EXHAUST AIR SHAFT, INTAKE AIR SLOPE AND INTAKE AIR SHAFT SOLDIER CANYON MINE

prepared for

SOLDIER CREEK COAL COMPANY

Price, Utah

MODIFICATION

TO THE

APRIL 1981

MINING AND RECLAMATION PLAN

by

KAISER ENGINEERS, INC.

March 1982

Job No. 81136

INDEX

INDEX

I. INTRODUCTION AND JUSTIFICATION FOR URGENCY

This modification to the April 1981 Mining and Reclamation Plan presents the plans for an exhaust air shaft, an intake air slope and shaft. The proposed project is within the mine plan area and was therefore identified in the Mining and Reclamation Plan. The mine plan area is in central Utah as shown in Figure I-1.

The Soldier Canyon Mine is currently mining in the Rock Canyon seam. The Gilson seam underlies the Rock Canyon seam and the Sunnyside seam is above. The Rock Canyon seam is of minable thickness in the location of the proposed shafts and slope while the Gilson seam is not. The Sunnyside seam, although not minable in the immediate vicinity of the proposed project, is minable approximately 3,500 feet north of the project.

Soldier Creek Coal Company has encountered excessive levels of methane gas in its mining operation. In the development entries (lower part of northern end of mine), the methane level has been over 2% for approximately one year. Normal mining operations should not have more than 0.5% methane in the ventilating air. This gas has created a significant miner safety problem and has required running fans at near peak capacity. The Main East entry development has been stopped and the continuous miner section transferred from the area. Substantial improvement in ventilation will be required before development of this area of the mine can proceed safely. If ventilation cannot be established and entry development continued, the mining of approximately 730 acres of both Rock Canyon and Gilson seams coal could be lost if a secondary approach to the acreage from the southern end of the tract near the coal outcrop were not successful.

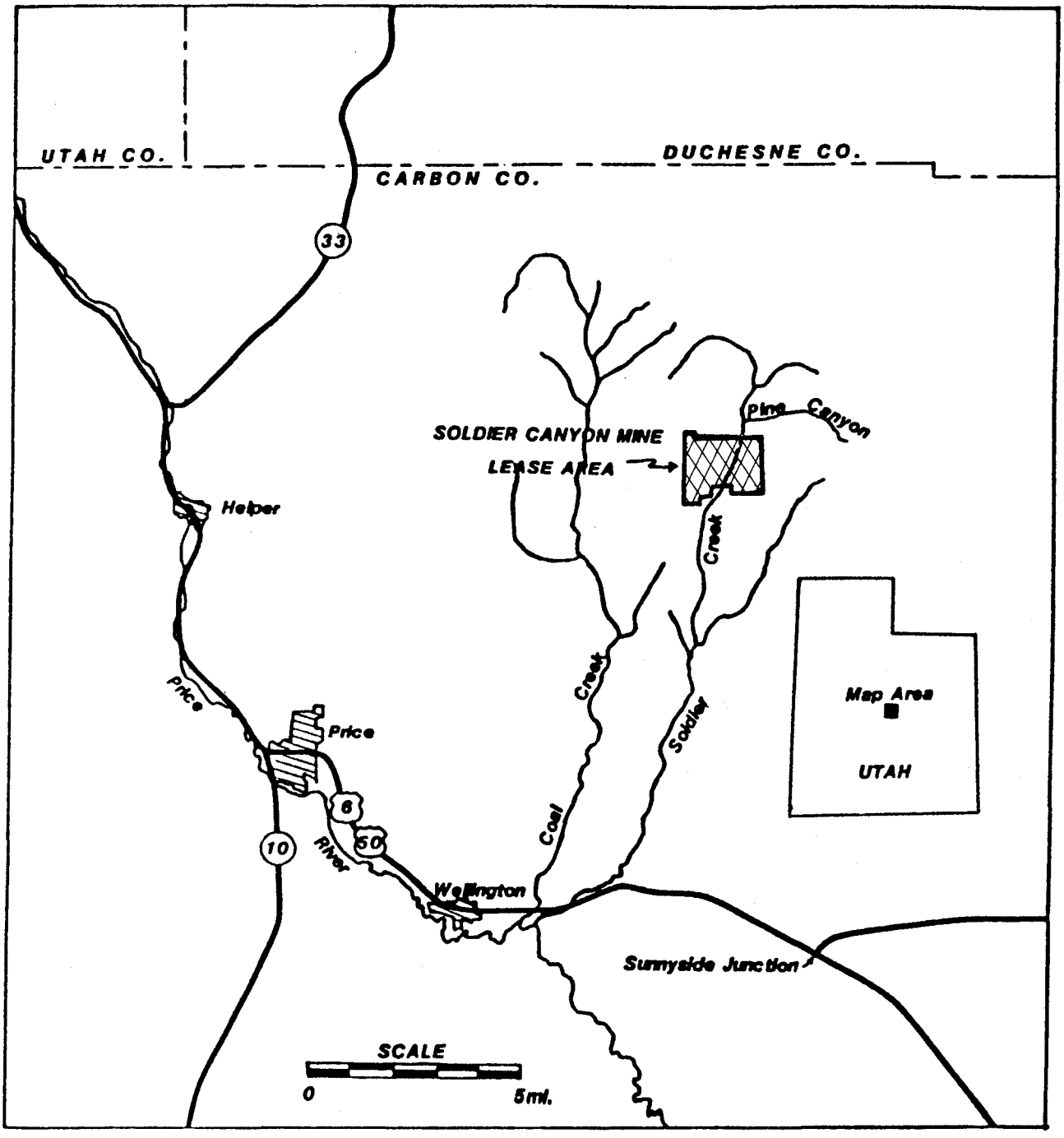

Figure I-1. Location of the Soldier Canyon Mine lease area.

The proposed solution to this very serious problem is to provide additional ventilation to remove the gas. Since the existing fan is operating at near capacity, a new exhaust air shaft with fan, an intake air slope and an intake air shaft will be required. Soldier Creek Coal Company has therefore respectfully requested that this modification be processed as quickly as possible since the gas problem is urgent and a very grave issue.

Fourteen copies of this modification are being sent to the Utah Division of Oil, Gas, and Mining (DOGM) for their approval and forwarding to relevant agencies.

II. PROJECT DESCRIPTION

In general, an intake air slope, intake air shaft and an exhaust air shaft will be constructed in previously disturbed areas. A fan, fan house and electrical substation will be located around the exhaust air shaft. Short ingress and egress driveways will lead to and from the site. Power will be transmitted by a power line which will cross Soldier Creek and then follow the Mountain Fuel Supply Company gas pipeline to near the exhaust air shaft location and thence across Soldier Creek to an electric substation. The source of power to the exhaust air shaft site is the main substation in the mine yard area.

A. SITE CHARACTERISTICS

As shown in Figure II-1, the exhaust air shaft site is located about 1,100 feet up the canyon from the main mine yard area. The environmental characteristics of the general area are presented in Section II.C. The actual shaft site was disturbed in the past when the original county road and Mountain Fuel Supply Company pipeline were built. This site is on BLM land.

Figure II-2 shows that one side of the exhaust air shaft site adjoins the east side of the county road. The other side of the site is approximately 50 feet from Soldier Creek. Approximately 0.3 acre will be required for the shaft site. This will allow enough room for the shaft itself, the fan and the fan house. The site is approximately 165 feet x 75 feet in dimension and was previously disturbed when the county road was constructed.

Approximately 0.10 acre also will be required for the intake air slope and shaft site. This site is located to the

southwest of the shaft site in the supply yard and is shown in Figure II-1 and details in Figure II-3. The intake air site was previously disturbed when the main mine facilities were constructed.

B. CHARACTERISTICS AND CONSTRUCTION OF THE EXHAUST AIR SHAFT

The proposed fan located at the new exhaust air shaft will be designed to produce approximately 280,000 ft^3/min or sufficient ventilating air to operate four continuous miner sections in this mine. A contingency for proposed and future ventilation requirements up to 500,000 ft^3/min will be provided by arrangements to increase the motor horsepower by replacing the intial electric motor with a new, larger motor. The increase in ventilation capability will permit the increase in the number of mining units to raise coal production from the current 800,000 tons per year level to around 1.5 million tons annually. The location of the proposed exhaust air shaft is designed to allow mining of coal lands to the north and immediately adjacent to the present Federal leased coal lands and also those coal lands to the east of the developing entries.

The proposed shaft will be 16 ft in diameter. The top 35 feet of overburden at the proposed shaft site consists of alluvium and will not be self supporting. Since the shaft penetrating this material would be normally sunk in a traditional manner and only about 65 ft of competent rock to the shaft bottom remains, it is felt advisable to use standard shaft sinking methods to excavate the shaft entirely to the coal seam. A reinforced concrete coping will be constructed from the surface into the competent rock strata and will be flared out at the base in a "hornset" footer to support the weight of the coping. The coping will be grouted at the contact point with the rock to eliminate water flow into the

shaft from Soldier Creek or aquifiers which may be present. A concrete lining will be constructed the remaining distance to the shaft bottom.

Material generated during shaft construction will be used as fill around the shaft openings to provide flood protection. Prior to use the area will be core drilled and chemical tests performed concerning suitability of the material for fill.

A review of the site geology indicates that the sedimentary formations present are only gently dipping and no geologic faults exist to adversely affect shaft construction. The details of the shaft in relationship to the mine are illustrated in Figure II-4.

Any water encountered during construction of the shaft will be pumped to a retention pond to allow sediments in the water to settle out.

All geological or geotechnical information obtained during the construction of the shaft will be available to the appropriate regulatory agencies for their review and information.

C. CHARACTERISTICS AND CONSTRUCTION OF THE INTAKE AIR SLOPE AND SHAFT

The intake air slope and shaft will provide the openings necessary to supply the ventilating air to the east side of the mine. These openings will avoid the extreme air velocities that would be created if the existing intakes are used exclusively.

The intake air slope will be constructed by driving an underground entry up an incline to the surface. The slope

will measure about 18 ft wide by 11 ft high and will be used as a man/material portal. It will be driven at a 15% grade. The roof in the slope will be supported by roof bolts and, at the openings, by corrugated tunnel sections for safety from sliding or falling rocks above the openings. If required for long-term roof support near the coal outcrop, steel arches will be installed. Lagging between the arches, if used, may be required if the mine roof is broken to any measurable extent.

The intake air shaft will be located approximately 50 ft from the intake air slope. It will be 16 ft diameter, approximately 45 ft deep and concrete lined, as shown in Figure II-5. A screen will be constructed over the shaft opening to prevent objects and persons from falling into the shaft.

D. ACCESS ROAD

Since the exhaust air shaft site is located immediately adjacent to the county road, no real access road will be required. Two additional short 20-feet wide approaches off and on the county road will be all that is required. Approval of entry, exit, and operation within the county road right-of-way is being obtained from Carbon County.

No road is required for the intake air slope and shaft site.

Access to the power line sites will be on an existing Mountain States Fuel road and stream crossing.

E. POWER

The primary source of power for the fan will be electrical with diesel backup. The power system is composed of diesel standby equipment at the shaft site, power line, and existing substation in the mine yard.

A standby diesel engine will also be present in addition to an underground 1,000-gallon diesel fuel storage tank at the exhaust air shaft site. This diesel system would be used only during electrical power failures and test operations.

The substation will be connected to the main substation in the mine yard area via a new 46-kV power line. The power line will be in the Mountain Fuel Supply Company gas pipeline right-of-way which is on the east side of Soldier Creek.

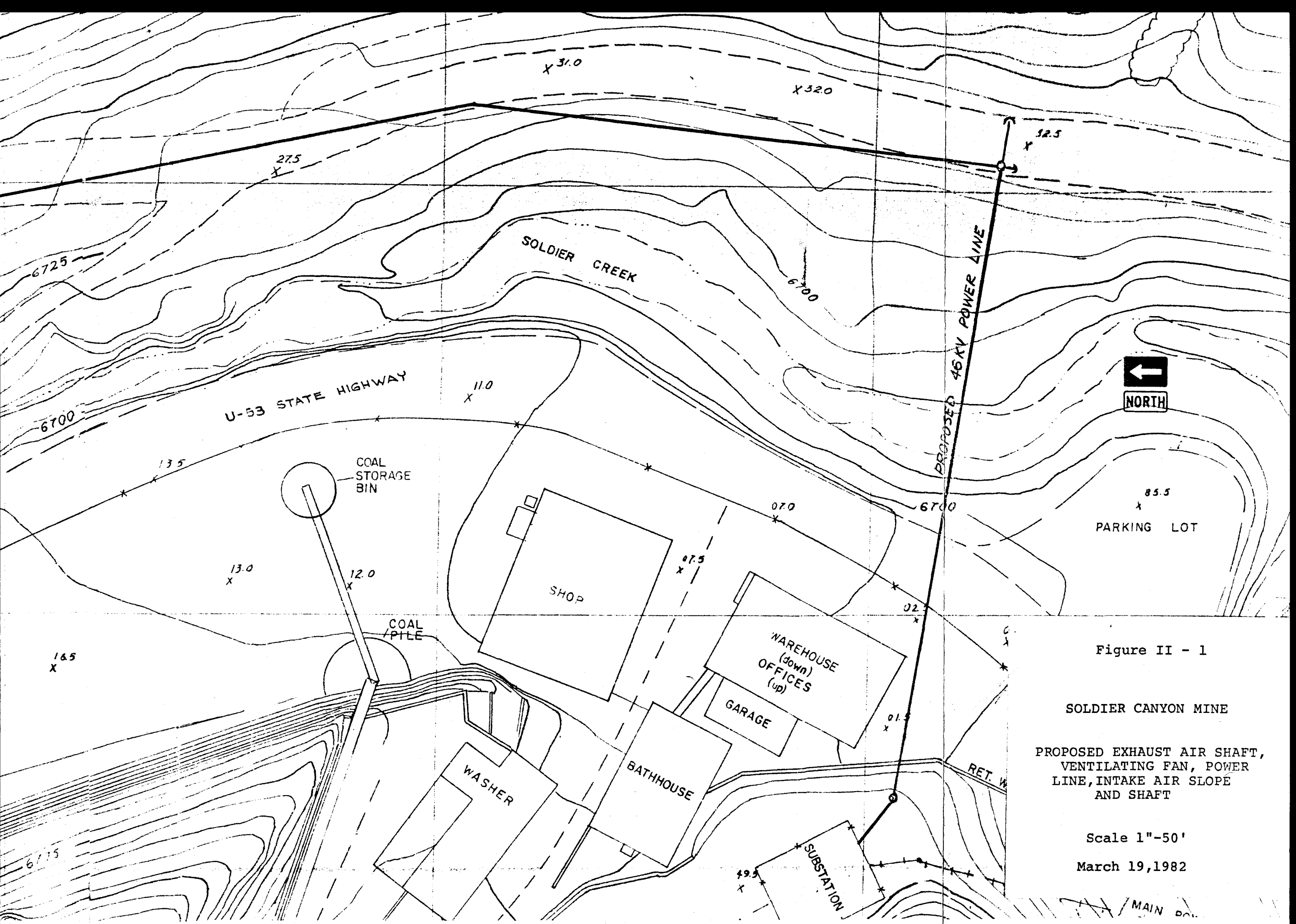

Figure II - 1

SOLDIER CANYON MINE

PROPOSED EXHAUST AIR SHAFT, VENTILATING FAN, POWER LINE, INTAKE AIR SLOPE AND SHAFT

Scale 1"-50'

March 19,1982

PROPOSED EXHAUST SHAFT AND FAN

PROPOSED SUB STATION

PROPOSED 46 KV POWER LINE

MFS GAS LINE ROAD

PROPOSED INTAKE AIR SHAFT

PROPOSED INTAKE AIR SLOPE

E 51,250

E 51,000

6800

6750

6725

6700

43.5

87.8

84.5

94.5

68.3

32.0

02.0

15.0

11.0

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16.5

18.5

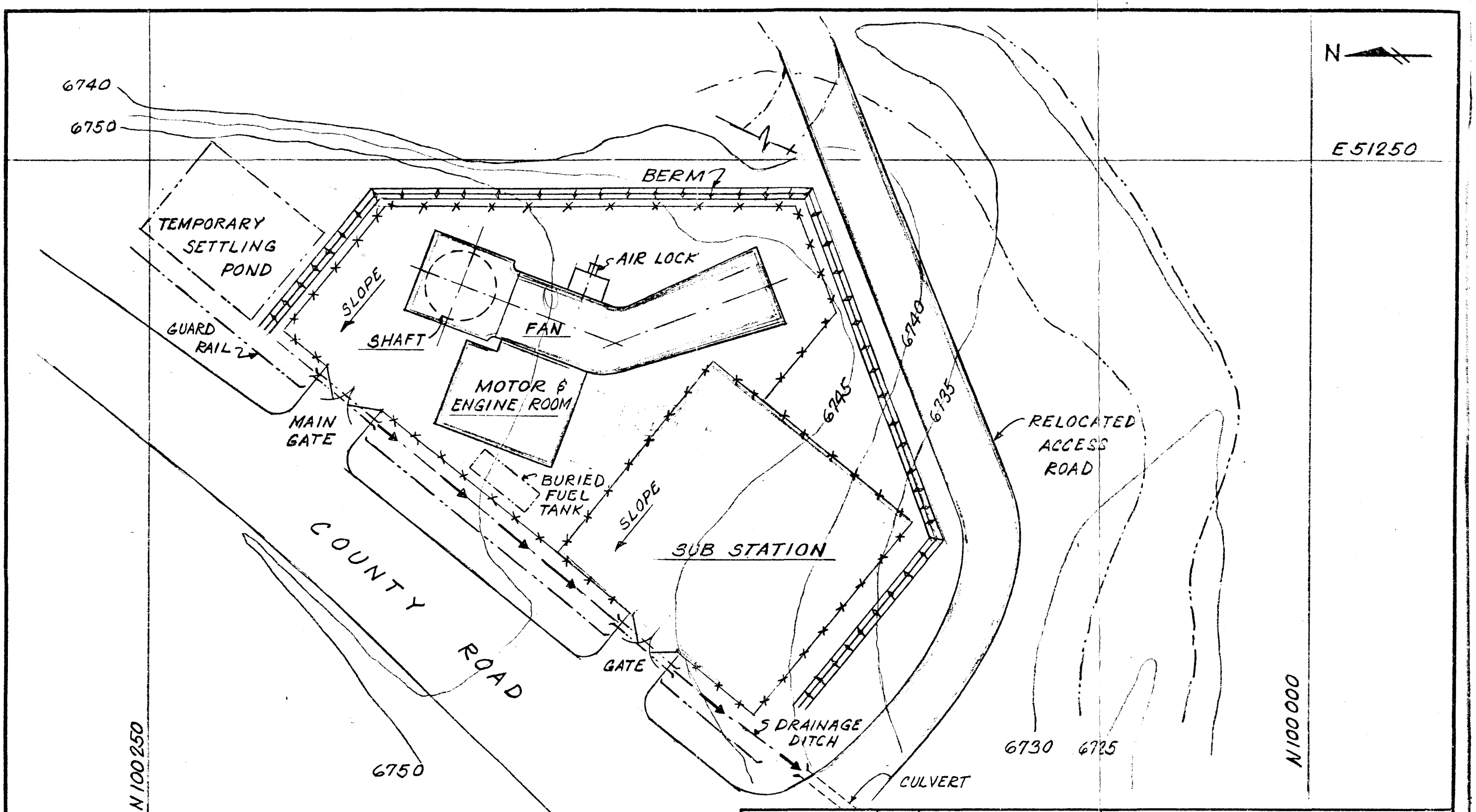
20

35.0

32.0

27.0

24.0



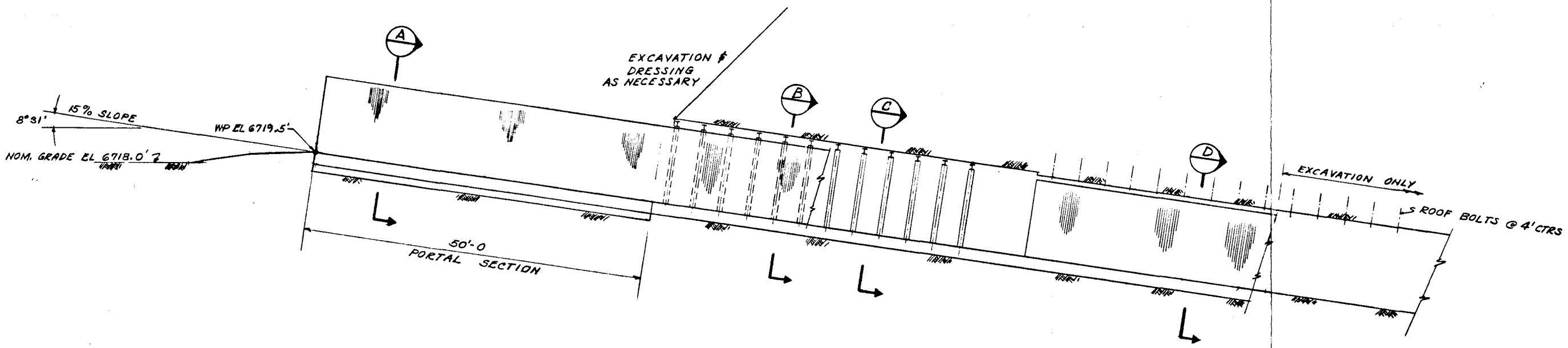
APPROVAL	DATE	SCALE 1 IN = 20 FT
		DRAWN BY RH DATE 3/18
		CHECKED BY DATE
		APPROVED C.P. Tillson Jr. 3/25/13

KAISER ENGINEERS — KAISER ENGINEERS, INC.

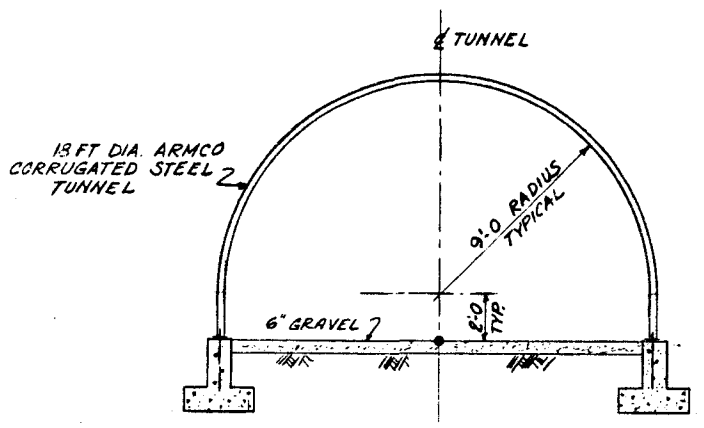
SOLDIER CREEK COAL CO.

EXHAUST AIR SHAFT AND VENTILATING FAN

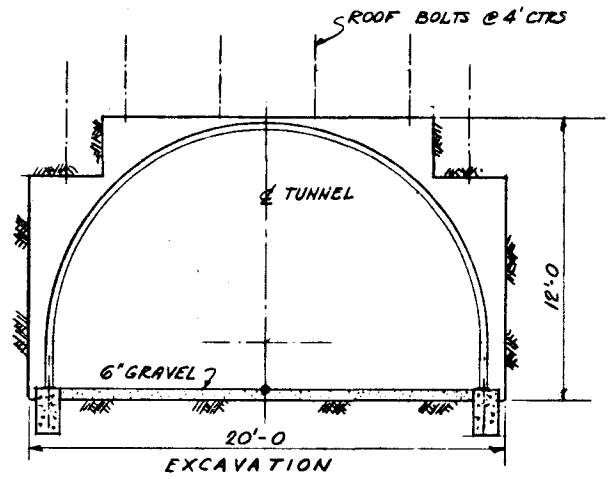
JOB NO. 81136 — DWG. NO. FIGURE II-2 REV 1



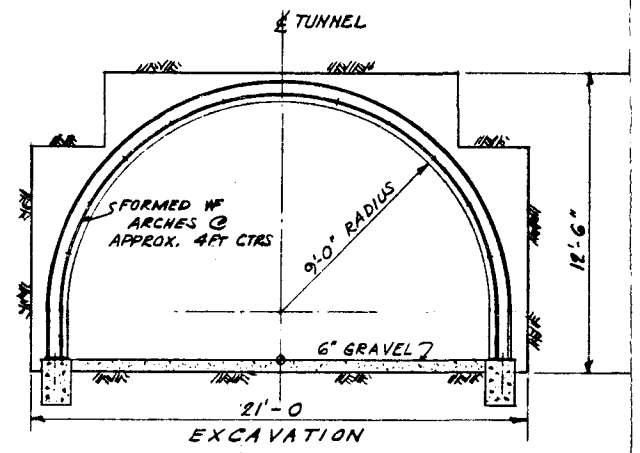
ELEVATION
1/8" = 1'-0"



SECTION (A)
1/4" = 1'-0"
(ARMCO TUNNEL AT GRADE)



SECTION (D)
1/4" = 1'-0"
(ARMCO TUNNEL IN STABILIZED ROCK)



SECTION (B)
1/4" = 1'-0
(ARMCO TUNNEL IN UNSTABILIZED ROCK & STEEL ARCHES)

SECTION (C)
SAME AS ABOVE EXCEPT WITHOUT ARMCO TUNNEL

NO.	DATE	REVISION	BY/CHK	APP.	APP.

NOTES

DESCRIPTION — COST ACCOUNT
WORK COVERED BY THIS DRAWING CHARGED TO COST ACCOUNT ABOVE

CONSTRUCTION APPROVAL

APPROVAL	DATE

SCALE: 1/8"=1'-0" & 1/4"=1'-0"	DATE
DESIGNED BY	
DRAWN BY R. HERRERA	3/4/82
CHECKED BY	
APPROVED BY C.B. Tillson Jr.	3/5/82
APPROVED BY	

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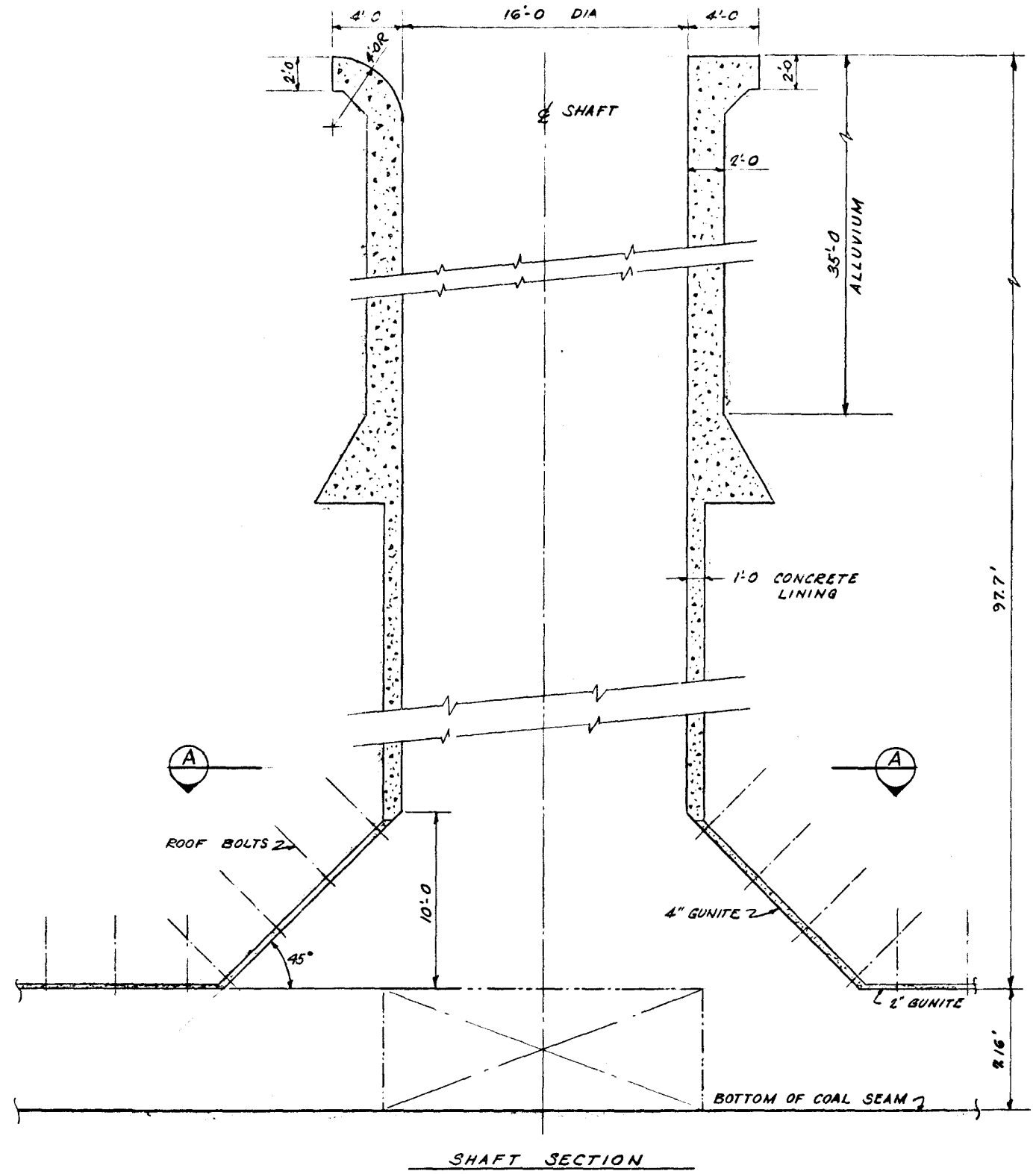
300 LAKESIDE DRIVE
P.O. BOX 23210
OAKLAND, CALIFORNIA 94623

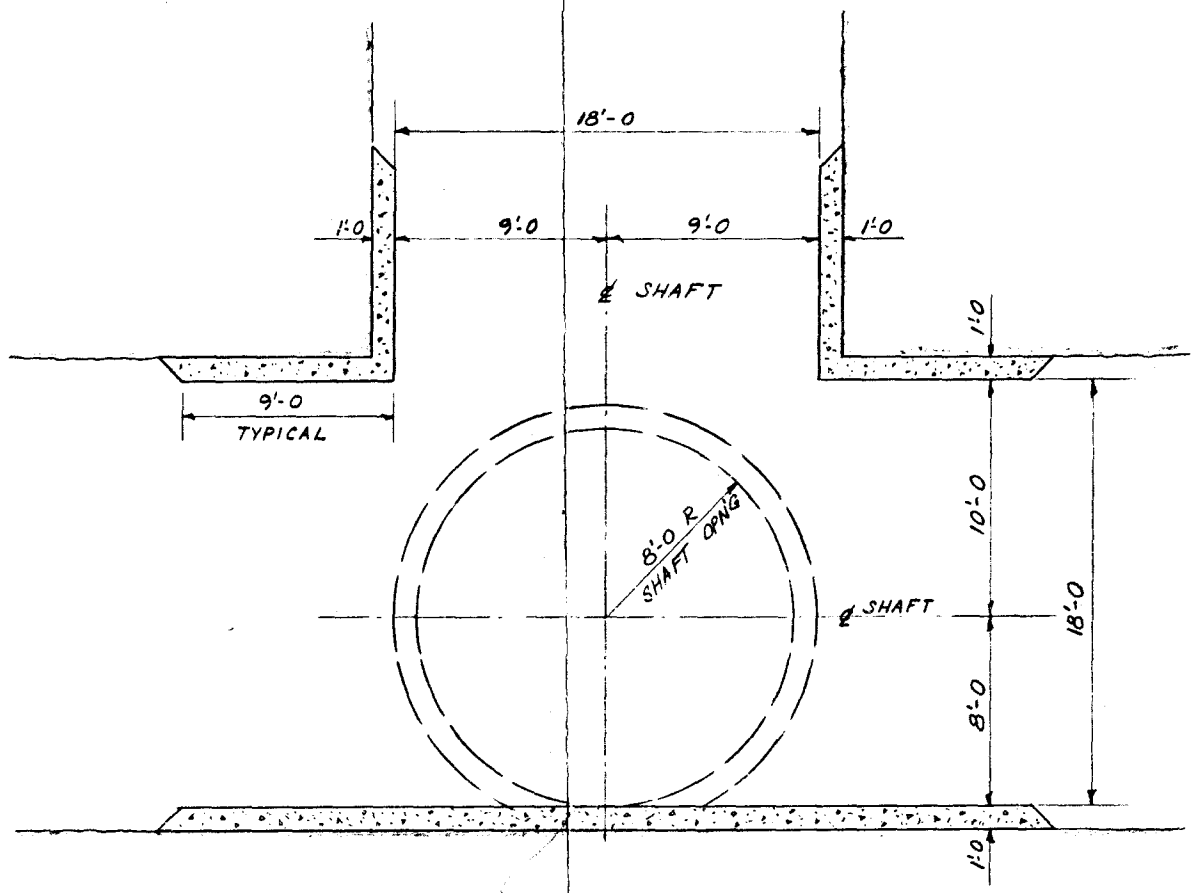
SOLDIER CREEK COAL CO.

SOLDIER CANYON MINE
SERVICE SLOPE - ELEVATION & SECTIONS

JOB No. 81136 | DWG. No. FIGURE II-3 | REVISION R-



SHAFT SECTION



SECTION (A) PLAN AT BOTTOM OF SHAFT

NO.	DATE	REVISION	BY CHK	APP.	APP.

NOTES

DESCRIPTION COST ACCOUNT

WORK COVERED BY THIS DRAWING CHARGED TO COST ACCOUNT ABOVE

CONSTRUCTION APPROVAL

APPROVAL	DATE

SCALE: 1/4" = 1:0	DATE
DESIGNED BY	
DRAWN BY R HERRERA	3/8/82
CHECKED BY	
APPROVED BY C.B. Tillman Jr	3/8/82
APPROVED BY	

PROFESSIONAL SEAL

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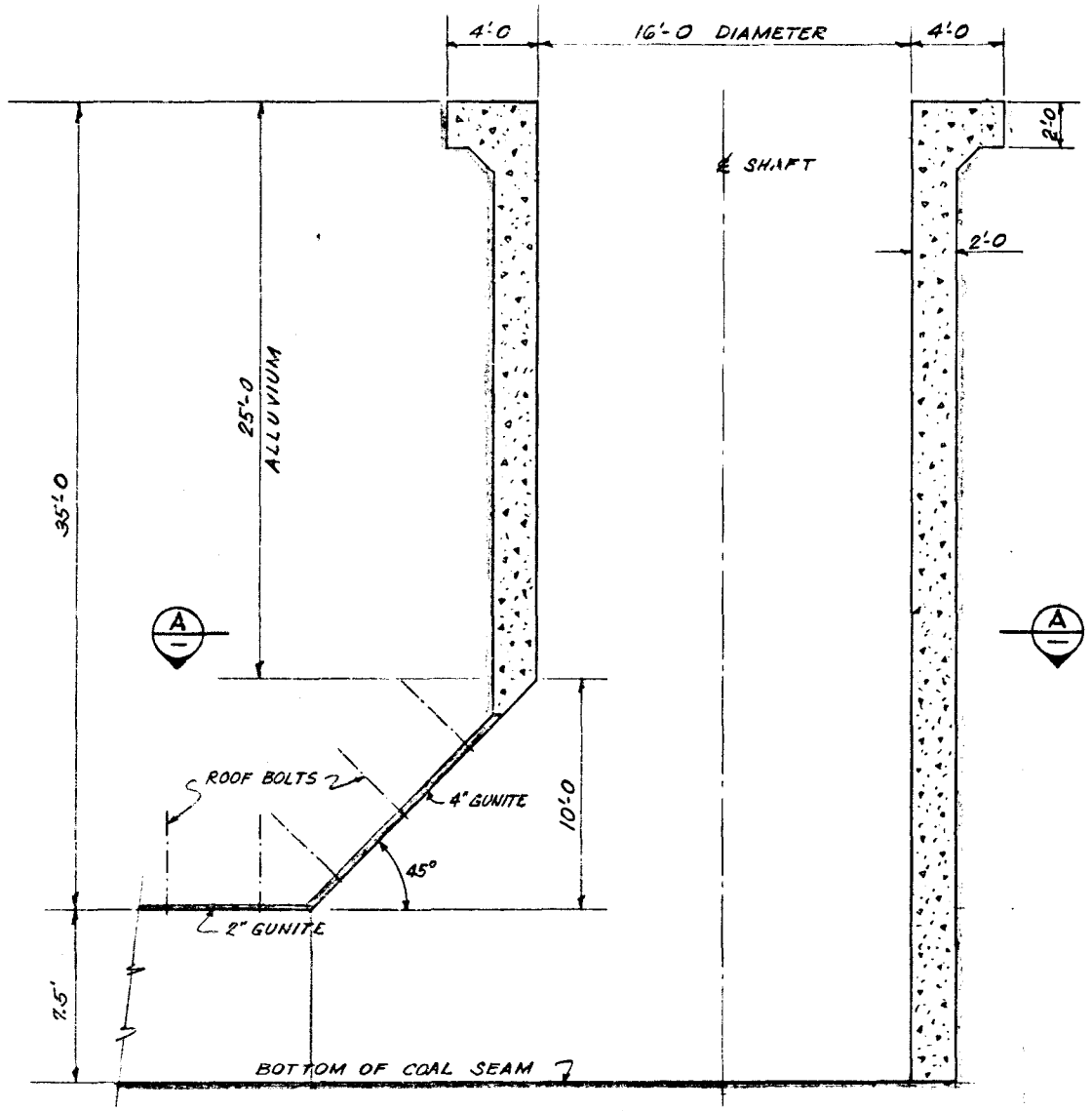
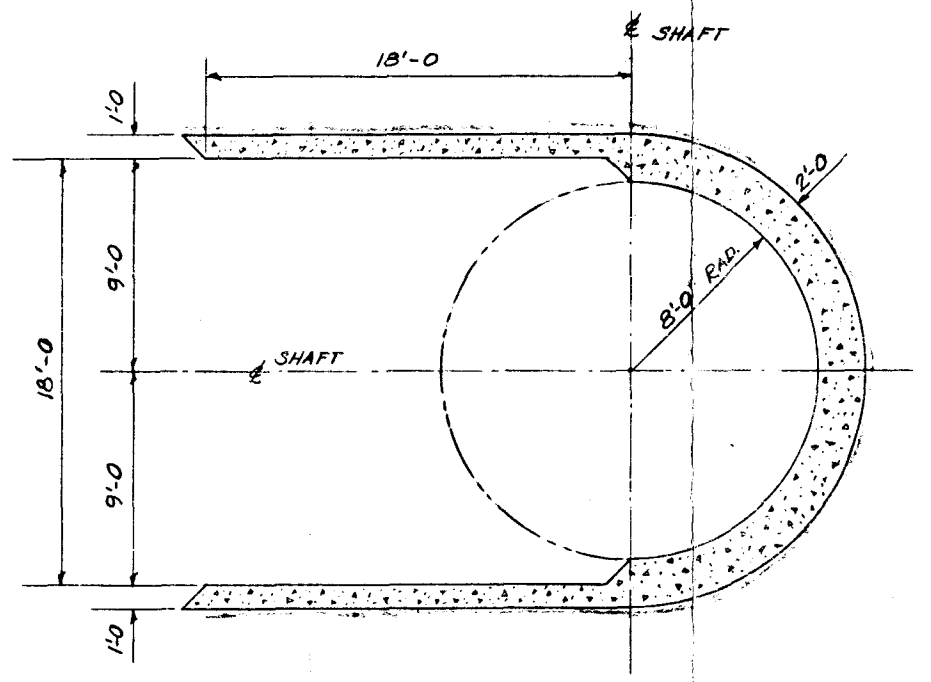
SOLDIER CANYON MINE

EXHAUST VENTILATION SHAFT
PLAN & SECTION

JOB No. 81136 | DWG. No. FIGURE II-4 | REVISION R-



SHAFT SECTION



SECTION (A) PLAN AT BOTTOM OF SHAFT

NO.	DATE	REVISION	BY CHK	APP.	APP.

NOTES

DESCRIPTION — COST ACCOUNT

WORK COVERED BY THIS DRAWING CHARGED TO COST ACCOUNT ABOVE

CONSTRUCTION APPROVAL

APPROVAL	DATE

SCALE: 1/4" = 1'-0"

		DATE
DESIGNED BY		
DRAWN BY	E.H.	3/22/82
CHECKED BY		
APPROVED BY	C.B. Tillem Jr	3/22/82
APPROVED BY		

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KAISER ENGINEERS

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SOLDIER CANYON MINE

INTAKE VENTILATION SHAFT
PLAN AND SECTION

JOB No. 81126 | DWG. No. FIGURE II-5 | REVISION R-

III. EXISTING ENVIRONMENT

A. SOILS

Information has been compiled from past investigations and specific soil information was acquired from a Soil Conservation Service Study.

The sites of the shafts and the slope are located in an area that lie predominantly in the Rock Outcrop-Rubble Land-Sunup Complex unit of the soils map. The hillside slopes in the general area are 60 to 70 percent, medium to long in depth, and concave in shape. However, the sites are basically flat. Elevation is about 6,750 feet. The average annual precipitation is about 14 to 18 inches; the mean annual air temperature is 43° to 45°F; and the average freeze-free season is 50 to 70 days.

The Rock Outcrop component of the unit is exposed bedrock and is composed of sandstone, conglomerate, and limestone. The Rubble Land component consists of stones and boulders, with little vegetation. These components are in the SCS capability subclass VIIIS. The unit is used for wildlife habitat.

The Sunup component is a gravelly loam or gravelly fine sandy loam. Less than 10% of the material in the Sunup component is <3". It has a plasticity index of 5 to 10; clay content of 10 to 16%; density of 1.35 - 1.45 g/cm3; permeability of 2 to 6 in/hr, available water holding capacity of 0.04 to 0.09 in/in; pH of 7.9 to 8.4; salinity <2MMHOS/cm; low shrink swell potential; and <3% organic matter. The Sunup component is considered suitable for rangeland only.

Generally, the surface is covered by sparse vegetation, leaves, twigs and needles. The surface litter extends to a

depth of about 1". The surface soil layer includes the litter and extends to 6" in depth. It is normally brown-cobbly-fine-sandy loam. Below the surface soil is an 8" thick layer that extends to approximately 14" in depth. It is considered a pale-brown-cobbly-fine-sandy-loam. Sandstone is at a depth of approximately 14".

The proposed affected area (and the entire area encompassing surface operations and facilities of the Soldier Canyon Mine) is not considered prime farmland. Historically, land in the area has not been used as cropland. The rocky character of the landscape in the mine area, in addition to steep canyon walls, would make farming difficult and unrealistic within the mine area.

B. VEGETATION

The exhaust air shaft site is located about 50 feet from the stream. The plant community along the stream consists of cottonwood, squawbush, bluegrass, boxelder. Cottonwood is the predominant type of vegetation. The riparian or stream bottom type of plant community occurs as a narrow strip along most perennial and intermittent streams in the canyon bottoms. On the long, moderately steep slopes above the site, the vegetation is open grass and brush. The community consists of Salina wildrye, big sagebrush, serviceberry, bluebunch wheatgrass, Nevada bluegrass, and snowberry. The site was originally part of the old road alignment and was therefore completely disturbed at one time. Some natural revegetation has occurred.

The site for the intake air shaft and slope is approximately 100 feet from the stream and is part of the existing supply yard. The same type of vegetation occurs in the adjacent areas.

Endangered or Threatened Plant Species

The following plant species have been proposed for inclusion on the list of endangered and threatened plants for Carbon County as a whole: Eriogonum corymbosum, Var davidesi, Eriogonum lancifolium, Hedysarum occidentale, and Var canohe.

None of the above listed plant species were found on the lease area, nor was any suitable habitat found for any of them.

C. WILDLIFE

1. General Wildlife Resource Information

The mine plan area is represented by the Transition and Canadian life zones and provides habitat for approximately 245 species of wildlife: 4 fish species, 5 amphibian species, 14 reptile species, 147 bird species, and 75 mammal species. Seventy-one of these species are of high interest to the State of Utah. High interest wildlife are defined as any threatened or endangered species, all game species, any economically important species, and any species of special aesthetic, scientific, or educational significance. No threatened or endangered species were observed or expected on the proposed sites.

An in-depth discussion of species and habitats present or potentially present in the mine plan area was included in Volume II of the Mining and Reclamation Plan permit application. The reviewer is referred to that document for detailed information.

The wildlife habitat on the sites is grass and shrubland. Adjacent to the sites are riparian habitats, pinyon juniper forests, aspen forests, conifer forests, and cliff and talus

slopes. Riparian areas are highly productive in terms of herbage produced and use by wildlife as ccmpared to surrounding areas. Experience has shown that as much as 70 percent of a local wildlife population is dependent upon riparian zones.

2. Fish

Since the ventilation project does not include any plans to discharge polluting effluents into local waters or impact the local fishery, data relative to macrophytes, macroinvertebrates, or fish is not relevant. Information concerning fish populations is presented for general background only.

Aquatic habitats of Soldier Creek in the general vicinity of the new exhaust air shaft may support four species of nongame fish, all of which are protected. None of these fish species have been determined to be of high interest to Utah. These fish--Utah chub, red shiner, fathead minnow, and speckled dace--could only be present during the best of water years; they originate due to an upstream migration from the Price River.

It is important to note that no species of fish federally listed as threatened or endangered inhabit the mine plan or adjacent areas.

3. Amphibians

Five species of amphibians, all of which are protected, are known to inhabit the biogeographic area in which the mine plan and adjacent areas are located. Only one specie of the amphibians inhabiting the general mine area has been determined to be of higher interest to the State of Utah, the

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It is important to note that no species of fish federally listed as threatened or endangered inhabit the mine plan or adjacent areas.

3. Amphibians

Five species of amphibians, all of which are protected, are known to inhabit the biogeographic area in which the mine plan and adjacent areas are located. Only one specie of the amphibians inhabiting the general mine area has been determined to be of higher interest to the State of Utah, the

tiger salamander. This salamander was not observed at the sites of the shafts and the slope nor were any amphibians federally listed as threatened or endangered.

4. Reptiles

Fourteen protected species of reptiles are known to inhabit the biogeographic area in which the mine plan and adjacent areas are located. Only one specie of the reptiles inhabiting the general mine area has been determined to be of high interest to the State of Utah. This is the Utah milk snake, which is a year-long resident animal of the mine area. To date, the milk snake or any type of snake dens, which are protected and of critical value to snake populations, have not been identified on or adjacent to the sites of the shaft and the slope. If the Company, at some later time, discovers a den, it would be reported to the Utah Division of Wildlife Resources. No federally listed threatened or endangered reptiles have been observed in the mine plan area.

5. Birds

Two hundred forty-four species of birds, all of which are protected, are known to inhabit the biogeographic area in which the mine plan and adjacent areas are located. It is probable that 147 of these species inhabit the general mine area. Thirty-nine species of the birds inhabiting the general mine area have been determined to be of high interest to the State of Utah.

The birds that may be year-long or seasonal residents or have habitats in the project area may include the ruffed grouse, the sage grouse, and the chukar. The raptors that may be year-long or seasonal residents or have habitats in

the general mine area include the turkey vulture, six species of hawks (goshawk, sharp-shinned, Cooper's, red-tailed, Swainson's, and marsh hawks), and eight species of owls (barn, screech, flammulated, great horned, pygmy, long-eared, short-eared, and saw-whet owls). Many of these species are of high federal interest pursuant to 43 CFR 3461.1. All of these species are of high interest to the State of Utah.

Realistically, nesting habitat does not exist on the project or adjacent areas for most, if not all, of these raptor species. However, if a species were to nest on or immediately adjacent to the site, it would have a specific crucial period during which the aerie would need protection from disturbance from construction. Soldier Creek Coal would minimize disturbance during that period if nesting does occur. If nests are sighted, the appropriate agencies will be notified and protective measures implemented.

The adjacent riparian area may provide valued habitat for the great blue heron, waterfowl (ducks), mourning doves, yellow-billed cuckoo, and belted kingfishers.

The adjacent cliff and conifer-forest areas may have valued habitat for the following species: raptors (including golden eagle and American peregrine falcon), blue grouse, black swift, pleated woodpecker, Williamson's sapsucker, purple martin, western bluebird, and mountain bluebird. Possibly inhabiting the adjacent area are the northern bald eagle and the Arctic peregrine falcon. These endangered raptors are not expected at the site of the shafts and the slope.

6. Mammals

Eighty species of mammals, of which 22 percent are protected, are known to inhabit the biogeographic area in which the project and adjacent areas are located. It is probable that 75 of these species inhabit the general mine area. Thirty species of the mammals inhabiting the general mine area have been determined to be of high interest to the State of Utah. Among these species are the dwarf shrew, western big-eared bat, spotted bat, snowshoe hare, desert cottontail, red fox, kit fox, black bear, short-tailed and long-tailed weasels, wolverine, marten, badger, striped and spotted skunks, bob-cat, cougar, mule deer, moose, Rocky Mountain elk, and big-horn sheep. It should be noted that the project site does not provide habitat for prairie dogs; thus their predator, the black-footed ferret, which is endangered, would also be absent.

There are mammals known to inhabit the biogeographic area of the mine site but not the particular wildlife habitat of the sites of the ventilation shafts and the slope. Species of high interest may include the red bat, mountain cottontail, northern flying squirrel, beaver, mink, muskrat, racoon, and the Canada lynx.

Currently, there are no other known high interest wildlife species or their habitat use areas on or adjacent to the project area. It is not unreasonable to suspect that, in the future, some additional species of wildlife may become of high interest to the local area, Utah, or the nation. If such is the case, the required periodic updates of project permits and reclamation plans can be adjusted and appropriate recommendations made.

D. GROUNDWATER HYDROLOGY

1. Regional Ground Water Hydrologic System

The principal factor controlling the occurrence and availability of ground water in any area is geology. Geologic formations exposed within the lease area are the Blackhawk and Price River formations of the Mesaverde Group and the North Horn and Flagstaff formations of the Wasatch Formation. These rocks are of continental and marine origin, consisting predominantly of interbedded sandstones and shales. Although some of the sandstones in the region serve as the principal water-bearing strata, their ability to yield water for extended periods of time is largely controlled by the fact that the sandstone beds are relatively impermeable and by the existence of the impermeable interbedded shale layers which prevent the downward movement of a significant amount of water.

In the vicinity of the ventilation shafts and the slope, the dip of the strata is to the north and east at approximately 11 percent (6 degrees) (Doelling, 1972). The strike of the strata coincides in general with the trend of the cliffs (Spieker, 1925).

There are no major faults within or adjacent to the Soldier Canyon Mine lease area. According to Pollastro (1980), no faults have been encountered in mining coal from the Soldier Canyon Mine.

According to the U.S. Geological Survey (1979), ground water in the region exists under water table, artesian, and perched conditions. Water table conditions exist primarily in shallow alluvial deposits along larger perennial streams and

in relatively flat-lying sedimentary rocks. Artesian conditions exist at greater depths where a confining layer overlies a more permeable member. However, pressures are generally not sufficient to produce flowing wells. Perched or impeded conditions exist where the confining layer lies beneath the water-bearing strata.

Only a small portion of the annual precipitation, probably much less than five percent, recharges the ground water supply (Price and Arnow, 1974; U.S. Geological Survey, 1979). The depth of water infiltrating through the surface to saturated beds is small for two reasons: the presence of relatively impermeable shale layers near the surface of much of the area and the potential evapotranspiration being greater than the rainfall.

Price and Arnow (1974) indicate that properly constructed wells in the Price River Basin would have very limited yields (normally less than 50 gallons per minute). Wells immediately adjacent to the Soldier Canyon Mine lease area could normally be expected to yield less than 10 gallons per minute (Price and Wadell, 1973). Increased yields could possibly be expected from wells penetrating highly fractured sandstones.

Rocks in the mountainous areas near the Soldier Canyon Mine generally have low specific yields (0.2 to 0.7 percent) and low hydraulic conductivities (Price and Wadell, 1973). The volume of recoverable water in the area is small, averaging less than 600 acre-feet per square mile in the upper 100 feet of saturated rock (Price and Arnow, 1974).

2. Ground Water Supply

All springs and seeps were sampled within and adjacent to the Soldier Canyon Mine lease area during September 1979 to obtain an index of ground water hydrologic conditions in the area. Discharge and water temperature measurements were made, and results are shown in Table III-1.

Only three springs were found within or adjacent to the lease area, and two of these were located outside the lease boundary. All three of the springs were located near the base of a dominant sandstone formation. Both springs S8-1 and S31-1 issue near the interface between the Flagstaff and North Horn formations, and spring S7-1 issues at the contact between the Castlegate Sandstone and non-coal bearing portion of the Price River formation.

The three springs encountered near the Soldier Canyon Mine were located at higher elevations with recharge zones suspected to be the small areas of the nearby flats located along adjacent ridges. Flows from the springs were low during the inventory, ranging from less than one gallon per minute to two gallons per minute. Due to the localized nature of the springs, flows are expected to be higher during the snowmelt runoff period and are expected to be quite sensitive to the amount of precipitation received during any given year.

Since no active coal exploration program is being conducted on the lease area, high cost relative to expected benefits precluded the drilling of observation wells in the area and the collection of reliable ground water hydrology data.

Table III-1. Results of the chemical analyses of water quality samples collected from springs, within the mine, and at the Banning Siding site at Sunnyside Junction during the fall study period.

Station Number		7-1	8-1	31-1	Mine	Banning Siding
Parameter	Units	9-26-79	9-26-79	9-26-79	9-26-79	10-10-79
FIELD MEASUREMENTS						
Discharge	gpm	<1.0	2.0	2.0	<1.0	
Dissolved Oxygen	mg/l					
pH	units	7.6	7.4	7.10	7.20	7.20
Specific Conductance	umhos/cm @ 25° C	1480	700	600	2300	3900
Temperature, Air	°C					
Temperature, Water	°C	12.0	13.0	11.0	16.0	13.0
LABORATORY MEASUREMENTS						
Acidity, as $CaCO_3$	mg/l	46.0	32.0	28.0	78.0	42.0
Alkalinity, as $CaCO_3$	mg/l	460.0	340.0	300.0	1296.0	354.0
Ammonia, NH_3 as N	mg/l					
Arsenic, Total	mg/l	0.001	<0.001	<0.001	<0.001	0.002
Arsenic, Dissolved	mg/l					
Barium, Total	mg/l	0.090	0.160	0.120	7.530	0.095
Barium, Dissolved	mg/l					
Beryllium, Dissolved	mg/l					
Bicarbonate	mg/l	561.20	414.80	366.00	1581.12	431.88
Boron, Total	mg/l	0.080	0.090	0.060	1.400	0.950
Boron, Dissolved	mg/l					
Cadmium, Total	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium, Dissolved	mg/l					
Calcium	mg/l	243.20	124.00	120.00	116.00	576.00
Chloride	mg/l	12.0	6.0	8.0	72.0	108.0
Chromium, Total	mg/l	0.002	<0.001	<0.001	<0.001	<0.001
Chromium, Dissolved	mg/l					
Cobalt, Dissolved	mg/l					
Copper, Total	mg/l	0.010	0.005	0.012	0.005	0.076
Copper, Dissolved	mg/l					
Cyanide	mg/l					
Fluoride	mg/l	0.40	0.29	0.27	1.27	0.12
Germanium, Dissolved	mg/l					
Gross Alpha Radioactivity	pCi/l					
Gross Beta Radioactivity	pCi/l					
Iron, Total	mg/l	0.580	5.850	0.310	0.100	0.560
Iron, Dissolved	mg/l	0.020	0.010	0.030	<0.010	0.113
Lead, Total	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001
Lead, Dissolved	mg/l					
Magnesium	mg/l	32.0	16.80	7.20	9.60	16.80
Manganese, Total	mg/l	7.680	0.030	0.130	0.021	0.590
Manganese, Dissolved	mg/l					
Mercury, Total	mg/l	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Mercury, Dissolved	mg/l					
Nitrate, NO_3 as N	mg/l		0.06	0.09	<0.01	0.07
Oil and Grease	mg/l	1.4	<1.0	1.2	<1.0	3.0
Phenol	mg/l	<0.001		<0.001	0.12	0.002
Phosphate, PO_4 as P Ortho	mg/l		0.08	0.060	0.060	0.040
Potassium	mg/l	3.847	1.240	1.161	23.400	3.990
Selenium, Total	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001
Selenium, Dissolved	mg/l					
Silica, as SiO_2	mg/l					
Silver, Total	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001
Silver, Dissolved	mg/l					
Sodium	mg/l	44.83	19.02	12.62	484.00	210.00
Sulfate	mg/l	350.0	76.0	52.0	<3.0	1410.0
Suspended Solids	mg/l					
Total Dissolved Solids	mg/l	969.0	458.0	386.0	1500.0	2540.0
Total Organic Carbon	mg/l					
Turbidity	FTU					
Zinc, Total	mg/l	0.011	0.009	0.004	0.006	0.021
Zinc, Dissolved	mg/l					

3. Ground Water Quality

As an index to ground water hydrologic conditions within the Flagstaff, North Horn, and Price River formations, water quality samples were collected and analyzed for the three springs within and adjacent to the Soldier Canyon Mine lease area. In addition, a water quality sample was collected from water dripping from the mine ceiling to index the groundwater hydrologic conditions of the Blackhawk formation. One additional water quality sample was collected and analyzed from ground water encountered in an enclosed pit dug at the mine train loadout facility near Sunnyside Junction, referred to hereafter as the "Banning Siding" sample. Water quality samples were collected and analyzed for a comprehensive list of parameters. Results of the chemical analyses are also illustrated in Table III-1.

Variability in ground water quality in the geologic formations was analyzed by comparing water quality constituents. Concentrations of the various constituents were relatively consistent between the Flagstaff and North Horn formations, with the ground water from within these formations being primarily of a calcium carbonate type (see Figure III-1). Ground water in the Price River formation is also strongly calcium bicarbonate, but sulfate concentrations are much higher than those of the Flagstaff and North Horn formations.

According to the analysis of the sample taken from within the mine, the ground water from the Blackhawk formation is predominantly sodium bicarbonate. The Blackhawk formation is extremely discontinuous in nature; therefore, the ground water quality within the Blackhawk formation itself is expected to be highly variable, as has been demonstrated at other locations within the Price River Basin (Vaughn Hansen Associates, December 1979).

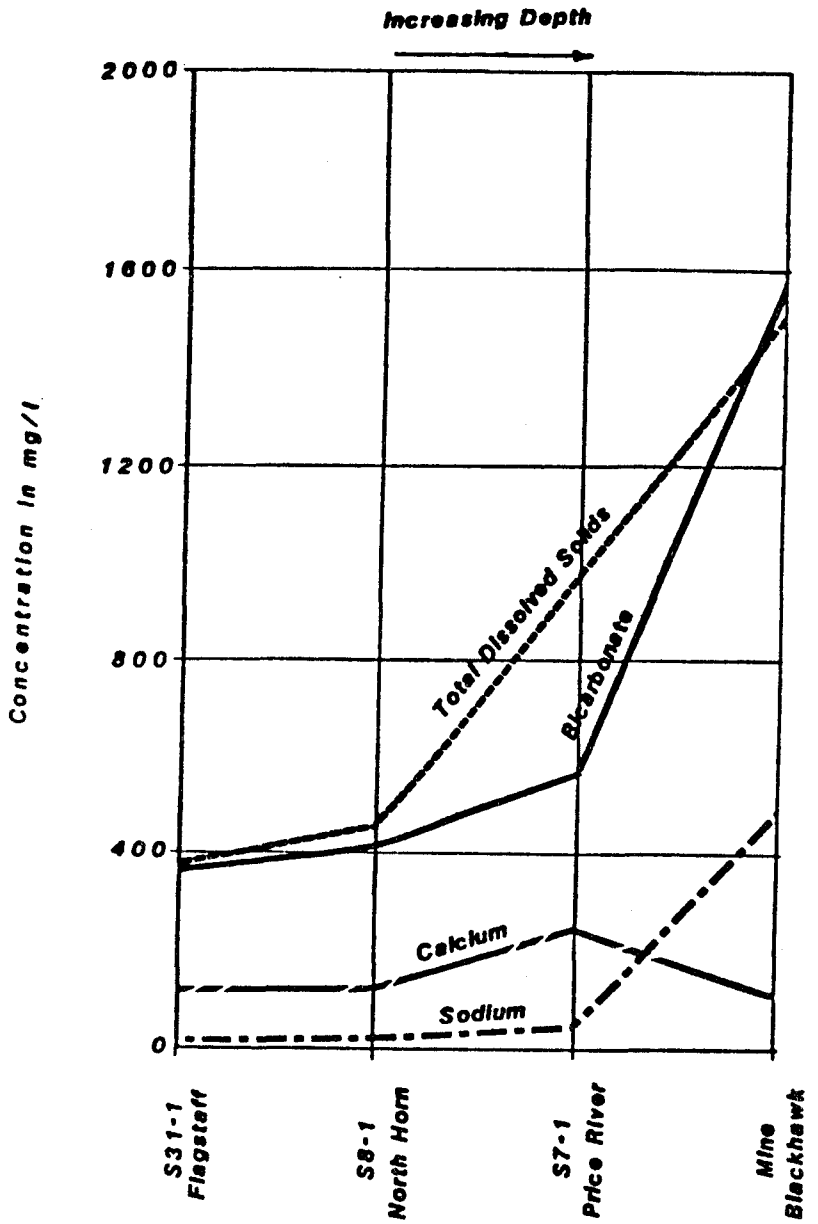


Figure III-1. Comparison of water quality data collected from the springs and mine from the separate geologic formations within the Soldier Canyon Mine lease area.

Concentrations of other constituents sampled at stations throughout the vicinity of the Soldier Canyon Mine were quite low. In many cases, trace metal concentrations were consistently below the level of detection by routine laboratory techniques (particularly cadmium, lead, mercury, selenium and silver).

Ground water taken from the Banning Siding site at Sunnyside Junction was of a calcium sulphate type. With the exception of the total dissolved solids concentration, no constituents were detected that exceeded state standards for water use in this area. The total dissolved solids concentration at this site was measured at 2,540 milligrams per liter, which exceeds the state standard for Class 4 waters (1,200 milligrams per liter). However, the water quality from the Banning Siding site is of comparable quality to surface waters in the near vicinity. Total dissolved solids concentrations in Grassy Trail Creek at Sunnyside Junction have been measured in excess of 3,500 milligrams per liter. Therefore, total dissolved solids concentrations naturally and significantly exceed state standards at this point.

E. SURFACE WATER HYDROLOGY

1. Regional Surface Hydrologic System

The Soldier Canyon Mine lease area is situated in the Book Cliffs near the headwaters of the Price River Basin. The entire lease area drains toward Soldier Creek, a perennial tributary of the Price River.

In general, the chemical quality of water in the headwaters of the Price River Basin is excellent, with this watershed providing most of the domestic water needs of the people

below. However, this quality rapidly deteriorates downstream as the streams cross shale formations (particularly the Mancos Shale in and adjacent to Castle Valley) and receive irrigation return flows from lands situated on Mancos-derived soils (Price and Wadell, 1973). Within the Price River Basin, for example, Mundorff (1972) reports that the Price River and its tributaries generally have a dissolved solids concentration of less than 400 milligrams per liter upstream from Helper. The water in this area is of a calcium bicarbonate type. Between this point and the confluence with Miller Creek, most of the flows originate on or traverse Mancos shales. Much of the flow is derived from irrigation return flows. The Price River at Wellington, which is near the center of the basin, has an average dissolved solids content of about 1,700 milligrams per liter and is of a mixed chemical type (calcium-magnesium-sodium-sulfate).

Sediment yield from the upper portion of the basin is probably negligible (Mundorff, 1972). According to the U.S. Soil Conservation Service (1975), erosion rates in the Price and San Rafael River Basin vary from 0.1 to 3.0 acre-feet per square mile per year. The bulk of the sediment yielded each year at the mouth of the Price River comes from limited areas covered with highly erodable shales (Mundorff, 1972).

Monthly flows for Soldier Creek were computed as the percentage of annual flow for the year 1978 to determine the seasonal distribution of flows for perennial streams in the vicinity of the lease area. The results are presented in Figure III-2, which also depicts the distribution of flows. This is typical of high mountain regions in the west, in which most of the streamflow occurs from March through June as a result of snowmelt.

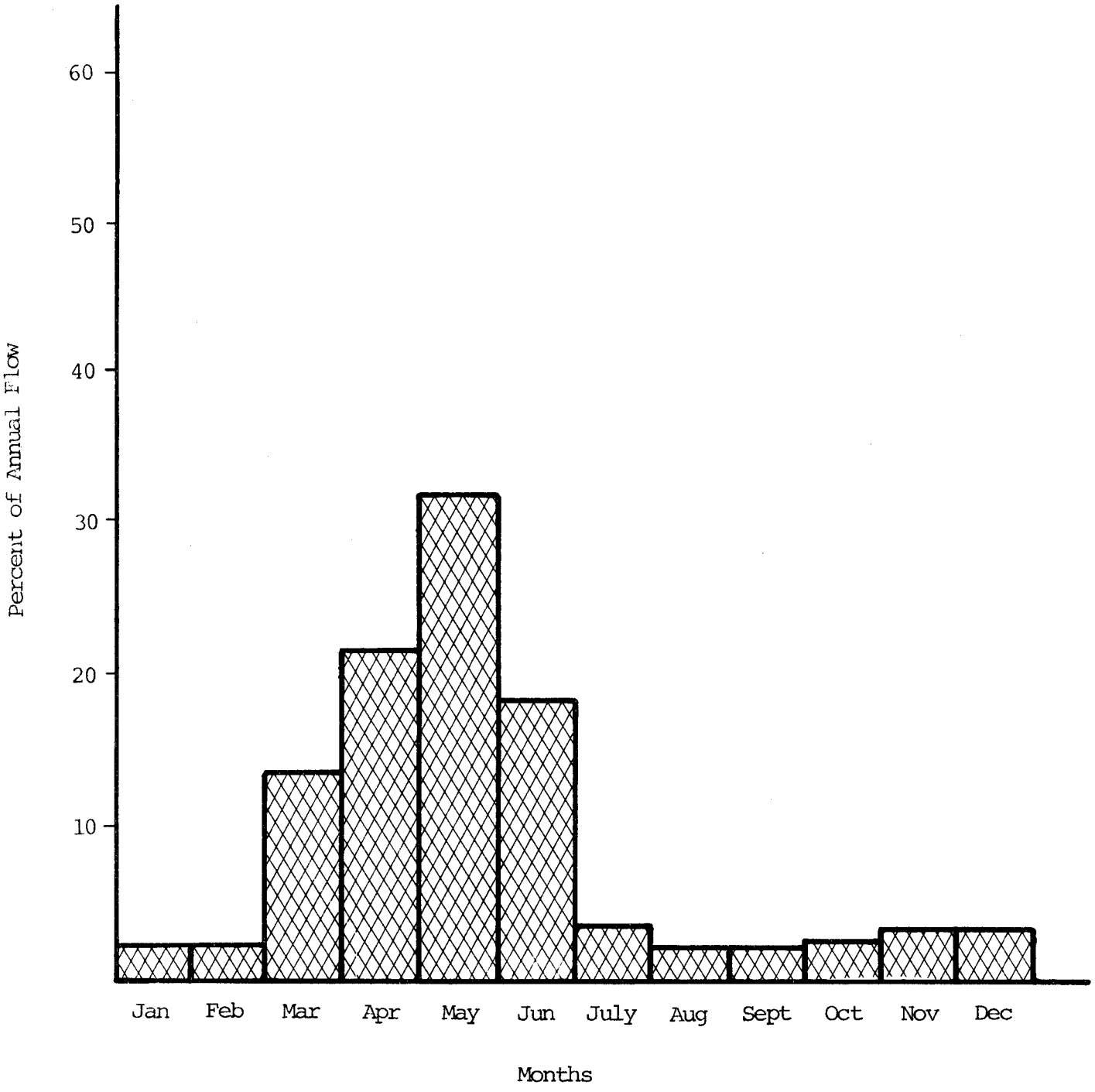


Figure III-2. Monthly distribution of flows for Soldier Creek, near the Soldier Canyon Mine, for the year 1978.

The U.S. Geological Survey has established a gauging station on Soldier Creek, immediately downstream from the Soldier Canyon Mine, and has obtained periodic measurements of discharge and water quality from July through November. Eureka Energy Company also maintains a gauging station upstream from the mine near the confluence of Soldier Creek with the tributary from Pine Canyon. Data are available from both gauging stations since 1978. Based upon the periodic measurements of these two sites since 1978, the maximum measured flow of Soldier Creek is 19.0 cubic feet per second and the minimum measured flow is 0.1 cubic feet per second. Peak discharges in Soldier Creek are expected to be much higher than these periodic measurements. Summer thunderstorms, common in this area, would produce flows well in excess of these measured values.

Estimates of peak flow recurrence intervals for Soldier Creek near the Soldier Canyon Mine were prepared by Vaughn Hansen Associates (July 1979). Peak flow estimates were determined from the runoff curve number and unit hydrograph technique as defined by the U.S. Soil Conservation Service (1972). According to Vaughn Hansen Associates (July 1979), the estimated peak discharge of Soldier Creek from the 10-year, 24-hour event is 285 cubic feet per second, and the peak discharge from the 25-year, 6-hour event is 391 cubic feet per second.

Studies are currently underway to determine the flood frequencies relative to the sites of the shafts and the slope for the 10, 25, 50 and 100 yr flood events.

3. Surface Water Quality

Surface water quality data were collected during the fall period of analysis (April-September 1979) within the Soldier

Canyon Mine lease area. These stations were located to obtain data from Soldier Creek both above and below existing surface facilities of the Soldier Canyon Mine. Additional water quality data were obtained from unpublished data of the U.S. Geological Survey and Eureka Energy Company of Salt Lake City, Utah, for the two previously identified gauging stations on Soldier Creek. The results of the chemical analyses are shown in Table III-2.

Total dissolved solids concentrations were lowest during the months of April through June when flows were highest. This inverse relationship is caused by a dilution effect from snowmelt in the early spring and runoff period. Later in the year, as flow decreases and the majority of flow is derived from ground water, this diluting effect is less pronounced, resulting in increased total dissolved solids concentrations. Total dissolved solids concentrations for Soldier Creek in the vicinity of the lease area were relatively high for a mountain stream, ranging from 374 milligrams per liter during the high flow season to 860 milligrams per liter during the low flow season.

From the data gathered during the fall period of analysis and other previously mentioned sources, suspended solids concentrations of Soldier Creek were found to vary from 1.0 to 1,644 milligrams per liter. All suspended solids concentrations measured during the summer and fall seasons of the year were less than 17 milligrams per liter. During the runoff period it is not uncommon for suspended solids concentrations in Soldier Creek to naturally and significantly exceed the federal coal mining effluent standard of 45 milligrams per liter.

The hydrogen ion activity (pH) of Soldier Creek was found to vary in the vicinity of the lease area from 7.4 to 8.7

Table III-2. Results of chemical analyses of surface water quality samples collected by Vaugh Hansen Associates.

Station Number		Lower Soldier	Lower Soldier	18-2	18-1	E-22	E-22
Parameter	Units	4-10-79	6-21-79	9-26-79	9-26-79	4-10-79	6-21-79
FIELD MEASUREMENTS							
Discharge	cfs	11.1	12.0	1.2	1.2	10.7	13.0
Dissolved Oxygen	mg/l		9.8				10.8
pH	units	7.88	8.0	7.6	7.60	7.93	8.0
Specific Conductance	umhos/cm @ 25° C	740	780	840	830	570	620
Temperature, Air	°C	0.0	12.0			0.0	13.0
Temperature, Water	°C		6.0	13.0	13.0		6.0
LABORATORY MEASUREMENTS							
Acidity, as $CaCO_3$	mg/l			22.0	18.0		
Alkalinity, as $CaCO_3$	mg/l	266.0	292.0	310.0	284.0	260.0	302.0
Ammonia, NH_3 as N	mg/l						
Arsenic, Total	mg/l			0.002	0.002		
Arsenic, Dissolved	mg/l						
Barium, Total	mg/l			0.130	0.120		
Barium, Dissolved	mg/l						
Beryllium, Dissolved	mg/l						
Bicarbonate	mg/l	324.52	356.24	378.20	346.48	317.20	368.44
Boron, Total	mg/l			0.160	0.180		
Boron, Dissolved	mg/l						
Cadmium, Total	mg/l			<0.001	<0.001		
Cadmium, Dissolved	mg/l						
Calcium	mg/l	60.0	56.80	104.00	88.00	45.60	55.20
Chloride	mg/l	12.0	12.0	16.0	12.0	8.0	8.0
Chromium, Total	mg/l			<0.001	<0.001		
Chromium, Dissolved	mg/l						
Cobalt, Dissolved	mg/l						
Copper, Total	mg/l			<0.001	0.002		
Copper, Dissolved	mg/l						
Cyanide	mg/l						
Fluoride	mg/l			0.38	0.39		
Germanium, Dissolved	mg/l						
Gross Alpha Radioactivity	pCi/l						
Gross Beta Radioactivity	pCi/l						
Iron, Total	mg/l			0.37	0.19		
Iron, Dissolved	mg/l			0.020	<0.010		
Lead, Total	mg/l			<0.001	<0.001		
Lead, Dissolved	mg/l						
Magnesium	mg/l	39.36	45.60	9.60	19.20	32.16	36.48
Manganese, Total	mg/l			0.023	0.012		
Manganese, Dissolved	mg/l						
Mercury, Total	mg/l			<0.0002	<0.0002		
Mercury, Dissolved	mg/l						
Nitrate, NO_3 as N	mg/l			0.04	<0.01		
Oil and Grease	mg/l			1.4	<1.0		
Phenol	mg/l				0.026		
Phosphate, PO_4 as P Ortho	mg/l			0.15	0.100		
Potassium	mg/l	2.20	1.929	2.762	2.318	1.300	1.185
Selenium, Total	mg/l			0.002	0.003		
Selenium, Dissolved	mg/l						
Silica, as SiO_2	mg/l						
Silver, Total	mg/l			<0.001	<0.001		
Silver, Dissolved	mg/l						
Sodium	mg/l		39.40	84.20	80.80	53.00	34.71
Sulfate	mg/l	150.0	109.0	143.0	160.0	72.0	52.0
Suspended Solids	mg/l	1644.0	1.0	17.0	6.5	1113.0	6.0
Total Dissolved Solids	mg/l	480.0	442.0	542.0	538.0	374.0	379.0
Total Organic Carbon	mg/l						
Turbidity	FTU	250				200	
Zinc, Total	mg/l			0.005	0.003		
Zinc, Dissolved	mg/l						

units. The basic condition of Soldier Creek is probably due to the high concentration of bicarbonates.

Total and dissolved iron concentrations are somewhat related to flowrate, with higher concentrations occurring during the snowmelt runoff period when suspended sediment concentrations are high and with lower concentrations occurring during baseflow conditions. Dissolved iron concentrations in Soldier Creek have varied from less than 0.01 milligram per liter to 0.385 milligram per liter, with the higher concentrations occurring in April and May during the snowmelt runoff period.

Total manganese concentrations were low in Soldier Creek, varying from 0.009 to 0.119 milligram per liter. No distinct seasonal variation in manganese concentrations can be determined.

The Utah Division of Health has classified the waters within the Soldier Canyon Mine lease area as 3C (protected for non-game fish and other aquatic life) and 4 (protected for agricultural uses including irrigation of crops and stock-watering).

4. Sediment Yield

Estimates of the average annual sediment yield to be expected from the mine lease area were made using the PSIAC (Pacific Southwest Inter-Agency Committee, 1968) method and the Universal Soil Loss Equation (U.S. Soil Conservation Service, 1977; Clyde et al, 1978). Assuming an average from the two methods of 0.39 acre-feet per square mile, the Soldier Canyon Mine lease area yields a yearly average of 1.04 acre-feet of sediment to the Price River Basin.

Although no published sediment yield data are available for the upland areas of the basin, this is undoubtedly only a small portion of the total amount of sediment yielded from the mountainous areas of the Price River Basin.

F. HISTORICAL AND CULTURAL RESOURCES

Historical and cultural investigations were carried out by the Utah Division of State History, and visual observations were made by the Soldier Creek Coal Company.

1. Historical Inventory

A September 26, 1980 letter from the Division of State History stated, "....there are no known prehistoric or historic resources in the area of the mine plan." A copy of this letter is included as Figure III-3.

2. Archaeological Inventory

No archaeological resources were found in the area by the Division of State History in their investigation.

3. Paleontologic Resources

There has been no evidence of paleontological resources in the area.

4. Inventory of Public Facilities

In a telephone conversation with the Bureau of Land Management and the Forest Service on March 13, 1981, it was determined that no public parks exist within the mine permit area.

SCOTT M. MATHESON
GOVERNOR

STATE OF UTAH
DEPARTMENT OF COMMUNITY AND
ECONOMIC DEVELOPMENT

Division of
State History
(UTAH STATE HISTORICAL SOCIETY)

MELVIN T. SMITH, DIRECTOR
307 WEST 2ND SOUTH
SALT LAKE CITY, UTAH 84101
TELEPHONE 801/533-5755

September 26, 1980

David G. Spillman
Mine Engineer
Soldier Creek Coal Company
Hidden Valley Mine
P. O. Box AS
Price, Utah 84501

Dear Mr. Spillman:

In reply to your request of September 8, 1980, a search of the cultural resource files was completed of those areas in Soldier Canyon that were requested. The search indicated that there are no known pre-historic or historic resources in the area of the mine plan.

Our office, however, is aware of some historic resources that may be located in the area of the mining plan.

If you have any questions, please contact me (801) 533-6000.

Sincerely,

Jim Dykman
Compliance Administrator

JLD:jr

Figure III-3

IV. ENVIRONMENTAL IMPACT

The majority of the environmental impact of the Soldier Canyon Mine occurred upon the opening of the mine. Only minor impact will occur during the installation of the new slope and the shafts since they will be located on less than four-tenths of an acre. The total impact for this project, as for the entire mine, has been and will continue to be minimized by complying with the performance standards established by the Environmental Protection Agency, the Office of Surface Mining, and Division of Oil, Gas and Mining.

A. LAND AND SOILS

The new shafts, slope, and short access road will occupy approximately four-tenths of a surface acre. The sites selected were previously disturbed; therefore, this new construction will have minimal impact.

Since the sites have been previously disturbed, some of the topsoil has probably been lost. Additionally, such a small area is involved that the impact to soils will be minor. Topsoil, if any, will be stripped from the sites directly after any naturally revegetated plants are cleared and removed. Topsoil will be stockpiled in the immediate area with environmentally acceptable slopes. The pile will be protected by water diversion ditches and revegetated with soil stabilizing grass. Signs will be posted to prevent accidental disturbance. With these environmental precautions, impact to the soils should be mitigated.

B. VEGETATION

Any naturally revegetated plants will be cleared and removed from the proposed sites.

Vegetation as described previously is sparse on the sites consisting primarily of Nevada bluegrass, blue bunch wheatgrass, and big sagebrush. Removal of this vegetation will temporarily remove this small amount of wildlife habitat. Upon abandonment of the mine, the land will be revegetated with similar species (see the revegetation plan in Section V). With the environmental controls described in Section V, this impact will be low in the short-term and negligible in the long-term.

C. WILDLIFE

With the temporary removal of wildlife habitat, there will be a short-term impact on wildlife. The high interest species that may be affected by removal of this small area of grasses and low brush could include animals such as the Utah milk snake, grouse, and other animals mentioned earlier.

Should any of the nesting bird species be observed on the sites of the shafts and the slope or in the adjacent areas, the crucial dates identified in the Mining and Reclamation Plan will be observed. Other animals observed will be encouraged to relocate. Wildlife will be protected from entry into the sites by fence. Certain power structures will be raptor-proofed.

Due to the small amount of habitat and the previously disturbed nature, the impact on wildlife present at the site is expected to be minimal. Impact on adjacent wildlife should also be minor since it has been demonstrated that most species readily become acclimated to the noise of ventilation fans.

D. GROUNDWATER IMPACT

Aquifers may be encountered during drilling; generally, these aquifers are located in the sandstone beds of the Blackhawk Formation. In a nearby drill hole (#4), at least two such aquifers were intercepted. The water yield from these aquifers is expected to be very low. The significant aquifers will be cased or grouted as they are encountered. This will prevent water production and possible contamination of higher quality water in one aquifer with lower quality from another aquifer.

E. SURFACE WATER IMPACT

The potential for impact to the surface water (Soldier Creek) will be highest during the construction of the exhaust air shaft. The primary impact to control and mitigate would be sediment influx to the stream from the disturbed areas. The steps for control and mitigation are outlined in Section E. Generally, they include diversion of undisturbed area drainage away from the shaft site and into a natural drainage. Runoff from the disturbed area will be directed over a gentle slope to a collection ditch with revegetated banks. This should allow most sediment to settle out before reaching the natural drainage. If necessary, straw bales will be used to collect sediment and protect the surface water quality.

The sites are within the DOGM-designated 100-foot stream buffer zone (817.57). Soldier Creek Coal Co. therefore requests that DOGM allow these activities to be within the stream buffer zone, based upon the following considerations:

1. No stream channel diversions will be required.

2. No untreated runoff will enter the stream; therefore, water quality and quantity will not be adversely affected.

3. Approximately 20 feet or more between the sites and creek will not be disturbed and will be marked as a buffer zone with regulation signs.

No water from the sites or polluting effluents will be discharged to the streams without proper treatment; thus, water quality should be protected.

F. IMPACT ON CULTURAL RESOURCES

There are no known historical/archaeological/paleontological resources or public facilities on the sites. Therefore, no impact on cultural resources would result. If, during any phase of construction, any unanticipated discovery of such resources is made, the appropriate agencies will be notified.

V. ENVIRONMENTAL CONTROL, SAFETY AND RECLAMATION PLAN

A. TOPSOIL HANDLING

Since the sites have been previously disturbed, some of the topsoil has probably been lost. Whatever topsoil remains, however, will be removed prior to new construction work. The topsoil removed will be stockpiled in the immediate area. The pile will be protected by water diversion ditches and revegetation with a soil stabilizing grass. A sign will be posted to prevent accidental disturbance.

When the shafts and slope are no longer needed (approximately 20 years in the future), the equipment will be removed and the shafts and slope sealed. The areas will then be regraded and the topsoil redistributed prior to revegetation.

B. REVEGETATION

Once the topsoil has been redistributed, it will be tested for fertility, pH, etc. If necessary, fertilization and neutralization will be carried out. Drill seeding of native species follows, along with planting of tree and brush seedlings. The proposed vegetation types are as follows:

1. Salina wildrye
2. Sagebrush
3. Serviceberry
4. Bluebunch wheatgrass
5. Nevada bluegrass

6. Snowberry

7. Oakbrush

8. Mountain mahogany

The area will be monitored following initial revegetation until the vegetative coverage is approximately 80 percent of the undisturbed reference area coverage. This may necessitate repeated seeding.

C. SEDIMENT CONTROL

Drainage at the intake air slope and shaft site will be handled by the existing storm water drainage system in the yard area.

At the exhaust air shaft site undisturbed area drainage will be diverted away from the shaft site via a diversion ditch. This ditch will return the runoff to a natural drainage. Precipitation falling in the disturbed area will be handled so the total suspended solids are reduced prior to return to natural drainage. The sites will be graded so there will be approximately a 3% slope toward a collection ditch. (See Figure II-2) on the west side of the shaft area. The ditch banks will be revegetated to help in sediment reduction. If sediment levels are still too high, straw bales will be placed in the ditch to reduce sediments or some other method employed. A berm will be placed on the north, east and south edges of the shaft area to help in runoff control.

D. SAFETY

During construction of the slopes, temporary ventilation systems will be set up in the mine to ventilate the slope

faces properly. This may require brattice, portable fans, or some other method.

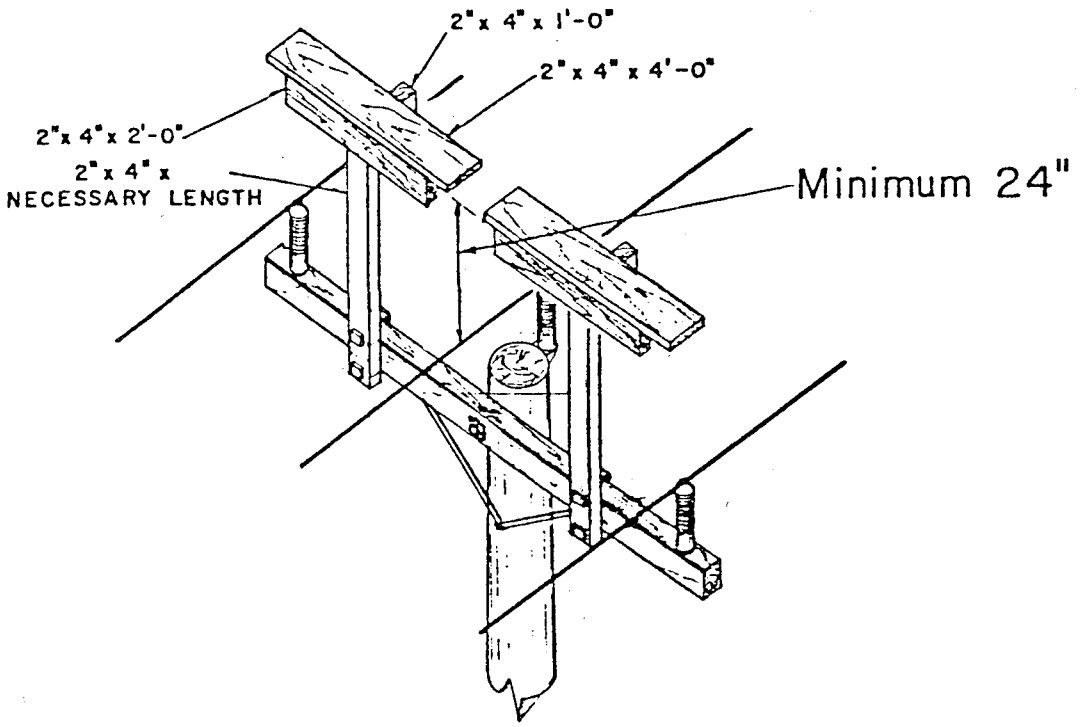
During operation safety within the mine will be improved by the new fan. From the surface the shafts and fan will not present safety problems since the entire shaft openings will be covered. The fan exhaust opening and the intake shaft will be covered by screens to prevent accidental entry. The substation at the shaft site will be fenced to prevent accidental shock.

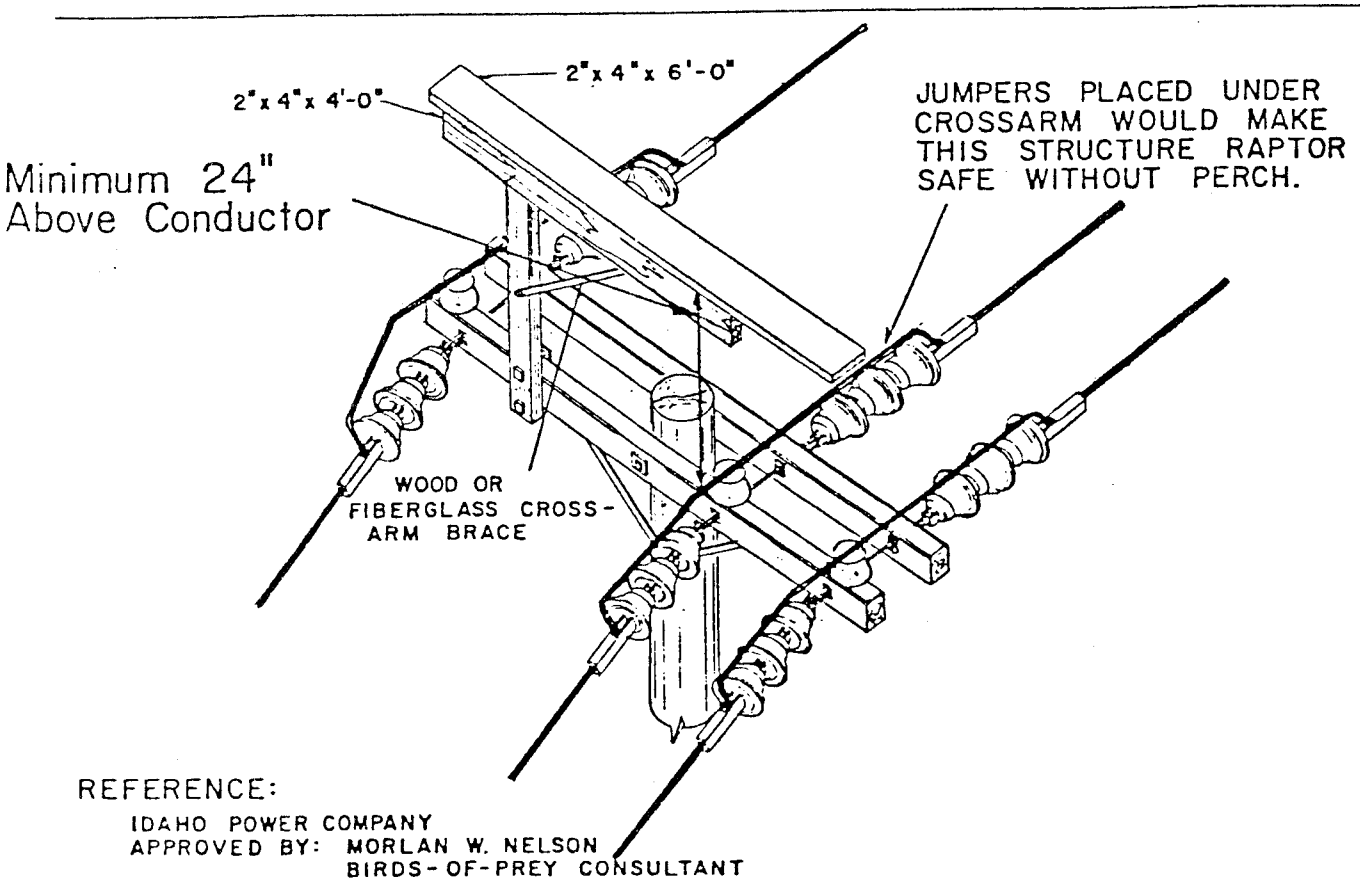
A railing will be constructed between the county road and the exhasut air shaft site. This will keep vehicles from entering the site in case of a car accident on the county road.

E. RAPTOR-PROOFING

Power structures which require protection will be raptor-proofed. This will probably be accomplished by utilizing one or more of the methods shown in Figure V-1 and V-2.

ELEVATED PERCH CONSTRUCTION





REFERENCE:

IDAHO POWER COMPANY
APPROVED BY: MORLAN W. NELSON
BIRDS-OF-PREY CONSULTANT

ALSO ~
REA BULLETIN 61-10
FIGURE 5

Figure V-1

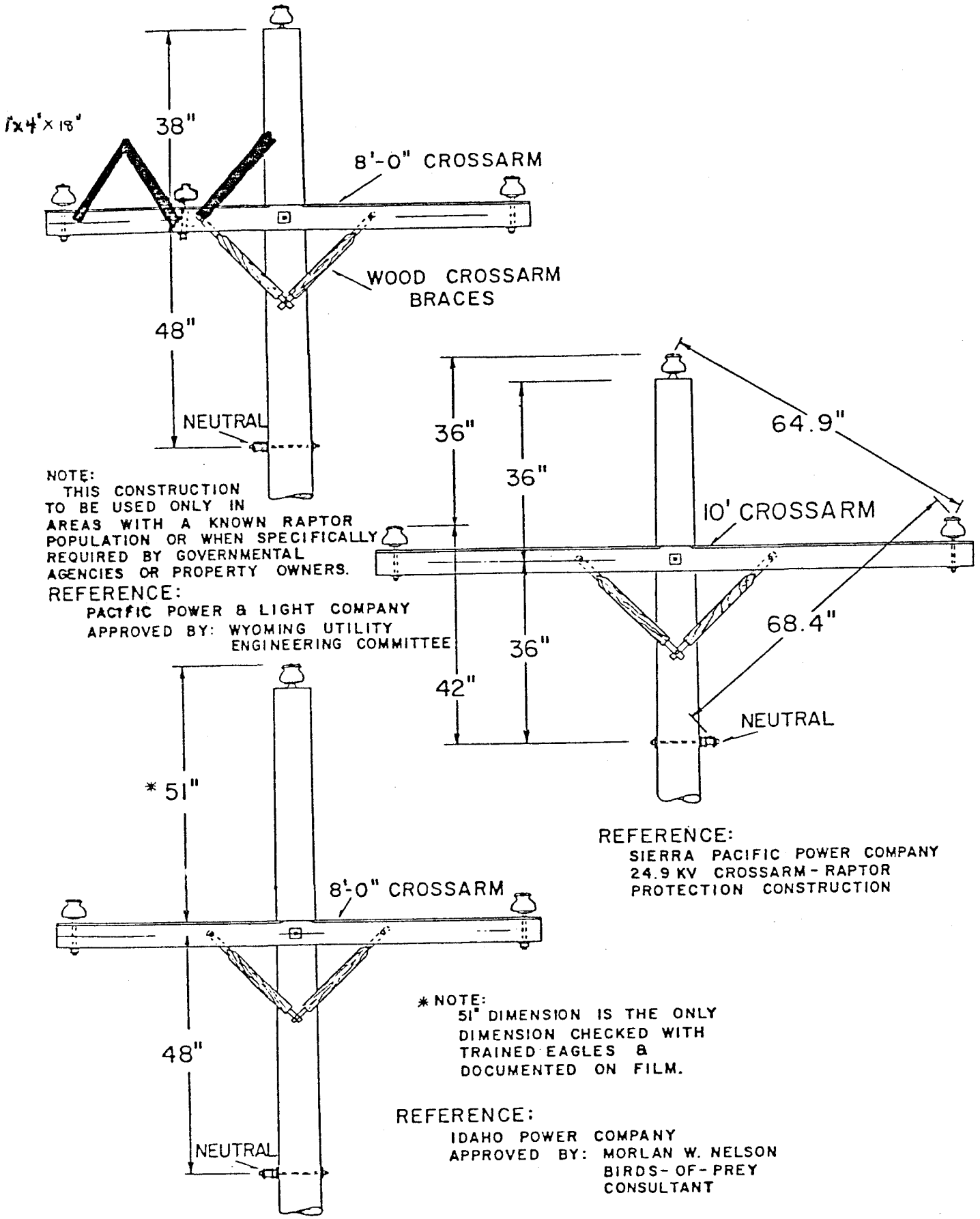

1x4"x18"
38"
8'-0" CROSSARM
WOOD CROSSARM BRACES
48"
NEUTRAL
NOTE:
THIS CONSTRUCTION TO BE USED ONLY IN AREAS WITH A KNOWN RAPTOR POPULATION OR WHEN SPECIFICALLY REQUIRED BY GOVERNMENTAL AGENCIES OR PROPERTY OWNERS.
REFERENCE:
PACIFIC POWER & LIGHT COMPANY
APPROVED BY: WYOMING UTILITY ENGINEERING COMMITTEE
36"
36"
64.9"
10' CROSSARM
68.4"
36"
42"
NEUTRAL
REFERENCE:
SIERRA PACIFIC POWER COMPANY
24.9 KV CROSSARM - RAPTOR PROTECTION CONSTRUCTION
* 51"
8'-0" CROSSARM
48"
NEUTRAL
* NOTE:
51" DIMENSION IS THE ONLY DIMENSION CHECKED WITH TRAINED EAGLES & DOCUMENTED ON FILM.
REFERENCE:
IDAHO POWER COMPANY
APPROVED BY: MORLAN W. NELSON
BIRDS-OF-PREY CONSULTANT

Figure V-2

VI. LITERATURE CITED

Soldier Creek Coal Co., 1981. Mining and Reclamation Plan. Price, Utah.

U.S. Geological Survey, 1979. Final Environmental Statement - Development of Coal Resources in Central Utah. Washington, D.C: Government Printing Office.