY U.S.

Plate III-10-b

III -10-b-1



- ○ MINE OPENING
- ← AIR MOVEMENT
- ← AIR INTAKE – MAIN ESCAPEWAY
- ← AIR RETURN
- –B– BELT LINE – SECONDARY ESCAPEWAY
- ● BELT DRIVE & TRANSFER POINT
- STOPPING
- STOPPING W/ MAN DOORS
- SEAL
- MAIN FAN
- OVERCAST

THIS IS TRUE AND CORRECT
TO THE BEST OF MY KNOWLEIDGE

9/30/82
DATE

Scott F. McNeil

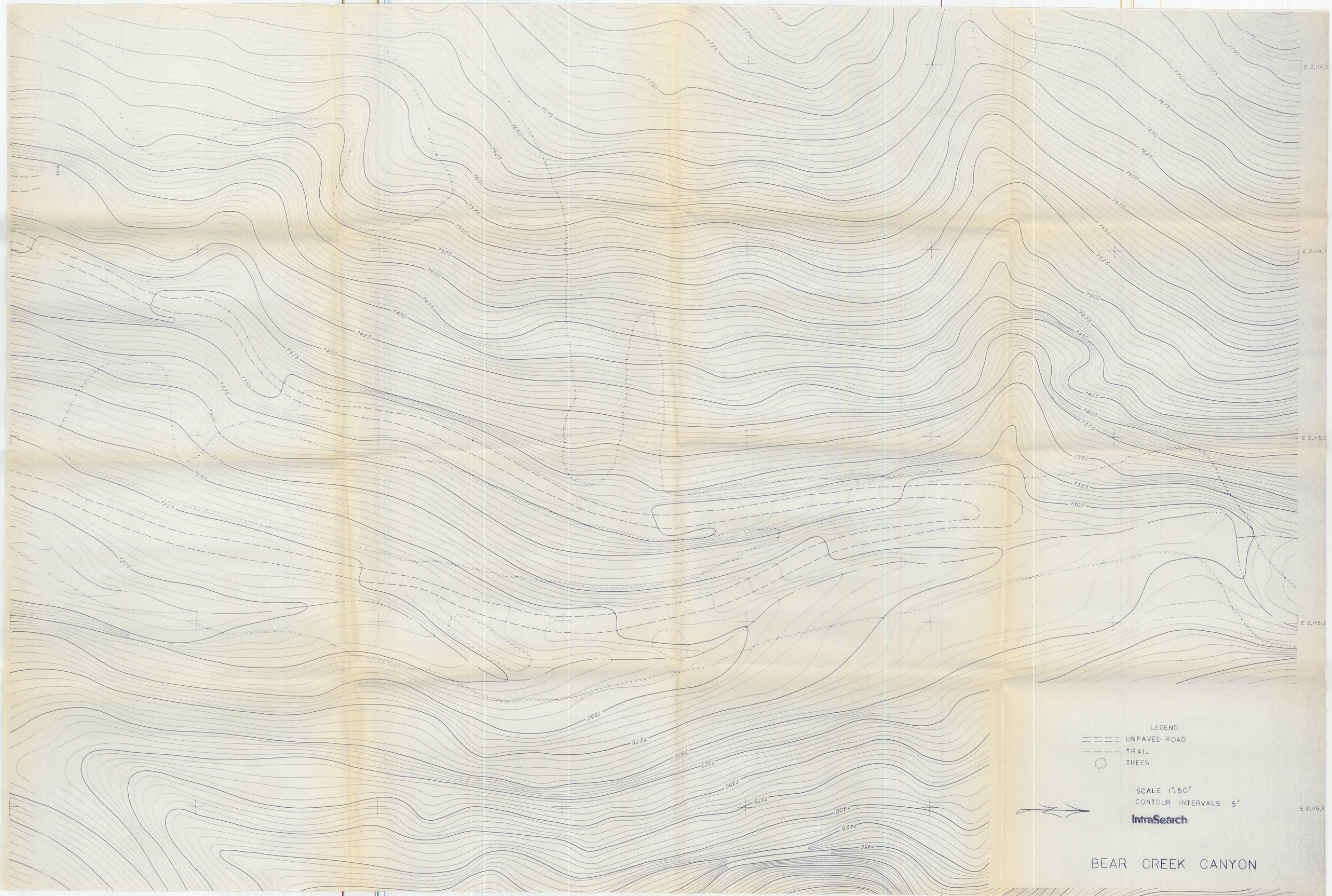
REGISTERED LAND SURVEYOR
SCOTT F.
McNEIL
4099
STATE OF UTAH

CO-OP MINING COMPANY #2
BOX 300 HUNTINGTON
EMERY COUNTY, UTAH 84528

SCALE : 1 IN. = 200 FT.
SURVEYED BY :
PAGE : 1 of 2

AUGUST 25, 1982
DRAWN BY : KCM

III - 10-b-3


E 2,114,5
E 2,114,7
E 2,115,0
E 2,115,2
E 2,115,5
LEGEND
UNPAVED ROAD
TRAIL
TREES
SCALE 1"=50'
CONTOUR INTERVALS 5'
IntraSearch
BEAR CREEK CANYON

Permit Area Boundary
Scale 1" = 50'-0"
Diversion
Berm
Registered Land Surveyor
Scott F. McNeil
4099
State of Utah
Typical Cross Section Of Road
Road Level
Cross Section Stockpile & Processing Area
Scales
Cross Section Road, Parking & Scales
Cross Section Of Fuel Tanks Location
Rock
Sediment Pond
x 7081.3
Catch Basin
Parking
Sales & Scales Office
Scales
Parking
Fuel Pumps
Proposed Haul Road
Drainage
x 7115.5
Tank Berm
Fuel Tanks
Extended Culvert
Top Soil Stockpile
Loading Conveyors
Coal Spray Tanks & Berm
x 7167.5
Truck Loading
Service Depot
7075
7100
7125
7150
7175
7200
7225
7250
7275
7300
7325
7350
7375
7400
7425
7450
7475
7500
7525