EXHIBIT 7A

HORROCKS & CAROLLO ENGINEERS
A JOINT VENTURE
ONE WEST MAIN
P. O. BOX 377
AMERICAN FORK, UTAH 84003

CRANDALL CANYON SITE WORK

SOILS CERTIFICATION

I, Gilbert R. Horrocks, do certify that I am a registered Professional Engineer and that I hold certificate No. 2986 as prescribed under the laws of the State of Utah. I further certify by authority of the owners I have performed or caused to be performed various soil classifications and tests as required by the Office of Surface Mining regulations and that these tests as contained in the attached document are true and correct. I further certify that the A-3 material proposed for the canyon fill is acceptable for the use intended if properly compacted to 95% relative density (T-99) near optimum moisture.

Gilbert R. Horrocks, P.E.
Utah P.E. No. 2986

HORROCKS ENGINEERS
One West Main
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Telephone (801) 756-7628

MOISTURE-DENSITY RELATIONS

PROJECT NAME PRICE RIVER COAL DATE 2/24/81

PROJECT No. _____ SAMPLE No. 81-07

METHOD OF COMPACTION T-180 "D"

TEST No.	1	2	3	4	5	6	7	8
CYL. & WET EARTH IN GRAMS	10140	10355						
CYLINDER WT. IN GRAMS	5613	5613						
WET EARTH IN GRAMS	4527.0	4742						
WET DENSITY IN LBS/CU. FT.	133.0	139.4						
DISH NUMBER	~	~						
DISH & WET SOIL WT. IN GRAMS	601.5	688.2						
DISH & DRY SOIL WT. IN GRAMS	578.6	655.2						
WATER WT. IN GRAMS	22.9	33.2						
DISH & DRY SOIL WT. IN GRAMS	578.6	655.2						
DISH WT. IN GRAMS	107.4	110.4						
DRY SOIL WT. IN GRAMS	471.2	544.8						
MOISTURE IN % OF DRY WT.	4.9	6.10						
DRY DENSITY IN LBS./CU. FT.	126.8	131.4						

132.0 pcf
9.0 % Op. MOISTURE

$$\text{DRY DENSITY} = \frac{\text{WET DENSITY}}{100 + \%\ \text{MOISTURE}} \times 100$$

TESTED BY: Darell Kinyon

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Project Name: PRICE RIVER COAL Date: 2/24/81
Project No. Station Sample No. 81-07
Test For: GRADATION - T-180

AS RECEIVED GRADATION			
Screen Size	Weight (a)	Percent Retained	Percent Passing
3"			
1½"			
1"			
¾"			
½"			
⅜"			
#4			
Wet Wt. -#4			
Dry Wt. -#4			
Total Wt. Dry			

SPECS.

WASHED GRADATION AFTER CRUSHING (2500 Gm. Dry Recombined Sample)					
Screen Size	Weight Retained	Percent Retained	Percent Passing	Total % Passing	SPECS.
1"					
¾"					
½"					
⅜"					
#4	9.4	3.5		96.5	
~~#8~~ #10	32.4	11.9		84.6	
#16					
#40 ~~#50~~	68.3	25.1		59.5	
#200	147.8	54.4		5.1	
-#200	13.8	5.1		Wt. before sieving Wt. after sieving	
Total Wt.	271.7				

		A.A.S.H.O. Classification
L.L.	N/P	A-3(0)
P.L.	N/P	
P.I.	N/P	

Tested By: Darrell Kaye

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Project Name: PRICE RIVER COAL Date: 2-24-81
Project No. Station Silt stone #4 Below Aberdeen S.S. Sample No.
Test For: Gradation

AS RECEIVED GRADATION			
Screen Size	Weight (a)	Percent Retained	Percent Passing
3"			
1½"			
1"			
¾"			
½"			
⅜"			
#4			
Wet Wt. -#4			
Dry Wt. -#4			
Total Wt. Dry			

SPECS.

WASHED GRADATION AFTER CRUSHING (2500 Gm. Dry Recombined Sample)					
Screen Size	Weight Retained	Percent Retained	Percent Passing	Total % Passing	SPECS.
1"					
¾"					
½"					
⅜"					
#4	0				
~~#8~~ #10	8.6	8.1	91.	91.9	
#16					
#40 ~~#50~~	47.2	44.4		47.5	
#200	39.4	37.0		10.4	
-#200	11.1	10.4		Wt. before sieving Wt. after sieving	
Total Wt.	106.3				

		A.A.S.H.O. Classification
L.L.	N/P	A-3(0)
P.L.	N/P	
P.I.	N/P	

Tested By: [illegible]

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Project Name: PRICE RIVER COAL Date: 2-24-81
Project No. Station C.G. -SS. # C.T Sample No. 81-06
Test For GRADATION

AS RECEIVED GRADATION			
Screen Size	Weight (a)	Percent Retained	Percent Passing
3"			
1½"			
1"			
¾"			
½"			
⅜"			
#4			
Wet Wt. -#4			
Dry Wt. -#4			
Total Wt. Dry			

SPECS.

WASHED GRADATION AFTER CRUSHING (2500 Gm. Dry Recombined Sample)					
Screen Size	Weight Retained	Percent Retained	Percent Passing	Total % Passing	SPECS.
1"					
¾"					
½"					
⅜"					
#4	7.8	4.6		95.4	
~~#8~~ #10	21.5	12.7		82.7	
#16					
#40 ~~#50~~	22.6	13.5		69.2	
#200	116.2	69.0		.2	
-#200	.3	.2		Wt. before sieving Wt. after sieving	
Total Wt.	168.4				

P.S.I. 6000

		A.A.S.H.O. Classification
L.L.	N/P	A-3(0)
P.L.	N/P	
P.I.	N/P	

Tested By: Darrell Kerr

compacted in two foot lifts. Proctor compaction tests will be conducted at regular intervals to assure design compaction. Samples from test hole "MC 207" have been analyzed for structure and compressability. The materials and plans for compaction have been reviewed by registered engineers and certified as acceptable. (See Exhibit 7A for physical analyses and engineer's certification.)

Upon completion of the shaft construction and the fill process, the final grade, minus hard-surfacing and required dressing, will have been reached.

The materials to be excavated and used in fill construction have been subjected to chemical analyses. Samples for analysis were obtained from test hole "MC 207." Exhibit 7 describes this test hole. Exhibit 7B is the laboratory results.

The exhaust shaft will be located on a lower bench east of the parking lot. An access ramp will connect the exhaust shaft surface area with the parking lot. The concrete collar of the exhaust shaft will protrude 3' above the finished surface elevation surrounding the shaft. A safety fence will surround the shaft.

Timing - Shaft construction will be initiated based on approval granted by the correspondence of December 23, 1980, and continue until completion approximately twenty months hence.

Finished Surfaces in Shaft Area - The areas around the intake shaft and associated buildings will be hard-surfaced to facilitate movement of materials and equipment into and from the shaft through the airlock door systems on north and/or south sides of the shaft, and, also, to maintain ready access to either the hoist or mine ventilation systems.

373.B CLASS II ACCESS ROAD

An access road to Crandall Canyon exists in the form of a jeep trail. This must and will be improved to a Class II road per existing regulations. The new access road will function as a right-of-way from the Utah State Route 6 to the shaft site permitting vehicular access for personnel and materials. The road will not be a coal haul road. To facilitate safe access between the proposed Crandall Canyon road and Utah State Route 6 at the mouth of Crandall Canyon, a new intersection will be constructed to Utah Department of Transportation specifications. (See Exhibit 8A.)

The proposed new (or improved) access road to be constructed through the canyon will follow the general routing of the present trail. While adhering to the specifications for a Class II road, the road design will attempt to ensure the minimum amount of cut-and-fill and/or stream channel modification.

In general, the hard-surface roadway will be 24' wide with 8" berms on each side. At the edge of the berms on the hillside, drainage ditches with crossroad culvert pipes will be constructed. A buried utility corridor will exist within one or both berms.

All cuts, fills, channel relocations and culvert-receiving and outfall areas will be seeded, riprapped or otherwise treated as required to prevent erosion.

The completed new access road will cross the stream channel in three locations. In these locations, sufficient bridging will be placed to permit the flow of the peak runoff from a "one-hundred-year storm"

The bridges, as well as the access road, will be designed to carry required H_2O-S16 loading.

CULVERT SIZES FOR CRANDALL CANYON, UTAH

As per 30 CFR 817.163(a)(1) and 30 CFR 817.163(c)(1)(i), the culverts in Crandall Canyon were designed to handle a 10-year, 24-hour storm. The various "fingers" in the canyon were identified and the maximum flow rates for a 10-year, 24-hour storm were calculated. The culverts were then sized based on a discharge rate of 10 fps. In some cases, more than one culvert was required due to 30 CFR 817.163(c)(2)(i)(C), which states that distances between culverts must not exceed 400' when grades are between 6 and 10%. The maximum road grade in Crandall Canyon is 9%. The smallest culvert used was 18".

3.73-C WATER LINE AND GAS LINE

Culinary water for bathing, etc., will be obtained from Price City at the mouth of Crandall Canyon and will be piped to a holding tank located near the Drill Hole MC 186. (See Exhibits No. 2 and No. 6.) The pipeline will be adequately sized, located and buried in the berm alongside the access road at sufficient depth to avoid freezing.

A natural gas pipeline (3" and 4" diameter) will be installed by the gas company (Mountain Fuel Supply Company) through Crandall Canyon to a metering point adjacent to the bathhouse office building. The natural gas distribution system and all devices and equipment consuming natural gas will be equipped with all necessary safety and monitoring devices and audible and visual alarm signals required to ensure their safe operation and compliance with State and Federal regulations regarding their use.

3.73-D MINE VENTILATION SYSTEM

A complete mine ventilation fan and air heating system, that will supply the No. 3 Mine with the required total ventilating air requirements, will be installed at the intake airshaft. Exhibit 5 shows the general arrangement of these facilities.

The mine fans, operating as a blowing system, will be mounted in parallel and will be capable of providing the mine

with up to 1,200,000 cubic feet per minute of air at up to 12" gauge pressure.

Mine air heating is required to prevent shaft icing. Air entering the shaft will be maintained above 32°F. at all times by an indirect, natural gas-fired heating system located on the intake side of the mine fans. Exhaust gases from the natural gas heaters will be exhausted through ducting which prohibits their entering the mine.

One supply fan will have an emergency diesel power system that actuates upon power loss to the fan electrical system. This emergency system will be completely automatic, starting and stopping upon loss or re-establishment of electric power from the main power sources. The diesel system will be capable of providing 600,000 cubic feet of air per minute to the mine.

3.73-E MEN AND MATERIALS HOISTING SYSTEM

As shown in Exhibit 5, a mine hoisting system will be installed at and over the main intake airshaft. The hoist will be a fully automated ground-mounted (multi-rope) friction-type hoist with a large cage and counterweight in balance. The hoist system will be used to raise and lower men, materials and mine equipment to any of the three mine levels.

Because of the proposed "blowing" system of mine ventilation to be employed, access to and from the cage at the shaft

collar (surface) elevation will be through the airlock enclosing the headframe as shown in Exhibit 5.

All automated systems dealing with the hoist, fans and heaters will have audible and visual warning devices indicating failures or disruptions of service.

3.73-F BATHHOUSE-OFFICE BUILDING

The bathhouse-office building, that will serve the entire mine work force, will be constructed immediately adjoining and east of the intake airshaft. Exhibit 5 illustrates the conceptual configuration of this building.

3.73-G SEWAGE TREATMENT PLANT

An extended aeration sewage treatment plant, sized on the basis of applicable State of Utah Department of Health Standards, will be installed to treat the sanitary wastes generated at the bathhouse, office and workshop-warehouse buildings. The plant will be installed immediately east of the exhaust shaft. The treated plant effluent (secondary treatment equivalent) will be discharged to the ground through an approved leachbed. The effluent will pass through a fine mesh screen prior to entering the leachbed to preclude the possibility of solids carry over from plugging the leachbed. The leachbed size has been designated as 50 x 100 feet. Requirements by Utah Department of

Health for a 100 foot stream buffer zone have resulted in the design of a two bed system, each 25 x 100 feet, as shown on Exhibit No. 6. A chlorine disinfection system will be installed. The plant and related system will be installed and operated in full compliance with requirements of the Utah Department of Health and, as applicable, the U. S. Environmental Protection Agency.

3.73-H WORKSHOP-WAREHOUSE BUILDING AND STORAGE AREA

A workshop-warehouse building will be constructed at the upper end of the site. The building will contain office, storage, sanitary and maintenance facilities required to support the personnel working within.

An external unloading ramp permitting tailgate unloading of large tractor-trailer combination will be built to the rear of the building, if needed.

Oils and other petrochemicals will be used and stored on the site in a designated area. No petrochemicals or related products will be disposed of on-site.

All sanitary effluents will be piped directly to the sewage treatment facility located at the lower end of the main construction area.

The parking lot and storage area above the workshop-warehouse building will be covered with stone and hard-surfaced

as required to support the loads handled. All surface runoff from the hard-surfaced area will be channeled through a sediment trap before being discharged to the stream channel.

3.73-I PARKING AREA

To the east of the bathhouse-office building, a parking area will be constructed. The compacted and graded fill from the shafts will be topped with crushed stone and later with hard-surfacing. Intended parking capacity will be 200 cars.

Cuts and fills made in construction of the site that have not been hard-surfaced or built upon will be re-soiled and seeded or riprapped as required to reduce the erosion.

3.73-J ELECTRICAL POWER SUBSTATION AND LINE

Electrical power required by the facilities will be obtained by constructing an overhead powerline from Hardscrabble Canyon over the ridge on the south side of the intake shaft to a substation located approximately 200' from the shaft. The path of the powerline will be cleared only of tall trees and only as required. There will be minimal disturbance to soil and low growing vegetation as a result of this construction. The proposed powerline will traverse land under the aegis of the Bureau of Land Management. A permit has been obtained from that agency for construction within a designated fifty (50)

foot corridor. (See Exhibits No. 1 and No. 6.)

The substation will be of the oil-cooled type and will be erected on a crushed stone raised bench surrounded by protective fencing. Powerlines will be constructed as per requirements set forth in environmental criteria for electrical transmission systems (USDI, USDA, 1970).

3.73-K STREAM CHANNEL DIVERSION

The gradient of the floor of the stream channel will be maintained as at present. The cross-section of the stream channel through the entire length of the construction area will be capable of accommodating the peak runoff from a "one-hundred-year storm."

Stream channel relocation will begin as part of site preparation. Permanent structures to contain the relocated stream channel will be constructed as soon as practicable thereafter. (See Exhibits 5B for design detail.)

At the upstream end of the flood channel, the stream will be widened to accept or funnel the flow from the upper slopes of the canyon. The slopes of the new channel will be riprapped as required, or in specific sections, the channel will be contained between the natural canyon wall stone facade and a concrete retaining wall.

EXCERPT FROM THE CRANDALL CANYON FLOW STUDY BY THE ALLEN & GARCIA COMPANY

The peak flow in Crandall Canyon was estimated using the Rational Method. The criteria for this method is that for storms of uniform intensity, evenly distributed over the entire watershed, the peak or maximum runoff rate occurs when the entire watershed is contributing to the point of concentration at the outlet, and that this flow is proportional to the rainfall intensity. The duration of that rainfall intensity is equal to the time of concentration; the time which a unit of water from the most distant point takes to travel to the point of concentration.

Duration = time of concentration = tc = $0.0078\ L^{0.77} S^{-0.385}$

Where: L - maximum length of travel = 12,400 by topo map.

S = slope = H/L = 2,710'/12,400' = 22%

$\therefore$ tc = <u>20 min.</u>

No gauging or rainfall intensities were found available for the specific area of Crandall Canyon. Utah State Climatologist, Mr. Richardson, provided us with a printout of the Scofield Dam, Utah area precipitation and the original Environmental Resource Data Study for the total mine provided similar data for the Price, Utah area.

Using the Scofield information, a frequency analysis graph was plotted with Duration against Rainfall Intensity.

At the tc value of 20 minutes, the intensity (i) was found to be 2.3 inches per hour for the 100 year storm return period.

Following this same logic for the Price data, the intensity (i) was found to be 2.0 inches per hour for the 100 year storm.

The Peak Flow formula for the Rational Method is:

$Q = c\ i\ A$

Where: A = area of watershed in acres from the topograph maps supplied = 2,400 acres

i = rainfall intensity = 2.3 inches per hour (Scofield)
2.0 inches per hour (Price)

c = runoff coefficient = rocks, gravel, sandy soil with light vegetation = 0.15 to 0.50, we will use 0.50

Q = 2,760 c.f.s. = Peak flow for the Scofield data.

Q = 2,400 c.f.s. = Peak flow for the Price data.

The diversion channel formula per Chezy-Manning is:

$$Q = \frac{1.49}{n} AR_h^{.667} S^{.5}$$

Where: Q = 2,760 c.f.s.

A = cross sectional area in $ft.^2$

n = Manning roughness coefficient

R_h = hydraulic radius = A/p in ft.

P = wetted perimeter

S = Slope - H/L - 60'/1200' = 5%

A, R_h and P are all factors of the width and height of channel. For ease of calculation, we will assume the width of the channel to be twice that of the height.

$\therefore$ Height = h Width - b = 2h

$A = 2h^2$ $P = 4h$ $R_h = \frac{2h^2}{4h}$

n = for jagged rock sides = 0.05

for concrete gutter = 0.016

We will use 0.035 since the channel will be partially concrete and partially rock.

$$Q = \frac{1.49}{n} AR_h^{.667} S^{.5}$$

$$Q = \left(\frac{1.49}{n}\right) (2h^2) \left(\frac{2h^2}{4h}\right)^{.667} (.05)^{.5}$$

For the Scofield data - h = 7.7 ft. = height

b = 15.4 ft. = width

Following the same calculations using the Price information:

h = 7.3 ft. = height

b = 14.6 = width

3.74 PROTECTION OF THE ENVIRONMENT

A. Topsoil Handling

B. Hydrologic Balance

C. Use of Explosives

D. Disposal of Spoil

E. Protection of Fish and Wildlife

F. Vegetation

G. Historical, Cultural or Archaeological Sites

H. Prime Farmland

I. Air Quality

3.74-A TOPSOIL HANDLING

Topsoil removal and storage procedures will be performed during all phases of site construction. Prior to construction activities for designated areas within the proposed area of affectment, the topsoil or upper six (6) inches of unconsolidated growth medium will be removed and stored in designated locations (see Exhibits No. 4, 5 and 6). Existing organic materials will not be included in topsoil storage piles. Topsoil will only be collected from areas where collection is technologically feasible; considering degree of slope and percentage of large boulders as limiting factors. Specifically, topsoil removal will not occur in the rocky Castle Valley soil formations. This includes slopes above the colluvial/alluvial valley soil complexes (Horrocks & Corollo, 7-79). Access road development, as shown in Exhibits 8A through 8F, will primarily disturb the Castle Valley formation with the exception of areas between State Route 6 and the first stream crossing. This stretch is "made land"*, being previously affected by highway construction. Some suitable growth material may be obtainable.

In areas where suitable unconsolidated growth media exists in excess of six inches, a greater amount may be collected to provide re-soiling material in areas for which topsoil is unavailable.

*Fitting the description of made land as described in the S.C.S. Soil Survey of Carbon County.

Topsoil Protection - Topsoil will be stored in designated areas to the point of stable capacity. Measures to achieve rapid growth will be attempted as soon as possible after each stockpile is complete. Methodology will include mechanical scarification, mulching, crimping and seeding with species of both an annual and perennial habit. Soil amendments will be added to stimulate growth as per soil test recommendations. Topsoil stockpiles will remain intact for a minimum of thirty (30) years. Surrounding mature species will not be discouraged from colonization. The following species will be included in the planting plan:*

Common Name	Species	Habit	lbs. Per Acre
Barley	Hordeum Vulgare	Annual	26
Intermediate wheatgrass	Agropyron intermedium	Perennial	4
Russian wildrye	Elymous junceous	Perennial	4
Great Basin wildrye	Elymous cinereus	Perennial	4
Woods rose	Rosa woodsii ultramontana	Perennial	1/2
Bitterbrush	Purshia tridenta	Perennial	1/2
Curlleaf Mt. Mahogany	Cecocarpus ledifolus ledifolus	Perennial	1/2
Birchleaf Mt. Mahogany	Cecocarpus montanus montanus	Perennial	1/2

*Based on recommendations by the Bureau of Land Management and D.O.G.M.

3.74-B HYDROLOGIC BALANCE

Both construction phases and long term usage of this facility are planned to be conducted in a manner which minimizes changes to the prevailing hydrologic balance. Effluent limitations set by UMC 817.42 and present NPDES Permits will not be exceeded unless the discharge is the result of a precipitation event equal to or greater than the 10 year - 24 hour storm. Past water monitoring data and analyses of earth materials indicate little possibility of heavy metals pollution (see Exhibit 7B). Additional contributions of sediment to the stream channel will be prevented by diverting drainage from unaffected areas away from the site, sedimentation ponds to collect affected surface runoff and a system of berms around the affected area (see Exhibits No. 4 and 5). After completion of shaft construction, most areas will be paved. Sediment control will be maintained by berms, berm filters and sediment collection ditches around the site (see Exhibits No. 5 and 5B). Other measures taken to minimize potential erosion and subsequent sedimentation will include: Vegetative and riprap stabilization of all cut and fill banks, revegetation of all disturbed areas not under paving or buildings. Riprapping of diversions as required by steep slopes or sinuosity and rapid seeding and mulching of the outslopes of dams and diversionary structures.

Design criteria for sediment control structures, diversions, culverts and ponds comply with requirements set forth in UMC 817.43(a), 817.44(b)(2) and 817.46(b)(1) and (c).

HORROCKS & CAROLLO ENGINEERS
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ONE WEST MAIN
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CRANDALL CANYON SITE WORK

HYDROLOGICAL CERTIFICATION

I, Harold Lee Wimmer, do certify that I am a registered professional engineer, and that I hold certificate No. 3535 as prescribed under the laws of the State of Utah. I further certify that I have a Bachelor of Engineering Science Degree in Civil Engineering from Brigham Young University and a Master of Science Degree in Civil Engineering from the University of Southern California, with an emphasis on Hydrology. I further certify that by authority of the owners I have reviewed or performed the required hydrology computations as required by the Office of Surface Mining regulations and that said calculations and computations have been correctly performed in accordance with professional standards of practice relating to hydrology and that the conclusions contained herein are true and correct and represent use of the most current hydrologic and climatological information available.

Harold Lee Wimmer

Harold Lee Wimmer, P.E.
Utah P.E. No. 3535

PRICE RIVER COAL COMPANY

CRANDALL CANYON SITE PLAN

SPILLWAY FOR POND 014

DESIGN DATA:

Runoff Area:	7.4 Acres
Maximum Length of Travel:	700 Feet
Average Slope:	9%
Runoff Coefficient:	0.40

DETERMINATIONS:

Find time of concentration, where $t_c = 0.0078\ L^{0.77} s^{-0.385}$

$t_c = (0.0078 \times 700)^{0.77}(0.09)^{-0.385} = 3$ min., Use 5 minutes

→ I max = 6.6 in/hr.

Q max = CIA = (0.4)(6.6)(7.4) = 19.5 ft.^{3}/sec.

for t_c = 10 minutes, I max. = 2.6 in/hr.

Q max. = CIA = (0.4)(2.6)(7.4) = 7.7 ft.^{3}/sec.

→ Use 18 inch CMP riser and outlet with 12% minimum slope on outlet pipe.

SPILLWAY FOR POND 013

DESIGN DATA:

Runoff Area:	8.0 Acres
Minimum Length of Pond:	1200 Feet
Average Slope:	6%
Runoff Coefficient:	0.40

DETERMINATIONS:

$t_c = (0.0078)(1200)^{0.77}(0.06)^{-0.385} = 5$ min., Use 5 minutes.

I max. = 6.6 in/hr.

Q max. = CIA = (0.4)(6.6)(8.0) = 21.1 ft.^{3}/sec.

for t_c = 10 minutes, I max. = 2.6 in/hr.

Q max. = CIA = (0.4)(2.6)(8.0) = 8.3 ft.^{3}/sec.

→ Use 18 inch CMP riser and outlet with 12% minimum slope on outlet pipe.

PRICE RIVER COAL COMPANY

CRANDALL CANYON SITE PLAN

STORAGE FROM DISTURBED AREA NO. 1 - POND 014

DESIGN DATA:

24 Hour - 10 Year Storm: 2.0 Inches

DETERMINATIONS:

Runoff from S.C.S. Field Manual, Exhibit 2-7 = 0.6 inches

→ Volume of runoff = (7.4)(43,560)(0.6)(1/12) = 16,120 $ft.^3$

Total volume for sediment and runoff = 6,560 + 16,120 = 22,680 $ft.^3$

PRICE RIVER COAL COMPANY

CRANDALL CANYON SITE PLAN

STORAGE FROM DISTURBED AREA NO. 1 - POND 014

DESIGN DATA:

Site Elevation:	6800 Feet (U.S.G.S.)
Runoff Area:	7.4 Acres
Average Slope Length:	300 Feet
Average Slope Gradient:	9%
6 Hour - 10 Year Storm:	1.4 Inches
Soil Characteristics:	7.8% Silt, 10% Fine Sand, 70% Sand, 0% Organic Matter, Fine Granular Soil, Rapid Permeability (Sample No. 80-286)

DETERMINATIONS:

Use Uniform Soil Loss Equation, A = RKLSPC

R: From "California Study", Figure 1, Type II distribution,
R due to rainfall = 60
for R_s due to snowmelt use $R_s = 40$
$R_t = R + R_s = 60 + 40 = 100$

K: From "A Soil Erodability Nomograph...", where % silt plus % sand = 18%, % san = 70%
K = 0.07

LS: From "California Study", Figure 5, ARea A-1, where slope length = 300 feet
LS = 1.9

C: From "California Study", Table 1
C = 1

P: Use P = 1, conservative

→ A = (100)(0.07)(1.9)(1)(1) = 13.3 tons/acre/year
for 7.4 acres, 3 years (OSM Regulations 817.46(b)(1)),
Soil = 90 lbs./ft.^{3}

$$A = (13.3)(7.4)(3)\left(\frac{2000}{1}\right)\left(\frac{1}{90}\right) = 6{,}560 \text{ ft.}^3$$

PRICE RIVER COAL COMPANY

CRANDALL CANYON SITE PLAN

SURFACE RUNOFF FROM UNDISTURBED HILLSIDES

DESIGN DATA:

Time of Concentration:	20 Minutes
24 Hour - 100 Year Storm: (for t_c = 20 Minutes)	2.3 Inches/Hour
Rational Equation C Value:	0.5
Area No. 1:	108 Acres
Area No. 2:	48 Acres

DETERMINATIONS:

Use rational formula for peak runoff, Q = CIA

Q (Area No. 1) = (0.5)(2.3)(108) = 124 $ft.^3$/sec.

Q (Area No. 2) = (0.5)(2.3)(48) = 55 $ft.^3$/sec.

Try 48" CMP (n = 0.026) for Q_1

Use Manning equation - $Q = \frac{1.49}{n} AR^{2/3} S^{1/2}$

for Q = 125, Slope = 3% ±, OK

Check headwater depth for inlet control, chart 2-53, Bureau of Public Roads, H_n = 88 inches, or 40 inches over crown of pipe.

Try 36" CMP (n = 0.026) for Q_2

for Q = 55, slope = 4 1/2% ±, OK

Check headwater depth, H_w = 61 inches, or 25 inches over crown of pipe.

PRICE RIVER COAL COMPANY

CRANDALL CANYON SITE PLAN

RUNOFF STORAGE FROM DISTURBED AREA NO. 2 - POND 013

DESIGN DATA:

24 Hour - 10 Year Storm: 2.0 Inches

DETERMINATIONS:

Runoff from S.C.S. Field Manual, Exhibit 2-7, = 0.6 Inches

→ Volume of runoff - (8.0)(43,560)(0.6)(1/12) = 17,420 $ft.^3$

Total volume for sediment and runoff = 5,970 + 17,420 = 23,390 $ft.^3$

PRICE RIVER COAL COMPANY

CRANDALL CANYON SITE PLAN

SEDIMENT STORAGE FROM DISTURBED AREA NO. 2 - POND 013

DESIGN DATA:

Site Elevation:	6800 Feet (U.S.G.S.)
Runoff Area:	8.0 Acres
Average Slope Length:	600 Feet
Average Slope Gradient:	6%
6 Hour - 10 Year Storm:	1.4 Inches
Soil Characteristics:	7.8% Silt, 10% Fine Sand, 70% Sand, 0% Organic Matter, Fine Granular Soil, Rapid Permeability (Sample #80-286)

DETERMINATIONS:

Use uniform soil loss equation, A = RKLSPC

R: From "California Study", Figure 1, Type II Distribution, R due to rainfall = 60
for R_s due to snowmelt - Use $R_s = 40$

$R_t = R+R_s = 60 + 40 = 100$

K: From "A Soil Erodability Nomograph....", where % silt plus % sand = 18%, % sand = 70%

K = 0.07

LS: From "California Study", Figure 5, Area A-1, where slope length = 600 feet

by extending Table LS = 1.6

C: From "California Study", Table 1

C = 1

P: Use P = 1, conservative

→ A = (100)(0.07)(1.6)(1)(1) = 11.2 tons/acre/year
for 8.0 acres, 3 years (OSM Regulations 817.46(b)(1)).

soil - 90 lbs./ft.^{3}

$$A = (11.2)(8.0)(3)\left(\frac{2000}{1}\right)\left(\frac{1}{90}\right) = 5{,}970 \text{ ft.}^3$$

Surface and Ground Water Monitoring - The ground water monitoring station for Crandall Canyon, designated as B-33, is monitored bi-annually and is included in the monitoring plan devised and submitted to all regulatory authorities about 4-78. Surface water monitoring has occurred in the same time-frames. The Crandall station is B-21. Although the stream in Crandall Canyon is ephemeral above the spring shown on Exhibit No. 2, an additional surface water monitoring station will be installed above the proposed surface operation (see Exhibit 6). Our water monitoring consultants, Vaughn Hansen Associates, were informed on February 4, 1981, to install and maintain such a station.

All surface water monitoring stations are sampled bi-monthly.

3.74-C USE OF EXPLOSIVES

Explosives will be used on site, below ground level to fracture resistant strata during shaft construction. No wells, dwellings, or any public buildings exist within 1/2 mile of the blasting sites or on any part of the mine plan area. Access to the area is restricted at all times to authorized personnel only. The blast site is nearly two (2) miles from any public road. The area to be fractured will be a few feet thick and no more than 28 feet in diameter for an individual blast.

3.74-D DISPOSAL OF SPOIL

The proposed fill described in Section 3.73-A may comprise a situation as addressed in UMC 817.71. Materials used in the fill have been tested for toxicity and other parameters and can be classed as non-acid/non-toxic forming (see Exhibit 7B). No under drains will be needed. All water will be directed away from the fill by diversion ditches to remain in place for the life of the facility (for further details, see Exhibit 7A).

3.74-E FISH & WILDLIFE

A survey of the entire MPA was performed in the spring of 1979 by the Utah Division of Fish and Wildlife Resources (Dalton, 1979). Additionally, a study of the bird population was conducted for the area around Crandall Canyon and the proposed powerline (Young, 1980). No threatened or endangered species were found to inhabit the area. Some impact to normally occurring species will occur by the twenty same acres of habitat destruction caused by site development and the 8 to 10 acres affected by powerline construction (see 3.73-J). Impact caused by the powerline will be minimal due to the infrequent maintainence required. The Fish and Wildlife plan for Crandall Canyon will conform to the intent of the plan for the entire MPA.

3.74-F VEGETATION

A vegetation inventory (Harner-White, 1980) has described three general vegetation associations within the proposed affected area; Pinon-Juniper, Douglas Fir Hillside and Canyon Bottom Complex. Most impact will occur in the latter association. The location and extent of the various community types is controlled by the topographically regulated thermal and moisture regimes. Broadly speaking, southfacing slopes support the Pinon-Juniper-Sagebrush Association, the northfacing slopes maintain a community of Douglas Fir, White Fir, Aspen and the valley bottom areas contain combinations of the previous two with a mixture of Ponderosa Pine, Narrow-leaf Cottonwood, Scrub Oak and Maple, and Colorado Blue Spruce.

3.74-G CULTURAL, HISTORICAL AND ARCHAEOLOGICAL SITES

Crandall Canyon has supported some past human activities as described in the land use section (3.75-A). Several rock structures exist within the canyon. Some potential for significance as cultural or historical features was indicated in past surveys of the area. Ensuing, more detailed studies (Sargent, 6-80, and Utah Archaeological Consultants, 12-80) determined that these structures were not eligible for the Federal Register nor did they hold any particular historical or cultural value. The results of these studies have been submitted to D.O.G.M. and O.S.M. Reviewers within D.O.G.M

have verbally concurred with the aforementioned results.

3.74-H PRIME FARMLAND

The Soil Conservation Service has determined that no prime farmland exists within the MPA. (See Letter of 7-16-79).

3.74-I AIR QUALITY

During construction activities, a potential for fugitive dust problems exists. The Class III Access Road will be the area of the greatest concern. Control of fugitive dust will be achieved by watering of roads and disturbed areas in dry periods. As soon after obtaining construction permission as possible, the road and surface facility will be paved. (See Section 3.73.) We have met with the Utah Department of Air Quality and they have no further requirements at this time.

Attachment 12-1

United States Department of Agriculture
Soil Conservation Service
4012 Federal Building
125 South State Street
Salt Lake City, UT 84138

July 16, 1979

Mr. Lee McCloskey
Project Manager
American Electrical Power Co.
Helper, UT 84526

Dear Mr. McCloskey:

We have reviewed all existing data available in our soil survey and other soil surveys made by Horrocks and Carollo Engineers as requested and made inquries as to the presence of Prime Land in the Braztah Corporation mine plan area near Helper, Utah, in Township T.12 S-13 and R. 8, 9 and 10 E.

As near as we can determine, there are no lands within the boundary that qualify as Prime Land. Presently none of the land is used as irrigated cropland and most of it is too steep or has other limiting properties that would exclude it from being Prime Cropland.

The map given to us for review by Mr. Laine Adair is enclosed. If you have any questions, contact Dr. T. B. Hutchings, State Soil Scientist, of our office.

Sincerely,

GEORGE D. MCMILLAN
State conservationist

Enclosure: One Map

RECEIVED
JUL 17 1979
A.E.P. SERVICE CORP.
HELPER, UTAH

3.75 RECLAMATION PLAN

A. Pre-Mining and Post Mining Land Use

B. Contemporaneous Reclamation

C. Final Reclamation

3.75-A PRE-MINING AND POST MINING LAND USE

The Pre-Mining Land Use in Crandall Canyon is not dissimilar to that of the entire mine plan area, which is primarily the undeveloped, unmanaged land as described in UMC 700.5 "Land Use", (j). Some light cattle grazing occurs. Most of the land within the canyon is owned by Price River Coal and leased to local ranchers, but no management activities or occasional hay production has taken place. Historical and cultural studies, commissioned by Price River Coal Company (see 3.74-G) have revealed some past uses in the canyon, including residential, recreational and some sheepherding. These uses may have existed as long as fifty years ago and hold no true significance for the determination of land use since the area has returned to the undeveloped state through natural succession.

Post-mining land use will re-establish the land to the current or to a better use by reclamation activities.

3.75-B CONTEMPORANEOUS RECLAMATION

Very little reclamation will occur until the resource, for which this facility has been designed to retrieve, has been exhausted. The probable period involved will be thirty years. Until that time, only the stabilization activities described in Section 3.74 will be implemented.

3.75-C FINAL RECLAMATION

It has been previously stated that this facility will remain active for a minimum of thirty (30) years. At that time, or when this facility is no longer needed, the following reclamation activities will commence:

1. Disassembly of all buildings and other surface structures. Recyclable metals will be sold as scrap. Other building materials will be discarded in accordance with accepted standards of the time.
2. All paved concrete, or asphalt surfaces will be broken up and discarded down the shafts.
3. Fill materials removed and placed during shaft construction will be returned to the shafts.
4. All culverts will be removed and discarded.
5. All disturbed areas will be graded to approximate original contour, tying into the natural slopes.
6. Stable drainage ways will be established across disturbed area.
7. Stored re-soiling materials will be spread on all graded areas to a minimum depth of six (6) inches.
8. Seeding, mulching and crimping will occur on all resoiled areas as soon as possible after the completion of resoiling. The seed mixture will be a combination of species of both annual and perennial habit to be determined at the time of planting based on current best revegetation techniques. Fertilizers

or other soil amendments may be applied to the seeded areas, based on soil analyses to be performed at the time of resoiling. The goal of reclamation and re-vegetation will be to return the site to the approximate pre-mining condition by the re-establishment of the indigenous vegetation. Although the site will be planted with a quick growing seed mixture for stabilization, colonization of the affected area by adjacent, natural plant populations will achieve the true restorative goal.

The maintenance period for this area, as set forth by UMC 817.116(b)(1)(i) is a minimum of ten years. Annual elevations of the success of vegetation will provide opportunities for adjustment of physical or chemical factors as shown to be needed. Success of revegetation will be measured by approved sampling techniques and compared with local natural areas of similar aspect, elevation and other physical factors.

3.76 ACKNOWLEDGEMENTS

Construction and Site Development

Design plans were produced in part by:

The Paul Weir Company of Chicago, Ill.

Golder Associates Inc. of Seattle, Washington

Horrocks Engineers of American Fork, Utah

Mapping

The Paul Weir Company of Chicago, Ill.

Horrocks Engineers of American Fork, Utah.

Hydrology and Structure Design

Allen and Garcia Company, 1980. Crandall Canyon Flow Studies. Performed at the request of Price River Coal Company.

Pond and Culvert Design Calculations for the Construction Site by Lee Wimmer, Hydrologist with Horrocks Engineers

Historic, Cultural and Archaeological Sites

Kay Sargent, Staff Archaeologist, 1980. Crandall Canyon Survey. Memo.

Blake Harper, 1978. An Archaeological and Historical Survey of Twelve Drill Sites and Access Roads in the Price Canyon Region of Carbon County, Utah. Dept. of Anthropology, University of Utah.

3.76 ACKNOWLEDGEMENTS

Archaeological Environmental Research Corporation. Survey of MPA, 1979.

Utah Archaeological Research Corporation, 1980. Documentation and Recommendation or Determination of Eligibility to the National Register of Three Archaeological Site in Crandall Canyon.

Wildlife Studies

Janet Lee Young, PHD., 1980. Crandall Canyon Raptor Study. At the request of Price River Coal Company.

Larry Dalton, 1979. Fish and Wildlife Resource Information provided by U.D.F. and W. R. At the request of Price River Coal Company.

Vegetation and Soils

Horrocks and Carollo Engineers, 1979. Soil Study for Utah Coal Property at Helper, Utah. At the request of Price River Coal Company.

Harner - White Ecological Consultants, 1980. Vegetation Inventory of the Crandall Canyon Underground Coal Mine Located in Carbon County, Utah. At the request of Price River Coal Company.