

CHAPTER III
OPERATION PLAN

Prepared for
TRAIL MOUNTAIN COAL COMPANY

BY
ENGINEERING DEPARTMENT

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OPERATION AND RECLAMATION PLAN

3.1 Scope

Chapter 3 describes the operating and reclamation plans that Trail Mountain Coal Comany intends to undertake during the permit and life of the Tract 2 permit area.

3.2 Surface Facilities

The Trail Mountain Mine is an existing mining operation. All needed surface facilities are in place under approved mining and reclamation plan ACT/015/009, and no expansion of surface facilities will be required during the mining life of Tract 2.

3.2.1 Site Selection and Preparation

The Trail Mountain Mine Site is an existing mining operation. The Tract 2 permit area will be accessed from the underground workings of the Trail Mountain Mine (ACT/015/009). There will be no additional site preparation, surface facilities or development of additional portals.

3.2.2 Portals

No portals, shaft or slopes will be required in the Tract 2 permit area. Access to Tract 2 will be from the existing underground workings of the Trail Mountain Mine.

3.2.3 Surface Buildings and Structures

All buildings and structures, surface facilities and sediment control structures associated with Tract 2 are in place and permitted (ACT/015/009). See Figure 3-1. Also all survey monuments associated with subsidence monitoring program are in place within the Tract 2 permit area.

3.2.4 Coal Handling, Processing, Preparation and Storage

The coal reserve in the Trail Mountain Mine Tract 2 mine plan area will be mined by continuous miners. The mined coal will be loaded at the face and transported to a feeder breaker by diesel or electric power shuttle cars. At that point the coal will be evenly distributed onto the belt at a predetermined rate by the feeder breaker. A 42" or 48" beltline will then transport the coal from the Tract 2 mine plan area through the workings of the existing Trail Mountain operations to the surface and the tipple area. The coal mined from the Tract 2 mine reserve is clean enough that washing is not needed. The coal from the Tract 2 permit area will be processed and sold as a run of mine product. Once the coal arrives at the tipple area it is crushed to a 2 X 0 product and this is the only processing required. This crushing is done at the tipple and after crushing, the material is loaded onto a stacker belt and distributed to the stockpile area. (See Figure 3-1) From the stockpile and storage area coal at this point is loaded with a Catapiller 988B, rubber tire front end loader into the on road trucks for shipment. Figure 3-2 shows a generalized schematic of the coal handling process.

3.2.5 Power System, Transmission Lines, Substation, Mine Feeders.

Power is supplied by Utah Power and Light at 12,470 volts, 60HZ. Surface substation transformers convert the 12,470 volts to 4,160 volts for underground distribution.

The existing 4160 volt line in the Trail Mountain Mine will be extended into Tract 2.
(See Figure 3-3)

Power underground is distributed by a 4-0 mine feeder cable as 4160. At each working section, a section transformer reduces the 4160 volts to a machine voltage of 480 volts.

3.2.6 Water Supply System

See ACT/015/009 - Page 3-8

See also Figure 3-4 and Figure 3-7

3.2.7 Sewage System

See ACT/015/009 - Page 3-8

3.2.8 Water Diversion Structures

See ACT/015/009 - Page 3-8

3.2.9 Sedimentation Control Structures and Water Treatment Facilities

See ACT/015/009 - Page 3-9

3.2.10 Transportation, Roads, Parking Areas, Rail Spurs

See ACT/015/009 - Page 3-9

3.2.11 Total Area for Surface Disturbance During the Permit Term

See ACT/015/009 - Page 3-9

3.2.12 Detailed Construction Schedule

There will be no construction on the Tract 2 mine plan area.

3.3 Operation Plan

At the present time the Trail Mountain Mine employs 53 people to conduct its underground mining activities. Underground mining of Tract 2 will employ approximately the same number of employees and consist of room and pillar mining using continuous mining equipment and operating two working sections.

The number of employees, sections and yearly production will vary as economic and market conditions increase or decrease.

3.3.1 Mining Plans

The layout of mining plans are shown in Figure 3-6

3.3.1.1 Orientation and Multiple Seam Consideration

*The Hiawatha Coal seam is the only coal seam of current economic interest underlying Tract 2.

*The U.S. Department of the Interior memorandum dated August 25, 1982 prepared by Mr. J. Gordon Whitney. (See Appendix 7)

See also ACT/015/009 - Appendix 3-3

3.3.1.2 Portals, Shafts and Slopes

No portals, shafts or slopes will be required in this permit area. Access to Tract 2 will be gained with the extension of the existing underground 6th West mains and by adding the 1st West mains west from the existing south mains of the Trail Mountain Mine.

ACT/015/009 (See Figure 3-6)

3.3.1.3 Mining Methods - Room and Pillar and Longwall

Mining will proceed using the room and pillar method, driving entries and rooms on development and pulling pillars on retreat with continuous miners. It is doubtful that longwall mining would justify the capital outlay for a longwall unit. Also, the given geologic conditions and size of Tract 2 further suggests that longwall mining would be uneconomical.

3.3.1.4 Projected Mine Development-Mains, Submains, Panels, etc.

The plan of mine development projected for the Trail Mountain Mine Tract 2 is shown in Figure 3-6. The development of the First West and First South mains will continue to within 100 feet of the property boundaries. Panels will be driven to the north and south from the 6th West mains. The First South mains will be developed south to within 100 feet of the property boundary. The First North mains will be developed north to within 100 feet of the property boundary. Panels will be developed east and west from the First North mains.

3.3.1.5 Retreat Mining

Pillaring will commence once the entries are of no further value. Barrier pillars protecting mains will be mined only on final retreat of the area. Pillar recovery will be maintained as high as safety and economics permit. Every attempt will be made to achieve maximum economic coal recovery.

An eighty-foot barrier will be maintained between panels. Upon completion of panel pillaring, the panels will be sealed at the panel neck.

3.3.1.6 Roof Control, Ventilation, Water Systems, Dust Suppression, Dewatering, Electrical, Etc.

Roof Control. (See Roof Control Plan - Appendix 5)

Ventilation - Tract 2 will be set up on an exhausting ventilation system and return and intake airways will be separated with incombustible block or metal stoppings. The belt line will be maintained on its own separate split of air. An intake and return

escapeway will be maintained to the outside (See Ventilation Control Plan - Appendix 6).

Dewatering - The water system will be maintained with sump at various points throughout the mining area of Tract 2. Pumps will be maintained at points where water collects. The grading of roadways and headings will be done to efficiently collect such water. Water can be pumped both into and out of the mine. (See Figure 3-7)

Dust Suppression - Underground dust control will be handled with both water spray and air current. (See Appendix 6)

Electrical - The existing underground electrical system will extend into Tract 2. All MSHA regulations pertaining to electrical distribution will be complied with (See ACT/015/009 Page 3-15)

3.3.2 Barrier Pillars

Barrier pillars will be left around oil and gas wells, surface structures and property boundaries and outcrops. These barriers will protect the recovery of the resource and the environment. (See also Chapter 12, Geotechnical)

3.3.2.1 Protection of Oil and Gas Wells

Presently no oil or gas wells exist within the permit area. However, should any wells be drilled, a barrier of 300 feet in diameter will be left unless a variance from MSHA is obtained to leave a smaller barrier.

3.3.2.2 Protection of Surface Structures and Streams

No surface structures or perennial streams exist within the permit areas.

3.3.2.3 Property Boundaries

Property boundaries will be protected with barrier pillars designed in accordance with both the Utah Industrial Commissions and BLM's regulations. Under the existing cover, a 100 foot property barrier has been established.

3.3.2.4 Outcrop Protection

The coal seam does not outcrop in the Tract 2 permit area.

3.3.3 Conservation of Coal Resources

3.3.3.1 Projected Maximum Recovery

Mining recovery of the coal in Tract 2 is projected to be greater than 50% of the total in-place reserves. The maximum amount of recoverable coal from Tract 2 is 4,796,776 tons. Table 3-1, Appendix 1, shows the breakdown of coal recovery. Figure 3-8 shows the areas of coal recovery. (See also Appendix 8 for BLM Approval of the Resource Recovery Protection Plan for Tract 2.)

3.3.3.2 Justification for Non-Recovery

All coal above five feet thick that can be safely and economically mined will be mined. It is anticipated to leave 12 to 18 inches of top coal during the mining of Tract 2. This top coal will be left to support the rock top and prevent airslacking between roof bolts. Various geologic conditions (spars, dikes, etc.) will further reduce coal recovery in Tract 2. In order to efficiently pillar panels and to reduce any chance of spontaneous

combustion, a full pillar extraction plan will be implemented. With this pillar plan, sealing of the pillared areas is necessary. To remain sealed, chain pillars between panels will remain intact. These chain pillars will control both water and gas in the pillared out areas. Also, State and Federal regulations require certain barrier pillars to be left in place. Mining seams and projections may change between applicants submittal and actual mining. However, Trail Mountain Coal Company will commit to mine in accordance with 43 CFR 3482.1 (c).(7) and to mine in such a manner as to achieve maximum economic recovery. Trail Mountain Coal Company will work closely with BLM to achieve MER in all Federal coal.

Trail Mountain Coal Company would reference Appendix 7 (Multiple Seam Consideration) and Appendix 9 (BLM Standards for Calculating Reserves) of this chapter for justifying single seam coal recovery (Hiawatha Seam). Also a reference should be made to Appendix 1 of Chapter 6 (Coal Drilling at Trail Mountain, Davis and Doelling UGMS Bulletin 112 - November 1977). In Appendix 1, drill holes 3, 4, and 5 were drilled in the vicinity of Trail Mountain. These logs show that the Hiawaths Seam is in fact the only seam that is of five feet or thicker.

3.3.3.3 Access to Future Reserves

Access to future reserves to the South, West and North of Tract 2 will be maintained by the 1st South Mains on the western most end of the Tract 2 property.

In accordance with 43 CFR 3482.1 (c).(7) it is the intention of Trail Mountain Coal Company to access future reserves through the 1st South Mains area and the 1st West Mains area. These access to future reserves will remain until final retreat of the Trail Mountain Mine. (See Appendix 8 and Figure 3-6)

3.3.4 Equipment Section

3.3.4.1 Surface Equipment

There will be no additional surface equipment associated with the Tract 2 permit area.

The following is a list of surface equipment presently being used at the Trail Mountain Mine Approved permit area ACT/015/009. This equipment will be utilized to handle coal and other surface functions for the Tract 2 permit area.

1-988B Cat Front End Loader

1-100C International Loader

1-910 Cat Wheel Loader

1-Truck Scales

1-E16 Motor Grader

1-D9H Cat Dozer

1-1020 International Dump Truck

1-275 B Clark Front End Loader

3.3.4.2 Underground Equipment

The Tract 2 permit area will be mined with continuous mining equipment. Typical continuous mining section equipment:

- 1-100 KVA Power Center
- 1-12CM Joy Continuous Miner
- 2-10SC Joy Shuttle Cars
- 1-Stamler Feeder Breaker
- 1-DB Lee Norse Roof Bolter
- 1-Satelite Pump
- 1-Bob Cat Loader
- 1-Rock Duster

Underground Belt Conveyors:

- Width-42"
- Length-3000' maximum between belt drives
- 300 HP Belt Drives-Mainline
- 150 HP Belt Drives-Section
- Power-Appropriate KVA rated
Transformers 4160/480V

Mantrips

- 3-Elmac 25 HP Diesel Boss Buggys
- 2-Eimco 950 Diesel Mine Tenders
- 4-Isuzu Diesel Pickups

Supply and Haulage

- 1-912 Eimco Siesel Scoop Loaders
- 1-913 Eimco Diesel
- 1-936 Eimco Diesel

1-975 Eimco Diesel Service Truck

1-Motorgrader

3-Three ton Supply Trailers

3.3.5 Mine Safety, Fire Protection and Security

See Trail Mountain Coal Company approved Mine Permit ACT/015-009 Volume 1, Chapter 3, Page 3-20.

3.3.5.1 Signs

Existing surface signs will be updated to reflect future permit numbers. See also Trail Mountain Coal Company approved Mine Permit ACT/015/009 Volume 1, Chapter 3, Page 3-21B.

3.3.5.2 Fences and Gates

No further gates or fences will be installed do to the fact that there is no additional surface disturbance or access.

3.3.5.3 Facilities, Coal Stock Piles, Refuge Piles and Coal Seam

No further facilities will be installed in the Tract 2 permit area due to the fact that there is no additional surface disturbance or access. See Trail Mountain Coal approved mine pemit ACT/015/009 Volume 1, Chapter 3, Page 3-23.

Trail Mountain Coal Company has no plans for underground waste or refuse piles.

Development wastes at the Trail Mountain Mine are expected to be very minimal due to our mining methods (room and pillar mining, also one to two feet of top coal is always left unmined). The main source of underground waste material comes from the cutting out of overcasts (top rock is cut out to achieve a 12 to 15 foot height). Each overcast produces between 80 and 90 ton of development waste (top rock). The rock from the overcasts is deposited in strategically located cross cuts or rooms in the mine workings. Roof falls are also a source of mine waste that is deposited in the same manner. It is hard to quantify the exact tons of development waste in Tract 2. However, there will be

approximately 1,000 tons of development wastes deposited within Tract 2 or portions of Tract 1.

3.3.5.4 Explosives

Explosives are not anticipated to be needed in the Tract 2 operation. No surface blasting will be done. Underground blasting, if required, will be done in accordance with MSHA regulations. No explosives will be stored on the Tract 2 permit area. Explosives and caps will be stored in separate MSHA approved explosives magazines. Only permissible explosive and caps will be utilized. See Trail Mountain Coal Company approved mine permit ACT/015/009 Volume 1, Chapter 3, Page 3-23.

3.3.6 Operation Schedule

Trail Mountain Coal Company anticipates operating two continuous miner section in the Tract 2 permit area. These continuous miners will operate one shift per day or two machine shifts per day.

3.3.6.1 Annual Production per Year for the Permit Term

Trail Mountain Coal Company anticipates production of 450,000 tons per year and will continue that production for the permit term. That prevailing economic climate and market conditions could cause the annual production to increase or decrease.

3.3.6.2 Operating Schedule-Days-Shifts

Trail Mountain Coal Company anticipates the following operation schedule in the Tract 2 permit area:

240 days per year

2 shifts per day

8 hours per shift

1 production shift per day and 1 maintenance shift per day

2 machine shifts per production shift

Again the prevailing economic climate and market conditions may increase or decrease this anticipated operation schedule.

3.3.6.3 Operation Employment

It is anticipated that mine operations conducted within the Tract 2 permit area shall be conducted with approximately 53 employees. Thirteen salaried employees and forty hourly employees. It is also anticipated that no other employment will be required for the Tract 2 permit area.

3.3.7 Mine Plan Area

The Tract 2 Mine Plan Area of the Trail Mountain Mine is outlined in figures 3-10. A total 641.47 acres are included in the Tract 2 Mine Plan Area.

3.3.7.1 Projected Mining by Year

The mine development and projected for the Tract 2 permit area is shown on figure 3-6. Map will show projected mining from 1987 on.

3.3.7.2 Acreage and Delineation

As described in Chapter 2, the Tract 2 Mine Plan Area consists of approximately 641.47 acres of federal coal. (See Figure 3-9).

3.4 Environmental Protection

3.4.1 Preservation of Land Use

The present land use of the surface area of the Tract 2 permit application is grazing, wildlife habitat and recreation. The United States Forest Service and the State of Utah have classified the Tract 2 permit area as non-developed recreation, forestry, minerals, hunting, and grazing.

3.4.1.1 Projected Impacts of Mining on Current and Future Land Use

The current and post mined land use of the Tract 2 Mine Permit Area owned by Trail Mountain Coal Company are anticipated to remain the same as the pre-mined land uses of grazing, wildlife habitat, recreation and forestry. Since the Tract 2 area involves no surface disturbance no impacts are expected to the current or future land uses of this area.

3.4.1.2 Control Measures to Mitigate Impacts

No impact are expected in the Tract permit area, therefore no control measures will be proposed. (See Approved Mine Plan ACT/015/009 Volume 1, Chapter 3, Page 3-28)

3.4.2 Protection of Cultural Resources

No public parks or historical sites have been found in the Tract 2 Mine Plan Area.

3.4.2.1 Projected Impacts of Mining on Cultural Resources

Since the Tract 2 permit area will be accessed from underground there will be no surface disturbances associated with the mining of the Tract 2 permit area, the applicant proposes that there will no impacts of mining on Cultural Resources. (See Chapter 5).

3.4.2.2 Control Measures to Mitigate Impacts

The applicant proposes that there will no impacts, therefore no mitigation is proposed. In the case of the Tract 2 permit area there are no known Cultural Resources that are liable to be impacted by the continued operation.

3.4.3 Protection of Hydrologic Balance

There are no major surface streams or seeps in the Tract 2 permit area and very little ground water has been encountered within the current mining operations of the Trail Mountain Coal Mine. The applicant proposes that impacts from mining on the hydrologic balance should be minimal. A discussion of the probable Hydrologic Consequences of the Tract 2 area is contained in Appendix 7-F of Chapter 7. Appendix 7-D(9) contains Trail Mountain Coal Company's approval to discharge. Chapter 7, Hydrology, contains a detailed discussion of the hydrologic balance and also of the seeps and springs surveyed on this Tract 2 permit area.

3.4.3.1 Projected Impacts on the Ground Water Hydrologic Balance

See Hydrology, Chapter 7, Tract 2 Mine Permit Application.

Also see Appendix 7-F for (PHC)

3.4.3.2 Control Measures to Mitigate Impacts

No significant impacts on the ground water are expected for mine operations within the Tract 2 permit area. However, water could be diverted due to the potential of Subsidence in the Tract 2 mine plan area. The ground water monitoring plan discussed

in Chapter 7 and the Subsidence monitoring plan discussed in Chapter 12 will provide a means to follow the possible effects of the mining activities on the ground water system.

State and Federal regulations (UMC 817.54) required that an alternate water supply be provided to replace any water source disrupted, degraded or diminished by the mining operation. Though the mine operation in the Tract 2 mine plan area is unlikely to effect the water supplies in the Trail Mountain area, the Trail Mountain Coal Company will provide this alternative supply if needed.

In the unlikely event of mining adversely affecting a water source, the Trail Mountain Coal Company will review and select an alternative water source after considering all possibilities of each sight specific circumstances. For example, if a seep or spring is disrupted, degraded or diminished by the mine operations, Trail Mountain Coal Company would construct in the vicinity of the disrupted, degraded, or diminished seep or spring a 2,000 gallon guzzler. This guzzler would be fenced with pole fencing. The maximum fence height would be 42 inches, the space in between poles would be 14 inches, and the space in between the ground and the first pole would also be 14 inches. This construction method would allow wildlife to enter and would keep grazing animals, such as cattle and horses, out of the guzzler.

3.4.3.3 Ground Water Monitoring Plan

Representative springs shown in figure 7-9 for Trail Mountain Coal approved Mine Permit ACT/015/009 will be monitored in accordance with the monitoring program. In addition, data will be collected from within the mine in the Tract 2 permit area. (See Chapter 7).

Figure 7-1, Chapter 7, Tract 2 Permit Application identifies seeps and springs that are presently being monitored and proposed monitoring locations. Also Chapter 7 spells out the proposed and existing water monitoring plan for the Trail Mountain mine.

Baseline Monitoring

See Chapter 7, Tract 2 Mine Permit Application

Operational Monitoring

See Chapter 7, Tract 2 Mine Permit Application

Post Mining Monitoring

See Chapter 7, Tract 2 Permit Application, see also approved mine plan ACT/015/009, Volume 2, Chapter 7 and Appendices 7 and 9.

3.4.3.4 Projected Impacts on the Surface Water Hydrologic Balance

It is presumed that mine activities will have little adverse impact on the hydrologic balance in the Tract 2 mine plan area. See Chapter 7, Tract 2 Mine Application.

3.4.3.5 Mitigation and Control Plans

See approved mine plan ACT/015/009, Volume 1, Chapter 3, Page 3-6; also Chapter 7. See also 3.4.3.2.

3.4.3.6 Surface Water Monitoring Plans

See Chapter 7

3.4.4 Preservation of Soil Resources

There will be no surface disturbance associated with the Tract 2 permit area.

3.4.4.1 Projected Impacts of Mining on Soil Resources

The Tract 2 permit area is an underground mine. Access from underground with no surface disturbance, therefore the impact of mining on soils should be negligible or nonexistent. The only possible impacts on soil from the Tract 2 permit area would be from the possibility of subsidence. Potential subsidence could result in very minor soil displacements. Trail Mountain Coal Company has been monitoring subsidence over the Mine Plan Area ACT/015/009 for five years. At this point in time there is no negligible subsidence.

3.4.4.2 Control Measures to Mitigate Impacts

Since no disturbance is anticipated in the Tract 2 mine plan area, no mitigation measures will be implemented. In the event that future disturbance or operations uncover or encounter salvagable soils, Trail Mountain Coal Company will remove, stockpile and stabilize the soils for use in future reclamation work.

3.4.5 Protection of Vegetating Resources

See Chapter 9

3.4.5.1 Projected Impacts of Mining on Vegetating Resources

Since the Tract 2 permit area is an underground mine and there is no surface disturbance associated with the mine in this area, there should be no impacts to the vegetating resources due to mining. (See Chapter 9)

3.4.5.2 Mitigating Measures to be Employed to Reduce Impacts on Vegetating Resources

Since no surface disturbance is anticipated in the Tract 2 permit area, no mitigating measures will be listed.

3.4.5.3 Monitoring Procedures - Reference Areas and Revegetation

See Chapter 9, Trail Mountain approved Mine Permit ACT/015/009.

In the event of any temporary cessation of mining operations at the Trail Mountain Mine site, Trail Mountain Coal Company will continue all required monitoring requirements.

3.4.6 Protection of Fish and Wildlife

The presence of wildlife in the Tract 2 mine permit area indicates their adaptability to the impact of mining. As a result, the overall impact to wildlife is expected to very minor, if any. In addition, Trail Mountain Coal Company is committed to practical mitigation of adverse affects of the mining operation.

3.4.6.1 Projected Impacts of Mining on Fish and Wildlife

The only potential negative impact to wildlife would result from Subsidence. Elk that are thought by the Utah Division of Wildlife Resources (UDWR) to be stable and productive use portions of the Tract 2 mine plan area at various times of the year for such necessary activities as wintering and feeding. The minimal disturbance caused by potential subsidence should have no sufficient impact on forage production.

Mule deer utilize the entire area of the Tract 2 mine plan area, taking advantage of various habitat at different times of the year, browse in the wintering range within the Tract 2 permit area is in good shape and should facilitate over wintering of the herd. Projected impact from potential Subsidence is expected to be minimal.

The range of cougars in the permit area is determined by the migration patterns of mule deer and by human disturbance. Since the cougar population is low and since their range is far greater than the area of the Tract 2 lease, mining activities will

have little impact on that species, also most surface disturbances associated with the Tract 2 mine plan area.

Cottontail rabbits are likely to be affected only by Subsidence, which would be limited to relatively small areas, thus causing little or no negative impact.

Impact on Snowshoe hares will be minor since the species habitat is limited in the permit area. Mine activities will have little effect on the habitat of small animals. Subsidence damage to burrows could increase mortality and reduce reproductive success temporarily.

Potential impact on bird species would be limited to potential escarpment failure at a nest site. Potential cliff subsidence is very unlikely in the Tract 2 mine plan area due to the fact that Trail Mountain Coal Company is protecting the escarpment by first mining only (no pillar pulling) the area outside the angle of draw. (See Figure 3-6).^{**}

The amphibians in the permit area occupy similar habitats throughout the region and are unlikely to be effected in any major way by the mining activities.

Reptiles found in the permit area are located in many other similar habitats and their populations will not be adversely impacted by planned activities. UDWR personnel will be notified if any denning sights are discovered during the mine activities in the Tract 2 mine plan area.

Aquatic wildlife - Since there are no perennial streams in the lease area, no impact to aquatic wildlife is expected.

For additional information on the projected impacts of mining on fish and wildlife, see approved mine plan ACT/015/009, Chapter 3, Page 3-41. See also Chapter 10, Tract 2 Permit Application.

3.4.6.2 Mitigating Measures to be Employed to Protect Fish and Wildlife

The mine activities associated with the Tract 2 mine plan area should facilitate no adverse impacts to fish and wildlife. Trail Mountain will make significant efforts to educate all employees to the intricate values of the wildlife resources within the Tract 2

^{**}Ch 3-Rev 3-4-87

mine plan area and adjacent areas. High interest species, critical habitats, and critical life history periods will be emphasized. This will be done by annually incorporating a slide presentation from the UDWR and Mr. Larry Dalton in Trail Mountain Coal's annual retraining. Each employee will be advised not to unnecessarily or without proper permits or licenses harass or take any wildlife, including young thought to be abandoned. They will be advised not to unnecessarily stop vehicles to view wildlife and not to leave the road by vehicle within the mine plan area. They will be encouraged to establish a game alert program. They will be advised that they as hunting and recreation users stand to gain the most by preserving and conserving what they have in proximity to their place of work and abode.

The company will maintain the relative inaccessibility of the Tract 2 mine plan area. No additional access roads will be built.

Discharge of fire arms by employees will be prohibited on company-controlled property during working hours.

3.4.7.1 Projected Impacts of Mining Operations on Air Quality

The Tract 2 mine plan area is an area with no associated surface disturbance. The mine plan area is accessed from underground, therefore the potential of degradation to the air quality within the Tract 2 area is nonexistent.

3.4.7.2 Mitigating Measures to be Employed to Control Air Quality

Since the air quality within the Tract 2 mine plan area will not be degraded, there will be no need for any mitigating measures. See also approved mine plan ACT/015/009, Volume 1, Chapter 3, Page 3-54 for additional information on mitigating impacts in regards to the disturbed surface area of the existing Trail Mountain Mine.

3.4.7.3 Air Quality Monitoring Plans

Plans to monitor the air quality in the vicinity of the Trail Mountain Tract 2 mine plan area have not been considered at this point.

3.4.8 Subsidence Control Plan

Trail Mountain Coal Company has entered into a collection agreement with the U. S. Forest Service to monitor the effects of subsidence within the Tract 2 mine plan area and contiguous areas within the Trail Mountain region. The subsidence monitoring program meets all state and federal regulations. See Appendix 3, Subsidence Control Plan. See Appendix 4, U.S. Forest Service Collection Agreement.

3.4.8.1 Projected Subsidence Effects

Several surveys and a series of subsidence monuments have been conducted over the 641.47 acres of the Tract 2 mine plan area presently controlled by Trail Mountain Coal Company which may be affected by mine operations.

Timber, wildlife, grazing areas, water seeps, and springs are the renewable resources occurring within the Tract 2 mine plan area. There are no oil and gas wells, pipelines, utility structures, or high power lines that will be affected by any surface subsidence within the Tract 2 permit boundary. No buildings or dwellings have been constructed on any surface that will be subject to subsidence within the Tract 2 mine plan area.

Timber growth and wildlife should not be affected, as regional subsidence is anticipated, rather than cracking the surface due to the thickness of overburden.

Water seeps and springs within and adjacent to the Tract 2 mine plan area have been surveyed in October 1985, by JBR Consultants and are currently being monitored. The source of water for the springs are snowmelt and rain on the plateau. A few of the springs are perennial, but most dry up during the warmer summer months.

3.4.8.2 Control Measures to Mitigate Impacts

See Chapter 12, Tract 2 permit application. See also approved mine plan ACT/015/009, Chapter 12. See Also approved mine plan ACT/015/009 Chapter 3, page 3-57.

3.4.8.3 Subsidence Monitoring

As previously stated, Trail Mountain Coal Company is currently operating under a collection agreement with the U.S. Forest Service to conduct subsidence monitoring. The Trail Mountain Coal Company Engineer Department has installed various subsidence monitoring monuments in the mine plan area and in contiguous areas of Trail Mountain. These monuments and the Tract 2 mine plan area and contiguous areas are flown annually by the U.S. Forest Service. See also Chapter 12 of the Tract 2 mine permit application.

3.4.9 Waste Disposal

The applicant proposes no new disposal areas or plans for the Tract 2 permit. Coal produced from the existing Trail Mountain Mine is clean enough that no waste material will be produced. All coal produced by the Trail Mountain Mine is sold as a run of mine product.

Trail Mountain Coal Company has no plans for underground waste or refuse piles. Development wastes at the Trail Mountain Mine are expected to be very minimal due to our mining methods (room and pillar mining, also one to two feet of top coal is always left unmined). The main source of underground waste material comes from the cutting out of overcasts (top rock is cut out to achieve a 12 to 15 foot height). Each overcast produces between 80 and 90 ton of development waste (top rock). The rock from the overcasts is deposited in strategically located cross cuts or rooms in the mine workings. Roof falls are also a source of mine waste that is deposited in the same manner. It is

hard to quantify the exact tons of development waste in Tract 2. However, there will be approximately 1,000 tons of development wastes deposited within Tract 2 or portions of Tract 1.

3.5 Reclamation Plan

See approved mine plan ACT/015/009 Volume 2, Chapter 9.

3.5.1 Contemporaneous Reclamation

Since the Tract 2 permit area involves an extension of the existing approved underground mining, and since no additional surface disturbance is proposed, the reclamation plan portion of this application is not applicable to the Tract 2 permit. See approved mine plan ACT/015/009 Volume 2, Chapter 9. See also Volume 1, Chapter 3, Page 3-61 and Page 3-61B for a contemporaneous reclamation plan.

3.5.2 Soil Removal and Storage

Not applicable to the Tract 2 mine permit area. See ACT/015/009 Volume 1, Chapter 3, Page 3-62. See also Chapter 8 and 9.

3.5.3 Final Abandonment

See ACT/015/009 Volume 1, Chapter 3, Page 3-62. See also Appendix 10

3.5.3.1 Sealing of Mine Openings

See ACT/015/009 Volume 1, Chapter 3, Page 3-62. See also Appendix 10

See also Figure 3-10

APPENDIX 1-RESERVES-TRACT 2

Subsidence

APPENDIX 3-SUBSIDENCE CONTROL PLAN

APPENDIX 3 Forest Service Plan for Studying the Effects of Underground Coal Mining
on Surface and Subsurface Resources

04/25/86

FOREST PLAN FOR STUDYING THE EFFECTS
OF UNDERGROUND COAL MINING
ON SURFACE AND SUBSURFACE RESOURCES

Manti-LaSal National Forest

Approved by:

W. H. Baly

Forest Engineer

6/26/86
Date

Public Law 86-517
86th Congress, H. R. 10572
June 12, 1960

AN ACT

74 STAT. 215.

To authorize and direct that the national forests be managed under principles of multiple use and to produce a sustained yield of products and services, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled. That it is the policy of the Congress that the national forests are established and shall be administered for outdoor recreation, range, timber, watershed, and wildlife and fish purposes. The purposes of this Act are declared to be supplemental to, but not in derogation of, the purposes for which the national forests were established as set forth in the Act of June 4, 1897 (16 U.S.C. 475). Nothing herein shall be construed as affecting the jurisdiction or responsibilities of the several States with respect to wildlife and fish on the national forests. Nothing herein shall be construed so as to affect the use or administration of the mineral resources of national forest lands or to affect the use or administration of Federal lands not within national forests.

National forests,
management.

30 Stat. 34.

SEC. 2. The Secretary of Agriculture is authorized and directed to develop and administer the renewable surface resources of the national forests for multiple use and sustained yield of the several products and services obtained therefrom. In the administration of the national forests due consideration shall be given to the relative values of the various resources in particular areas. The establishment and maintenance of areas of wilderness are consistent with the purposes and provisions of this Act.

Multiple use;
sustained yield.

SEC. 3. In the effectuation of this Act the Secretary of Agriculture is authorized to cooperate with interested State and local governmental agencies and others in the development and management of the national forests.

SEC. 4. As used in this Act, the following terms shall have the following meanings:

Definitions.

(a) "Multiple use" means: The management of all the various renewable surface resources of the national forests so that they are utilized in the combination that will best meet the needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; that some land will be used for less than all of the resources; and harmonious and coordinated management of the various resources, each with the other, without impairment of the productivity of the land, with consideration being given to the relative values of the various resources, and not necessarily the combination of uses that will give the greatest dollar return or the greatest unit output.

(b) "Sustained yield of the several products and services" means the achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources of the national forests without impairment of the productivity of the land.

Approved June 12, 1960.



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FOREST PLAN FOR STUDYING THE EFFECTS
OF UNDERGROUND COAL MINING
ON SURFACE AND SUBSURFACE RESOURCES

Manti-LaSal National Forest

I. INTRODUCTION

Minerals are one of the abundant resources of the Manti-LaSal National Forest. The extraction of these minerals is endorsed by the Forest Land Management Plan, except where this action is incompatible with planned surface uses. The Forest, by regulation and law, is committed to multiple use management of all National Forest resources, and must assure that adverse impacts to surface and subsurface resources are minimized whenever any resource is utilized--including minerals and mineral resources.

Data describing the effects of coal mining and mining-related activities is scarce. Current resource protection, mitigation, and reclamation measures are based on this limited data. A resource monitoring program is needed to assess impacts to resources, to evaluate the effectiveness of protection, mitigation, and reclamation measures, and to provide a basis for making--as needed--new protection, mitigation, and reclamation stipulations for mineral leases, and mining and reclamation plans.

Since 1973, the Manti-LaSal National Forest has recommended that a program be established to quantify impacts to surface resources due to underground mining. Certain stipulations have appeared in all Environmental Assessment Reports and Impact Statements dealing with coal programs which are prepared by or had concurrence of the Forest Service.

Two stipulations have been developed that relate to the mining activity. Stipulation Number One requires that baseline data be obtained prior to any disturbance, and Stipulation Number Two requires that a monitoring program be initiated during mining operations. They are as follows:

Stipulation 1 - The lessee shall perform a study to secure adequate baseline data to quantify the existing surface resources on and adjacent to the lease area. Existing data may be used if such data is adequate for the intended purposes. The study shall be adequate to locate, quantify, and demonstrate the inter-relationship of the geology, topography, surface hydrology, vegetation, and wildlife. Baseline data will be established so that future programs of observation can be incorporated at regular intervals for comparison.

Stipulation 2 - The lessee shall be required to establish a monitoring system to locate, measure, and quantify the progressive and final affects of underground mining activities on the topographic surface, underground and surface hydrology, and vegetation. The monitoring system shall utilize techniques which will provide a continuing record of change over time and an analytical method for location and measurement of a number of points over the lease area. The monitoring shall incorporate and be an extension of baseline data.

In managing wildlands, information is needed to address all Forest Service resource systems, forest and rangeland, water, wildlife and fish, outdoor recreation and wilderness, etc. To make an assessment of the potential effects of alternative land uses such as underground mining on surface resource systems, requires basic information on resources and their relationship to each other. Local management and planning decisions require mapped and pinpointed information, whereas state, regional and national level decisions may be based on statistical information obtained from much broader samples. This plan requires a high degree of resolution, consequently large scale (low altitude) aerial photographs and large scale maps will be required to facilitate the process.

II. OBJECTIVES

Objectives of the program will include:

- A. Establishing baseline surface terrain resource and hydrologic data prior to mining, and for existing mines.
- B. Implementing programs of observation at regular intervals, which would generate data for comparison with baseline.
- C. Defining impacts of coal mining upon wildlife, range, vegetation, timber, water, topography, geology, other minerals, recreation, and visual resources; all of which are encompassed in the multiple use direction of the Forest Service.
- D. Coordinating resource uses and management planning with coal mining, minimize adverse impacts to surface resources on National Forest System lands.
- E. Predicting change(s) in the hydrologic cycle that may occur as a result of coal mining so that provisions for relocation of water sources or development of alternative water sources can be made available to facilitate the multiple uses of the Forest.
- F. Careful inventorying and monitoring of resources at each mine prior to, during, and after the conclusion of underground mining will help establish and predict the area's response to coal extraction, and expedite technology to minimize the resultant effects.

III. RESOURCE CONSIDERATIONS

The objective of resource monitoring is to quantify and display the progression and final effects of underground mining upon surface resources of National Forest System lands.

The surface and subsurface resources to be considered have been categorized into four resource groups. They are:

- A. Recreation and Visual Resources
- B. Vegetation (Which Includes Range, Wildlife Habitat, and Timber)
- C. Geology and Hydrology
- D. Other

The basic data requirements with which these resources will be inventoried and monitored is included with each resource group.

A. Recreation and Visual Resources

Potential effects of mining on recreation and visual resources shall be evaluated - including an inventory to establish a comparison baseline - prior to any mining activity. The recreational uses and scenic values of the area will determine the nature and extent of monitoring requirements.

It is expected that monitoring of recreation resources would include defining of changes in areas of use by recreationists, i.e., fishing, hunting, camping, hiking, etc., as may be affected by mining activities, i.e., coal hauling, mining.

For visual resources, a monitoring program would most generally be visual inspections on a programmed frequency. This would include a photographic record and map at a scale compatible for registration with other data map record layers as well as a written record. It would address such items as the visual change in mine facilities, roads, streams, slopes and escarpments (i.e., rockfalls), slope failures, excessively eroded areas, etc.

B. Vegetation

The effect of undermining upon vegetation is still largely unknown. Range analyses, timber surveys, and wildlife habitat studies will be conducted in areas expected to be affected by mining. The intensity and frequency of these investigations will be determined on a site-by-site basis. Data will be summarized annually, and used to define change.

This monitoring program would rely upon existing data, supplemented where necessary with data from other sources and from field inventories obtained prior to mining. These data would form the base upon which the monitoring program data would be compared for definition of change.

In situations where mining effects become substantial, the mining company would be required to participate in formulation and implementation of mitigation measures.

C. Geology and Hydrology

The geologic structure and stratigraphic nature of an area has a major determining effect upon the ground water regimen, upon the mining, conservation of the resource, mode of subsidence, and surface features such as topography, soils, and slope stability.

Without adequate geologic data--both from surface exposures and drilling and mining--resource conservation planning cannot be done. Also, any impacts to surface resources cannot be identified or mitigated without a knowledge of the geology.

To fulfill the requirements of this monitoring plan, the following is required to establish baseline data.

1. A geologic map at the same scale as other data map layers showing lease location, faults, folds, joint systems, geologic formations, seeps, springs, and other data which are essential for proper identification of the existing geologic and hydrologic conditions. The map would be updated as new information becomes available.
2. A narrative description of each of the above items, giving sufficient detail for evaluation. Existing seeps and springs on the lease area and adjacent areas, which would be affected by underground mining, will be inventoried. In most cases, estimates of quantity would be adequate. However, representative springs (springs having current use for wildlife, range, or for municipal use) which are important for the management of the surface resource will be sampled and tested for quality, and flows determined.

The responsibility for these data would be that of the mining company. The Forest Service and the Office of Surface Mining would, however, cooperate in the designation of hydrologic monitoring requirements for each site, and would provide those data which may have been obtained from previous studies.

D. Other

Surface structures, such as power transmission lines, pipelines, oil and gas wells, roads, dams and reservoirs, and other physical improvements could be affected by mining. Mine planning must consider these features, and data must be obtained prior to mining that will identify possible impacts. Those structures that are identified which might be damaged should be photographed before and after mining, together with the documented inspections which establish their condition prior to, during, and after mining.

The mining company would have responsibility for this information. There are, however, considerable data available on these structures which could be made available by the Forest Service, Bureau of Land Management, State, and county.

IV. FOREST SERVICE REQUIREMENTS

The following responsibilities, procedures, resource inventories, and study programs are those which the Manti-LaSal National Forest will require for leasing of National Forest System lands for coal mining, exploration, or for coal mine plan approval. These are, in part, requirements of laws and regulations of the Department of the Interior and, in part, requirements of the Forest Service. Those required by the Department of the Interior are not referenced and may not be included in their entirety or have the same specific requirements. It is not intended that this program plan supersede in whole or in part requirements of the Department of the Interior. The programs are intended to generate the data we have determined essential for responsible multiple resource management. The operator would be responsible for those parts where data are needed to determine the effects of mining upon surface resources.

All programs to monitor the effect of mining on surface and subsurface resources will be applicable to existing leases (in all stages of development) and future leases. Accumulation of data pertinent to coal mining studies will occur at all stages of lease development.

A. Tract Leasing

Prior to leasing of any land on the Manti-LaSal National Forest for coal mining, the preparation of a site specific Environmental Assessment (EA) will be required. This assessment is the process by which the Manti-LaSal National Forest will determine a tract's suitability for leasing. A Decision Notice (DN) and, if appropriate, a Finding of No Significant Impact (FONSI) will be prepared for each lease. The Decision Notice, accompanied by the Environmental Assessment, is the Forest Service approval document for coal land leasing. The Forest Service will be responsible for its preparation. The Technical Examination required to obtain the essential data for the EA will be performed by the Forest Service in cooperation with the Bureau of Land Management. Data would be obtained by the Forest Service, Bureau of Land Management, State, and other agencies as needed.

The Technical Examination will include an inventory and description of surface resources and uses; and will include the requirements given in items 1 through 9 below. These requirements, however, are not intended to be of a detail as to establish baseline data for the requirements of resource monitoring as specified in item C for mine plan approval. They will, however, include sufficient detailed data to make an assessment of the compatibility of a coal lease tract with other resource elements, uses, determining the tract's leasability, an evaluation of probable impacts of mining the tract upon the environment, and for developing of lease stipulations.

The requirements for the Environmental Assessment will include the following information:

1. A description and assessment of the existing environment, including wildlife, vegetation, hydrology, soils, topography, geology, mineral occurrence, recreation, visual quality, historical, archeological, surface structures, and other resources as may be appropriate, will be required. This report also would include an assessment with regard to areas which may not be available for leasing, i.e., wilderness, withdrawals, threatened and endangered species, special uses, oil and gas fields, pipelines, reservoirs, and other surface features as may affect human safety.
2. A preliminary geologic map of an acceptable scale that will include faults, folds, joint systems, geologic formations, and significant surface geologic features, such as landslides and unstable slopes is required.
3. A topographic map. This would properly serve as the base map for 2 and 4. Currently, existing color resource photography would supplement the topographic map for making the inventory and assessments.
4. A preliminary inventory of known ponds, reservoirs, springs, seeps, and significant wet areas will be recorded on a map. Flows will be estimated.
5.
 - a. A preliminary assessment of the surface hydrology that will include climate, precipitation, flooding, and descriptions of the stream(s) and drainage systems.
 - b. A preliminary assessment of the ground water geohydrology. This would include item 4 above, with a description as necessary. In addition, it will include an appraisal of the importance of each item listed and described to Forest management and will furnish estimated flow quantities and, where appropriate, the water quality. This would also include a description of the water source (i.e., seeps, springs, wells, etc.) in relation to topography, geologic conditions, vegetation, and other resources as may be appropriate.
6. Existing transportation and utility corridors, and possible future corridors, should be located and recorded on maps. Each should be accompanied by a detailed description.
7. Existing roads, existing mine portals, possible mine sites, oil and gas wells, and the opportunity for relocation of these features should be discussed jointly with the Forest Service and BLM so that any major restrictions to these activities will be brought to light early in the process.
8. An evaluation of the tract for feasibility of mining, in-place tonnage, and expected recoverability will be addressed in a report to the Forest Service by the Bureau of Land Management. A conceptual mine plan, complete with a transportation plan, will accompany this data.

9. Any drilling by the Bureau of Land Management, prior to leasing, should be required to follow exploration regulations (Part B, below).

B. Exploration

Exploration of a coal mining tract is normally performed by the lessee after the lease is obtained. Some exploration for evaluation prior to leasing may be done by private industry or by the Bureau of Land Management as required by 30 CFR 211. Exploration is performed to evaluate the value of the coal seam(s) and the geologic structure; and the lithology of the rock formations for mine planning.

Exploration is most often performed by drilling of holes from the ground surface to the coal seam(s). However, not all lessees will be explored by drilling, nor is it required. New exploration methods are being developed. Presently, drilling is the method used.

When exploration is done by drilling, the following should be required of the operator:

1. A comprehensive plan of operations as required by 30 CFR 211. This plan should include:
 - a. A map showing the locations of the proposed activity (drill hole locations) and the proposed access.
 - b. A detailed description of drilling plans and procedures. This should include:
 - (1) Drill hole locations, T., R., S.
 - (2) Expected depths of drill holes.
 - (3) Proposed access routes, including a description of the requirements for upgrading, reconstruction, or construction of the access roads.
 - (4) The time frame for the drilling program.
 - (5) Surface resource protection considerations.
 - c. A reclamation plan.
2. A log from each drill hole showing the ground waters encountered. Data will be compiled and submitted by the company giving depths and lithologies where water is encountered. An attempt will be made to quantify amounts of water in the aquifers. Each actual drill hole location will be accurately plotted on the base map or appropriate overlay.

These data, combined with the surface geologic and hydrologic data, will aid to define the ground water system. This will be used to develop the hydrologic monitoring system required by regulation, as well as to aid in identifying possible impacts to surface water sources from undermining.

Selected holes may be required to be left open for periodic water level measurements and ground water sampling. These drill holes and intervals of monitoring will be designated by the Bureau of Land Management or Office of Surface Mining in consultation with the Forest Service upon the review of the drilling information.

C. Mine Plan Approval

All mining plans for underground coal mines should include, as part of the mining plan, a study and monitoring program to determine what, if any, effects mining will have upon other resource elements and land uses. This plan or study program will necessarily include two phases; (1) establishment of baseline data for existing resource and land use elements from which any change due to mining can be measured (see Stipulation #1), and (2) establishment of study programs to monitor these resource and land use elements for measurement of any change that has occurred because of the mining (see Stipulation #2).

1. Baseline Data Collection

The Forest Service will require of the operator the following specific data:

- a. Water - The location and identification, including a detailed description, of water sources. This should include the topography, geology, use, flow, quality, and other data as may be necessary to define each water source. Water sources which will be inventoried include seeps, springs, wet areas, natural ponds, lakes, reservoirs, stock ponds, streams, and water wells, on and within the area of influence of the leasehold. This would include a literature search, compilation of existing data, and a field search, investigation, and description of each.

To aid in the location and identification of these water sources, color infrared aerial photography (CIR) of the proposed mine area and area of influence may be required. The main purpose for the color infrared photography is to aid in: (1) the location identification and description of all water source points, and (2) the detection and monitoring of dead or dying (stressed) vegetation due to subsurface mining activities.

Water sources, surface cracks, property corners, and other points that are not used or tied to basic project control may be photo-identified in the field by direct or precise methods. A description of the procedures using these two methods can be found in the Appendix (VIII. A.).

It is expected that the infrared photography will not be required for all mine plans. The need for this photography is to be determined by the Forest Service in consultation with and concurrence of the Bureau of Land Management or the Office of Surface Mining on a site-by-site basis.

Each water source shall be located and plotted on the base map or appropriate overlay, giving elevation, coordinates, flow (gpm), and date flow was measured. The method used to measure the flow must be described, i.e., weir, flow meter, estimated, etc. See a. above. Measurements ideally should be quarterly for a minimum of two years and preferably longer prior to any significant mining.

It is recognized that some water sources cannot be measured at these frequencies because of heavy snow cover, intermittent flows, or difficulty of access to the area.

It is not a requirement that the targets or ground panels required for the subsidence monitoring photography appear or be visible on the CIR photography. The same scale of photography (or degree of resolution) may not be required for detecting or interpreting images as may be required for accurate terrain measurements. However, there are several advantages in maintaining the ground panels for visibility on the CIR photography and flying all photography at the same altitude or scale. Cross correlation for interpretive comparisons and the transfer of points and data from one set to the other are but a few of these advantages.

If required, the CIR photography will be obtained with an acceptable 9" x 9" format mapping camera with an 8 1/4" or 6" focal length and single-lens-between-the-lens-shutter system. Film will be Kodak Aerochrome Infrared 2443 (or equivalent) and will be exposed with the proper filter and camera setting as to provide the best possible image resolution and print quality. The flight dates of the CIR photography will be scheduled by individual project to obtain the optimum results for water and vegetative detection and analysis. The nominal or mean scale of this photography will not exceed 1:6,000.

- b. Geology - A geologic map on which will be shown the rock formations, faults, folds, joint systems, dip and strikes, landslides, and other significant geologic features is required of the operator.
- c. Manmade Features - The location of surface and subsurface features that might incur damage by subsidence is required. This would include power transmission lines, property or land corners, pipelines (water, oil and gas, etc.), oil and gas wells, roads, dams, reservoirs, buildings, and other features

as may be present. Documented descriptions, along with appropriate photographs, are required. The location of existing major highways and proposed highways should be identified. Unless otherwise specified, this information will be shown on the original topographic and/or planimetric base.

- d. Monumentation - A network of monuments is to be established, both over the mine or proposed mine workings and in adjacent areas not expected to be disturbed (reference monuments) by the mining operations (subsidence). Each mine or proposed mine area will require an individual control survey and targeting plan to complement the topography, access, mine layout, aerial photography coverage, and other constraints. The monuments will be constructed as survey control points for the subsidence, hydrologic, vegetative, and other monitoring study programs. The monuments will be located on a coordinate system that is the same for the mine survey and surface survey, so that surface points and the subsurface mine works can be superimposed. It is recommended that the state plane coordinate system be used as primary control for all surveys. Reference the Appendix (VIII. B, Figures 5 and 6) for target or ground panel configuration and dimensions.
- e. Surface Terrain - Initial, low altitude color or black and white aerial photography of the proposed mine area will be flown at a scale such that elevations to within one foot vertically and horizontally (± 0.5) can be attained by photogrammetric methods. This photography will be used for constructing the initial baseline surface map upon which potential subsequent surface subsidence will be measured and recorded. It will also provide the master base to assist in documenting changes to vegetation, topography, geology, surface structures, recreational, and land uses on the surface over undermined areas. All other map data layers will be registered to this base which will be constructed at a scale of $1" = 100'$.

See attached map specifications for symbols, etc., in the Appendix (VIII. C, Figure 5). This map will contain the following:

- (1) Plotted horizontal positions of all control survey monuments and elevations.
- (2) Plane coordinate grid 5000' intervals.
- (3) Contours. Interval to be specified on a project by project basis.
- (4) Aerial photo centers.
- (5) Paneled section and quarter corners.
- (6) Planimetry and cultural features.
- (7) Legend.

- (8) Water sources - streams, springs, marshes, wet areas, reservoirs, and lakes.
 - (9) Transportation system including all existing travelways, roads, trails, railroads, etc.
 - (10) Grid ticks showing the horizontal position including coordinates and vertical elevation of all terrain surface points, read photogrammetrically.
- f. Vegetation - Vegetative and wildlife inventories are to be conducted in areas subject to potential impacts. The inventories will consist of on-the-ground transects. Data will be presented in the form of a map overlay which will register to the master base. In most cases, the photography will be used for delineation of vegetative types and from which this data will be photogrammetrically transferred to its respective overlay.

The following vegetative analysis studies will be established for areas which may be affected or disturbed and will be measured as:

- (1) Permanent photo points and photo studies.
 - (2) Changes in plant species composition and vegetative trends.
 - (3) Changes in ground cover density (changes in vegetative and litter cover).
 - (4) Changes in total forage production.
 - (5) Quantification by acre of all riparian vegetation.
- g. Visual Observation - Visual observation of surface effects. Every monitoring plan will include an on-the-ground observation to document the existing (premining) condition of the ground surface, at the proposed portal, access, and over the proposed mine area (plus angle of draw).
- h. Precipitation Gages - Installation of precipitation gages at the mine site. A qualified hydrologist will supervise the site selection and the installation of the gages.
- i. Seismic Events - Natural seismic events. All such events that may occur over mine areas shall be documented. It would include a documentation of each event, its magnitude, intensity, epicenter location, date of occurrence, any resulting underground or surface disturbance, and its probable intensity at the mine site.

2. Study Programs for Resource Monitoring

The Forest Service will require of the operator the following specific monitoring plans:

- a. Subsidence Monitoring - Aerial photography will be required initially for baseline data collection. Subsequent flights will be annual and will cover the area mined and the area to be mined in the next 18 months (plus the angle of draw) on the entire lease area, as may be appropriate. A 30-percent overlap of flight lines and a 65-percent overlap of photographs will be required. The photography will be flown at a scale that will produce elevations accurate to within one foot (± 0.5). Unless otherwise approved, the nominal or mean scale will be 1:4,800 for an 8 1/4" focal length camera and 1:6,600 for a 6" focal length camera. The criteria being that vertical photogrammetric measurements should be obtainable to 1/10,000 of the flying height. Both scales and respective focal lengths theoretically equal .33 feet. The vertical margin should allow for some residual reading errors.

Aerial photography will be evaluated each year for determining the location and magnitude of subsidence. It will be supplemented by surveys for subsidence evaluation.

The aerial photography will not only serve for subsidence monitoring, but will aid in interpreting and documenting changes to vegetation, topography, geology, hydrology, recreational uses, wildlife use, range use, and surface structures. Prints of the aerial photography will be furnished to the Forest Service by the operator of the initial flight and of each annual flight as requested. "Pugged" diapositives of the baseline flights will also be furnished, along with control coordinates as requested.

Monuments established for the initial flight will be properly paneled each year prior to each annual flight. For required dimensions and suggested materials, see Appendix (VIII. B, Figure 3).

Visual Observation of Surface Effects. An on-the-ground visual inspection will be made each year of the condition of the ground surface above all underground mine workings (plus angle of draw). This survey should attempt to locate, photo-identify and document the presence of tension cracks, fissures, structural offsets, and obvious subsidence damage to buildings, roads, powerlines, pipelines, railroads, dams, reservoirs, or other features. The hydrologic monitoring program will assess changes in spring flows, streams, ground water levels, etc. Photographs, as well as written documentation, will be required.

An annual field inspection of all unstable areas will be made for evidence of renewed movement. Unstable areas would include

landslides, escarpments, etc. These will be documented with photographs, written descriptions, and maps.

A continued documentation of seismic events will be maintained throughout the mine life. These data are available from State and Federal agencies.

- b. Hydrologic Monitoring - The monitoring for water quality and quantity will be of representative sources selected from the baseline inventory. Time intervals and methods of monitoring will be determined on a site specific basis. Representative sources and specifics of the requirements for monitoring will be determined by coordination of the operator, Forest Service, and Office of Surface Mining or Bureau of Land Management. Requirements for sampling, measuring of flows, and testing are defined by the Office of Surface Mining and Bureau of Land Management regulations. Those water sources not designated for detailed monitoring within the affected area where subsidence might reasonably be expected to occur will be visually evaluated annually.

Frequent recording and quantification (where possible) of water encountered in the mining operations will be required. Sufficient measurements of major seeps or flows within the mine should be made to determine any trends in flow and quality. Location of the flow should be documented and a description should be made of the geologic structure where such waters are produced. This would include such features as faults, joints, sandstone beds, wet coal, etc.

Mine water discharge must be sampled and analyzed as required by EPA and State regulations. In addition, mine water discharge will be measured for volume, and the moisture content of the coal will be measured.

Infrared aerial photography as required will be repeated once every five years, or more frequently if needed. This will be for the mine area plus the area to be mined in the next five years. Prints of the initial flight will be furnished upon request.

The precipitation gages required by l.h. will be monitored daily. Data will be furnished the Office of Surface Mining and Forest Service monthly.

- c. Vegetative and Wildlife Monitoring - The plots (on-ground transects) established for the baseline inventory will be permanently identified on the ground. They will be reevaluated at 3- to 5-year intervals throughout the mine's life. Shorter intervals may be required at some sites. The data will be presented in the form of a map having a scale of 1:4,800. It would be expected that the aerial photography would be used for this study and would serve as the base map.

- d. Visual and Recreation Monitoring - Monitoring of visual resources will include a visual inspection at least annually and more frequently if required. This inspection will include a photographic and map record, as well as written. It will document the visual changes in an area from installation of mine facilities, roads, and traffic of these facilities. It would address such items as portal areas, roads, conveyor lines, streams, slopes, escarpments (i.e., rockfalls), slope failures, excessively eroded areas, etc.

Monitoring of recreation resources will include defining of changes in an area's use by recreationists as is affected by the installation of a coal mine. This would include fishing, hunting, camping, hiking, etc. Of particular importance to this monitoring program would be the affect of the increased truck traffic on the roads.

V. LEASE READJUSTMENT

Rentals, royalties, and other conditions of the lease are subject to readjustment at the end of the primary term of 20 years, and at the end of each following 10-year period. The Bureau of Land Management, in cooperation with the Forest Service, is required to prepare an Environmental Assessment Report/Technical Examination. Stipulations may be added which bring the lease into conformance with surface management planning or other legal requirements. Monitoring programs, because they are part of the mine plans, will be implemented or modified as needs are identified, and will generally not be part of the lease readjustment process.

VI. RECLAMATION/MITIGATION

At this point in time, it is difficult to suggest any mitigation of impacts or reclamation of areas that are impacted by undermining, since we can only assume those impacts and their effect. Mitigating measures will be contingent upon the findings of the program. As data is collected, methods of mitigation and reclamation will be formulated. This will be done in cooperation with the Bureau of Land Management, Office of Surface Mining and other agencies as required.

Since significant subsidence is expected to occur after final mining, the Forest Service will require continuance of pertinent programs until such time that it is determined the program is no longer needed. This time period will be a result of data evaluation and information from not only the specific mine involved, but as a result of data from several sources. The time period will be established by the Forest Service, Office of Surface Mining, and the Bureau of Land Management.

VII. LAND MANAGEMENT POLICY

All data accumulated by these monitoring programs will be used to mitigate impacts to resource elements of the National Forest System lands and to update the Forest Land Management Plan, and to provide source information for processing new leases and/or new mining proposals and operations. The programs will be congruous with all present and future management plans. Changes in resource values and emphasis will also have bearing on the intensity of these programs. Flexibility of these programs and their implementation is important in the management of the Forest. The Forest Service will, therefore, recommend modification of the monitoring programs as necessary.

This monitoring plan will be evaluated and updated as frequently as needed by the Forest Service, in cooperation with the Bureau of Land Management and Office of Surface Mining, in response to the data generated and to changes in management policies and direction.

VIII. APPENDIXA. Direct and Precise Methods for Photo Identification

If size prohibits the direct identification, a small diameter image point readily identifiable on the photography is used for a compass bearing and distance tie to the water source. Small pinholes in the photo emulsion surface are used to identify the image point selected (reference Figure 1).

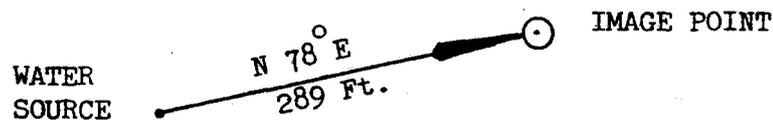


Figure 1 - Compass Bearing and Distance. Note that the bearing is from the property corner to the image point. If horizontal distance exceeds 400 feet, the precise identification procedure should be used (reference Figure 2).

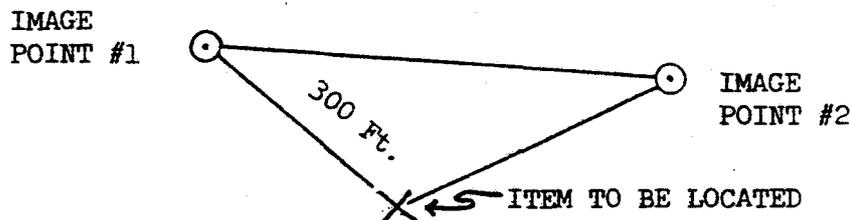


Figure 2 - Precise Identification Tie. Both image points must be pinpricked on the photograph. Horizontal and vertical angles are observed from X to image points 1 and 2. Horizontal and vertical angles are observed from image point #1 to X and image point #2. Horizontal distance is measured between image point 1 and X. Regardless of the method used, a sketch (and description of image points and item being located) on the back of the photograph are essential. Both methods of identification provide for accurate photogrammetric transfer to a base map. If water sources or other items required to be plotted on a base map are tied horizontally to the photo control network, their positions may be scaled on the base map from coordinate values. In the event color infrared photography is not required or available, the photo-identification will apply to existing project photography.

B. Photographic Targets (Ground Panels)

The precision required in large scale mapping projects using photogrammetric methods, requires an exact correlation between the photography coverage and a significant number of selected points or monuments on the ground for which X, Y, and Z coordinates are accurately measured and established by ground survey methods. These points are usually station markers in the ground in solid rock or on a permanent concrete-type structure where the points, once measured, will be well preserved for recovery and use whenever needed. Placement of a target centered on the monument or station marker so it will appear as a well-defined concentric image on the aerial photographs is essential (see Figures 3 and 4). These targets should also be placed on all supplemental control points required for orientation of the aerial photographs in photogrammetric instruments for forming stereoscopic models to scale and elevation for accomplishing the required measuring and mapping. Targets should also be placed on pertinent survey monuments on the boundaries of all affected properties including Township and Range, Section and quarter corners. Predetermined points on which photogrammetric measurements will be made to establish surface baseline information may also require targeting, however, these will not require permanent monumentation. In this case, capped rebar in the center of each target will be adequate. Property corners not used as basic control may be targeted with only 3 legs of equal spacing using the same dimensions as shown in Figure 3.

Care should be taken where possible to place control and targets in open areas where they will not be obscured by ground cover and/or shadows. In some cases, this may not be possible and clearing will be required. Figure 4 illustrates the approximate clearing criteria. Experience has shown that the darker center of the target provides better contrast for "readability".

C. Photogrammetric Map Compilation

1. Description

This work shall consist of compiling a topographic map and/or "reading" a series of points from aerial photographs in accordance with these specifications, including labor, equipment, materials, and incidentals necessary to complete the work. The initial area to be mapped shall be the area to be mined in the next 18 months (plus angle of draw) on the entire lease area as appropriate.

2. Materials

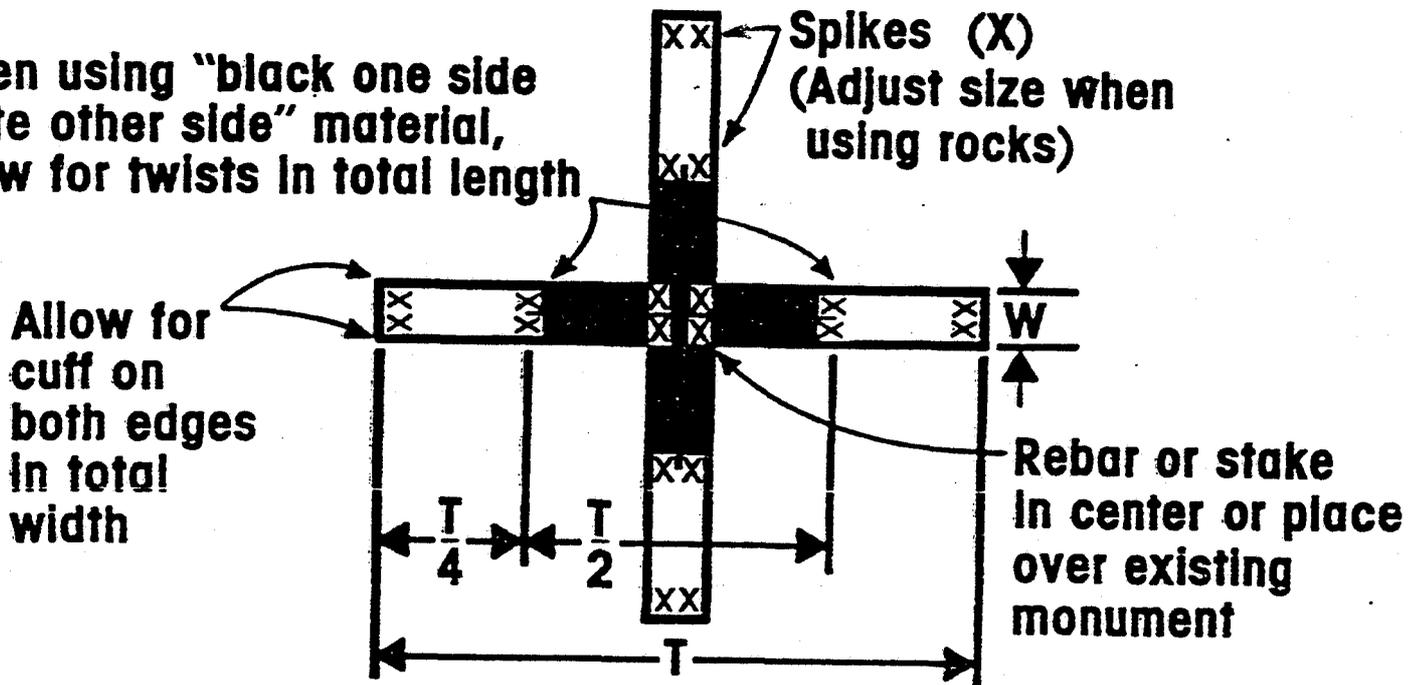
Base sheets for both the original base manuscripts and the overlays shall be polyester base film between 0.004 inch and 0.007 inch in thickness. Paper prints of the final drafted map sheets shall be 16 pounds or heavier stock paper.

3. Requirements

- a. Manuscript Map Requirements - Manuscripts shall be compiled as follows:

GROUND TARGETS FOR CONTROL SURVEYS RECOMMENDED DIMENSIONS

When using "black one side
white other side" material,
allow for twists in total length



T = Total Length (in feet)
= 1/50 Photo Scale (ft to 1 in)
ie. 1:6000 PSR = 1" = 500' ÷ 50 = 10'-12'

W = Width of Leg (in Inches)
= 1/60 Photo Scale (ft to 1 in)
ie. 1:6000 = 1" = 500' ÷ 60 = 8.3"-12"

- Terrain, cover and reflectance characteristics of surface material affect pt. reading accuracy of targeted control station
- Record of location (photo I.D./image pt. tie)
- Maintenance
- Roll stock, pre-cut and/or prefabricated material and targets available from commercial sources

Figure 3

GROUND TARGET PLACEMENT GUIDE

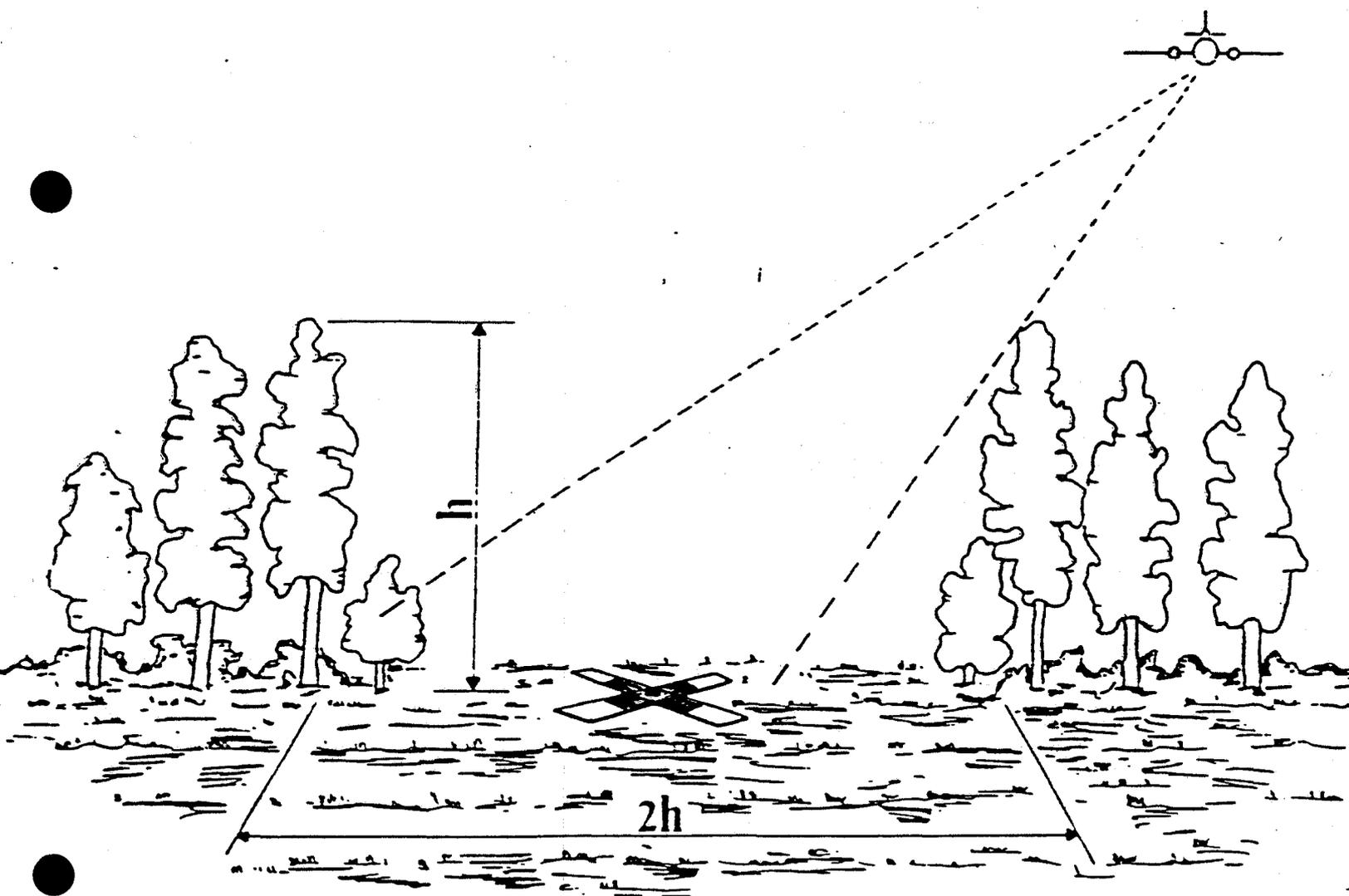


Figure 4

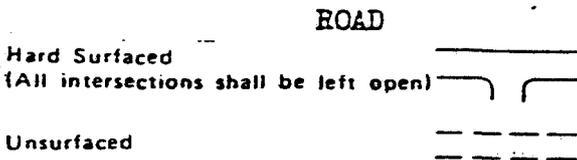
- (1) Coordinate Grid Ticks - The plotted positions of each plane coordinate grid tick shall not vary by more than 0.01 inch from the true grid position. Grid ticks shall be plotted at 5 inch intervals. A north arrow indicating grid north shall be shown on each sheet.
- (2) Scale and Contour Interval - The scale and contour interval shall be 1" = 100' and 2' or as specified by individual project.
- (3) Match Lines - Match lines and reference numbers shall be provided so that each map may be accurately joined to those which are adjacent.
- (4) Sheet Layout - Each sheet shall be numbered in the border area in each of the four corners. The numbers shall be approximately 0.5 inch high and shall be encircled. A label which includes Forest name, project name, date, and scale shall be placed in the margin at the lower right hand corner of each sheet.
- (5) Control Points - All control points shall be plotted and labeled including: horizontal and vertical control points, pass points, tie points, and construction survey control points when required. The principle point of each photo shall also be plotted and labeled.
- (6) Planimetric Features - All planimetric features visible and identifiable on the aerial photos shall be shown. Planimetric feature symbols shall conform to Figure 5. Planimetric features not shown on Figure 5 shall be drawn to scale and labeled.
- (7) Topographic Features - All contours shown shall be compiled using a stereo plotting instrument. Every fifth contour shall be a heavier weight line. The elevation of every fifth contour shall be shown in tiers approximately 10 inches apart.

Where contours spacing is more than 2 inches apart at final scale, spot elevations shall be shown in a 1-inch grid pattern. Spot elevations shall also be shown at peaks, depressions, saddles, on centerline at each end of a bridge, on centerline at road intersections, and at locations where interpolations from contours will not give true elevations.

Where contour spacing is less than 10 per inch, the intermediate contours may be dropped and every fifth contour, with heavier line weights, shall be left.

- b. Final Map Requirements - Except for sheet layout, the final map sheets shall meet the manuscript map requirements. In addition, the final map sheets shall meet the following requirements.

FIGURE 5
PHOTOGRAMMETRIC DRAFTING STANDARDS
(Dimensions at final scale)



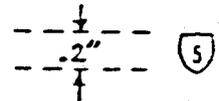
FEDERAL



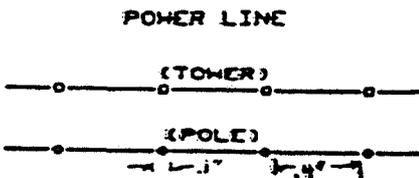
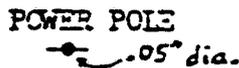
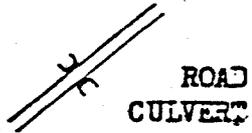
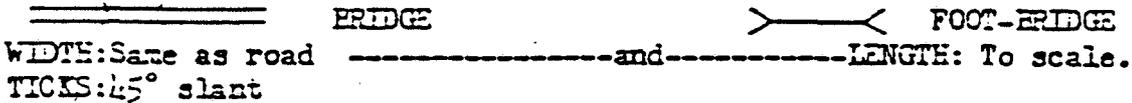
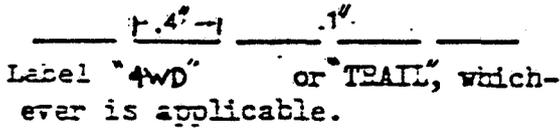
STATE



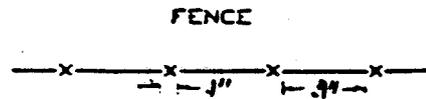
INTERSTATE



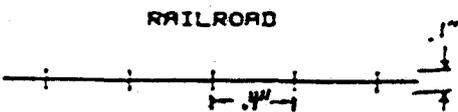
Use proper highway symbols and numbers when applicable.



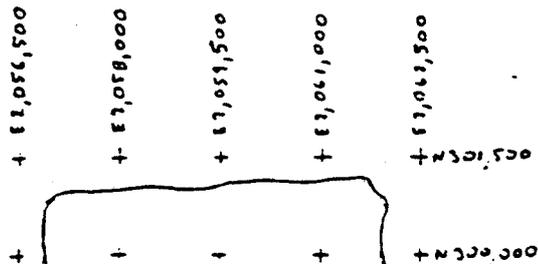
BOUNDARY: Label kind of, i.e.



K.F. EDRY.
OR
SITE EDRY.

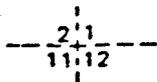


Grid Numbers
place so as to be readable from SOUTH and EAST



Monuments

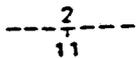
Section Corner



Boundary Monument
(1" Square for symbol)

MP 1 □

Quarter Corner



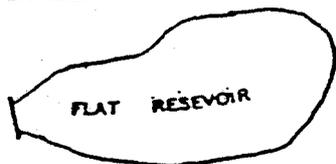
LAKE



INTERMITTENT LAKE



RESEVOIR



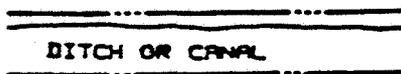
MARSH



RIVER



STREAMS



WELL

○ .07" dia.-label as "WELL"

SPRING

○ .07" dia.-label as "SPRING"

LINE WEIGHTS

CONTOURS

INDEX----- .015"
INTERMEDIATE----- .005"
SUPPLEMENTARY----- .005"

4WD ROADS & TRAILS----- .015"

LETTERING----- .005"

OTHER SYMBOLS----- .008"

DEPRESSIONS

SPOT ELEVATIONS

X 4131

X 4181.3



BM-22

BENCH MARK



1234.56

Premarks

Principal Points

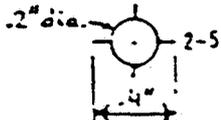


Image Points

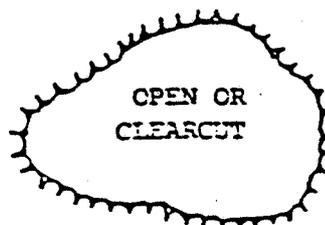


Verticle Control Point

3V 7245.36

Horizontal & Vertical Control Point

5HV 7831.49



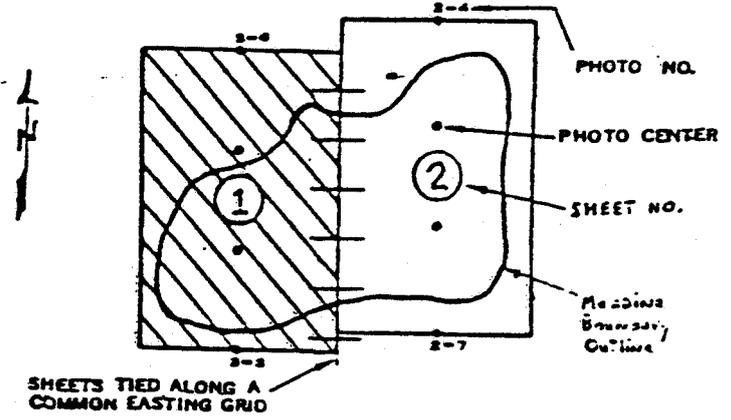
Freehand the outlines as compiled and label inside.

Figure 5 (cont.)

Example TITLE BLOCK

U.S. DEPARTMENT OF AGRICULTURE
 FOREST SERVICE
 REGION PHOTOGRAMMETRIC SECTION
MANTI-LASAL N.F.
 PROJECT CHALK CR
 FILE# 1818
 Map Scale 1" = 1320'
 Photo Scale 1:80,000
 Contour Interval 40'
 MAPPING BY PHOTOGRAMMETRIC METHODS
 Photo Symbol 41047 (76) Map Date 12-78
6600 Foot Grid Based on UTAH
 Coordinate System, NORTH Zone
T10S R6E
 *REFER TO FOR ALL FUTURE REFERENCES

Sheet Index
 hachure ONLY the representative sheet



MAP LEGEND

	FORM LINE CONTOURS
	TREE BOUNDARY
	ROADS
	WATER
	DITCH OR CANAL
	POWER LINE
	FENCE
	RAILROAD
	GROUND TARGET
	SPOT ELEVATION
	PHOTO CENTER

Position the Title Block, Map Legend
 and Sheet Index such that the map is "balanced"

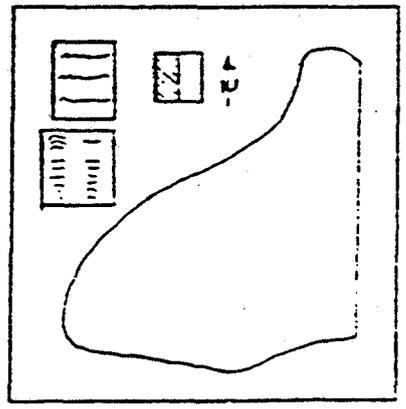


Figure 5 (cont.)

- (1) Sheet Size and Layout - Sheets shall be the size specified in Special Project Specifications. Each sheet shall have a border and title block in the lower right hand corner.

A title block and bar scale shall be shown on each final map sheet. The title blocks shall include the following statements:

- (a) Date of photography, scale of aerial photography, and scale at which map was compiled.
- (b) Statement of datum basis of map grid and elevation.

A small scale, correctly oriented, map sheet index shall be shown on each map sheet. The index shall show all sheets and their numbers. The sheet upon which the index is located shall be crosshatched.

- (2) Drafting - Final map sheets shall be either scribed or drafted with ink at the final map scale. The drafting method chosen shall be used for all sheets.

Map details shall be clear, sharp, and legible after reproduction. Lettering shall not be done freehand.

c. Map Accuracy

- (1) Topography - At least 90 percent of all elevations determined from contours shall be within 0.5 contour interval of true elevation, and all elevations so determined shall be within 1.0 contour interval of true elevation except as follows:

(a) Where the ground is obscured by brush or tree cover, contours shall be plotted from the stereoscopic model, making use of spot elevations measured photogrammetrically in places where the ground is visible. In these areas, at least 90 percent of the elevations determined from contours shall be within 1.0 contour interval of true elevation. All elevations so determined shall be within 2 contour intervals of true elevation. Contours within these areas shall be shown as dashed lines.

(b) In densely wooded areas where spot elevations cannot be determined, contours shall not be drawn. They shall be outlined and labeled "ground not visible" or "GNV".

- (2) Spot Elevations - At least 90 percent of all spot elevations shall be within 0.25 contour interval of true elevation. All spot elevations shall be within 0.50 contour interval of true elevation.

- (3) Planimetric Features - At least 90 percent of all well-defined planimetric features such as structures, paved roads, intersections, etc., shall be within 0.025 inch of their true position. All shall be within 0.050 inch of their true position.
- (4) Coordinate Grid Ticks - The plotted position of all coordinate grid ticks shall not vary by more than 0.01 inch from their true grid position.
- (5) Horizontal Control - The plotted position of all horizontal control points shall not vary by more than 0.01 inch from their calculated position.

Acceptance or rejection of the map or portions thereof will be the responsibility of the lessee and based on whatever means they feel necessary to perform (generally field survey methods).

- d. Map Accuracy Tests - The Forest Service may elect to evaluate map accuracy and precision based on a sample of test points. The test points will be randomly selected models and representative of the feature being tested.

The position and elevation of test points will be determined by the Forest Service using photogrammetric or ground survey methods of equal or better precision than those used for map production. Discrepancies will be calculated between the test values and map values. Statistical methods of hypothesis testing will be used to determine if the mean and standard error of the sample of discrepancies indicate that map accuracy requirements have been met. Tests for accuracy will apply to the models in which tests were performed.

All required materials or suitable duplicate thereof will be provided to the Forest Service as requested to insure and assist in the successful implementation and continuation of this program.

ROUGH DRAFT
WBoley:gd
April 9, 1981

FOREST PLAN FOR STUDYING THE EFFECTS
OF
UNDERGROUND COAL MINING ON SURFACE AND SUBSURFACE RESOURCES

Manti-LaSal National Forest

Public Law 86-517
86th Congress, H. R. 10572
June 12, 1960

AN ACT

74 STAT. 215.

To authorize and direct that the national forests be managed under principles of multiple use and to produce a sustained yield of products and services, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That it is the policy of the Congress that the national forests are established and shall be administered for outdoor recreation, range, timber, watershed, and wildlife and fish purposes. The purposes of this Act are declared to be supplemental to, but not in derogation of, the purposes for which the national forests were established as set forth in the Act of June 4, 1897 (16 U.S.C. 475). Nothing herein shall be construed as affecting the jurisdiction or responsibilities of the several States with respect to wildlife and fish on the national forests. Nothing herein shall be construed so as to affect the use or administration of the mineral resources of national forest lands or to affect the use or administration of Federal lands not within national forests.

SEC. 2. The Secretary of Agriculture is authorized and directed to develop and administer the renewable surface resources of the national forests for multiple use and sustained yield of the several products and services obtained therefrom. In the administration of the national forests due consideration shall be given to the relative values of the various resources in particular areas. The establishment and maintenance of areas of wilderness are consistent with the purposes and provisions of this Act.

SEC. 3. In the effectuation of this Act the Secretary of Agriculture is authorized to cooperate with interested State and local governmental agencies and others in the development and management of the national forests.

SEC. 4. As used in this Act, the following terms shall have the following meanings:

(a) "Multiple use" means: The management of all the various renewable surface resources of the national forests so that they are utilized in the combination that will best meet the needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; that some land will be used for less than all of the resources; and harmonious and coordinated management of the various resources, each with the other, without impairment of the productivity of the land, with consideration being given to the relative values of the various resources, and not necessarily the combination of uses that will give the greatest dollar return or the greatest unit output.

(b) "Sustained yield of the several products and services" means the achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources of the national forests without impairment of the productivity of the land.

Approved June 12, 1960.

National forests, management.

30 Stat. 34.

Multiple use; sustained yield.

Definitions.



4. Final Map Requirements
a. Sheet Size Layout
b. Drafting

5. Map Accuracy
a. Topography
b. Spot Elevations
c. Planimetric Features
d. Coordinate Grid Ticks
e. Horizontal Control

6. Map Accuracy Tests

~~7. Photographic Targets~~

c. Photographic Targets

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g. Topographic Features	

I. INTRODUCTION

Minerals are one of the abundant resources of the Manti-LaSal National Forest. The extraction of these minerals is endorsed by the Forest Land Management Plans, except where this action is incompatible with planned surface uses. The Forest, by regulation and law, is committed to multiple use management of all National Forest resources, and must assure that adverse impacts to surface and subsurface resources are minimized whenever any resource is utilized--including minerals and mineral resources.

Data describing the effects of coal mining and mining-related activities is scarce. Current resource protection, mitigation, and reclamation measures are based on this limited data. A resource monitoring program is needed to assess impacts to resources, to evaluate the effectiveness of protection, mitigation, and reclamation measures, and to provide a basis for making--as needed--new protection, mitigation, and reclamation stipulations for mineral leases, and mining and reclamation plans.

Since 1973, the Manti-LaSal National Forest has recommended that a program be established to quantify impacts to surface resources due to underground mining. Certain stipulations have appeared in all Environmental Assessment Reports and Impact Statements dealing with coal programs which are prepared by or had concurrence of the Forest Service.

Two stipulations have been developed that relate to the mining activity. Stipulation number one requires that baseline data be obtained prior to any disturbance, and stipulation number two requires that a monitoring program be initiated during mining operations. They are as follows:

Stipulation 1 - Prior to mining, the lessee shall perform a study to secure adequate baseline data to quantify the existing surface resources on and adjacent to the lease area. The study will be established in consultation with and concurrence by the surface managing agency, and shall be

adequate to locate ^{and demonstrate} and quantify the interrelationships of the geology, topography, ^{all} surface hydrology, vegetation, and wildlife. The baseline data will be established so that future ^{programs or} observations can be ^{incorporated} made at regular intervals for comparison.

Stipulation 2 - The lessee shall establish a monitoring system to locate ^{measure} and quantify the progressive and final affects of underground mining activities on the land surface, the underground and surface hydrology, and on the vegetation. The monitoring system shall utilize techniques which will provide a continuing record of change over time. The monitoring shall be an extension of baseline data at representative locations and will be conducted in a manner approved by the surface managing agency in consultation with the State and Federal regulatory agencies.

In managing wildlands, information is needed to address all Forest Service resource systems, forest and rangeland, water, wildlife and fish, outdoor recreation and wilderness, etc. To make an assessment of the potential effects of alternative land uses such as underground mining on surface resource systems, requires basic information on their resources and their relationship to each other. Local management and planning decisions require mapped and pinpointed information, whereas State, regional and national level decisions may be based on statistical information obtained from much broader samples. This plan requires a high degree of resolution, consequently large scale (low altitude) aerial photographs and large scale maps will be required to facilitate the process.

II. OBJECTIVES

Objectives of the program will include:

- A. Establishing baseline surface terrain resource and hydrologic data prior to mining, and for existing mines.
- B. Implementing programs of observation at regular intervals, which would generate data for comparison with baseline.
- C. Defining impacts of coal mining upon wildlife, range, vegetation, timber, water, topography, geology, other minerals, recreation, and visual resources; all of which are encompassed in the multiple use direction of the Forest Service.
- D. Coordinating resource uses and management planning with coal mining, minimize adverse impacts to surface resources on Forest lands.
- E. Predicting change(s) in the hydrologic cycle that may occur as a result of coal mining so that provisions for relocation of water sources or development of alternative water sources can be made available to facilitate the multiple uses of the Forest.
- F. Careful inventorying and monitoring of resources at each mine prior to, during, and after the conclusion of undermining will help establish and predict the area's response to coal extraction, and expedite technology to minimize the resultant effects.

III. RESOURCE CONSIDERATIONS

The objective of resource monitoring is to quantify and display the progression and final effects of undermining upon surface resources of National Forest lands.

The surface and subsurface resources to be considered have been categorized into four resource groups. They are:

- A. Recreation and Visual Resources.
- B. Vegetation (which includes Range, Wildlife Habitat, and Timber).
- C. Geology and Hydrology.
- D. Other.

The basic data requirements with which these resources will be inventoried and monitored is included with each resource group.

A. Recreation and Visual Resources

Potential effects of mining on recreation and visual resources shall be evaluated - including an inventory to establish a comparison baseline - prior to any mining activity. The recreational uses and scenic values of the area will determine the nature and extent of monitoring requirements.

It is expected that monitoring of Recreation Resources would include defining of changes in areas^{of} use by recreationists, i.e., fishing, hunting, camping, hiking, etc., as may be affected by mining activities (i.e., coal hauling, mining).

For Visual Resources, a monitoring program would most generally be visual inspections on a programmed frequency. This would include a photographic record and map at a scale compatible for registration

with other data map record layers as well as a written record. It would address such items as the visual change in mine facilities, roads, streams, slopes and escarpments (i.e., rockfalls), slope failures, excessively eroded areas, etc.

B. Vegetation

The effect of undermining upon vegetation is still largely unknown. Range analyses, timber surveys, and wildlife habitat studies will be conducted in areas expected to be affected by mining. The intensity and frequency of these investigations will be determined on a site-by-site basis. Data will be summarized annually, and used to define change.

This monitoring program would rely upon existing data, supplemented where necessary with data from other sources and from field inventories obtained prior to mining. These data would form the base upon which the monitoring program data would be compared for definition of change.

In situations where mining effects become substantial, the mining company would be required to participate in formulation and implementation of mitigation measures.

C. Geology and Hydrology

The geologic structure and stratigraphic nature of an area has a major determining effect upon the ground water regimen, upon the mining, conservation of the resource, mode of subsidence, and surface features such as topography, soils, and slope stability.

Without adequate geologic data--both from surface exposures and drilling and mining--resource conservation planning cannot be done. Also, any impacts to surface resources cannot be identified or mitigated without a knowledge of the geology.

To fulfill the requirements of this monitoring plan, the following is required to establish baseline data.

1. A geologic map at the same scale as other data map layers showing lease location, faults, folds, joint systems, geologic formations, seeps, springs, and other data which are essential for proper identification of the existing geologic and hydrologic conditions. The map would be updated as new information becomes available.
2. A narrative description of each of the above items, giving sufficient detail for evaluation. Existing seeps and springs on the lease area and adjacent areas, which would be affected by undermining, will be inventoried. In most cases, estimates of quantity would be adequate. However, representative springs (springs having current use for wildlife, range, or for municipal use) which are important for the management of the surface resource will be sampled and tested for quality, and flows determined.

The responsibility for these data would be that of the mining company. The Forest Service and the U.S. Geological Survey would, however, cooperate in the designation of hydrologic monitoring requirements for each site, and would provide those data which may have been obtained from previous studies.

D. Other

Surface structures, such as power transmission lines, pipelines, oil and gas wells, roads, dams and reservoirs, and other physical improvements could be affected by mining. Mine planning must consider these features, and data must be obtained prior to mining that will identify possible impacts. Those structures that are identified which might be damaged should be photographed before and after mining, together with the documented inspections which establish their condition prior to, during, and after mining.

The mining company would have responsibility for this information. There are, however, considerable data available on these structures which could be made available by the Forest Service, U.S. Geological Survey, State, and County.

IV. FOREST SERVICE REQUIREMENTS

The following responsibilities, procedures, resource inventories, and study programs are those which the Manti-LaSal National Forest will require for leasing of Forest lands for coal mining, exploration, or for coal mine plan approval. These are, in part, requirements of laws and regulations of the Department of the Interior and, in part, requirements of the Forest Service. Those required by the Department of the Interior are not referenced and may not be included in their entirety or have the same specific requirements. It is not intended that this program plan supersede in whole or in part requirements of the Department of the Interior. The programs are intended to generate the data we have determined essential for responsible multiple resource management. The operator would be responsible for those parts where data are needed to determine the effects of mining upon surface resources.

All programs to monitor the effect of mining on surface and subsurface resources will be applicable to existing leases (in all stages of development) and future leases. Accumulation of data pertinent to coal mining studies will occur at all stages of lease development.

A. Tract Leasing

Prior to leasing of any land on the Manti-LaSal National Forest for coal mining, the preparation of a site specific Environmental Assessment (EA) will be required. This assessment is the process by which the Manti-LaSal National Forest will determine a tract's suitability for leasing and is the approval document for coal land leasing. The Forest Service will be responsible for its preparation. The Technical Examination required to obtain the essential data for the EA will be performed by the Forest Service in cooperation with the U.S. Geological Survey and Office of Surface Mining. Data would be obtained by the Forest Service, U.S. Geological Survey, Bureau of Land Management, State, and other agencies as needed.

The Technical Examination will include an inventory and description of surface resources and uses; and will include the requirements given in items 1 through 9 below. These requirements, however, are not intended to be of a detail as to establish baseline data for the requirements of resource monitoring as specified in item C. for mine plan approval. They will, however, include sufficient detailed data to make an assessment of the compatibility of a coal lease tract with other resource elements, uses, determining the tract's leasability, an evaluation of probable impacts of mining the tract upon the environment, and for developing of lease stipulations.

The requirements for the Environmental Assessment will include the following information:

1. A description and assessment of the existing environment, including wildlife, vegetation, hydrology, soils, topography, geology, mineral occurrence, recreation, visual quality, historical, archeological, surface structures, and other resources as may be appropriate, will be required. This report also would include an assessment with regard to areas which may not be available for leasing, i.e., wilderness, withdrawals, threatened and endangered species, special uses, oil and gas fields, pipelines, reservoirs, and other surface features as may affect human safety.
2. A preliminary geologic map of an acceptable scale that will include faults, folds, joint systems, geologic formations, and significant surface geologic features, such as landslides and unstable slopes, is required.
3. A topographic map. This would properly serve as the base map for 2 and 4. Currently, existing color resource photography would supplement the topographic map for making the inventory and assessments.

4. A preliminary inventory of known ponds, reservoirs, springs, seeps, and significant wet areas will be recorded on a map. Flows will be estimated.
5.
 - a. A preliminary assessment of the surface hydrology that will include climate, precipitation, flooding, and descriptions of the stream(s) and drainage systems.
 - b. A preliminary assessment of the ground water geohydrology. This would include item 4 above, with a description as necessary. In addition, it will include an appraisal of the importance of each item listed and described to Forest management and will furnish estimated flow quantities and, where appropriate, the water quality. This would also include a description of the water source (i.e., seeps, springs, wells, etc.) in relation to topography, geologic conditions, vegetation, and other resources as may be appropriate.
6. Existing transportation and utility corridors, and possible future corridors, should be located and recorded on maps. Each should be accompanied by a detailed description.
7. Existing roads, existing mine portals, possible mine sites, oil and gas wells, and the opportunity for relocation of these features should be discussed jointly with the Forest Service and Geological Survey so that any major restrictions to these activities will be brought to light early in the process.
8. An evaluation of the tract for feasibility of mining, in-place tonnage, and expected recoverability will be addressed in a report to the Forest Service by the Geological Survey. A conceptual mine plan, complete with a transportation plan, will accompany this data.
9. Any drilling prior to leasing ~~done~~ by the U.S. Geological Survey) should be required to follow exploration regulations (Part B, below).

B. Exploration

Exploration of a coal mining tract is normally performed by the lessee after the lease is obtained. Some exploration for evaluation prior to leasing may be done by the Geological Survey as required by 30 CFR 211. Exploration is performed to evaluate the value of the coal seam(s) and the geologic structure; and the lithology of the rock formations for mine planning.

Exploration is most often performed by drilling of holes from the ground surface to the coal seam(s). However, not all lessees will explore by drilling, nor is it required. New exploration methods are being developed. Presently, drilling is the method used.

When exploration is done by drilling, the following should be required of the operator:

1. A comprehensive plan of operations as required by 30 CFR 211.

This plan should include:

- a. A map showing the locations of the proposed activity (drill hole locations) and the proposed access.
- b. A detailed description of drilling plans and procedures.

This should include:

- (1) Drill hole locations, T., R., S.
- (2) Expected depths of drill holes.
- (3) Proposed access routes, including a description of the requirements for upgrading, reconstruction, or construction of the access roads.
- (4) The time frame for the drilling program.
- (5) Surface resource protection considerations.

c. A reclamation plan.

2. A log from each drill hole showing the ground waters encountered. Data will be compiled and submitted by the company, giving depths and lithologies where water is encountered. An attempt will be made to quantify amounts of water in the aquifers. Each actual drill hole location will be accurately plotted on the base map or appropriate overlay.

These data, combined with the surface geologic and hydrologic data, will aid to define the ground water system. This will be used to develop the hydrologic monitoring system required by regulation, as well as to aid in identifying possible impacts to surface water sources from undermining.

Selected holes may be required to be left open for periodic water level measurements and groundwater sampling. These drill holes and intervals of monitoring will be designated by Geological Survey upon the review of the operating plan. Coordination between the Forest Service, Geological Survey, and the operator is required to determine a need for, and establishment of, hole locations and reclamation.

C. Mine Plan Approval

All mining plans for underground coal mines should include, as part of the mining plan, a study and monitoring program to determine what, if any, effects mining will have upon other resource elements and land uses. This plan or study program will necessarily include two phases; (1) establishment of baseline data for existing resource and land use elements from which any change due to mining can be measured (see stipulation #1), and (2) establishment of study programs to monitor these resource and land use elements for measurement of any change that has occurred because of the mining (see stipulation #2).

1. Baseline Data Collection

The Forest Service will require of the operator the following specific data:

- a. Water - The location and identification, including a detailed description, of water sources. This should include the topography, geology, use, flow, quality, and other data as may be necessary to define each water source. Water sources which will be inventoried include seeps, springs, wet areas, natural ponds, lakes, reservoirs, stock ponds, streams, and water wells, on and within the area of influence of the leasehold. This would include a literature search, compilation of existing data, and a field search, investigation, and description of each.

To aid in the location and identification of these water sources, color infrared aerial photography (CIR) of the proposed mine area and area of influence may be required. The main purpose for the color infrared photography is to aid in: (1) the location identification and description of all water source points, and (2) the detection and monitoring of dead or dying (stressed) vegetation due to subsurface mining activities.

Water sources, surface cracks, property corners, and other points that are not used or tied to basic project control may be photo-identified in the field by direct or precise methods. A description of the procedures using these two methods can be found in the Appendix (VIIIA).

It is expected that the infrared photography will not be required for all mine plans. The need for this photography is to be determined by the Forest Service in consultation with and concurrence of the U.S. Geological Survey and the Office of Surface Mining (OSM) on a site-by-site basis.

Each water source shall be located and plotted on the base map or appropriate overlay, giving elevation, coordinates, flow (gpm), and date flow was measured. The method used to measure the flow must be described, i.e., weir, flow meter, estimated, etc. See a. above. Measurements ideally should be quarterly for a minimum of two years and preferably longer prior to any significant mining.

It is recognized that some water sources cannot be measured at these frequencies because of heavy snow cover, intermittent flows, or difficulty of access to the area.

It is not a requirement that the targets or ground panels required for the subsidence monitoring photography appear or be visible on the CIR photography. The same scale of photography, (or degree of resolution) may not be required for detecting or interpreting images as may be required for accurate terrain measurements. However, there are several advantages in maintaining the ground panels for visibility on the CIR photography and flying all photography at the same altitude or scale. Cross correlation for interpretive comparisons and the transfer of points and data from one set to the other are but a few of these advantages.

If required, the CIR photography will be obtained with an acceptable 9" x 9" format mapping camera with an 8½" or 6" focal length and single-lens-between-the-lens-shutter system. ~~See Appendix VIII for detailed camera specifications.~~ Film will be Kodak Aerochrome Infrared 2443 (or equivalent) and will be exposed with the proper filter and camera setting as to provide the best possible image resolution and print quality. The flight dates of the CIR photography will be scheduled by individual project to obtain the optimum results for water and vegetative detection and analysis. The nominal or mean scale of this photography will not exceed 1:6000.

- b. Geology - A geologic map on which will be shown the rock formations, faults, folds, joint systems, dip and strikes, landslides, and other significant geologic features is required of the operator.

- c. Manmade Features - The location of surface and subsurface features that might incur damage by subsidence is required. This would include power transmission lines, property or land corners, pipelines (water, oil and gas, etc.), oil and gas wells, roads, dams, reservoirs, buildings, and other features as may be present. Documented descriptions, along with appropriate photographs, are required. The location of existing major highways and proposed highways should be identified. Unless otherwise specified, this information will be shown on the original topographic and/or planimetric base.

- d. Monumentation - A network of monuments is to be established, both over the mine or proposed mine workings and in adjacent areas not expected to be disturbed (reference monuments) by the mining operations (subsidence). Each mine or proposed mine area will require an individual control survey and targeting plan to complement the topography, access, mine layout, aerial photography coverage, and other constraints. The monuments will be constructed as survey control points for the subsidence, hydrologic, vegetative, and other monitoring study programs. The monuments will be located on a coordinate system that is the same for the mine survey and surface survey, so that surface points and the subsurface mine works can be superimposed. It is recommended that the State plane coordinate system be used as primary control for all surveys. Reference the Appendix for target or ground panel configuration and dimensions.

- e. Surface Terrain - Initial, low altitude color or black and white aerial photography of the proposed mine area will be flown at a scale such that elevations to within one foot vertically and horizontally (± 0.5) can be attained by photogrammetric methods. This photography will be used for constructing the initial baseline surface map upon which potential subsequent surface subsidence will be measured and recorded. It will also provide the master base to assist in documenting changes to vegetation, topography, geology, surface structures, recreational, and land uses on the surface over undermined areas. All other map data layers will be registered to this base which will be constructed at a scale of 1" = 10A'.

See attached map specifications for symbols, etc. This map will contain the following:

- (1) Plotted horizontal positions of all control survey monuments and elevations.
- (2) Plane coordinate grid 5000' intervals.
- (3) Contours. Interval to be specified on a project by project basis.
- (4) Aerial photo centers.
- (5) Paneled section and quarter corners.
- (6) Planimetry and cultural features.
- (7) Legend.
- (8) Water sources - streams, springs, marshes, wet areas, reservoirs and lakes.
- (9) Transportation system including all existing travelways, roads, trails, railroads, etc.
- (10) Grid ticks showing the horizontal position including coordinates and vertical elevation of all terrain surface points, read photogrammetrically.

in the Appendix (F) 3

- f. Vegetation - Vegetative and wildlife inventories are to be conducted in areas subject to potential impacts. The inventories will consist of on-the-ground transects. Data will be presented in the form of a map overlay which will register to the master base. In most cases, the photography will be used for delineation of vegetative types and from which this data will be photogrammetrically transferred to its respective overlay.

The following vegetative analysis studies will be established for areas which may be affected or disturbed and will be measured as:

- (1) Permanent photo points and photo studies.
 - (2) Changes in plant species composition and vegetative trends.
 - (3) Changes in ground cover density (changes in vegetative and litter cover).
 - (4) Changes in total forage production.
 - (5) Quantification by acre of all riparian vegetation.
- g. Visual Observation - Visual observation of surface effects. Every monitoring plan will include an on-the-ground observation to document the existing (premining) condition of the ground surface, at the proposed portal, access, and over the proposed mine area (plus angle of draw).
- h. Precipitation Gages - Installation of precipitation gages at the mine site. A qualified hydrologist will supervise the site selection and the installation of the gages.
- i. Seismic Events - Natural seismic events. All such events that may occur over mine areas shall be documented. It would include a documentation of each event, its magnitude, intensity, epicenter location, date of occurrence, any resulting underground or surface disturbance, and its probable intensity at the mine site.

2. Study Programs for Resource Monitoring

The Forest Service will require of the operator the following specific monitoring plans:

- a. Subsidence Monitoring - Color aerial photography will be required initially for baseline data collection. Subsequent flights will be annual and will cover the area mined and the area to be mined in the next 18 months (plus the angle of draw) on the entire lease area, as may be appropriate. A 30-percent overlap of flight lines and a 65-percent overlap of photographs will be required. The photography will be flown at a scale that will produce elevations accurate to within one foot (± 0.5). Unless otherwise approved, the nominal or mean scale will be 1:4800 for an 8½" focal length camera and 1:6600 for a 6" focal length camera. The criteria being that vertical photogrammetric measurements should be obtainable to 1/10,000 of the flying height. Both scales and respective focal lengths theoretically equal .33 feet. The vertical margin should allow for some residual reading errors.

Aerial photography will be evaluated each year for determining the location and magnitude of subsidence. It will be supplemented by surveys for subsidence evaluation.

The aerial photography will not only serve for subsidence monitoring, but will aid in interpreting and documenting changes to vegetation, topography, geology, hydrology, recreational uses, wildlife use, range use, and surface structures. Prints of the color aerial photography will be furnished to the Forest Service by the operator of the initial flight and of each annual flight as requested. "Pugged" diapositives of the baseline flights will also be furnished, along with control coordinates as requested.

Monuments established for the initial flight will be properly paneled each year prior to each annual flight. For required dimensions and suggested materials, see Figure 2.

Visual Observation of Surface Effects. An on-the-ground visual inspection will be made each year of the condition of the ground surface above all underground mine workings (plus angle of draw). This survey should attempt to locate, photo-identify and document the presence of tension cracks, fissures, structural offsets, and obvious subsidence damage to buildings, roads, powerlines, pipelines, railroads, dams, reservoirs, or other features. The hydrologic monitoring program will assess changes in spring flows, streams, groundwater levels, etc. Photographs, as well as written documentation, will be required.

An annual field inspection of all unstable areas will be made for evidence of renewed movement. Unstable areas would include landslides, escarpments, etc. These will be documented with photographs, written descriptions, and maps.

A continued documentation of seismic events will be maintained throughout the mine life. These data are available from State and Federal agencies.

- b. Hydrologic Monitoring - The monitoring for water quality and quantity will be of representative sources selected from the baseline inventory. Time intervals and methods of monitoring will be determined on a site specific basis. Representative sources and specifics of the requirements for monitoring will be determined by coordination of the operator, Forest Service, and Geological Survey. Requirements for sampling, measuring of flows, and testing are defined by the Geological Survey

guidelines. Those water sources not designated for detailed monitoring within the affected area where subsidence might reasonably be expected to occur will be visually evaluated annually.

Frequent recording and quantification (where possible) of water encountered in the mining operations will be required. Sufficient measurements of major seeps of flows within the mine should be made to determine any trends in flow and quality. Location of the flow should be documented and a description should be made of the geologic structure where such waters are produced. This would include such features as faults, joints, sandstone beds, wet coal, etc.

Mine water discharge must be sampled and analyzed as required by EPA and State regulations. In addition, mine water discharge will be measured for volume, and the moisture content of the coal will be measured.

Infrared aerial photography as required will be repeated once every five years, or more frequently if needed. This will be for the mine area, plus the area to be mined in the next five years. Prints of the initial flight will be furnished upon request.

The precipitation gages required by l.h. will be monitored daily. Data will be furnished the Geological Survey and Forest Service monthly.

- c. Vegetative and Wildlife Monitoring - The plots (on-ground transects) established for the baseline inventory will be permanently identified on the ground. They will be reevaluated at 3- to 5-year intervals throughout the mine's life. Shorter intervals may be required at some sites. The data

will be presented in the form of a map having a scale of 1:4800. It would be expected that the aerial photography would be used for this study and would serve as the base map.

- d. Visual and Recreation Monitoring - Monitoring of visual resources will include a visual inspection at least annually and more frequently if required. This inspection will include a photographic and map record, as well as written. It will document the visual changes in an area from installation of mine facilities, roads, and traffic of these facilities. It would address such items as portal areas, roads, conveyor lines, streams, slopes, escarpments (i.e., rockfalls), slope failures, excessively eroded areas, etc.

Monitoring of recreation resources will include defining of changes in an area's use by recreationists as is affected by the installation of a coal mine. This would include fishing, hunting, camping, hiking, etc. Of particular importance to this monitoring program would be the affect of the increased truck traffic on the roads.

V. LEASE READJUSTMENT

Rentals, royalties, and other conditions of the lease are subject to readjustment at the end of the primary term of 20 years, and at the end of each following 10-year period. The Bureau of Land Management and the U.S. Geological Survey, in cooperation with the Forest Service, are required to prepare an Environmental Assessment Report/Technical Examination. Stipulations may be added which bring the lease into conformance with surface management planning or other legal requirements. Monitoring programs, because they are part of the mine plans, will be implemented or modified as needs are identified, and will generally not be part of the lease readjustment process.

VI. RECLAMATION/MITIGATION

At this point in time, it is difficult to suggest any mitigation of impacts or reclamation of areas that are impacted by undermining, since we can only assume those impacts and their effect. Mitigating measures will be contingent upon the findings of the program. As data is collected, methods of mitigation and reclamation will be formulated. This will be done in cooperation with the OSM and other agencies as required.

Since significant subsidence is expected to occur after final mining, the Forest Service will require continuance of pertinent programs until such time that it is determined the program is no longer needed. This time period will be a result of data evaluation and information from not only the specific mine involved, but as a result of data from several sources. The time period will be established by the Forest Service, Geological Survey, Office of Surface Mining, and Bureau of Land Management.

VII. LAND MANAGEMENT POLICY

All data accumulated by these monitoring programs will be used to mitigate impacts to resource elements of the National Forest lands and to update the Forest's land management plans, and to provide source information for processing new leases and/or new mining proposals and operations. The programs will be congruous with all present and future management plans. Changes in resource values and emphases will also have bearing on the intensity of these programs. Flexibility of these programs and their implementation is important in the management of the Forest. The Forest Service will, therefore, recommend modification of the monitoring programs as necessary.

This monitoring plan will be evaluated and updated as frequently as needed by the Forest Service, in cooperation with the Geological Survey and Office of Surface Mining, in response to the data generated and to changes in management policies and direction.

A problem to monitoring is access to surface areas, particularly on private land.

VIII. APPENDIX

DIRECT AND PRECISE METHODS FOR PHOTO IDENTIFICATION

If size prohibits the direct identification, a small diameter image point readily identifiable on the photography is used for a compass bearing and distance tie to the water source. Small pinholes in the photo emulsion surface are used to identify the image point selected (reference Figure 1).

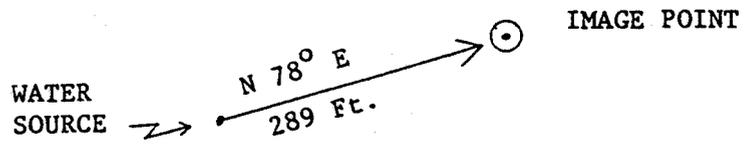


Figure 1 -

Figure 1. Compass bearing and distance. Note that the bearing is from the property corner to the image point. If horizontal distance exceeds 400 feet, the precise identification procedure should be used (reference Figure 2).

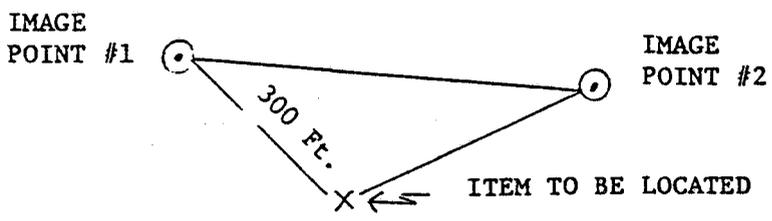


Figure 2 - Precise Identification Tie

In Figure 2, both image points must be pinpricked on the photograph. Horizontal and vertical angles are observed from X to image points 1 and 2. Horizontal and vertical angles are observed from image point #1 to X and image point #2. Horizontal distance is measured between image point 1 and X. Regardless of the method used, a sketch (and description of image points and item being located) on the back of the photograph are essential. Both methods of identification provide for accurate photogrammetric transfer to a base map. If water sources or other items required to be plotted on a base map are tied horizontally to the photo control network their positions may be scaled on the base map from coordinate values. In the event color infrared photography is not required or available, the photo-identification will apply to existing project photography.

B.

PHOTOGRAMMETRIC MAP COMPILATION

DESCRIPTION

- 1. This work shall consist of compiling a topographic map and/or "reading" a series of points from aerial photographs in accordance with these specifications, including labor, equipment, materials, and incidentals necessary to complete the work. The initial area to be mapped shall be the area to be mined in the next 18 months (plus angle of draw) on the entire lease area as appropriate.

MATERIALS

- 2. Base sheets for both the original base manuscripts and the overlays shall be polyester base film between 0.004 inch and 0.007 inch in thickness. Paper prints of the final drafted map sheets shall be 16 pounds or heavier stock paper.

REQUIREMENTS

- 3. MANUSCRIPT MAP REQUIREMENTS. Manuscripts shall be compiled as follows:
 - a. Coordinate Grid Ticks. The plotted positions of each plane coordinate grid tick shall not vary by more than 0.01 inch from the true grid position. Grid ticks shall be plotted at 5 inch intervals. A north arrow indicating grid north shall be shown on each sheet.
 - b. Scale and Contour Interval. The scale and contour interval shall be 1" = 100' and 2' or as specified by individual project.
 - c. Match Lines. Match lines and reference numbers shall be provided ^{so} that each map may be accurately joined to those which are adjacent.

- d. Sheet Layout. Each sheet shall be numbered in the border area in each of the four corners. The numbers shall be approximately 0.5 inch high and shall be encircled. A label which includes Forest name, project name, date and scale shall be placed in the margin at the lower right hand corner of each sheet.
- e. Control Points. All control points shall be plotted and labeled including: horizontal and vertical control points, pass points, tie points, and construction survey control points when required. The principle point of each photo shall also be plotted and labeled.
- f. Planimetric Features. All planimetric features visible and identifiable on the aerial photos shall be shown. Planimetric feature symbols shall conform to Figure ~~195-1~~³. Planimetric features not shown on Figure ~~195-1~~³ shall be drawn to scale and labeled.
- g. Topographic Features. All contours shown shall be compiled using a stereo plotting instrument. Every fifth contour shall be a heavier weight line. The elevation of every fifth contour shall be shown in tiers approximately 10 inches apart.

Where contours spacing is more than 2 inches apart at final scale, spot elevations shall be shown in a 1-inch grid pattern. Spot elevations shall also be shown at peaks, depressions, saddles, on centerline at each end of a bridge, on centerline at road intersections, and at locations where interpolation from contours will not give true elevations.

Where contour spacing is less than 10 per inch, the intermediate contours may be dropped and every fifth contour, with heavier line weights, shall be left.

4. FINAL MAP REQUIREMENTS. Except for sheet layout the final map sheets shall meet the manuscript map requirements. In addition, the final map sheets shall meet the following requirements.

a. Sheet Size and Layout. Sheets shall be the size specified in Special Project Specifications. Each sheet shall have a border and title block in the lower right hand corner.

A title block and bar scale shall be shown on each final map sheet. The title blocks shall include the following statements:

(1) Date of photography, scale of aerial photography and scale at which map was compiled.

(2) Statement of datum basis of map grid and elevation.

A small scale, correctly oriented, map sheet index shall be shown on each map sheet. The index shall show all sheets and their numbers. The sheet upon which the index is located shall be crosshatched.

b. Drafting. Final map sheets shall be either scribed, or drafted with ink, at the final map scale. The drafting method chosen shall be used for all sheets.

Map details shall be clear, sharp, and legible after reproduction. Lettering shall not be done freehand.

5. MAP ACCURACY

a. Topography. At least 90 percent of all elevations determined from contours shall be within 0.5 contour interval of true elevation, and all elevations so determined shall be within 1.0 contour interval of true elevation except as follows:

- (1) Where the ground is obscured by brush or tree cover, contours shall be plotted from the stereoscopic model, making use of spot elevations measured photogrammetrically in places where the ground is visible. In these areas, at least 90 percent of the elevations determined from contours shall be within 1.0 contour interval of true elevation. All elevations so determined shall be within 2 contour intervals of true elevation. Contours within these areas shall be shown as dashed lines.
 - (2) In densely wooded areas where spot elevations cannot be determined, contours shall not be drawn. They shall be outlined and labeled "ground not visible" or "GVN".
- b. Spot Elevations. At least 90 percent of all spot elevations shall be within 0.25 contour interval of true elevation. All spot elevations shall be within 0.50 contour interval of true elevation.
 - c. Planimetric Features. At least 90 percent of all well-defined planimetric features such as structures, paved roads, intersections, etc., shall be within 0.025 inch of their true position. All shall be within 0.050 inch of their true position.
 - d. Coordinate Grid Ticks. The plotted position of all coordinate grid ticks shall not vary by more than 0.01 inch from their true grid position.
 - e. Horizontal Control. The plotted position of all horizontal control points shall not vary by more than 0.01 inch from their calculated position.

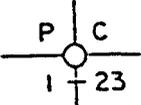
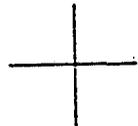
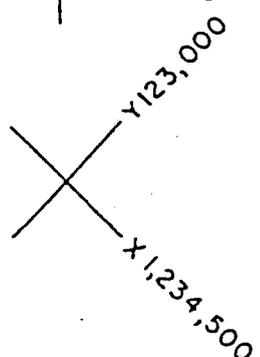
Acceptance or rejection of the map or portions thereof will be the responsibility of the leasee and based on whatever means they feel necessary to perform (generally field survey methods).

6. MAP ACCURACY TESTS. The Forest Service may elect to evaluate map accuracy and precision based on a sample of test points. The test points will be randomly selected models and representative of the feature being tested.

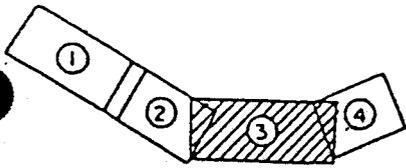
The position and elevation of test points will be determined by the Forest Service using photogrammetric or ground survey methods of equal or better precision than those used for map production. Discrepancies will be calculated between the test values and map values. Statistical methods of hypothesis testing will be used to determine if the mean and standard error of the sample of discrepancies indicate that map accuracy requirements have been met.

The values listed on Table 195-1 will be used to determine if the mean and standard error may be reduced by assuming a horizontal displacement not to exceed 0.025 inch. Tests for accuracy will apply only to the models in which tests were performed.

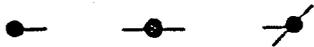
All required materials or suitable duplicate thereof will provided to the Forest Service as requested to insure and assist in the successful implementation and continuation of this program.

H-1A △	HORIZONTAL CONTROL POINT (LABEL)
P-1A ○ <u>1234.56</u>	VERTICAL CONTROL POINT - FIELD (LABEL)
HP-1A △ <u>1234.56</u>	HORIZONTAL & VERTICAL CONTROL POINT - FIELD
BM-22 ⊠ 1234.56	BENCH MARK
X 1234.5 ⬡	SPOT ELEVATION PHOTOGRAMMETRICALLY CONTROLLED POINT
	AERIAL PHOTO CENTER
	SECTION CORNER
	QUARTER CORNER
	GRID TICK (1 INCH LONG)
	COORDINATE VAULES - LABEL AROUND PERIMIETER OF SHEET
	SHEET NUMBERS - ON EACH CORNER OF MANUSCRIPT SHEETS. ADJACENT MATCH SHEET NUMBER SAME, NO CIRCLE.

3
Figure 195-1 -- Photogrammetric Map Symbols



SHEET LAYOUT DIAGRAM, FINAL SHEETS. ORIENT TO SHEET BEING DRAFTED, CROSS HATCH SHEET ON DIAGRAM.



UTILITY POLES.



TRANSMISSION LINES & TOWERS



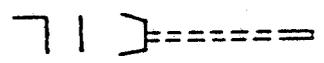
MANHOLE 3/32 INCH CIRCLE w/3 DOTS



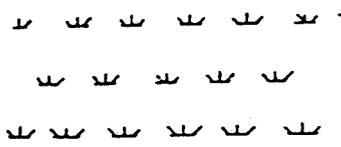
DRAINAGE INLET SMALL SQUARE w/3 LINES



FIRE HYDRANT



HEADWALL, HDWL w/PIPE, LABEL ONLY TO CLARIFY



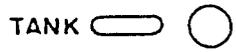
MARSH OR SWAMP



INDIVIDUAL AND GROUPED TREES, BRUSH GROUND COVER
P - PINE O - OAK



ROCKS (LABEL)



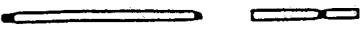
TANK (LABEL)

- FIRE HYDRANT - FH
- FLAGPOLE - LABEL - FP
- PULLBOX - PB
- WELL - WELL
- ETC. LABEL TO CLARIFY
- ALL 1/16 INCH CIRCLE

Figure 195-1 -- Photogrammetric Map Symbols



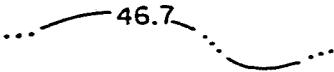
RAILROADS - 50 SCALE OR LARGER
100 SCALE OR SMALLER



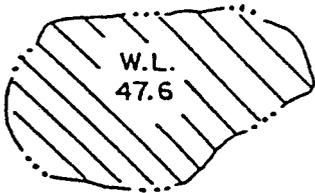
FREEWAY SIGNS



SIGNS



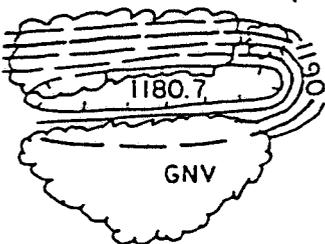
SMALL STREAM



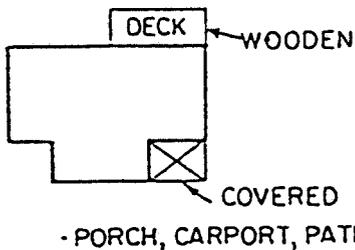
LARGE BODIES OF WATER. WATER LEVEL AS SHOWN.
CROSS HATCH APPROX. 0.25 INCH IN AROUND EDGE



SMALL BODIES OF WATER CROSS HATCH AS SHOWN.



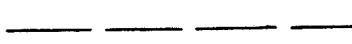
CONTOURS SOLID LINES IN OPEN AREAS. 1.0 INCH DASH
LINES UNDER TREES AND BRUSH WHERE GROUND IS
OBSCURED, BUT WITH OPEN SPOTS. WHERE GROUND IS NOT
VISIBLE AND THERE ARE NO OPEN SPOTS, DO NOT DRAW
CONTOURS. LABEL GNV. USE TICK MARKS AND SPOT
ELEVATIONS TO INDICATE DEPRESSIONS.



BUILDING. LABEL ONLY TO CLARIFY. SHOW MOBILE
HOMES THE SAME. DO NOT SHOW TRAVEL TRAILERS.



EDGE OF CONCRETE OR ASPHALT TRAVELED WAY. 0.5 INCH
DASH.

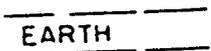


EDGE OF SHOULDERS TURNOUTS, PARKING AREAS 0.5 INCH
DASH.



ASPHALT DIKE (LABEL)

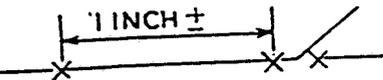
Figure 195-1 -- Photogrammetric Map Symbols



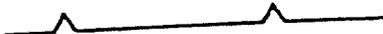
EDGE OF AGGREGATE OR EARTH TRAVELED WAY. 0.25 INCH DASH LABEL TO CLARIFY.



TRAIL OR WHEEL TRACKS. 0.25 INCH DASH. LABEL TO CLARIFY.



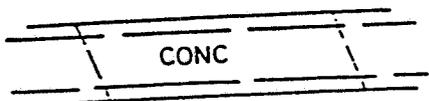
FENCE & GATE.



RETAINING WALL. "V" TOWARD HIGH SIDE



GUARD RAIL POSTS - PLOT AT SCALE



BRIDGE SHOW RAIL AND ENDS OF BRIDGE.



MISCELLANEOUS PLANIMETRY LABEL TO CLARIFY.

NOTES: 1. All maps 1:1200 and larger shall be drafted with two line weights.

SCRIBE

- a. Fine=0.010 inch
- b. Heavy=0.016 inch

INK

- #00 Rapidograph or equal
- # 2 Rapidograph or equal

For maps smaller than 1:1200 use:

- a. Fine=0.006 inch
- b. Heavey=0.013 inch

- #000 Rapidograph or equal
- #0 Rapidograph or equal

2. Map lettering shall be size 100 Leroy caps or equal. Except for proper names which shall be 120 Leroy caps or equal with fine pen.

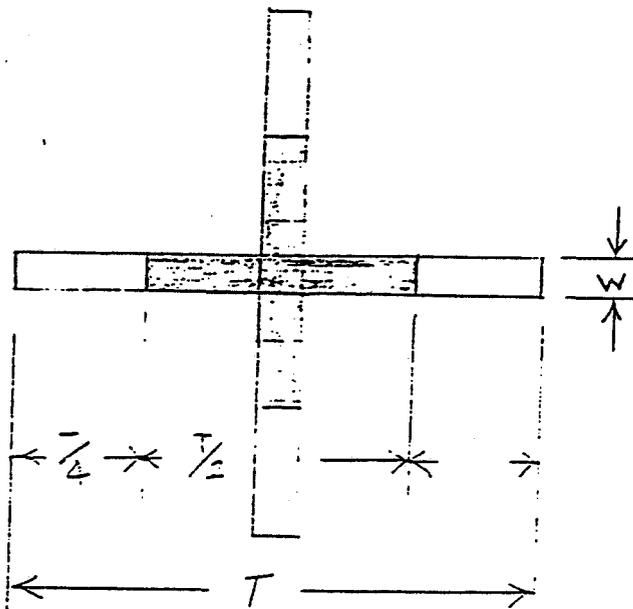
Figure 195-1 -- Photogrammetric Map Symbols

PHOTOGRAPHIC TARGETS (GROUND PANELS)

The precision required in large scale mapping projects using photogrammetric methods, requires an exact correlation between the photography coverage and a significant number of selected points or monuments on the ground for which X, Y, and Z coordinates are accurately measured and established by ground survey methods. These points are usually station markers in the ground in solid rock or on a permanent concrete-type structure where the points, once measured, will be well preserved for recovery and use whenever needed. Placement of a target centered on the monument or station marker so it will appear as a well-defined concentric image on the aerial photographs is essential (see Figure 3). These targets should also be placed on all supplemental control points required for orientation of the aerial photographs in photogrammetric instruments for forming stereoscopic models to scale and elevation for accomplishing the required measuring and mapping. Targets should also be placed on pertinent survey monuments on the boundaries of all affected properties including Township and Range, Section and quarter corners. Predetermined points on which photogrammetric measurements will be made to establish surface bareline information may also require targeting, however, these will not require permanent monumentation. In this case, capped rebar in the center of each target will be adequate. Property corners not used as basic control may be targeted with only 3 legs of equal spacing using the same dimensions as shown in Figure 3.

Care should be taken where possible to place control and targets in open areas where they will not be obscured by ground cover and/or shadows. In some cases, this may not be possible and clearing will be required. Figure 4 illustrates the approximate clearing criteria. Experience has shown that the darker center of the target provides better contact for "readability".

FIGURE 3 -- Recommended target configurations and dimensions for placement on station markers. Recommended material is Griffolyn Type 65 black and white matte finish or equivalent.

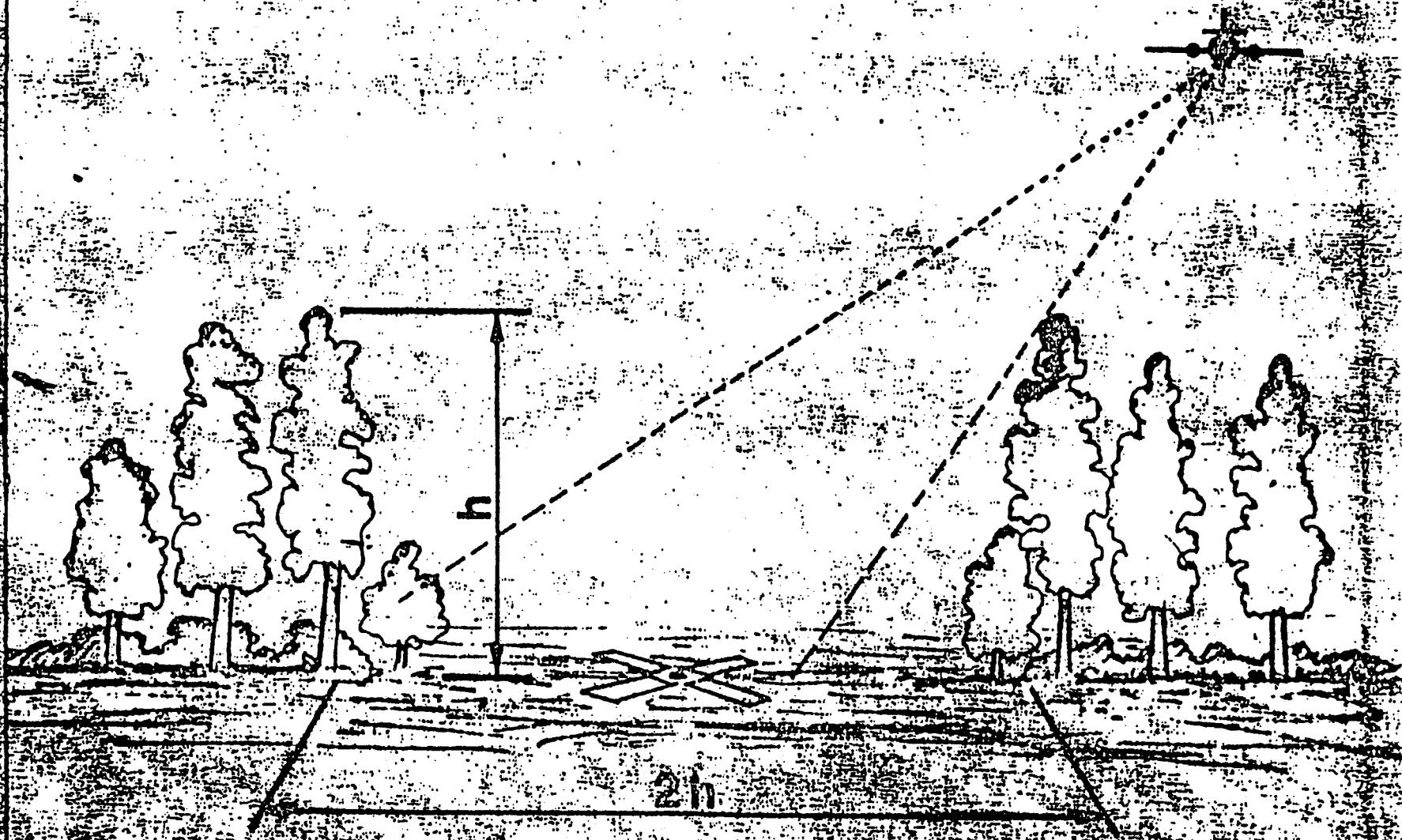


T = total length (in feet) = 1/40 photo scale expressed in feet to inches.
Example: 1:4800 photo scale equals 1" = 400' ÷ 50 = 10'.

W = width of leg in inches = 1/60 photo scale expressed in feet to inches.
Example: 1:4800 = 1" = 400' ÷ 60 = 6.7.

Note: Allowances should be made in width and length for "hem" or double thickness if spikes are used to hold down target. Additional width and length should also be used if rocks are necessary to hold down target or if targets are placed on steep sideslopes.

MASTER VU GRAPH MODEL
FOR
8X11 SLIDE VERTICAL
CAMERA
18 X 10 CLEAR APERTURE



APPENDIX 4-U.S. FOREST SERVICE COLLECTION AGREEMENT

COLLECTION AGREEMENT

Between

Trail Mountain Coal Company

And

Manti-LaSal National Forest
United States Department of Agriculture

THIS COLLECTION AGREEMENT, made and entered into by and between Trail Mountain Coal Company, hereinafter referred to as the DEPOSITOR, and the Manti-LaSal National Forest, U.S. Department of Agriculture, hereinafter referred to as the FOREST SERVICE, under the provisions of the Granger--Thye Act of February 24, 1950 (16 U.S.C. 572).

WITNESSETH:

WHEREAS, the FOREST SERVICE has the responsibility as a surface management agency to insure mineral development with adequate protection of surface resources,

WHEREAS, the DEPOSITOR is desirous to comply with the requirements for subsidence monitoring (30 CFR 211-700),

WHEREAS, it is to the mutual advantage of the parties hereto mentioned to cooperate in instigating and supporting a photogrammetric method of monitoring subsidence, more particularly prescribed in the attached plan, which is hereby made part of this agreement.

NOW THEREFORE, in consideration of the above premises, the parties hereto agree as follows:

A. THE DEPOSITOR SHALL

1. Construct target monuments at designated locations over their lease area. One of these must be at or near the mine portal. These target monuments shall be in accordance with or superior to those shown on Attachment No. 1.
2. Determine the precise coordinates and elevation of each of these monuments--Utah Coordinate System should be used.
3. Target all monuments, as shown on Attachment No. 1, for the first year, and as specified by the FOREST SERVICE each successive year prior to taking of the aerial photography.
4. Provide the FOREST SERVICE with copies of the survey data.

5. Upon presentation of a Bill for Collection, annually deposit with the FOREST SERVICE, within 30 days, the amount estimated by the FOREST SERVICE, needed to cover the cost of conducting the annual aerial photographic survey of portions of the leasehold. This amount includes the cost of conducting the aerial survey, color and infrared photography, prints (digitizing photographs, producing contour maps, and/or ortho photographs, as needed), and related indirect costs.
6. Upon presentation of a Bill for Collection, reimburse the FOREST SERVICE within 60 days the actual cost of services in excess of advance deposits.

B. THE FOREST SERVICE SHALL

1. Make aerial photographs of the lease area using methods that will produce usable and adequate photographic prints for measurement of subsidence.
2. Perform aerial triangulation (bridging).
3. Make point readings for subsidence monitoring (as necessary).
4. Provide to the DEPOSITOR one set of black and white and one set of color prints (9" x 9"), with a 1:4800 scale following each annual flight.
5. Provide to the DEPOSITOR copies of all subsidence monitoring point readings (as may be required).
6. Deposit funds so collected in the cooperative work fund of the FOREST SERVICE.
7. Use the funds collected under A.5 and A.6 to cover the costs of conducting aerial surveys, color and (when required and agreed upon) infrared photography, prints, digitizing photographs, and producing contour maps and/or ortho photographs, as needed.
8. Assist, cooperate, and--in some areas--conduct range analysis, timber surveys, and wildlife habitat studies on National Forest System lands, as may be necessary, to determine the effects of undermining upon surface resources.

C. IT IS MUTUALLY AGREED AND UNDERSTOOD BY AND BETWEEN THE SAID PARTIES THAT

1. As data is collected, frequency and times of the surveys may be changed to accommodate identified needs.
2. The FOREST SERVICE will require continuance of programs until such time it is determined the program is no longer needed, but not to exceed five years following final closure of the mine. Special cases may exist which require this time period to extend beyond five years. Concurrence of all involved parties would then be required for extending this monitoring period.

3. This agreement will have no effect on provisions and clauses of any of the DEPOSITOR'S Special Use Permit(s).
4. Upon request of the DEPOSITOR, any unused or unobligated deposited funds for a given year will be refunded, and a statement of costs for the period provided. Otherwise, unused or unobligated funds will be applied to the following year's billing(s).
5. That nothing herein shall be construed as obligating the FOREST SERVICE to expend, or as involving the United States in any contract or other obligation for the future payment of, money in excess of appropriations authorized by law and administratively allocated for this work.
6. No Member of or Delegate to Congress, or Resident Commissioner, shall be admitted to any share or part of this agreement, or to any benefit that may arise therefrom; but this provision shall be construed to extend to this agreement if made with a corporation for its general benefit.
7. This agreement may be amended as necessary by mutual consent of both parties, by the issuance of a written amendment, signed and dated by both parties.
8. Either party may terminate the agreement by providing 60 days' written notice: Provided that any funds on deposit will be available for expenses incident to closing out the work beyond the period of written notice. Unless terminated by written notice, this agreement will remain in force indefinitely.

IN WITNESS THEREOF, the parties hereto have executed this agreement as of the last date written below.

TRAIL MOUNTAIN COAL COMPANY

7/3/84
Date

By: Joe Tilder

USDA - FOREST SERVICE

7/10/84
Date

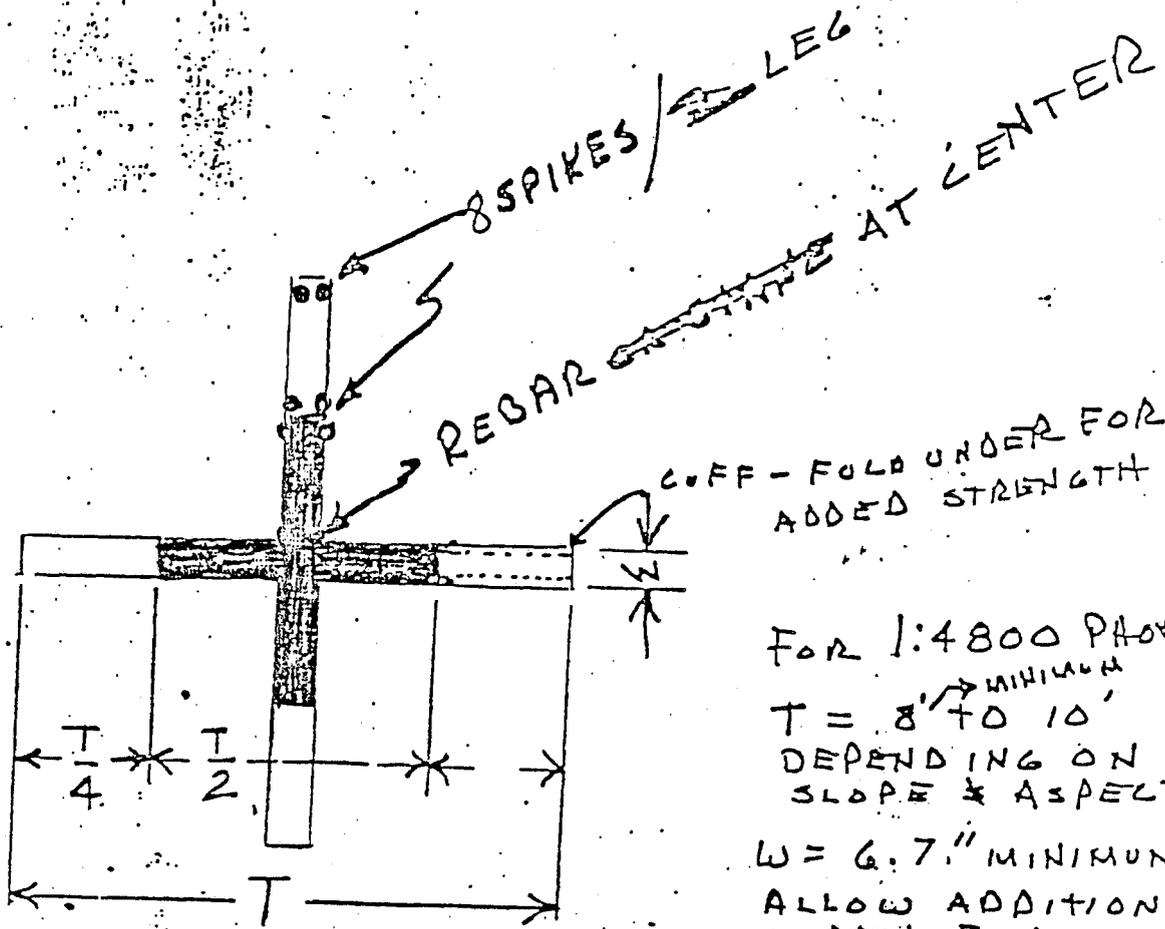
By: Leed C. Clouston
Forest Supervisor

PHOTOGRAPHIC TARGETS (GROUND PANELS)

The precision required in large scale mapping projects using photogrammetric methods, requires an exact correlation between the photography coverage and a significant number of selected points or monuments on the ground for which X, Y, and Z coordinates are accurately measured and established by ground survey methods. These points are usually station markers in the ground in solid rock or on a permanent concrete-type structure where the points, once measured, will be well preserved for recovery and use whenever needed. Placement of a target centered on the monument or station marker so it will appear as a well-defined concentric image on the aerial photographs is essential (see Figure ⁴/₃). These targets should also be placed on all supplemental control points required for orientation of the aerial photographs in photogrammetric instruments for forming stereoscopic models to scale and elevation for accomplishing the required measuring and mapping. Targets should also be placed on pertinent survey monuments on the boundaries of all affected properties including Township and Range, Section and quarter corners. Predetermined points on which photogrammetric measurements will be made to establish surface bareline information may also require targeting, however, these will not require permanent monumentation. In this case, capped rebar in the center of each target will be adequate. Property corners not used as basic control may be targeted with only 3 legs of equal spacing using the same dimensions as shown in Figure 3.

Care should be taken where possible to place control and targets in open areas where they will not be obscured by ground cover and/or shadows. In some cases, this may not be possible and clearing will be required. Figure ⁴/₃ illustrates the approximate clearing criteria. Experience has shown that the darker center of the target provides better contact for "readability".

ATTACHMENT 1



COFF - FOLD UNDER FOR ADDED STRENGTH

FOR 1:4800 PHOTO
 $T = 8'$ TO $10'$ MINIMUM
 DEPENDING ON SLOPE & ASPECT
 $W = 6.7"$ MINIMUM
 ALLOW ADDITIONAL WIDTH FOR COFF ON @ SIDE

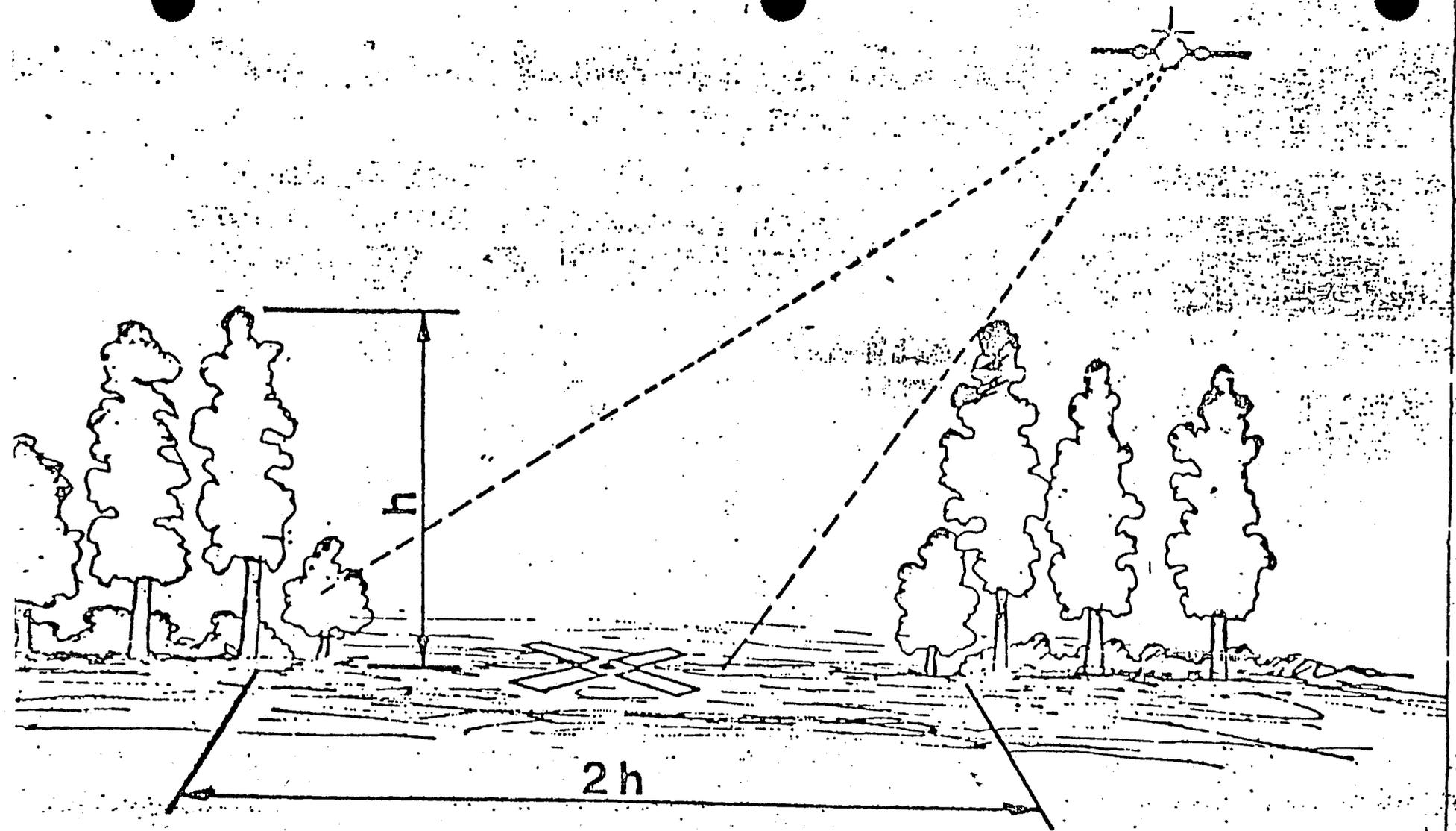
$T =$ TOTAL LENGTH (IN FEET)
 $= \frac{1}{50}$ PHOTO SCALE (ft to in)
 $1:6000 \text{ PSR} = 1" = 500' \therefore 50 = 10' - 12'$

$W =$ WIDTH OF LEG IN INCHES
 $= \frac{1}{60}$ PHOTO SCALE (ft to in)
 $1:6000 = 1" = 500' \therefore 60 = 8.3" - 12"$

GRIFFOLYN TYPE 65 B/W MATTE
 1200' ROLLS 50" WIDE

$1:6000 \text{ } \$2.13 + / \text{ TARGET}$

* MAINTENANCE & RECORD OF LOCATION



GUIDE FOR CLEARING TO ELIMINATE SHADOWS
AND COVER OBSCURITY

APPENDIX 5-ROOF CONTROL PLAN

ROOF CONTROL AND PILLAR RECOVERY PLAN

FEBRUARY 1986

TRAIL MOUNTAIN COAL COMPANY
TRAIL MOUNTAIN MINE
ORANGEVILLE, UTAH
MINE I.D. 42-01211



Diamond Shamrock
Coal Company

February 6, 1986

Mr. John Barton
Mine Safety and Health Administration
P. O. Box 25367
Denver, CO 80225

RE: Trail Mountain Mine I.D. #42-01211, Roof Control Plan

Dear Mr. Barton;

Trail Mountain Coal Company hereby submits the enclosed roof control plan for your review and consideration. This plan has been formulated to provide protection to the miners employed at Trail Mountain Coal Company. This plan shows minimum requirements and additional support will be installed if needed to insure the safety of the miners. This roof control plan will supersede any previously submitted and approved roof control plans.

Your consideration in this matter is greatly appreciated. If you have any questions or need further information, please feel free to contact me at (801) 748-2140.

Sincerely;

TRAIL MOUNTAIN COAL COMPANY

Joseph R. Fielder
General Mine Manager

Enclosure

JRF/gg

ROOF-CONTROL PLAN

General Information

Date February 6, 1986 Mine I.D. No. 42-01211

A. Company Trail Mountain Coal Company

Address P. O. Box 550 Orangeville, Utah 84537
City State

B. Mine Trail Mountain Mine

Mine Location

Orangeville Emery Utah
City County State

C. Location (Reference to nearest highway route, direction, and distance)

Three (3) Miles North Off Route No. Ut. Hwy 29
West

D. Type(s) of plan See Attachment (A)

E. Area(s) of mine covered by the plan Active Working Areas

F. Maximum cover (Feet) 2000 - 2600

Main roof

Sandstone	10'+
Coal	0' - 3'

Immediate roof

Sandstone	2' - 4'
Coal	1' - 2'

Coalbed

Sandstone	1' - 4'
Coal	7' - 9'

Bottom

Sandstone	10'+
-----------	------

G. Joseph R. Fielder Joe Sulder General Mine Manager
Company or mine official validating plan Title

Roof-control investigator(s) _____

Approved by _____ Date _____

Title _____

This Roof Control Plan approved this date hereby supersedes all previously approved plans

ATTACHMENT (A)

FULL BOLTING ROOF CONTROL PLAN

1. Full roof bolting plan with the exception of the normal mining cycle. Normal mining cycle will not exceed 140' in any entry or cross-cut. See Drawing #1.
2. The sole means of roof support during the normal mining cycle will be timbers and/or jacks on five (5) foot centers to maintain the roadway width at 16 feet. However, cross bars, steel beams, planks or cribs may be used as sole support or in conjunction with jacks or timbers.
3. The Timbers and/or metal jacks will be replaced with roof bolts on five (5) foot centers as the entry or cross cut is fully bolted. See drawing #2.
4. If falls occur to solid formation, four (4) foot bolts may be used in these areas, excluding hanging brows. Four (4) foot bolts may be installed for construction purposes if not used for primary roof support.

H. ROOF-SUPPORT MATERIALS ROOF BOLTS -CONVENTIONAL TYPE

Manufacturer CFI, Birmingham or Manufacturer's
equivalent Designation R-1, NA

Minimum length 60" as Primary Support Diameter 5/8" extra HS
48" as Specified in Attachment A
Type steel High strength or extra HS Type thread Standard

Length of thread 3 3/4 Min. Type head Standard
(Standard, Self Centering, Cone Neck)

Dimensions of bolt head: Nut 1 and 1/8" Flange Standard

I. BEARING PLATES

Manufacturer Mikco Inc. or other Manufacturer's
equivalent approved plates Designation NA

Dimensions Minimum 6 x 6 x 1/4 or 6 x 6 x 3/8 or 6 x 6 x 3/16

Shape Embossed or flat Center
(Donut Embossed, Bell Embossed, Flat) Hole Size 7/8" maximum

J. WASHERS

Manufacturer DNA Manufacturer's
Designation DNA

Type steel DNA Size DNA

Shape DNA Hole Size DNA
(Donut embossed, Bell embossed, Flat)

K. ANCHORAGE UNIT

Manufacturer CFI, Ohio Brass or Manufacturer's
equivalent unit Designation PUTIM D-1
22463

Type BAIL Size of Finished Hole 1-3/8" minus zero
Dust Control +.030"

Method of drilling _____

Installed torque 120-250 foot pounds

L. MATERIALS USED IN CONJUNCTION WITH ROOF BOLTS

Timbers, Metal Jacks, Cribs, Cross Bars, I-Beams.

Mats, Wooden cap Blocks and Planks

M. FACE EQUIPMENT AND SECTION HAULAGE EQUIPMENT ASSOCIATED WITH EACH:

1. 2 - 10 SC Joy Shuttle Cars

2. SN 822-009 Pyott Boone Ram Car

3. 2 Jeffrey Diesel Ram Cars

4. 3 TDI-36-2-3E Lee Norse Double Boom Roof Drills

5. 12 CM-11 Joy Continuous Miner

6. 12 CM-3 Joy continuous Miner

N. SEQUENCE OF MINING AND INSTALLATION OF SUPPORTS INCLUDING TEMPORARY SUPPORTS

Plan drawing showing sequence of mining including pillar mining where applicable, sequence of installation and spacing of supports including temporary supports and maximum width of entries, rooms, intersections, crosscuts, and pillar lifts are attached.

Entry width 20'

Entry centers 120' 100' 80' 60' 50' 40'

Crosscut width 20'

Crosscut centers 120' 100' 80' 60' 50' 40'

Room width 20'

Room centers 120' 100' 80' 60' 50' 40'

Room crosscut width 20'

Room crosscut centers 120' 100' 80' 60' 50' 40'

Slope width (anthracite) DNA

Gangway width (anthracite) DNA

D. ROOF SUPPORT MATERIALS - CONVENTIONAL OR TEMPORARY AND SUPPLEMENTAL

Length of post As required

Diameter of post 1 inch for each 15 inches in length but not less than 4 inches - Split posts shall have a cross-section area equal to that

required for round posts of equivalent length. Jacks: Simplex or equivalent: certified minimum 4 tons.

Type of post Round or split of solid straight grain wood with the ends sawed square and free from defects which would affect their strength.

* Cap blocks, size and shape Cap Blocks and footers shall have flat parallel sides and be not less than 6" x 18" tapered from 2" in size.

Wedges, size and shape 1/0" x 3 1/2" x 10" Minimum

Crossbars, type Straight grain solid wood

* Crossbars, size A minimum of 3 inches by 8 inches of varying length.

Standard steel 4" I beam 13 pounds per linear foot.

* Planks, size A minimum of 1 inch by 8 inches of varying length

Cribbing blocks, size A minimum of 30 inches in length of varying cross section

DRAWING * 1

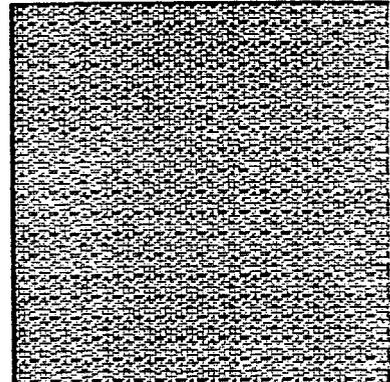
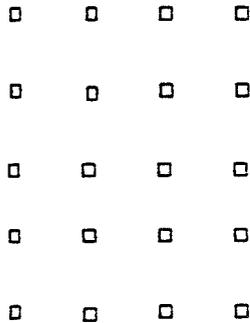
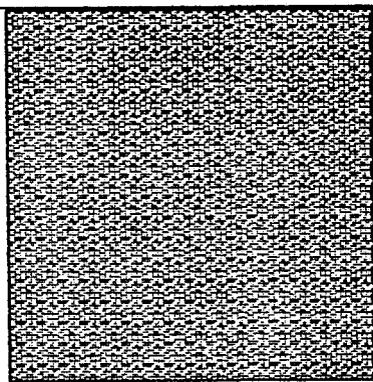
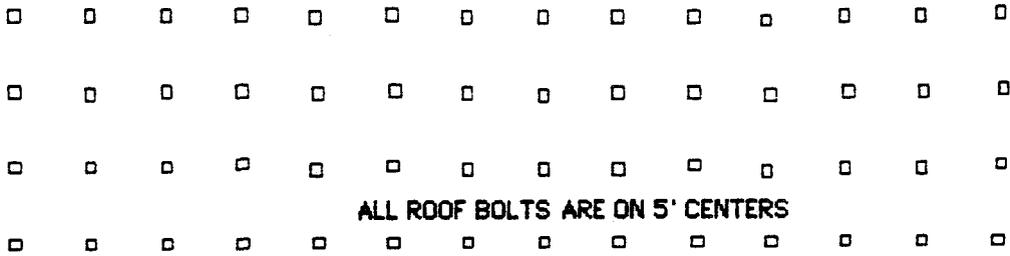
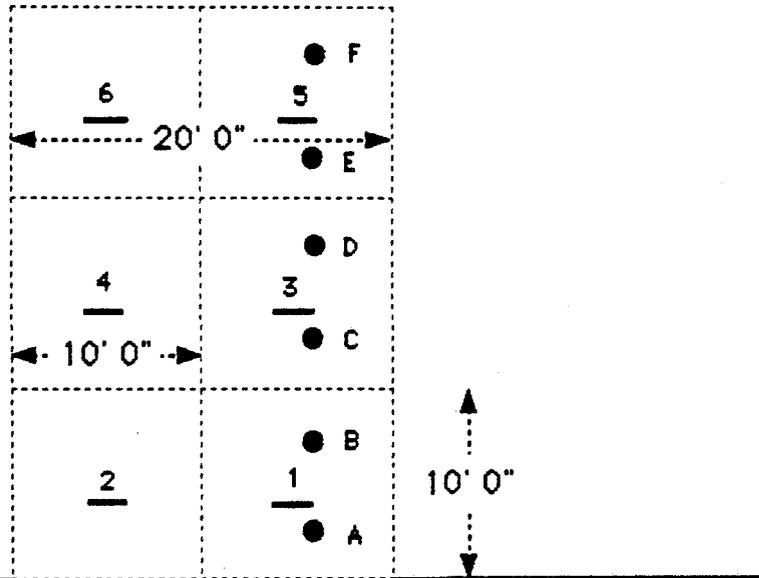
NORMAL MINING SEQUENCE

LEGEND

- Timbers or Metal Jacks
- Roof Bolts (5-0' c-c)
- 1 Cut Sequence
- A Timber Sequence

SCALE 1" = 10'

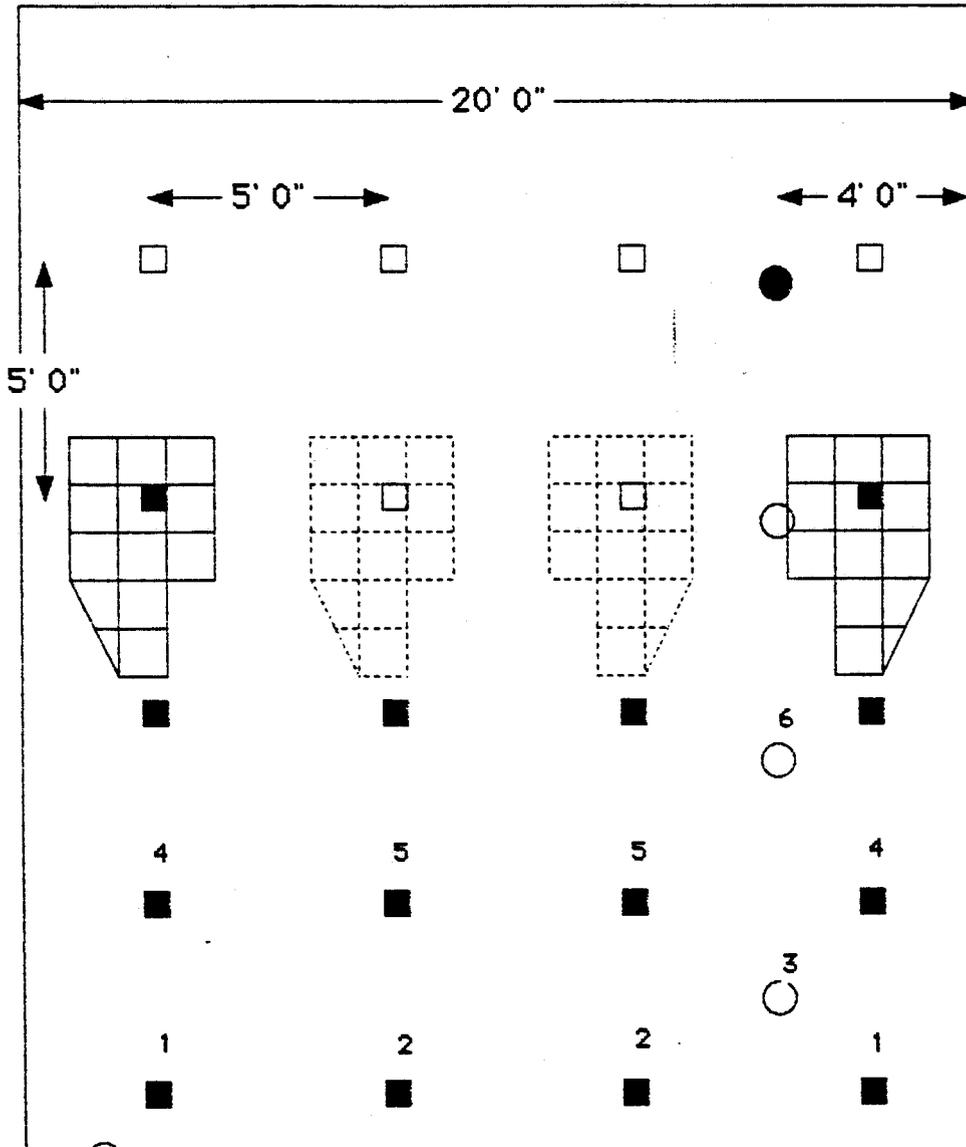
Cut 1, install supports A & B. Cut 2.
 Cut 3, install supports C & D. Cut 4.
 Cut 5, install supports E & F. Cut 6
 Etc., Etc..



This is the normal sequence, showing entries and cross-cuts fully bolted on five (5) foot centers. This bolting is completed as soon as practical. Normal mining cycle will not exceed 140 feet in by any entry or cross cut. Intersections will be fully bolted prior to any entries or cross-cuts being started or holed through.

**ROOF BOLT INSTALLATION SEQUENCE WITH ATRS SYSTEM
AND REMOVAL OF ROADWAY TIMBERS AND OR JACKS**

The first roof bolt will be installed against the rib lines after ATRS is pressurized against the roof. Remaining bolts will be installed by moving the ATRS towards the center of the roof with roof bolts installed on 5' centers. If the distance from the rib to the first roof bolt exceeds 5', additional bolts will be installed on cycle.



Bolting will not be done if ATRS system is inoperative.

- Timber and/or jack removed
- Timber and/or jack in place during normal mining sequence
- Proposed roof bolt
- Roof bolts in-place
- 1 Roof support sequence

Scale: 1" = 5'

DRAWING # 2

The following resin grouted roof-support material is approved for use in lieu of conventional type roof bolts at the subject mine:

ROOF SUPPORT MATERIALS - RODS

Manufacturer Mountain States Bolt **Manufacturer's Designation** _____
Mikco Industries _____
CFI (or equivalent) _____

Minimum length 60" as Primary Roof Support Diameter 3/4" or 7/8"

Type steel 48" as Specified in Attachment (A) Rebar Type head Square

Minimum yield _____

Dimensions of bolt head: Nut 1-1/8" Flange 1-3/4"

BEARING PLATES

Manufacturer _____ **Manufacturer's Designation** _____

Dimensions 6 x 6 x 1/2" or 6 x 6 x 3/8" or 16 x 6 x 1/2"

Shape Flat or Embossed **Center Hole Size** 1"

RESIN

Manufacturer Saf-Loc, Dupont **Manufacturer's Designation** _____
Loc Tite, Celtite or _____
equivalent _____

Type M35 Fast Setting Resin **Method of Drilling** _____

Size of Finished Hole _____ **Dust Control** Vacuum or Water

SAFETY PRECAUTIONS FOR MINING CYCLE

1. This is the minimum roof control plan and was formulated for normal roof conditions while using the mining system(s) described. In areas where subnormal roof conditions are encountered, indicated or anticipated, the operator shall provide additional support where necessary. If changes are to be made in the mining system that necessitates any change in the roof control plan, the plan shall be revised and approved prior to implementing the new mining system.
2. All personnel required to install roof supports shall be trained by a qualified supervisor designated by mine management before being assigned to perform such work. This training shall insure that such persons are familiar with the functions of the support being used, proper installation procedures, and the approved roof control plan.

Supervisors in charge and miners who install supports shall be informed of an approved roof control plan and any change in a previously approved roof control plan no later than their first working shift following receipt of the approved plan. As soon as possible, but not later than three weeks after receipt of this approved plan, all provisions contained herein shall be fully explained to all miners whose duties require them to be on a "working section". All new miners shall have the hazards of mine roof and ribs and the content of this plan explained to them before they start to work.

3. (a) Upon completion of the loading cycle, a reflectorized warning device, such as a "stop" sign, shall be conspicuously placed to warn persons approaching any area that is not permanently supported. It is to be emphasized that the warning device has been placed to cause the person to stop, examine, and evaluate the roof and rib conditions prior to entering the area--even after temporary supports have been installed.
- (b) Where required, temporary support shall be installed immediately after the loading cycle is completed.

(i) Except when the District Manager has determined that more than 5 minutes are needed, "immediatley" is interpreted to mean that the installation of such temporary supports shall be started not later than 5 minutes after mining of the cut is completed and, after the installation of such supports is started, the installation of supports shall be continued until at least the minimum number are installed as required in the approved plan.

(c) Only those persons engaged in installing temporary supports shall be allowed to proceed beyond the last row of permanent supports until temporary supports are installed. Before any person proceeds inby permanently supported roof, a thorough visual examination of the unsupported roof and ribs shall be made. If the visual examaination does not disclose any hazardous condition, persons proceeding inby permanent supports for the purpose of testing the roof by the sound and vibration method and installing supports shall do so with caution and shall be within 5 feet of a temporary or permanent support. If hazardous conditions are detected, corrective action shall be taken to give adequate protection to the workman in the area involved.

4. Work such as extending line curtains, other ventilating devices or making methane tests inby the permanent supports shall not be done unless a minimum of two temporary supports are installed. This minimum is applicable only if they are within 5 feet of the face or rib and work is done between such supports and the nearest face or rib. Other methods of providing temporary supports for this work will be accepted if equivalent protection is provided.

5. (a) Where loose material is being taken down, a minimum of two temporary supports on not more than 5-foot centers shall be installed between the workmen and the material being taken down unless such work can be done from an area supported adequatley by permanent roof supports.

(b) To enable miners to perform their duties from a safe position with-out exposure to falling material, a bar of suitable length and design shall be provided on all mobile face-equipment, except haulage equipment, and such

bar shall be used when prying down loose material. (The length of bar shall be suitable for the area involved in its use, i.e., construction areas, roof falls, and other mining areas require a bar of suitable length.)

6. All metal jacks shall be installed with a cap block between the jack and roof unless an oversize bearing plate of not less than 36 square inches is provided.
7. The roof in the face of an entry or room shall be supported according to the approved plan before any side cuts are started.
8. All posts installed under roof that is cracked, broken or susceptible to sloughing shall have a wooden cap block, plank, or crossbar between the post and the roof. Where crossbars or planks are installed, they shall be blocked to equally distribute the load across their length.
9. A supply of suitable roof support material, including temporary supports, sufficient to support the roof during one complete cycle of mining shall be provided as close as practical to each working face.
10. Posts shall be installed tight and on solid footing. Not more than two wooden wedges shall be used to install a post. One crib block may be used for footing.
11. An additional supply of supplementary roof support material shall be provided at the dumping point or within 500 feet of the faces, whichever is closer. Such supplementary/support shall consist of at least 20 posts of proper length with sufficient cap pieces and wedges and a minimum of two crossbars for each active place or at least six per section. Where spot roof bolting has been incorporated in the roof control plan, at least 50 roof bolts may be used in lieu of the crossbars. If such bolts are used, the approved spot bolting plan shall be complied with. Tools and equipment necessary to install such supports shall be available within the above specified distance.
12. A suitable roof sounding device shall be provided with all mobile face equipment, except haulage equipment. If face workmen who are not

operators or helpers on such equipment do not carry a roof sounding device, such device shall be available within 50 feet of their working area.

13. Where roof falls have occurred and at all overcasts, boom holes, and other construction sites that require removal of mine roof material, (e.g., by blasting, by ripping with a continuous mining machine, by cutting with a cutting machine, or any other means), the roof shall be considered unsupported. If miners are required to enter such areas, either to travel over the fallen material, to clean it up, or to perform other duties, the roof shall be supported adequately, or posted off to prevent travel through the unsupported area. Mine management shall devise and have posted in writing at the scene of such unsupported roof a plan incorporating the following procedures:

- (i) Such work shall be under the direct and, unless the miners are specially trained to do such work, constant supervision of a qualified person.
- (ii) Adequate temporary support on not more than 5-foot centers should be set at the edge of the fall when work is to be started. A minimum of four posts or jacks shall be used.
- (iii) Temporary support mentioned above shall be replaced by permanent supports and advanced as cleanup work progresses.
- (iv) Installation of supports shall proceed from permanently supported roof to the temporary supports before other work is performed and roof supports shall be advanced as cleanup work progresses.
- (v) Where necessary to load material before support can be set, such loading shall be done from areas of permanent support with the operator and other persons in the area under supported roof at all times.
- (vi) Where feasible, permanent supports shall be placed in the entire fall area before loading starts.

(b) All roof falls in active working areas and other areas of unsupported roof that are not being cleaned up shall be posted off at each entrance to the fall and unsupported areas by at least two rows of posts (or the equivalent) installed on not more than 5-foot centers across the opening.

14. During development, except where old workings are involved, mine openings shall not be holed through into unsupported areas.
15. Permanent roof supports shall not be recovered unless the operator has included a detailed system for such recovery in the approved roof control plan. See Drawing #2

SAFETY PRECAUTIONS TO BE TAKEN
FOR CONVENTIONAL ROOF BOLTS

1. An approved calibrated torque wrench that will indicate the actual torque on the roof bolts by a direct reading shall be provided on each roof bolting machine in operation.
2. Immediately after the first bolt is installed in each place, the torque shall be tested and thereafter at least one roof bolt out of every four shall be tested by a qualified person. If any of the bolts tested do not fall within the required range, the remaining previously installed bolts on this cycle should be tested.

If the majority of the bolts still fall outside the required torque range, necessary adjustments shall be made immediately. If, after these adjustments are made, the required torque ranges are still not obtained, supplementary supports such as different length roof bolts with adequate anchorage, posts, cribs or crossbars shall be installed.

3. When roof bolts are installed in by the outby corner of the last open crosscut, a spot-check of torques shall be made during each 24-hour period on at least one out of every ten roof bolts intalled in such areas. Such torque checks are necessary only on advancing sections in working places producing coal during any portion of the aforementioned 24-hour period.

The results of these tests shall be recorded in the onshift examination book. The record should show the number of bolts tested and the number above and below the required range.

If the results show that the majority of the bolts are not maintaining at least **150 / *125 foot-pounds of torque or have loaded up to where they exceed 250 foot-pounds of torque, supplementary support such as additional roof bolts, longer roof bolts with adequate anchorage, posts, cribs, or crossbars shall be installed.

4. Devices such as spherical washers, angle washers, or slotted wood wedges, shall be used to compensate for the angle when roof bolts are installed at angles greater than 5° from the perpendicular to the roof line.
5. All roof bolt materials shall be stored and handled in such a manner that will minimize rusting and/or damaging.
6. At locations where roof bolts are installed the first roof bolt hole shall be drilled to a depth of at least 12 inches above the anchorage horizon of the bolts intended for use to determine the nature of the strata. If the area to bolted exceeds 50 feet, additional test holes shall be drilled at intervals not to exceed 50 feet.

** Plates used directly against roof.

* Plates used against wood.

SAFETY PRECAUTIONS FOR RESIN GROUTED RODS

1. Persons responsible for installation of resins shall be instructed in safe handling precautions for such materials.
2. The relationship between the hole dimensions, rod size, and the size and number of resin cartridges is critical; therefore, adequate training and supervision shall be provided to assure proper installation.
3. All safety precautions required in the regular roof control plan shall apply to resin grouted bolts.
4. Resin grouted rods shall be installed as soon as practicable (to be determined on a mine-to-mine basis--normally not more than 8 hours) after the working place is exposed. Where required, temporary supports shall be installed immediately after the loading cycle is completed unless roof bolting machines are equipped with acceptable automated supports.
 - (a) Except when the District Manager has determined that more than 5 minutes are needed, "immediately" is interpreted to mean that the installation of such temporary supports shall be started not later than 5 minutes after mining of the cut is completed and, after the installation of such supports is started, the installation of supports shall be continued until at least the minimum number are installed as required in the approved plan.
5. Resin grouted rods and conventional roof bolts shall not be intermixed unless they are used as supplementary support.
6. Drill steel shall be equivalent in length to the rods used or adequately marked to assure the proper hole depth. Each resin grouted rod shall be fully grouted. Each drill hole shall be filled the entire length with resin.

7.
 - (a) All resin grouted rods shall be used with bearing plates approved for use.
 - (b) Bearing plates shall be installed tight against the mine roof.
8.
 - (a) The resin shall not be used if manufacturer's recommended shelf life is exceeded.
 - (b) Resin packages shall be protected from excessive heat and cold during storage, and shall not be used in areas where the ambient temperature falls outside the range recommended by the manufacturer.
 - (c) Broken cartridges of resin or cartridges that show signs of deterioration shall be removed from the underground portion of the mine.
 - (d) Resin grouted rods shall be installed in accordance with the manufacturer's recommendations.
9. For test purposes the first resin grouted rod installed in each cycle in each working place, after a minimum curing time of 10 minutes, shall be checked with a torque wrench after installing the first line of permanent support and prior to removing any temporary supports. The torque applied should be 150 foot-pounds. Should the rod turn in the hole, a second rod shall be tested in the same manner. If this rod also turns, resin installation shall be discontinued until reasons for failure of the resin is determined. (A click type torque wrench is recommended for this test).

AUTOMATED TEMPORARY ROOF SUPPORT (ATRS) SAFETY PRECAUTIONS

A.	<u>Roof Bolter Manufacturer</u>	<u>Model Number</u>	<u>Serial Number</u>	<u>Minimum Load Carrying Capacity</u>
	1. LEE NORSE double boom	TD2-43-5-4E		Exceeds 11,250 lbs
	2. LEE NORSE double boom	TD2-43-5-4E		Exceeds 11,250 lbs
	3. LEE NORSE double boom	TD2-43-5-4E		Exceeds 11,250 lbs
	4.			
	5.			

- B. A registered professional engineer shall certify that each ATRS is capable of supporting the above minimum load carrying capacities. Evidence of the certification shall be furnished by attaching a plate, label, or other appropriate marking to the ATRS system.
- C. Two safety jacks must be kept on the bolting machine at all times to be used when adverse roof conditions are encountered and the automated support does not supply adequate protection for the bolter operator.
- D. No one shall proceed inby the automated temporary support system unless a minimum of 2 temporary supports are installed. This minimum is applicable only if the supports are not more than 5 feet apart, within 5 feet of permanent support, face, or rib and the work is done between such supports and the nearest face or rib.
- E. Holes will not be drilled or bolts will not be installed to the left or right of the outer four contact points of the automated temporary support system unless the coal rib or a temporary support is within 5 feet of these contacts.
- F. The automated temporary support system shall be placed firmly against the roof not more than 5 feet inby the last row of permanent supports, before any person proceeds inby permanent support.

- G. There will be no installation of roof bolts inby the temporary roof support.
- H. The controls necessary to position and set the automated support shall be located in such a manner that they can be operated from under permanent support.
- I. A check valve or equivalent protection shall be incorporated in the automated temporary support system to eliminate the danger of collapse through sudden loss of hydraulic fluid from a broken hose.

PILLAR RECOVERY AND BARRIER EXTRACTION

Pillar recovery and barrier extraction plans will be submitted for approval at a later date.

We are formulating plans at the present time. Pillar recovery and barrier extraction will not be implemented at Trail Mountain Coal Mine until the appropriate plans have been submitted and approved for our use.

APPENDIX 6-VENTILATION PLAN

VENTILATION SYSTEM AND
METHANE AND DUST CONTROL PLAN

NATOMAS TRAIL MOUNTAIN COAL COMPANY
TRAIL MOUNTAIN MINE
MINE I.D. 42-01211
ORANGEVILLE, UTAH

MARCH 1983

I. GENERAL

A. COMPANY INFORMATION

1. Company Name	NATOMAS TRAIL MOUNTAIN COAL CO.
Mine Name	TRAIL MOUNTAIN MINE
Post Office Address	P.O. BOX 370
Town County & State	ORANGEVILLE, EMERY, UTAH 84537
Telephone Number	1-801-748-2140
Operator's Name	Joseph R. Fielder
Operator's Title	GENERAL MANAGER
Operator's Address	P.O. BOX 370 ORANGEVILLE, UTAH 84537
Operator's Telephone Number	(801) 748-2140

2. The life of the mine is greater than one year.

3. Number of employees:

SURFACE	<u>15</u>
UNDERGROUND	<u>45</u>
TOTAL	<u>60</u>

4. The Hiawatha seam is being mined at a height of 7-9 feet.

5. FACE EQUIPMENT:

- (2) 12 CM Joy continuous miners
- (1) HH489 Lee Norse continuous miner
- (4) Joy 10 SC shuttle cars
- (1) TDI-36 singleboom Lee Norse roof bolter
- (3) Double Boom Lee Norse roof bolters
- (2) Pyott Boone battery scoops
- (3) Eimco mine tenders-diesel
- (3) Elmac diesel boss-buggies
- (1) Eimco 912D diesel scoop
- (1) Eimco 913 permissible diesel scoop
- (2) Jeffery diesel Ram Cars
- (4) Isuzu diesel pickups

II. Ventilation System

A. Main Fans

1. Information

a. Exhaust Ventilation, Bonanza Axiflo Fans I.D. #1

b. 150 h.p.

c. Operation Specifications

1. 1800 rpm

2. Blade setting:

3. Bristol air chart - 3½ inches

4. Voltage is 440

d. Fan Curves - see enclosed Graph on page 4

2. All main fan installations shall meet or exceed the criteria in sections 75:300-2 and 75:300-3.30 CFR, unless a variance is granted by the District Manager.

3. There are no standby fan motors available to the mine at the present time.

B. Face Mining Cycle

1. See Page 6

C. Section Mining Cycle

1. See Page 7

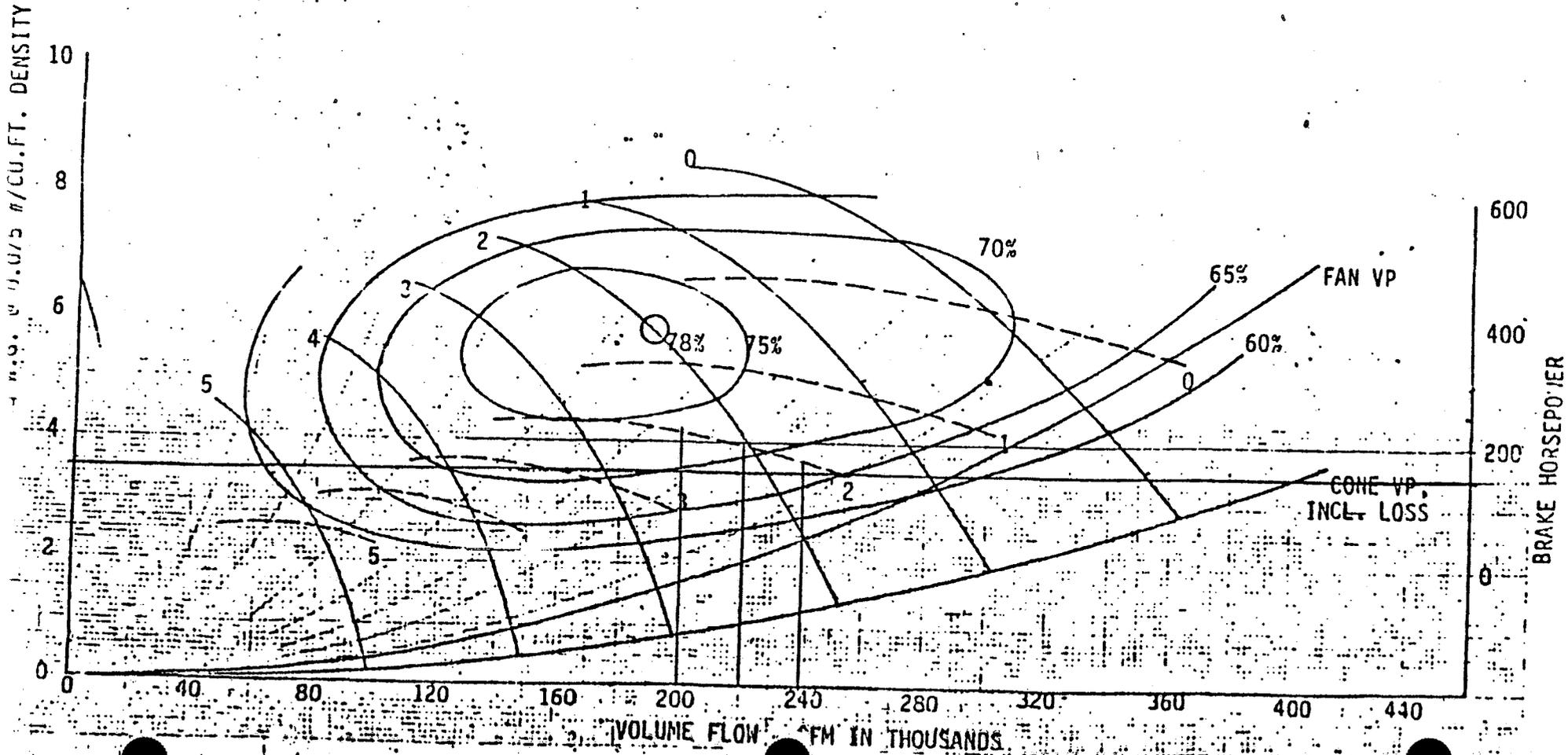
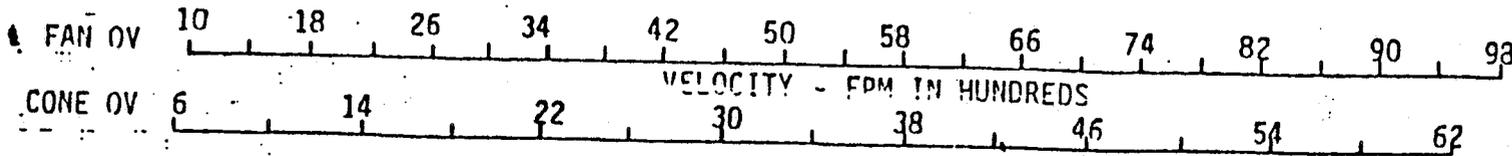
D. Typical Section Ventilation System

1. See Page 7

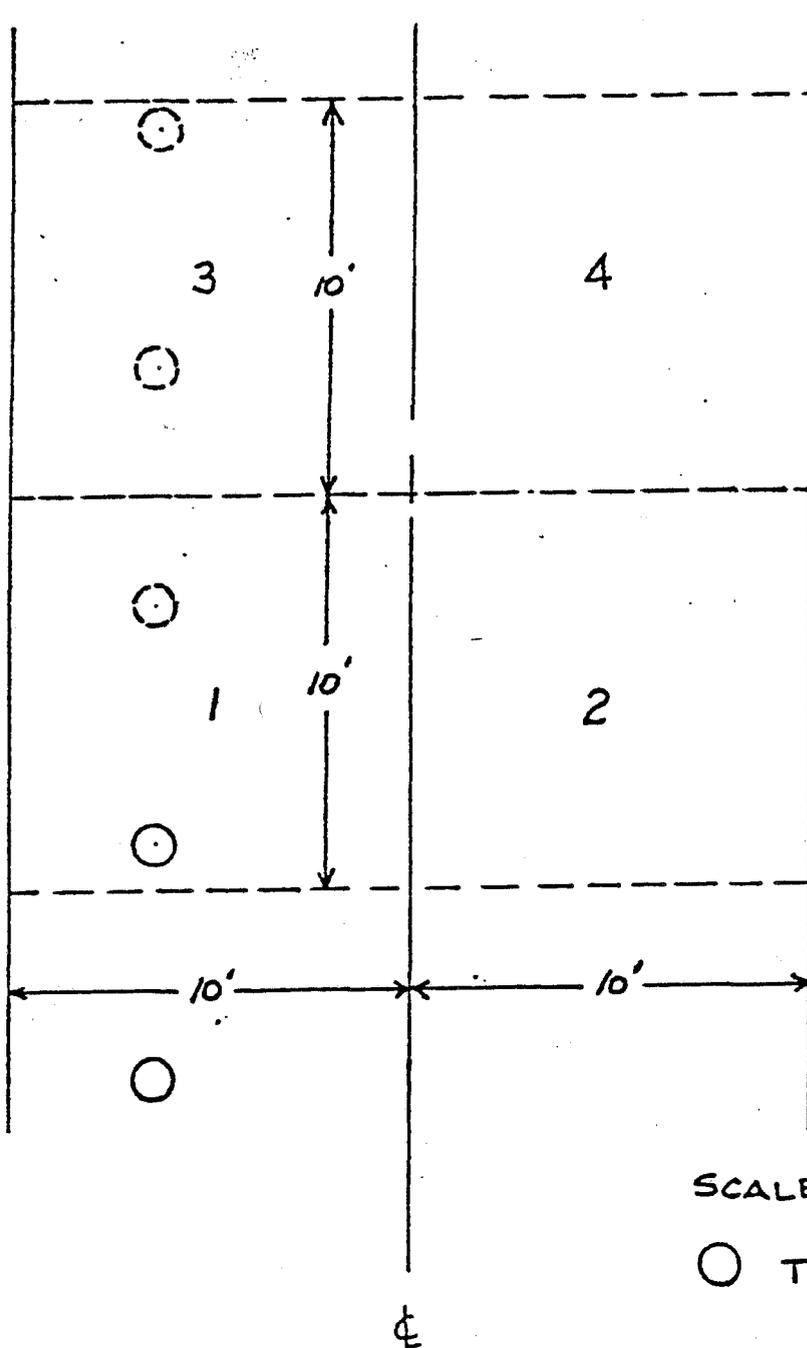
E. There are no auxillary fans or machine-mounted diffusers being used in the mine at the present time.

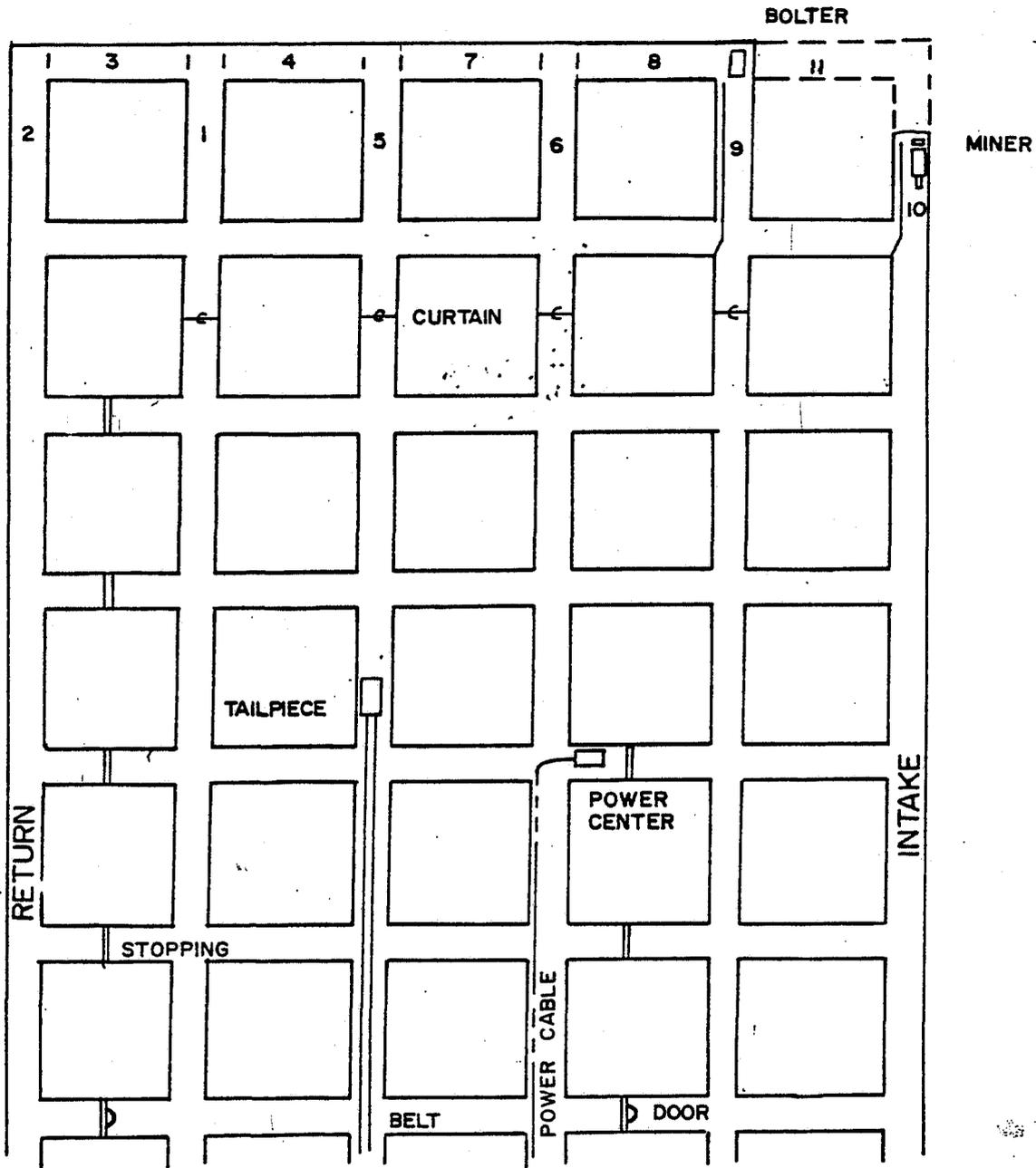
1312 E. WAKEHAM
SANTA ANA, CA. 92705

BONANZA FANS II
1312 E. WAKEHAM
SANTA ANA, CA. 9



An initial cut of 10 feet will be made on the brattice side of the advancing face. The second cut will be on the off brattice side to square up the face. The ventilation control will be adjusted and the continuing cycle will repeat itself. At no time will the brattice be more than 15 feet from the point of deepest penetration when coal is being cut, mined, or loaded from the working face.





Entries in each section may vary as to number of intakes, returns and neutral air courses. All air courses will be separated by stoppings, constructed according to requirements and air quantities will be controlled by regulators and/or brattice cloth. Belt air will not be allowed to contaminate the working section.

If two miners were to be used simultaneously in the same set of developing entries each miner would be ventilated on a separate air split.

NATOMAS TRAIL MOUNTAIN

ADVANCE MINING CYCLE

1" = 100' DRWN AK

F. Construction of Ventilation Devices

1. Construction

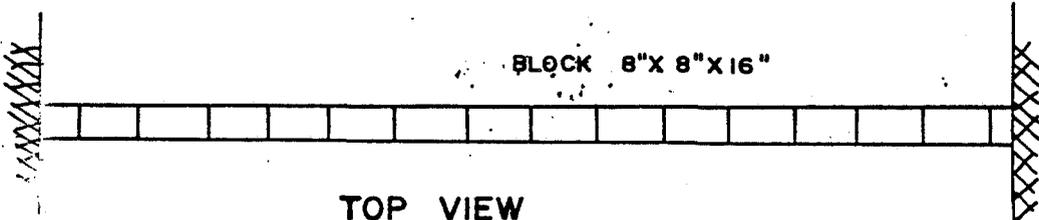
- a. All ventilating devices such as stoppings, overcasts, undercasts, shaft partitions, et cetera, shall be of substantial and incombustible construction, installed in a workmanlike manner and maintained in a condition to serve the purpose for which they were intended.
- b. Permanent stoppings shall be erected between the return, intake and belt aircourses and shall be maintained to and including the third connecting crosscut outby the faces of the entries on the return side. Whenever the third connecting crosscut is broken through, work shall be started on building the stopping as soon as possible and shall continue in a reasonable and diligent manner until completed. Similary, whenever a belt move is completed, temporary brattice shall be installed immediately and work shall be started on building the permanent stoppings as soon as possible and shall be continued in a diligent manner until completed.

2. Construction Method: Permanent Stoppings

- a. Kennedy brand or equivalent metal stoppings may be used in short term developments (less than two years)
- b. The materials used in the construction of stoppings are: Cinder or cement blocks 8" x 8" x 16", 6" x 8" x 16", 4" x 8" x 16" and 2" x 8" x 16"; this also includes half blocks as needed. All permanent stoppings, belt separations, overcasts, regulators, seals, and any other necessary structure will be constructed on clean and substantial bottom, dry-stacked and wedged solidly and sprayed with an acceptable fibrous cement spray or set in mortar joints and covered with a fibrous cement spray if necessary. Any wood used in the construction and maintenance of these structures including doors will be treated with an approved fire-retardant chemical. Celltite "10 Airtite" mine sealant MSHA-1c-29 is used as both a sealant and a fire retardant, any variations from this chemical will be of equal properties with MSHA

approval numbers and applied according to manufacturer specifications. Dry stacked stoppings in main developments will be coated on both sides with an approved construction type sealant. Burrell "Fibercrete" a fibrous cement MSHA 1C-18/I or Celltite "10 Airtite" are usually used as a construction type sealant; any variation will be of equal properties with MSHA approval numbers and applied according to manufacturers specifications.. Dry stacked stoppings in short lived developments (less than two years) can be coated on the intake side with an approved construction type sealant or coated on both sides with plaster or an approved nonconstruction type sealant.

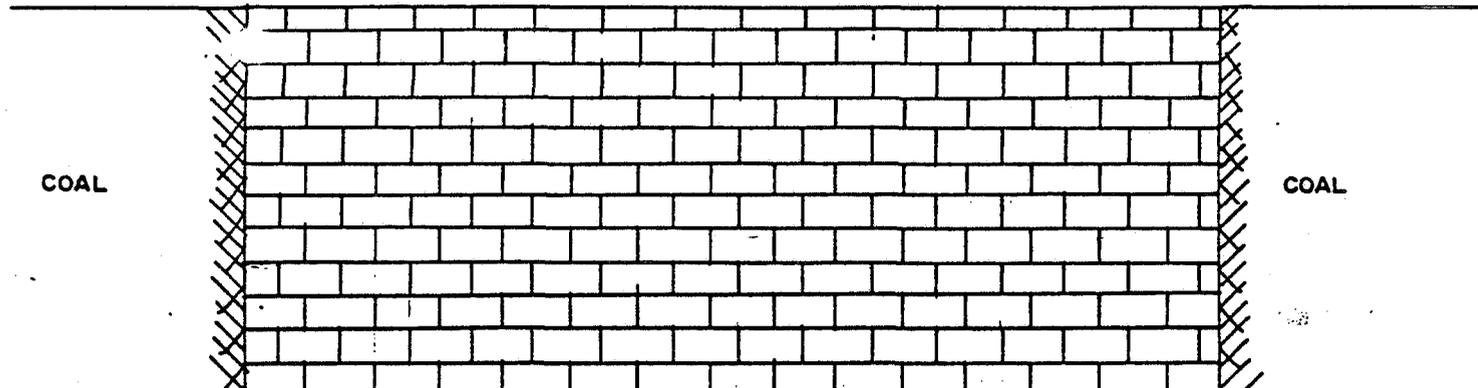
- c. Temporary stoppings of fireproof brattice are the only other type of stopping being used in the mine.
- d. Areas of the mine where each type of stopping is used and how they are used.
 - 1. Permanent stoppings will be used during all development work to separate intake from return and to isolate the belt.
 - 2. Seals will be erected at all abandoned areas unless otherwise ventilated.
 - 3. Brattice cloth will be used as temporary stoppings in the working section.



TOP VIEW

DRY STACKED AND PLASTERED
OR MORTAR JOINTS

BLOCK STOPPING

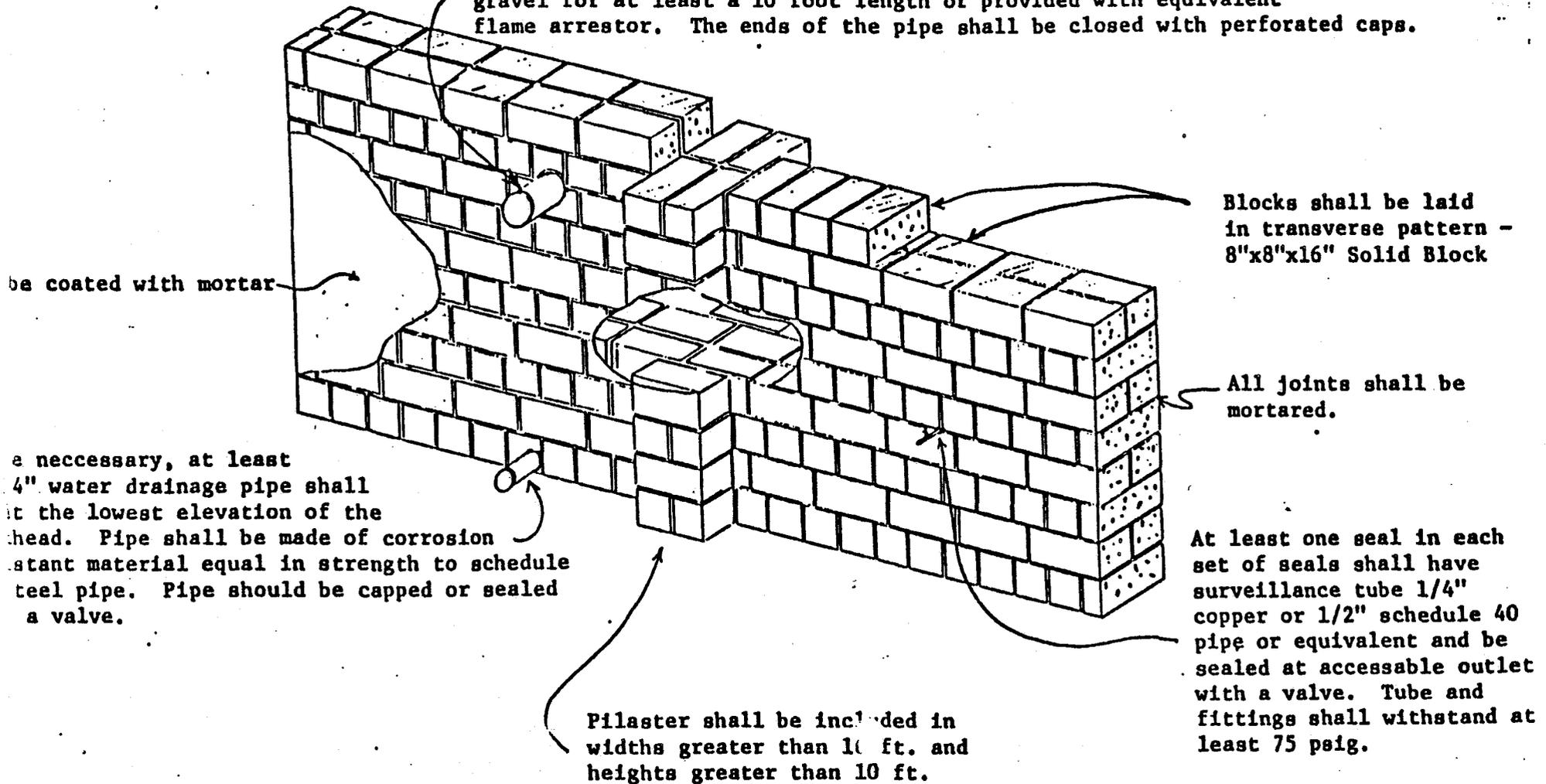


FRONT VIEW

PERMANENT STOPPING		
NATOMAS TRAIL MTN. COAL CO.		
ORANGEVILLE UTAH 84537		
DATE	7/81	DRN: AK

Example of Typical Explosion Proof Seal

Vent pipe(s) shall be installed through the bulkhead into a return aircourse. It shall not be more than 8 inches and have a strength equal to schedule 40 steel pipe and be located near the roof but not closer than 4 feet from a rib and not on the center line of the bulkhead. Vent pipe shall be packed with gravel for at least a 10 foot length or provided with equivalent flame arrestor. The ends of the pipe shall be closed with perforated caps.



If necessary, at least 4" water drainage pipe shall be installed at the lowest elevation of the bulkhead. Pipe shall be made of corrosion resistant material equal in strength to schedule 40 steel pipe. Pipe should be capped or sealed with a valve.

Pilaster shall be included in widths greater than 10 ft. and heights greater than 10 ft.

Blocks shall be laid in transverse pattern - 8"x8"x16" Solid Block

All joints shall be mortared.

At least one seal in each set of seals shall have surveillance tube 1/4" copper or 1/2" schedule 40 pipe or equivalent and be sealed at accessible outlet with a valve. Tube and fittings shall withstand at least 75 psig.

This seal accepted as meeting the requirements of 25.730, 30 CFR. Proposed seal locations for each new or panel must be shown on 6 month updated map.

III. Methane Control

A. Face Areas

1. Line brattice or any other approved device used to provide ventilation to the working face from which coal is being cut, mined, or loaded shall be installed and maintained at a distance no greater than fifteen (15) feet from the point of deepest penetration; to which any portion of the face has been advanced.
2. A minimum quantity of 6,000 cubic feet of air per minute shall reach each working face from which coal being cut, mined, or loaded.
3. All dead-ended entries, idle faces, and working faces where cleanup work is being done will be ventilated with 1500 cfm or sufficient air to limit a methane concentration of no more than at least 1.0 volume per centum. Line curtain will be maintained fifteen (15) feet from the face unless bolting or clean up is being done.
4. The minimum quantity of air reaching the last open crosscut in any pair or set of developing entries or rooms shall be 9,000 cfm and the minimum quantity of air reaching the intake end of a pillar line shall be 9,000 cubic feet per minute.
5. Longwall faces do not apply at this time.
6. Methane examinations will be made at the last row of roof supports.

B. Methane Control in Outby Areas

1. The Methane content in any return aircourse other than an aircourse returning the air from a working section (as provided in Section 75.309 and 75.310) shall not exceed 2.0 volume per centum. The methane content in the air in active workings shall be less than 1.0 volume per centum.
2. All pillared out and abandoned areas will be sealed from active workings, except for the temporarily abandoned 12th West Section previously referred to as 1st South; see attached approval letter. The 2nd West Section has been sealed as required. Bleeder entries will not be required in second mining sections unless the methane concentrations become uncontrollable.

3. Description of Seals

- a. Seals and explosion proof bulkheads will be constructed of incombustible materials consisting of solid cement blocks, or tiles.
- b. Seals will be installed between main air courses and the abandoned area with sufficient pillars left as a barrier to protect the seals from damage due to excessive pressure or override.

IV. Miscellaneous

A. Diesel Equipment

1. Any diesel equipment used in by the last open cross-cut shall comply with title 30, Part 36, CFR.
2. All diesel equipment shall be operated and maintained in accordance with the manufactures operating specifications and maintenance manuals. These manuals and specifications shall be made available for reference.
3. Once each shift in working areas where diesel equipment is used in by the last open cross-cut, examinations for carbon monoxide (CO) and nitrogen dioxide (NO₂) shall be made in the immediate return of each air split, the examination shall be made approximately 30 minutes after normal operations have begun but no longer than 1 hour after start up. If samples are above the treshold limits (50 ppm CO, 5 ppm NO₂) corrective actions must be taken immediately. A record of these examinations (along with their results) shall be maintained in a book available for inspection.
4. Diesel equipment used in outby areas for men and material haulage will be examined once weekly for levels of carbon monoxide (CO) and nitrogen dioxide (NO₂). If samples are above the treshold limits (50 ppm CO; 5 ppm NO₂) corrective actions shall be taken immediately. A record of these examinations and their results shall be maintained in a book available for inspection.

5. Once every seven (7) days, the diesel equipment shall be examined by a qualified maintenance person to insure that the equipment and scrubber system are being maintained in proper operating condition. A record of these examinations including the examiner's initials and the date shall be maintained in a book available for inspection.
6. The minimum quantity of air to be maintained over diesel equipment during operation shall be 10,000 cfm and the minimum quantity of air passing through the last open cross-cut where diesel equipment is used shall be 22,500 cfm.

B. Roof Bolting

1. A sufficient quantity of air not to be less than 3,000 cfm shall be maintained over the roof bolter except when bolting behind the miner in the return air course. A perceptible movement of air will be required with more stringent examinations for concentrations of methane when bolting in the return and connecting crosscuts behind the continuous miner. The line curtain will be maintained no more than 10 feet outby the operating controls.
2. Dust control during roof bolting will be controlled by water or dust collectors. Spot bolting in outby areas may by necessity have dust control through ventilative means which will carry the dust away from the operator. Dust control through ventilative means will be on idle shifts.

C. Dust Control

1. Dust control at belt transfer points consists of daily clean up and re-rock dusting of these areas. If float coal dust accumulation becomes uncontrollable, a water spray with 30 psi will be installed at the transfer point.
2. Dust control at feeder breakers consist of air control away from the feeders.
3. All roadways are maintained in a damp and well compacted condition.
4. MMU sheets - attached.
5. DA Sheets - attached

6. Respirable dust citations or orders.

1. Any corrective actions taken that result in the abatement of a citation or order for high respirable dust concentrations shall be incorporated into the ventilation plan.
2. In accordance with section 70.2001 (d) a record shall be kept of all corrective actions taken to obtain compliance and this record shall be available for inspection.

WPK

Coal Mine Safety and Health
District 9

April 22, 1982

UNDERGROUND MINE FILE	
DATE FWD.	4/23/82
INITIALS	J

James R. Thompson
Safety Director
Natomas Trail Mt. Coal Co.
PO Box 551
Orangeville UT 84537

Re: Trail Mt. Mine
I.D. No. 42-01211
~~1st South~~
Request to Ventilate

Dear Mr. Thompson:

Your request to ventilate the subject areas of your mine as per Section 75.329, 30 CFR 75, is hereby approved subject to the following:

1. A minimum quantity of 10,000 cfm of air must be maintained through the last open crosscut of each section.
2. The area must be maintained for travel so that the entire section can be examined on a weekly basis.
3. This approval will be evaluated periodically, and if conditions warrant, it may be revoked.

Sincerely,


John W. Barton
District Manager

WPKNEPP:df:4/22/82

cc: Price SDM (1)
Orangeville FO (2)

FIELD MINE FILE	
DATE FILED	04/22/82
INITIALS	J

EXHIBIT
04/26/82

Date: MAY 20, 1981

Mine Name: NATOMAS TRAIL MOUNTAIN COAL
Mine I.D. No. : 42-01211
MMU I.D. No. : 007-0
Designated Occupation (D.O.): 036

Type of Mining and Section Haulage
Equipment: Joy 12 CM 11
continuous miner
Ripper

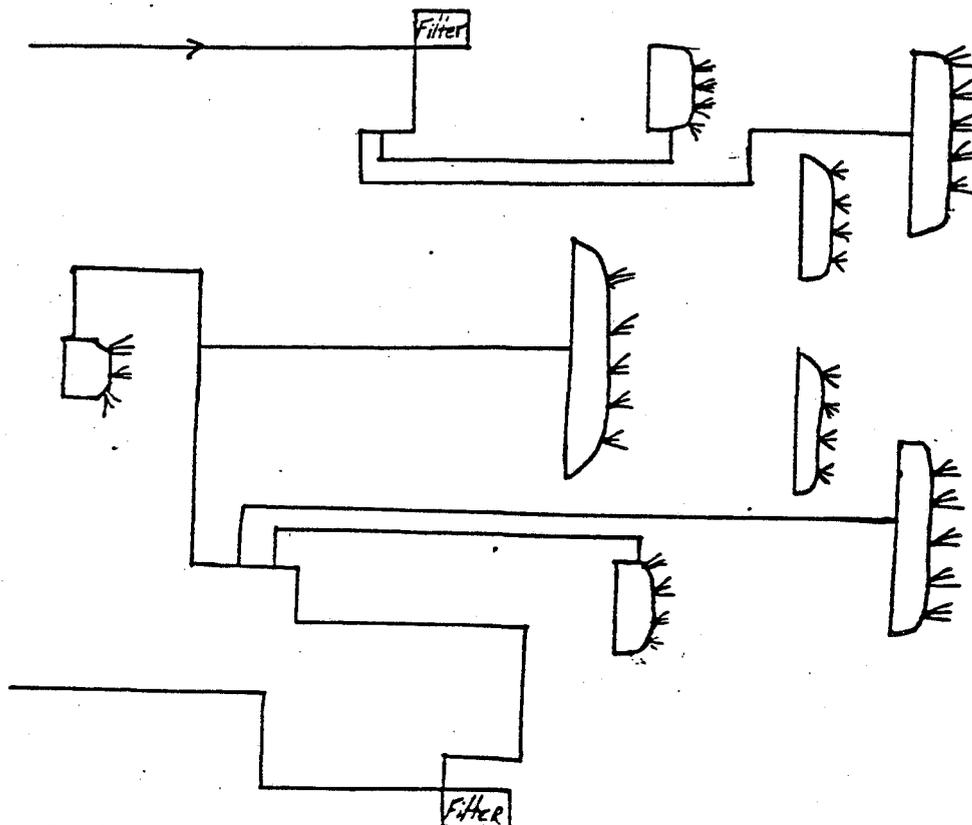
The following parameters are hereby adopted as part of the ventilation system and methane and dust control plan as per Section 75.316, 30 CFR.

Don B. Hanna
(Signature Company Official)

1. The minimum mean entry air velocity maintained in the working place or the minimum face velocity maintained across the longwall face shall be 60 feet per minute.
2. The maximum distance the ventilating device is maintained from the area of deepest penetration of the working face shall be 15 feet. (Longwalls not applicable)
3. The minimum quantity of air reaching the working face or longwall face shall be 6,000 cubic feet a minute.
4. The following water suppression system shall be maintained and operated as follows:

Equipment Description	*Number of Sprays	Type of Sprays	Minimum Operating Pressure
<u>Joy 12 CM 11</u>	<u>34</u>	<u>#5</u>	<u>70 psi</u> <u>90% operating</u>

5. Other controls or practices: (Identify additional sheets by MMU I.D. number)



* Include sketch or schematic showing locations

Mine Name: NATOMAS TRAIL MOUNTAIN COAL
 Mine I.D. No. : 42-01211
 MMU I.D. No. : 002-0
 Designated Occupation (D.O.): 036

Date: MAY 20, 1981
 Type of Mining and Section Haulage
 Equipment: Joy 12 CM3
continuous miner
solid head

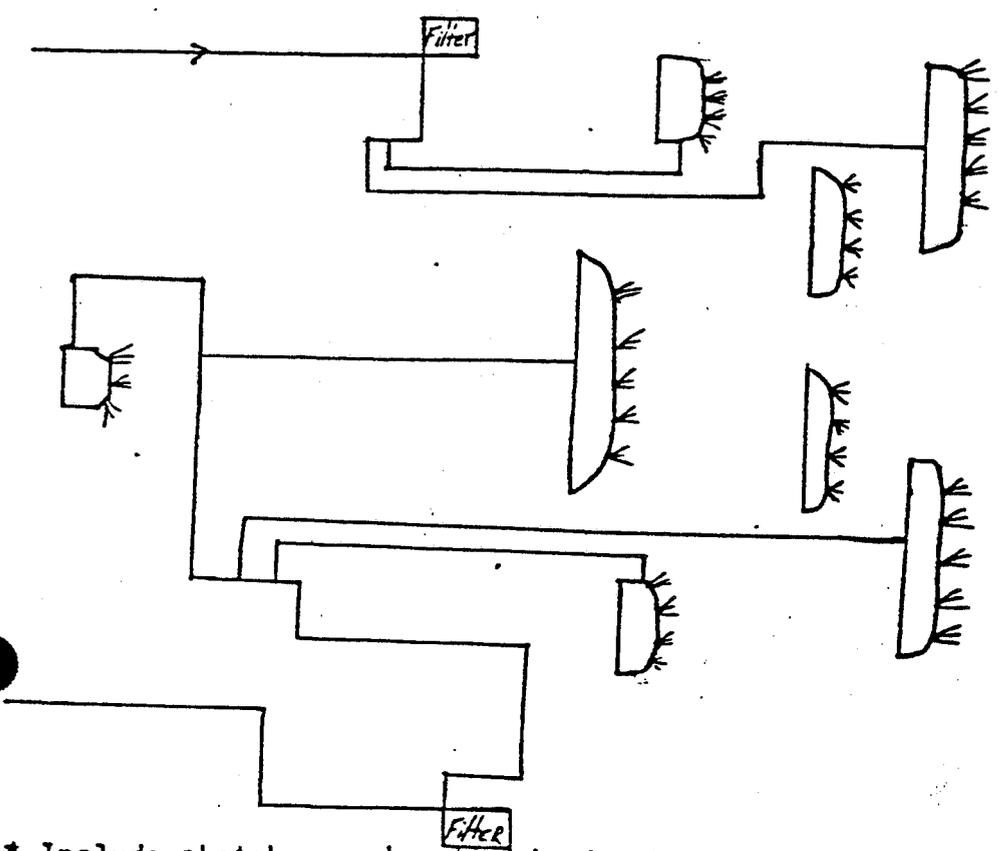
The following parameters are hereby adopted as part of the ventilation system and methane and dust control plan as per Section 75.316, 30 CFR.

Don B. Hanna
 (Signature Company Official)

1. The minimum mean entry air velocity maintained in the working place or the minimum face velocity maintained across the longwall face shall be 60 feet per minute.
2. The maximum distance the ventilating device is maintained from the area of deepest penetration of the working face shall be 15 feet. (Longwalls not applicable)
3. The minimum quantity of air reaching the working face or longwall face shall be 6,000 cubic feet a minute.
4. The following water suppression system shall be maintained and operated as follows:

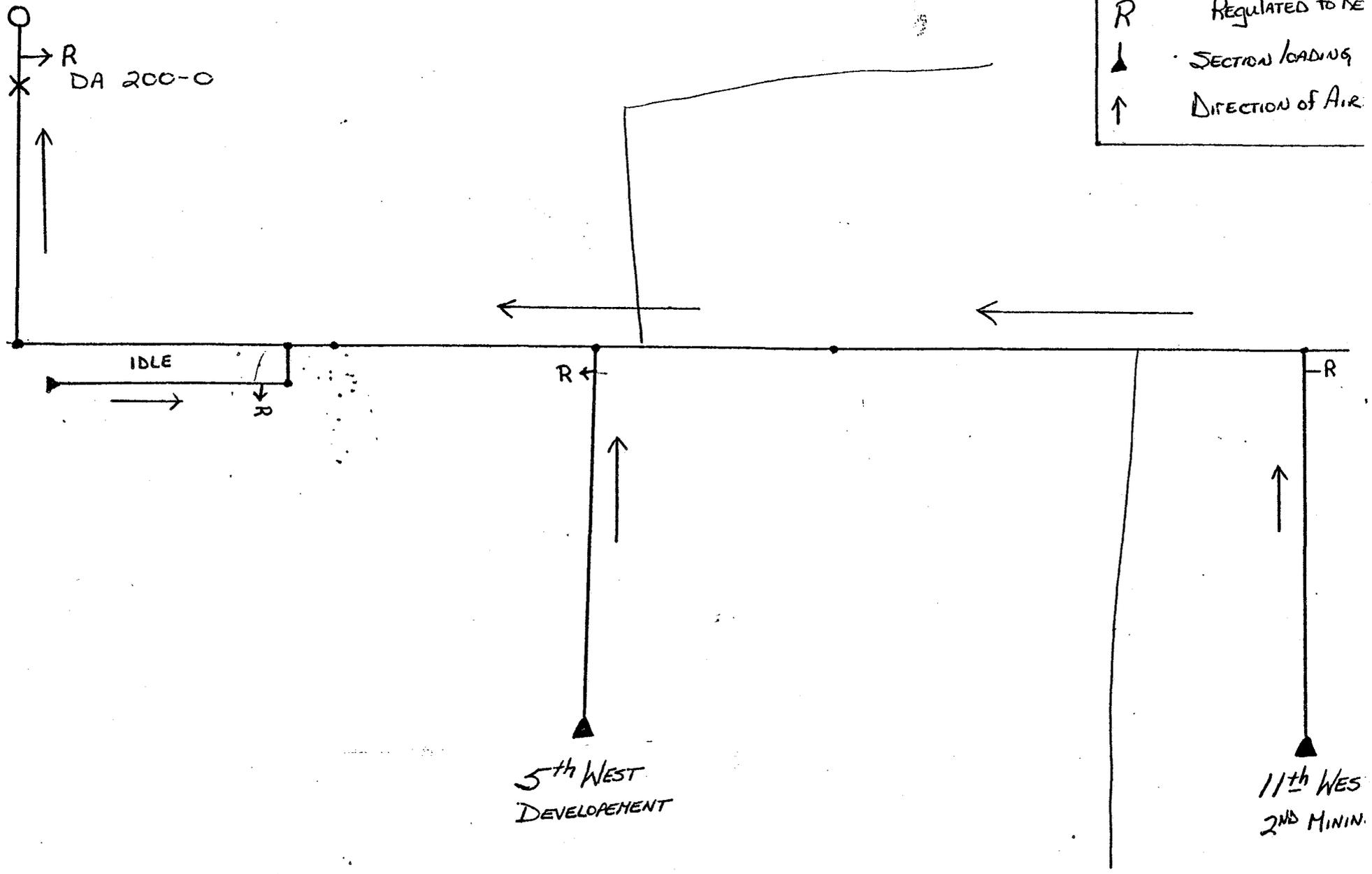
Equipment Description	*Number of Sprays	Type of Sprays	Minimum Operating Pressure
<u>Joy 12 CM3</u>	<u>34</u>	<u>#5</u>	<u>70 psi</u> <u>90% operating</u>

5. Other controls or practices: (Identify additional sheets by MMU I.D. number)



* Include sketch or schematic showing locations

-  MINE OPENING
-  BELT TRANSFER
-  DESIGNATED AREA
-  REGULATED TO RE
-  SECTION LOADING
-  DIRECTION OF AIR



NOT TO SCALE

Selection Sheet For Designated Areas

Mine Trail Mountain Coal Mine Mine ID 42-01211

Company Trail Mountain Coal Company

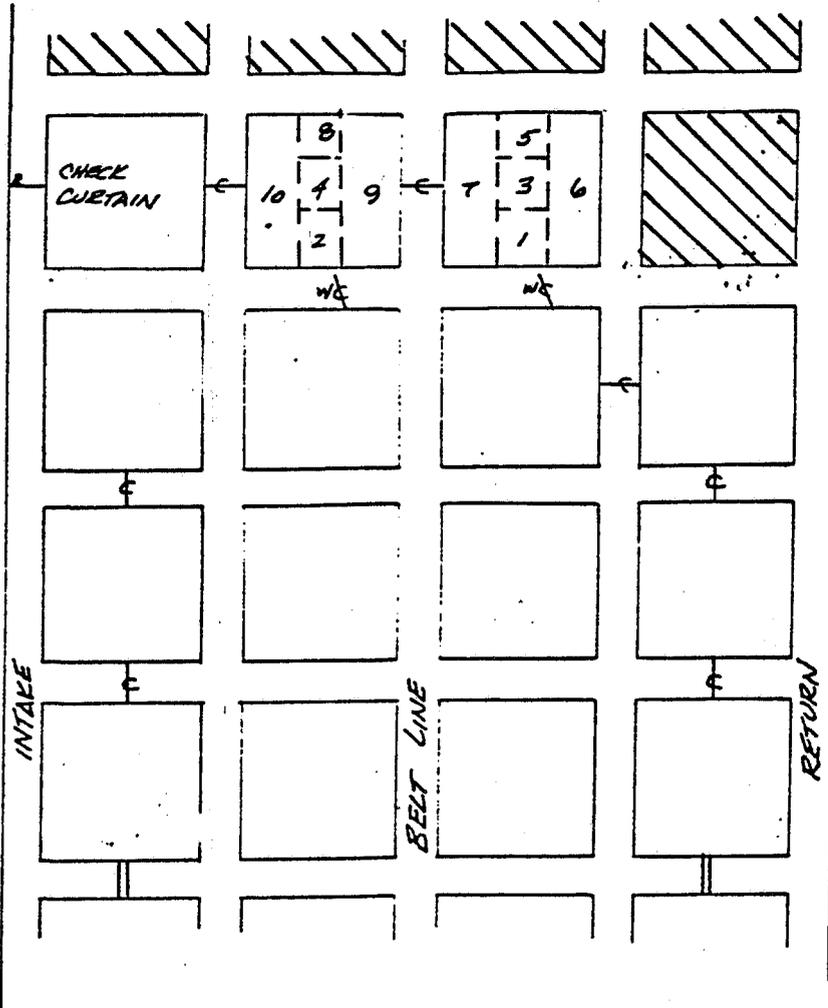
To Be Filled In
By MSHA

Location Of Designated Area: The belt line regulator on #1 belt
line: the first crosscut inby the belt line portal;
return side.

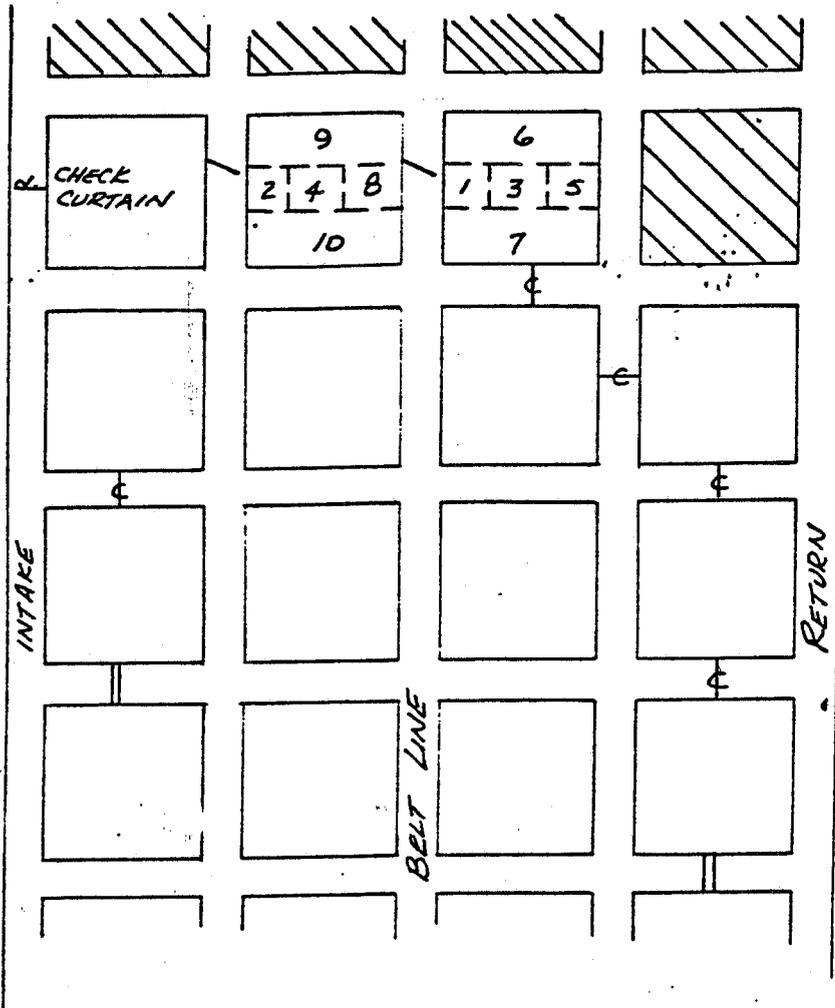
Designated
Area
ID: 200-0

Position Of Sampling Instrument Within Designated Area: Located
approximately 50' upwind of where the belt air is
regulated into the return. Sampling device placed on
a normal breathing position not less than one foot
from the roof where obstructions will not affect the air

to the sampling
device.



NATOMAS TRAIL MOUNTAIN COAL CO
PILLAR RECOVERY METHOD I

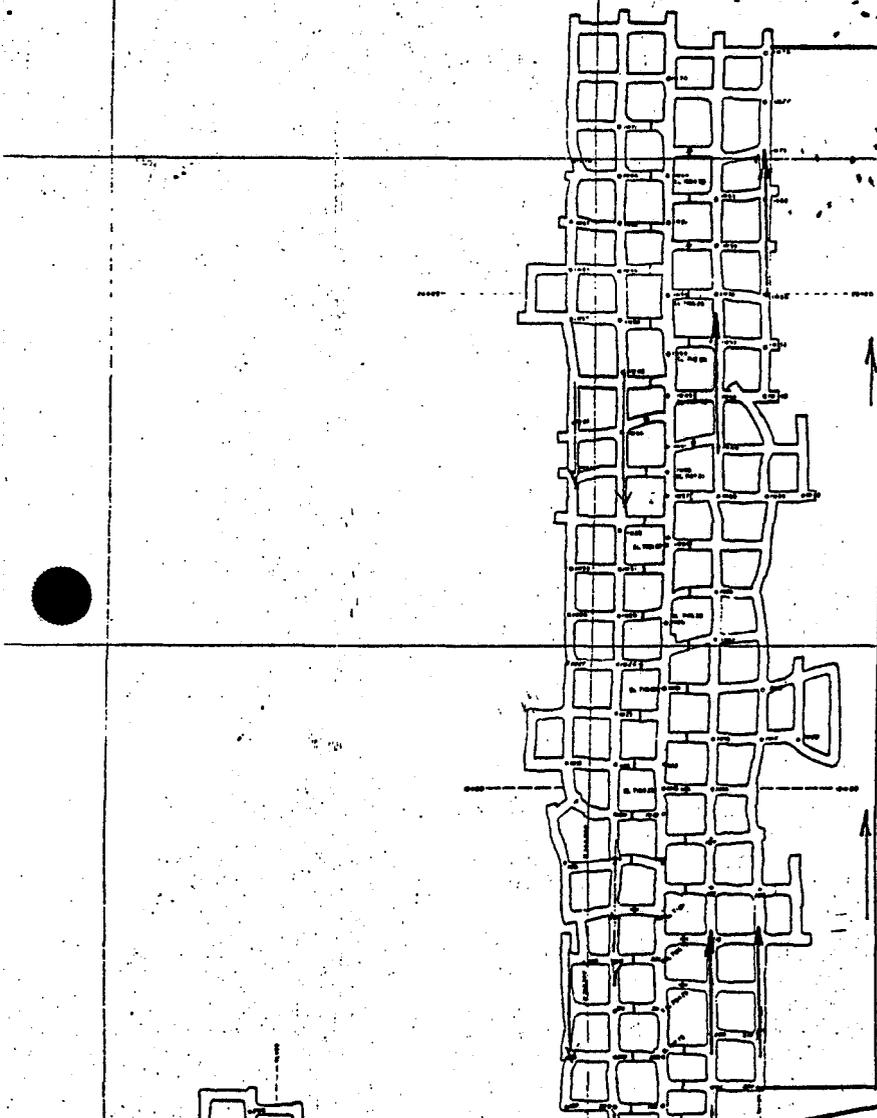


NATOMAS TRAIL MOUNTAIN COAL CO.

PILLAR RECOVERY METHOD II

1" = 100"

D-1-2-2



2ND MINING

SEALS

14

6. Respirable dust citations or orders.

1. Any corrective actions taken that result in the abatement of a citation or order for high respirable dust concentrations shall be incorporated into the ventilation plan.
2. In accordance with section 70.2001 (d) a record shall be kept of all corrective actions taken to obtain compliance and this record shall be available for inspection.

Hanna/Ha/ghs

U. S. Department of Labor

Mine Safety and Health Administration
P O Box 25367
Denver, Colorado 80225
Coal Mine Safety and Health
District 9



March 8, 1983

Dan Hanna
Safety Director
Natomas Trail Mountain Coal Co.
P.O. Box 370
Orangeville, UT 84537

Re: Trail Mountain Mine
I.D. No. 42-01211
Ventilation System and Methane
and Dust Control Plan

Dear Mr. Hanna:

The ventilation system and methane and dust control plan dated March 1, 1983, has been approved in accordance with Section 75.316, 30 CFR 75. The plan is subject to revision at any time and shall be reviewed by the operator and MSHA at least once every six months. Before any changes are made in the approved ventilation system, they shall be submitted to and approved by the District Manager prior to implementation.

This plan supersedes any previously approved plans and a copy of this plan shall be made available to the miners.

Sincerely yours,

John W. Barton
John W. Barton
District Manager

Enclosure(s)

APPENDIX 7-MULTIPLE SEAM CONSIDERATION

Estimated Maximum Economic Recovery—MER
and Mining Method for Natomas Coal Company
Emergency Coal Lease Application U-49332

August 25, 1982

The emergency lease tract lies within the Wasatch Plateau KRCRA approximately 10 miles northwest of Orangeville, Utah, and has the following land description:

T. 17 S., R. 6 E., SLM, Emery County, Utah

- sec. 25: $S\frac{1}{2}NW\frac{1}{4}$, $W\frac{1}{2}SW\frac{1}{4}$, and $W\frac{1}{2}E\frac{1}{2}SW\frac{1}{4}$;
sec. 26: $SE\frac{1}{4}NE\frac{1}{4}$, $E\frac{1}{2}SW\frac{1}{4}NE\frac{1}{4}$, $E\frac{1}{2}SE\frac{1}{4}$, and $E\frac{1}{2}W\frac{1}{2}SE\frac{1}{4}$;
sec. 35: lot 1 and $E\frac{1}{2}$ of lot 2, and $SE\frac{1}{4}NE\frac{1}{4}$,
 $E\frac{1}{2}SW\frac{1}{4}NE\frac{1}{4}$, $E\frac{1}{2}SE\frac{1}{4}$, and $E\frac{1}{2}W\frac{1}{2}SE\frac{1}{4}$.

Containing 641.47 acres.

The Hiawatha is the only coal seam of current economic interest underlying the tract. In addition to coal, the lands of the area are also valuable prospectively for oil and gas. Lands under the original coal lease U-082996 are also under oil and gas lease U-10849. However, the value of this land for oil and gas has not been established.

Coal beds in this area are contained in the Blackhawk formation. The coal dips approximately 4° to the southwest and the overburden ranges from 750 feet in the northwest to about 2,250 feet in the west. Locally, irregularly shaped dikes and sills of very tough fine-grained clayey sandstone occur erratically within the Hiawatha seam. Ranging up to 3 feet in thickness, these structures complicate mining and increase the costs of recovering the coal.

Total recoverable reserves are estimated to be 4,750,000 short tons of high quality coal. The proximate coal analysis on as received basis and taken from seven samples of mine run coal are listed below. The heating value of the coal recovered is expected to average about 12,000 Btu/lb. with 0.6 percent sulfur and a 9 percent ash content.

<u>Coal Seam</u>	<u>Moisture %</u>	<u>Ash%</u>	<u>Sulfur %</u>	<u>Carbon %</u>	<u>Volatiles %</u>	<u>Btu</u>
Hiawatha	4.69	8.38	.57	47.28	39.64	12,517

The present size of the operation and the limited reserves suggests that mining will continue in the present manner. Mining will proceed using the room and pillar method, driving entries and rooms on development and pulling pillars on retreat with continuous miners. A belt haulage system will be used to transport coal from underground to the surface facilities.

It is doubtful that longwall mining would justify the capital outlay for a longwall unit. Also, the given geologic conditions and the size of the subject tract further suggests that longwall mining would be uneconomical.

We estimate that a 50 percent recovery rate will be obtained by the room and pillar mining method for the lease tract. Maximum economic recovery will be achieved provided sound and prudent mining practices are followed.

J. Gordon Whitney
Prepared by

APPENDIX 8

BUREAU OF LAND MANAGEMENT (BLM)
APPROVAL OF THE RESOURCE RECOVERY PROTECTION PLAN
FOR TRACT 2



United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Moab District
P. O. Box 970
Moab, Utah 84532

3482
U-082996
U-49332
(U-067)

RECEIVED MAY 19 1986
MAY 20 1986

Memorandum

DIVISION OF
OIL, GAS & MINING

To: Senior Project Manager for Utah, Office of Surface Mining, Denver

Attention: Richard Holbrook

From: District Manager, BLM, Moab

Subject: Trail Mountain Mining and Reclamation Plan, Tract 2 (UT 0017)

We have received the subject plan consisting of 2 volumes on April 16, 1986 and have reviewed it with regards to land uses administered by the BLM and the adequacy of the resource recovery and protection plan (R²P²). The submitted plan is an amendment to the original permit application package (PAP), referenced UT 0017, and approved by the Assistant Secretary on December 14, 1984. Soon after approval, the complete plan on file in our Salt Lake State Office was transferred to the San Rafael Resource Area (in Price, Utah) of the Moab District, where field engineers responsible for on-ground lease administration would have access to the complete plan. It was decided once the mine plan is approved and sent to field offices that any revisions, changes or additions to the R²P² would be reviewed and commented on at the District level. We, therefore, are addressing items checked for both the Branch of Solid Minerals (BSM) BLM and Federal Land Managing Agency (FLMA).

The subject tract is entirely on National Forest land requiring no response to land use conflicts and protection of nonmineral resources by the BLM.

With regard to the R²P², we have reviewed the mining layout and operational sequencing. Trail Mountain is adding to the original permit a newly acquired emergency Federal coal lease U-49332 located directly west and adjoining the present permit area. All access to the lease will be from adjacent underground mine workings located in the present permit area. Present surface facilities will be used. The plan meets the requirements of the 43 CFR 3482.1(c) rules and regulations. We have determined that the proposed coal recovery procedures will safely obtain maximum recovery of the coal resource within the plan area using the equipment and technology proposed. Within the limits of our authority, we approve the R²P² and recommend the subject plan be approved.

/S/ GENE NODINE

cc:
Diamond Shamrock Trail Mountain Coal Co.
DOGM
USO (U-921)

APPENDIX 9

BUREAU OF LAND MANAGEMENT (BLM)
STANDARDS FOR CALCULATING MINABLE RESERVES

BLM BASIC STANDARDS FOR CALCULATING COAL RESERVES

INPLACE RESERVES

4' - 30" (See Table 2-Underground Criteria)

MINABLE RESERVES

5' - 12' (See Table 2-Underground Criteria)

If the operator can demonstrate that full seam mining is not possible or practical, that information will be considered and minable reserves will be reduced accordingly.

RECOVERABLE RESERVES

BLM normally figures 50% of minable as being recoverable (unless operator can show less). (See Table 2-Underground Criteria).

Exceptions to consider:

- Difficult mining conditions
- Overburden Thickness
- Burn Area (500')
- Angle of Draw
- Escarpment Protection

BLM standards are local determinations of each area or region. The BLM needs this standard to acquire firm figures to determine diligence and continued operations requirements. Part 3483 43 CFR.

Table 2.
UNDERGROUND CRITERIA

REGION	MIN. SEAM TH.	MAX MIN HT.	MULT SEAM IB	BURN LINE	OB TH.	REC OVERY	MULT SEAM
WYOMING-- Hanna Basin	N/A	16 ft.	N/A	0	N/A	60%	N/A
Western Rock Springs Uplift	5.5 ft.	13.0 ft.	75%	0	1500 ft.	40%	
COLORADO-- Lower GR-HF	5 ft.	11 ft.	50 ft.	500	0-1500 1500-2000	50% 40%	40% 30%
UTAH-- Wasatch	4 ft. 5'	12 ft. 12 - MINABLE	50 ft.	500 ft.	0-1500 1500-+	50% 40%	40% 30%
Kaiparowitz	Use same criteria as for Wasatch.						
NEW MEXICO-- San Juan	5 ft.	12 ft.	50 ft.	N/A	250-1200	50%	50%
Tulsa	30 in.	Full Seam Thickness	N/A	0	0	50%	N/A