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MASTER

PHASE I: THE PIPELINE GAS DEMONSTRATION PLANT

PRELIMINARY COAL MINING PLAN

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ABSTRACT

Contract No. EF-77-C-01-2542 between Continental Oil Company and the United States Department of Energy (DOE) requires Continental Oil Company, as Contractor, to analyze, design, construct, test, evaluate, and operate a Demonstration Plant capable of converting high-sulfur bituminous caking coal to a high-Btu pipeline quality gas. One of the assignments under the contract is to prepare a preliminary plan for mining a coal reserve adjacent to the tentatively selected site for the Demonstration Plant. This coal reserve is one potential source of the coal feed to the plant during Phase III operations of the plant as a commercial venture.

A large reserve of surface-mineable Meigs Creek Ohio No. 9 coal is located within about three miles of the tentatively selected Demonstration Plant site in Noble County, Ohio. This reserve is owned by Consolidation Coal Company, and Consolidation Coal has expressed a willingness to enter into a long-term agreement to supply ROM coal to the Demonstration Plant.

The coal would be mined using a combination of stripping dozers and a walking dragline. Conventional mining practices would be followed. Both the mining procedures and reclamation of the areas affected by mining would be in conformance with Federal and State statutes and regulations.

The mining plan requires producing 1,468,000 tons per year of ROM coal for a period of 25 years. The investment in mining equipment and mine development over this period is estimated to be $83,104,000. A total of 168 employees will be required for the mining operations.

1.0 INTRODUCTION

Continental Oil Company and the United States Department of Energy (DOE) executed Contract No. EF-77-C-01-2542 on May 27, 1977. This contract requires Continental Oil Company, as Contractor, to analyze, design, construct, test, evaluate, and operate a Demonstration Plant capable of manufacturing pipeline gas from high-sulfur bituminous caking coal.

The contract specifies that the project will proceed in three phases:

Phase I:	Development and Engineering
Phase II:	Demonstration Plant Construction
Phase III:	Demonstration Plant Operation

Phase I is being financed entirely by the U.S. Government. The costs of Phases II and III are to be shared equally by the Government and private industry.

In order to implement Phase III of the project, the Contractor must arrange for the supply of all raw materials, catalysts, chemicals, and other supplies needed to operate the plant for a period of about 42 months. This assignment is to be completed during Phase I.

In order for the Contractor to obtain private financing for its share of Phase II and III costs, the Contractor intends to construct the Demonstration Plant so that it can be operated as a commercial venture for 20 years following completion of the Phase III program. Thus, firm commitments for a 24-year supply of the major raw materials — coal, water, and power — must be established during Phase I of the project.

The Contractor has decided to design a Demonstration Plant capable of processing Meigs Creek Ohio No. 9 coal into pipeline quality gas and has proposed to locate the plant in Noble County, Ohio. The contract requires the Contractor to select the coal feed and the plant location. Ohio No. 9 coal is a moderately-caking, high-sulfur bituminous coal.

The Demonstration Plant is being designed to gasify 3,240 tons-per-stream day of sized (2" x 1/4") Ohio No. 9 coal. The plant will receive run-of-mine (ROM) coal. A coal preparation section which includes a coal washing unit will be included in the Demonstration Plant. While design of the coal preparation section has not been completed, the requisite ROM coal deliveries are expected to be about 5,000 tons-per-stream day including fines and "gob" from coal preparation. Thus, the annual ROM coal requirements will be about 1,650,000 tons.

Since the annual coal requirements are quite high, the Contractor has selected a plant site which is adjacent to a large reserve of surface-mineable Meigs Creek Ohio No. 9 coal. This reserve, termed the Noble County, Ohio, North Field, is owned by Consolidation Coal Company (Consol), a wholly-owned subsidiary of Continental Oil Company. Consol has expressed a willingness to enter into a long-term agreement to supply ROM coal to the Demonstration Plant.

Since the Phase III program is limited to about 42 months, DOE is not interested in a long-term supply of coal feed for the Demonstration Plant and in fact, prefers that the coal supply for this period be purchased on a short-term basis from existing coal mines. The Contractor, however, is interested in obtaining contractual commitments during Phase I for most of the coal feed requirements for at least the 20-year period of commercial operations which would follow Phase III.

Since Consol is a subsidiary of the Contractor, an independent third party will be retained to negotiate the long-term coal supply agreement. Also, competent engineering consultants will be retained to evaluate the terms of the agreement and the associated costs and fees for mining the coal.

It is emphasized that the long-term coal supply agreement will be between Consol and the industrial partner who will share Phase II and III costs with the Government. The industrial partner is expected to be composed of a number of industrial firms of which the Contractor would be one. The Government's involvement in the long-term coal supply is limited to the following contractually specified obligations:

a. The advancement of an option payment, if any, during Phase I to hold the coal reserve for the project. The option payment is to be re-paid to the Government by the industrial partner during Phase II of the project.

b. The sharing of termination costs, if any, with the industrial partner if the Demonstration Plant operations are terminated at the end of Phase III.

In order to negotiate the long-term coal supply contract with Consol, the third-party negotiator and the engineering consultants must have a preliminary coal mining plan. This plan is needed so that the engineering consultants can evaluate the extent of the reserves, the ability of Consol to supply the contractually specified quantities of coal, and the estimated costs of mining the coal.

Consol has prepared a mining plan based on preliminary engineering studies. This plan includes coal reserve estimates, mining procedures, selection of mining equipment, and a budget estimate of the investment costs in fourth quarter 1977 dollars for the proposed surface mine. The mine is designed to provide 1.468 million tons per year of ROM Ohio No. 9 coal.

The plan is based upon exploration drilling data and adequate mapping of the area. This information was processed at Consol's computer facilities which provided a detailed reserve breakdown and other detailed information from which the mining parameters were derived. These data were then used to design the mining method and to size the major mining equipment.

The plan contemplates compliance with the recently enacted "Surface Mine Control and Reclamation Act of 1977 - Interim Performance Standards." The current interpretation of these new regulations are subject to change, and this may in turn affect the costs or investments shown in this report.

It should be noted that the schedule of pre-mining studies required for an initial mine permit in Noble County, as shown in Section 10.0 of this report, are tentative based upon the current best interpretation of the applicable regulations.

This study does not include a detailed year-by-year breakdown over the entire life of the mine. A breakdown showing, among other things, specific mining areas, haulage roads, power distribution, sedimentation ponds, diversion ditches, etc. will be required for the actual development of the mine and to meet mine permit requirements.

2.0 SUMMARY

2.1 Mining Method

A combination of stripping dozers and a walking dragline (65 CY) has been selected to mine the reserves in the Noble County, Ohio, North Field. This equipment will remove the overburden from 0-140+ feet of cover by the contour method of surface mining. The overburden will be prepared for removal by drilling and blasting. The overburden will be drilled by two Airtrack type drills and one rotary type drill similar to a Bucyrus Erie 60-R drill. The exposed raw coal will be loaded from the pit using a front-end loader (10 CY) and an electric coal loading shovel (13 CY) combination into 120 ton off-highway bottom dump coal trucks. These trucks will haul the raw coal to the Demonstration Plant from the working pit.

The areas affected by mining will be reclaimed, conforming to previously stated regulations, using a combination of construction type dozers and scrapers. The scrapers will perform topsoil removal, stockpiling, and topsoil replacement over final graded areas. The dozers will perform final grading of spoil, topsoil stockpile grading, and topsoil spreading upon replacement.

The following is a summary of the major mining and reclamation equipment required:

Overburden Removal

1 - 65 CY Dragline (Bucyrus Erie 1570-W or Marion 8200)
3 - Dozers (D-9H Type)
2 - Airtrack Drills (Drill hole size = 4 inch)
1 - Rotary Drill (Drill hole size = 12 1/4 inch)

Coal Loading and Haulage

1 - Front End Loader (Caterpillar 992 Type)
1 - Coal Loading Shovel
3 - 120 Ton Bottom Dump Coal Trucks (off-highway)

Reclamation

2 - Dozers (D-9H Type)
6 - Scrapers (Caterpillar 637-D Type)
3 - Dozers (Fiat Allis HD-41 Type)

2.2 Reserves

Overburden Interval	0-140+ feet
Average Height Overburden	53.0 feet
Coal Seam Mined	Meigs Creek No. 9 Coal
Roof Coal Seam Thickness	1.53 feet (average)
Main Coal Seam Thickness	3.35 feet (average)
Coal Acres Mined	4,025 acres
Surface Acres Affected	8,050 acres

Recoverable Coal Tons from Mining

Roof Coal (9R)	12,174,900 tons
Main Coal (09)	31,702,500 tons
Raw Coal Ratio	11.79 bank cubic yards per ton ROM coal
Plant Feed Ratio	9.34 bank cubic yards per ton of feed to the coal preparation plant (Raw Coal + Dilution)

2.3 Mine Productivity

	Project Year*		
	1	2	3-26
Overburden, Cubic Yards	0	1,303,000	13,700,000
Coal Preparation Plant Feed, Tons	0	436,000	1,468,000

2.4 Mine Investments in Thousand Dollars (4th Quarter, 1977)

	Project Year*					
	0	1	2	3-26	27	Total
Development	677	3,000	853	1,626		6,156
Initial Capital		7,803	21,738			29,541
Replacement Capital				41,441		41,441
Mine Closing					5,966	5,966
Total	677	10,803	22,591	43,067	5,966	83,104

2.5 Manpower Requirements

Category	Project Year*		
	1	2	3-26
Hourly Labor	0	92	131
Salaried Labor	0	35	37

*Project Year 1 starts on the date on which Consolidation Coal is authorized to open the mine to supply coal to the Demonstration Plant. Opening of the mine, however, cannot start until after all Federal, state, and local permits are obtained. Certain mine development costs (see Paragraph 6.0, page 41, and Paragraph 10.0, page 60) occur during a two year period prior to Project Year 1. For simplicity in preparing the report, this pre-mine opening period is referred to as Project Year 0. Overburden removal and coal production start during Project Year 2.

3.0 COAL RESERVES

The Noble County, North Field Reserves were calculated from drill hole information obtained from exploration programs conducted from 1948 through 1977. There are 346 drill holes located in the North Field Reserve area. Surface elevations were taken from 1"=400' maps originally flown in 1968 and updated in 1977. Top of coal elevation, seam thickness, and overburden interval maps were generated from these data. Additionally, reserves located inside town boundaries, cemeteries, gas pipeline corridors, power transmission line corridors, state road corridors, and previously mined out areas were excluded from the reserve calculation.

A brief summary of the major assumptions and methods used in calculation of the reserves follows:

a. The reserves calculated in the North Field were assumed to be mined for eventual preparation to a coal washing plant. The final clean product will be utilized in the Demonstration Plant.

b. The Meigs Creek, Ohio No. 9 seam consists of two prominent benches separated by a parting of variable thickness. The upper bench was designated as the roof seam coal and the lower bench was designated as the main seam coal In addition, there are locations where the roof seam coal did not exist leaving only the main coal seam. Only in very isolated instances was the roof coal seam present without the main coal seam in mineable thickness.

c. Tonnage and overburden have been excluded from the areas that had been previously mined or that fell within the designated boundaries of major state roads, pipeline corridors, cemeteries or towns in the reserve area.

d. The following densities in tons per acre-foot (TPAF), specific gravities and recovery factors were used in calculating the roof coal seam and main coal seam raw coal reserves in the North Field.

	Cover Line, Ft	Density (TPAF)	Specific Gravity	Mining Recov. Factor
Roof Coal	0-10	2,039	1.50	0.35
Roof Coal	10-140+	2,039	1.50	0.90
Main Coal	0-10	1,930	1.42	0.35
Main Coal	10-140+	1,930	1.42	0.90

e. The reserves were calculated as adverse, Consol controlled, and combined controlled for this report and are summarized as follows:

NOBLE COUNTY, OHIO, NORTH FIELD

Consol Controlled Reserves

Cover Line, Ft	Main Seam, Acres	Avg Ht, Ft	Main Seam, Tons	Roof Seam, Acres	Avg Ht, Ft	Roof Seam, Tons	Overburden Avg Ht, Ft	Overburden Thousand Cu Yd	Raw Ratio
0-10	739,99	3.34	1,667,700	446.46	1.52	484,300	6.4	7,652.4	3.56
10-80	3,403.46	3.36	19,841,700	2,881.67	1.52	8,038,000	41.6	234,118.0	8.40
80-140	1,200.50	3.45	7,203,500	916.02	1.61	2,706,400	102.9	199,739.0	20.16
140+	153.39	3.48	926,200	92.79	1.45	246,900	157.7	39,024.7	33.27
Totals	5,497.34	3.38	29,639,100	4,336.94	1.54	11,475,600	53.3	480,534.1	11.69

Adverse Reserves

Cover Line, Ft	Main Seam, Acres	Avg Ht, Ft	Main Seam, Tons	Roof Seam, Acres	Avg Ht, Ft	Roof Seam, Tons	Overburden Avg Ht, Ft	Overburden Thousand Cu Yd	Raw Ratio
0-10	78.41	2.95	156,400	37.53	1.40	37,500	6.1	772.6	3.98
10-80	267,86	3.01	1,399,000	199.53	1.43	523,600	38.0	17,399.6	9.05
80-140	69.20	2.96	355,700	45.34	1.22	101,500	106.5	12,029.8	26.31
140+	25.78	3.40	152,300	18.02	1.11	36,700	156.6	6,512.8	34.46
Totals	441.25	3.01	2,063,400	300.42	1.38	699,300	49.7	36,714.8	13.29

NOBLE COUNTY, OHIO, NORTH FIELD

Combined Consol & Adverse Reserves

Cover Line, Ft	Main Seam, Acres	Avg Ht, Ft	Main Seam, Tons	Roof Seam, Acres	Avg Ht, Ft	Roof Seam Tons	Avg Ht, Ft	Thousand Cu Yd	Raw Ratio
0-10	818.40	3.30	1,824,100	483.99	1.51	521,800	6.4	8,425.0	3.59
10-80	3,671.32	3.33	21,240,700	3,081.20	1.51	8,561,000	41.3	251,517.6	8.44
80-140	1,269.70	3.43	7,559,200	961.36	1.59	2,807,900	103.1	211,768.8	20.43
140+	179.17	3.47	1,078,500	110.81	1.39	283,600	157.5	45,537.5	33.43
Totals	5,938.59	3.35	31,702,500	4,637.36	1.53	12,174,900	53.0	517,248.9	11.79

The 0-140+ foot tonnages and corresponding ratio from the combined Consol and adverse reserve calculations were used as the basis for the cost estimates. Consol controls approximately 94 percent of the recoverable coal in the field from 0-140+ feet of cover.

4.0 MINE PLAN

4.1 Introduction

The mine plan is based on mining 35,668,000 tons of wash plant feed (raw coal + dilution) over a 25-year period using the contour method of surface mining currently being practiced in the State of Ohio. This plant feed will be washed in a coal preparation plant and the resultant washed product will be fed to the Demonstration Plant. All cited figures may be founded at the end of this section.

The coal in the Meigs Creek No. 9 coal seam in Noble County outcrops (coal seam intersects ground surface) along the hillside approximately 150-200 feet above the adjacent valley floors. (See map, Appendix A) Therefore, the depth of overburden increases from zero cover at the outcrop to 140+ feet of cover in the field. The resultant geometry of the coal seam and overburden is a series of undulating ridges and valleys throughout the field. This geometry lends itself to the contour method of mining currently practiced by Consol in Ohio. This method consists of opening a series of successive cuts parallel to the existing land contour advancing from the outcrop (zero feet overburden cover) into the hillside and greater depths of cover. (See Figure 4-1) Moving the overburden in these successive cuts exposes the coal for extraction. The successive cuts of overburden over the coal are normally moved by dozers, stripping shovels, draglines or various combinations of this equipment.

For this project, the basic mine plan will be to remove overburden from the outcrop of No. 9 seam to 140+ feet of cover using a combination of dozers and dragline. This will expose the Meigs Creek No. 9 coal seam which exists in two benches (Roof Seam and Main Seam) separated by a parting. This coal with dilution as shown in the Reserve Section of this report will be loaded by a coal loading shovel and hauled by off-highway trucks to the coal preparation plant. The average ratio for the mine is 9.34 bank cubic yards of cover per ton of coal feed to the preparation plant.

4.2 Mining Method

This mine will begin production in year 2 of the project and will produce 436,000 tons of coal preparation plant feed. Some 1,303,000 bank cubic yards per year of overburden will be removed from 0-30 feet of cover with three Caterpillar D-9H type dozers uncovering the Meigs Creek No. 9 coal. (See Figure 4-2)

The dozers will establish a working pit 500-1,000 feet long parallel to the contour by pushing successive cuts of overburden over the outcrop line exposing the coal for loading. These cuts will advance from the outcrop (zero feet of cover) to approximately the 30-foot cover line. Upon completion of

the initial pit, successive pits will be established along the contour. The cut from 0-30 feet of cover will be utilized for spoil room from the initial dragline cut in the second year of production.

In addition to removing the overburden from 0-30 feet of cover in the first year of production, the dozers and drills will be utilized to move approximately 1,000,000 bank cubic yards per year of overburden to prepare roads and benches from which the dragline will operate in the second year of production.

These dozers are scheduled to operate 230 days per year and two shifts per day. The calculated productivity for each dozer is 2,144 bank cubic yards per shift. The overburden will be drilled and blasted before removal by the dozers. Drilling will be performed by two Airtrack drills scheduled to operate 230 days per year and two shifts per day. The overburden will be blasted using an Ammonium Nitrate Fuel Oil mixture (ANFO). This explosive is similar to that being currently used by Consol in Ohio. The ANFO will be transported to the mine from the Cadiz, Ohio, Nitrate Plant operated by Consol with highway tractor-trailer trucks. The trailers will be utilized for temporary magazine storage of the ANFO at the mine. The powder factor to be used to blast the overburden prepared by the Airtrack drills is 0.8 pounds per cubic yard. Blasting is scheduled for 230 days per year and one shift per day.

The coal seam is sufficiently soft and thin that blasting is not required to break it. The coal uncovered in the first year of production will be removed and loaded along with out-of-seam dilution by a front-end loader (10CY) similar to a Caterpillar 992 Front-End Loader. The front-end loader will also remove parting material and perform pit clean up. The annual coal recovery, out-of-seam dilution and parting removal are outlined in Section 3.0 of this report.

The raw coal plus dilution will be loaded by the front-end loader into two off-highway 120-ton bottom dump coal trucks similar to Euclid CH-120. This material will then be transported by the trucks over a haul road constructed at the mine to the coal preparation plant. (See Figure 4-4) The weighted average haul distance over the life of the mine is approximately three miles. Two possible profiles were used in conjunction with available truck performance curves to establish haul cycle times. One profile approximates haulage through the working pit, downhill to a valley, proceeding along the valley, and terminating with uphill haulage to the plant site. (See map, Appendix A) The second profile simulates haulage through the pit, uphill to a road along the ridge, proceeding along the ridge, and termination with downhill haulage to the plant site. These two profiles were selected to approximate the varied haulage profiles that will be encountered during the life of the mine.

The cycle times from these two profiles were then used in a truck-per-shovel computer program to establish the final required loaders and trucks for the first year of production. Coal loading and haulage is scheduled for 230 days per year and two shifts per day. Additional production and maintenance support equipment required for the first year of production are outlined in the Section 7.0 of this report. Commencing in the second year of production (Project Year 3) until the end of production in Project Year 26, the mine will produce 1,468,000 tons per year of coal preparation plant feed. The overburden will be removed using a combination of the D-9H type dozers and a dragline (65 CY) similar to a Bucyrus Erie 1570-W Dragline. The dozers will remove the overburden from 0-30 feet of cover at an annual rate of 1,303,000 cubic yards per year and will prepare roads, ramps and benches from which the dragline will operate. The yardage moved for the dragline will be approximately 1,000,000 bank cubic yards per year. The dragline will remove overburden from 30-140+ feet of cover at an annual rate of 14,133,000 cubic yards per year, equivalent to 12,397,000 virgin cubic yards per year with a field average rehandle of 14 percent. The dragline will move the overburden while operating from one of four prepared benches, depending upon the depth of cover encountered in a particular area. (See Figure 4-1) Based on range diagrams of the BE 1570-W Dragline, the following sequence of operation was derived. (See Figures 4-2 and 4-3)

The dragline will begin operation at an initial bench elevation of approximately 60 feet above the coal establishing an initial working pit approximately 200 feet wide parallel to the crop line. The overburden removed from this cut will be sidecast into the pit established by the dozers from 0-30 feet of cover and downslope below the crop line. The coal exposed in this pit will be removed and loaded by a coal loading shovel and front-end loader into off-highway coal trucks and hauled to the coal preparation plant. Upon completion of the initial cut, the dragline will move to a second bench having an elevation of approximately 84 feet above the coal and begin exposing a second pit approximately 118 feet wide parallel to the initial dragline cut. The overburden removed from the cut will be sidecast into the preceding pit from which the coal has been loaded. The coal exposed in this pit will be loaded and hauled to the coal preparation plant as in the preceding pits. Upon completion of this cut, the dragline will proceed to the third bench level at an elevation of approximately 107 feet above the coal. Working from the bench prepared by the dozers, the dragline will remove overburden from the third cut parallel to the preceding cut exposing a working pit approximately 118 feet wide. The overburden removed will be sidecast into the preceding cut from which the coal has been loaded. Upon completion of the third cut, the dragline will then move to the fourth and final bench level at an elevation of approximately 130 feet above the coal. Working from the bench prepared by the dozers, the dragline will remove overburden from the fourth cut parallel to the previous cut exposing a working pit approximately 118 feet wide.

In order to sidecast the overburden removed from the fourth cut, an extended fill bench overlapping the previously exposed pit must be constructed. (See Figures 4-2 and 4-3) The dragline must construct this bench due to the fact that the volume of overburden removed from the fourth cut, increased due to material swell, cannot be placed into the space available from the previous cut. Therefore, the extended bench allows the dragline to cast the overburden a greater distance from the fourth cut by moving out on the extended fill bench. This method requires that a certain volume of the fourth cut be rehandled. The rehandle expressed as a percentage is calculated as:

$$\frac{\text{Volume of extended bench}}{\text{Volume of cut}} \times 100$$

Based on range diagrams, the extended rehandle incurred on the fourth cut would be 57 percent. However, there are many areas in the North Field in which the overburden covering the coal can be removed by the dragline operating from the lower three bench levels (60', 83', and 107'). Operating from these bench levels will not require construction of the extended bench in handling the overburden. Based on analysis of the overburden distribution and corresponding depth of cover over the reserves to be mined, approximately 51 percent of the overburden falls in the range of 80-140+ feet. It is estimated that approximately 20 percent of the overburden to be removed is at a depth of cover 130 feet or above. The field average rehandle attributed to extended bench construction is therefore estimated to be 10 percent.

The dragline, upon completion of the fourth cut, would continue at the 130-foot bench level and assisted by the dozers would move the overburden above 130 feet of cover and expose additional pits of coal approximately 118 feet wide. The dragline would proceed in this manner until the area is completed. The overburden from 0-30 feet of cover to be moved by dozers is approximately 10 percent of the total overburden to be moved. The overburden from 30-130 feet of cover to be moved by draglines and dozers is approximately 87 percent of the total, and the overburden above 130 feet to be moved by dragline and dozers is approximately 3 percent of the total.

The overburden to be moved by the dragline and dozers will have to be drilled and blasted. The overburden to be moved by the dozers in the preparation of dragline benches and roads will be drilled by the Airtrack drills. The overburden to be moved by the dragline will be drilled by a track-mounted rotary drill similar to a Bucyrus Erie 60-R Rotary Drill. This drill will commence operation in the second year of production (Project Year 3) corresponding to the startup of operation of the dragline.

The overburden will be blasted using an Ammonium Nitrate Fuel Oil (ANFO) mixture. The ANFO will be supplied from the Nitrate Plant operated by Consol at Cadiz, Ohio. The ANFO will be shipped by highway tractor-trailer trucks to the field. The trailers will be utilized for temporary magazine storage at the mine site. The blasting will be initiated and controlled using an electronic blasting machine to assure compliance with the "Surface Mine Control and Reclamation Act of 1977." This machine controls the quantity of explosives shot at any one time preventing damage to structures and disturbance of population centers that lie in close proximity to the mining area. The powder factor to be used to blast the overburden prepared by the 60-R drill is 0.5 pound per cubic yard. This powder factor is based primarily on Consol's experience at other Ohio surface mining operations which require blasting overburden material similar to that existing in Noble County. Overburden drilling is scheduled 230 days per year and two shifts per day. Blasting will be performed 230 days per year and one shift per day.

Beginning in the second year of production, coal removal and loading will be performed primarily by a coal loading shovel (13 CY) similar to a Bucyrus Erie 155-B. The startup of production by this machine corresponds to the initial year of production of the dragline. Supplemental coal removal and loading and parting removal will be performed by the front-end loader which begins operation in the first year of production. The raw coal plus out-of-seam dilution will be loaded into off-highway 120-ton bottom dump coal trucks similar to Euclid CH-120 one hundred-twenty ton trucks. The plant feed will then be transported over a haul road constructed from the mine to the coal preparation plant. The coal loading and parting removal operation in the pits exposed by the dozers from 0-30 feet of cover or the dragline and dozers from 30-140+ feet of cover will be accomplished in the following manner.

The roof seam coal, parting greater than 1.0 feet, and main seam coal will be loaded from the exposed pit in successive cuts 50-75 feet wide. These cuts will proceed from the spoil side of the pit to the highwall side. Initially, the front-end loader will remove and load out the roof coal plus dilution from the first cut into the coal trucks. The exposed parting will then be removed and spoiled on the existing spoil bank by the front end loader. The exposed main seam and dilution will then be removed and loaded by the coal shovel into the coal trucks. Upon completion of the first cut, the front end loader will then proceed to work on the second cut in the pit. The roof seam coal from the second cut may be either loaded on the coal trucks or piled up into the space provided by the first coal cut to be blended and loaded by the coal shovel while loading the main seam from the second cut. The parting material is removed and spoiled in the first cut area against the spoil bank. The coal shovel will then either load the main seam plus dilution or the roof seam piled up by the front-end loader and the main seam plus dilution into the coal trucks. This sequence will then proceed until the entire exposed pit is loaded.

In the situations where there is roof seam coal, parting less than 1.0 feet, and main seam coal or where there is roof seam coal or main seam coal only, the coal shovel will remove and load the coal plus dilution supplemented by the front-end loader. The front-end loader will also be used to perform general pit cleanup. Coal loading and haulage are scheduled 230 days per year and two shifts per day,

4.3 Reclamation and Acid Mine Drainage Treatment

The land affected by this surface mine will be reclaimed and any resultant acid mine drainage from exposed coal or toxic overburden will be treated before discharge into the streams which course through the field. This reclamation and acid mine drainage control must be performed to comply with the "Surface Mine Control and Reclamation Act of 1977." This act generally requires that all land disturbed by surface mining must be restored to the approximate original contour. The accomplishment of this task includes pre-mining tree and brush removal, pre-mining construction of sedimentation ponds, pre-mining removal and stockpiling of topsoil material, grading or backfilling spoil material into exposed mining cuts eliminating all exposed highwalls, post-mining topsoil placement over graded spoil, revegetation of the topsoiled land, and post-mining monitoring and control of the reclaimed areas until stabilization of the land is attained. Additionally, this act requires that discharge from potential acid producing coal and overburden be controlled and treated before discharge throughout pre-mining, mining, and post-mining activity. This control is normally accomplished by installing sodium hydroxide and lime treatment plants with a system of ponds which collect discharge from the mining area and provide necessary retention time of the discharge, after chemical treatment, to allow suspended solids to settle out of the effluent before discharge downstream.

The reclamation of the land affected by mining requires that a variety of heavy construction-type equipment be purchased and operated during the project. The types of equipment selected are based primarily on experience obtained from current reclamation practices by Consol in Ohio. The quantity of this equipment required was determined based on calculations from the "Caterpillar Performance Handbook," Edition 7, or from actual operating experience of the selected equipment. The type and quantity of equipment selected and their corresponding functions are summarized as follows:

Tree and Brush Removal

Pre-mining tree and brush removal will be performed by outside contractors. This operation will prepare the areas to be affected by mining for topsoiling operations.

Sedimentation Pond Construction

Sedimentation pond construction will be performed by one D-9H type dozer and one scraper similar to a Caterpillar 637-D Scraper. These two pieces of equipment will also be used to construct haulage ramps and roads and for other general construction jobs at the mine. The selection of this equipment is believed to have ample capacity to perform the above functions since each type of construction will be required infrequently throughout the project.

Topsoil Handling

Topsoil handling (removal, stockpiling, and replacement) will be accomplished by scrapers similar to Caterpillar 637-D Scrapers and Caterpillar D-9H type dozers. Beginning in the second year of production (Project Year 3) and continuing to the end of production in Year 26 of the project, approximately 161 coal acres will be uncovered affecting approximately 322 surface acres. The number of surface acres affected is based on a reclamation expansion factor of two affected acres per coal acre disturbed. This ratio is based on the experience of surface mining operations under similar conditions in Ohio. In determining the number of scrapers and dozers required for topsoil removal, stockpiling, and replacement, it was assumed that one foot of topsoil would be removed from the 322 surface acres to be disturbed. The scrapers will remove the topsoil while being pushed by the dozers and will place the topsoil an average of one mile from the mining area into stockpiles until mining activity in the area is completed. At that time, the topsoil will be loaded by the scrapers and placed over the graded spoil area. Three scrapers are scheduled to begin operation in the first year of production (Project Year 2) along with two dozers. These scrapers will remove the topsoil over the area to be affected initially by the dozers in the first year of production and the area to be affected in the second year of production (Project Year 3) by the dragline and dozers. During the second year of production three additional scrapers are scheduled to remove topsoil from the area to be affected in succeeding years and to begin replacement of topsoil over final graded spoil areas in the area where mining has been completed. This reclamation planning assumes that reclamation of the mined out area will be sequenced no later than one year following completion of mining in a particular area. This scheduling will assure compliance with current reclamation requirements for surface mines in Ohio. Topsoil handling is scheduled 230 days per year and two shifts per day.

Spoil Leveling and Grading

Spoiled overburden placed during the mining sequence by the dozers and dragline during mining must be leveled and all highways backfilled or eliminated such that the final graded area conforms to the approximate original contour of the land preceding mining activity. This final grading will be performed

by Fiat Allis HD-41 type dozers. These dozers were selected based on Consol's operating experience. Three HD-41 type dozers are scheduled to begin operation in the second year of coal production (Project Year 3) and will grade approximately 322 surface acres annually throughout the life of the project. The scheduling of these dozers assumes that reclamation of the mined out areas will be maintained one year after mining. The HD-41 type dozer requirements are further defined in Section 5.0 of this report. The grading operation is scheduled 260 days per year and two shifts per day.

Acid Mine Drainage Treatment

Due to the presence of high acid potential from the pyrite in overburden and coal, it will be necessary to treat runoff from the mined out areas before being discharged into streams in the mining area. The primary means of controlling acid mine drainage from the mined out areas will be accomplished through reclamations final grading, topsoil replacement, and revegetation of mined out areas. By sequencing the reclamation plan to follow mining in a specific area by one year, the coal seam and toxic overburden will be covered and sealed to prevent leaching of acid from the mined out areas. A secondary means of controlling discharge during pre-mining preparation, mining activity, and post-mining reclamation will be to construct sedimentation ponds in close proximity to the mining areas to collect runoff. These ponds will collect the runoff allowing the sediments to settle during retention, thus reducing the suspended solids. The tertiary means of control and treatment will be a system of sodium hydroxide plants and sedimentation ponds designed to collect the discharge from the mining area and neutralizing the acid. Additional settling of suspended solids will be accomplished in the sedimentation ponds located with these plants. The final treatment before discharge into the streams will be accomplished in the sedimentation ponds located with these plants. The final treatment before discharge into the streams will be neutralization in a lime plant and final settling in a system of ponds. The basic operation of these plants involves collecting the discharge downstream from the sodium hydroxide plants in a sedimentation pond where additional suspended solids are removed. The effluent from this pond then passes through an open channel at a designed flow rate where the lime is added under metered control to assure neutralization of acid in the effluent. The effluent then is collected into a series of polishing ponds where additional suspended solids are removed before final discharge to the streams. For the purpose of this study, it was assumed that one lime plant with ponds and two sodium hydroxide plants would be purchased in Year 1 of the project to begin operation in Year 2 of the project corresponding to the first year of coal production. Additionally, a Water Quality Analysis Laboratory will be purchased and operated on this same schedule. One additional lime plant and two additional

sodium hydroxide plants will be placed in operation in the fifth year of coal production. (Project Year 6)

The above assumptions were made in order to provide an estimate of the required capital to meet this obligation. These estimates are based primarily upon experience from surface operations in Ohio mining under conditions similar to those to be encountered in the North Field of Noble County. Final design and scheduling of these plants will be made based on detailed hydrology studies, overburden analysis, and mine plan sequence.

FIGURE 4-1

D-9H DOZER & 1570-W DRAGLINE PITS

TYPICAL SECTION

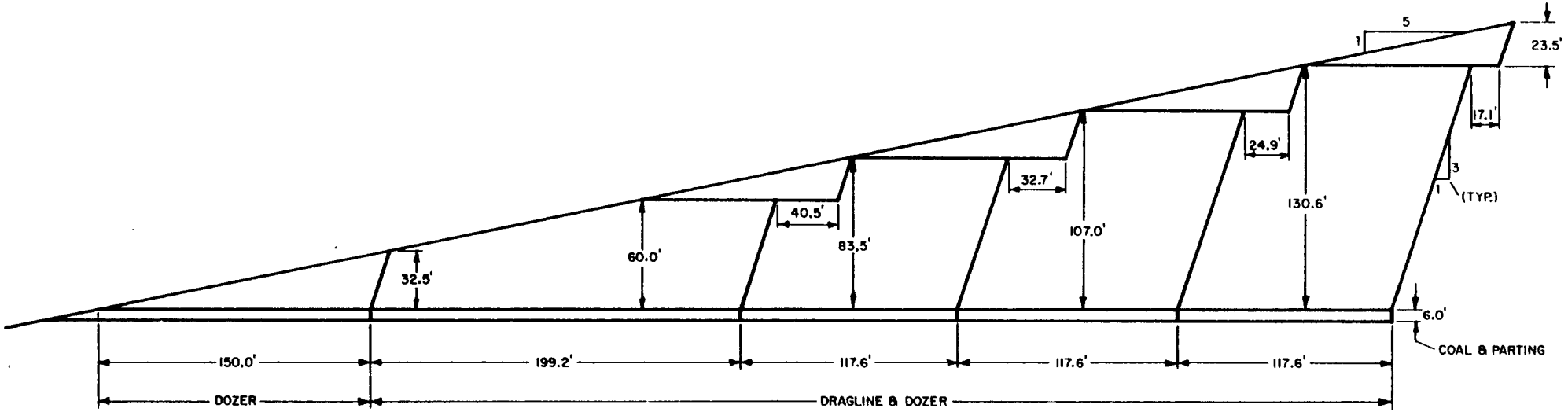


FIGURE 4-2

RANGE DIAGRAM
B.E. 1570-W DRAGLINE – 65 CY.
OVERBURDEN CUT SEQUENCE

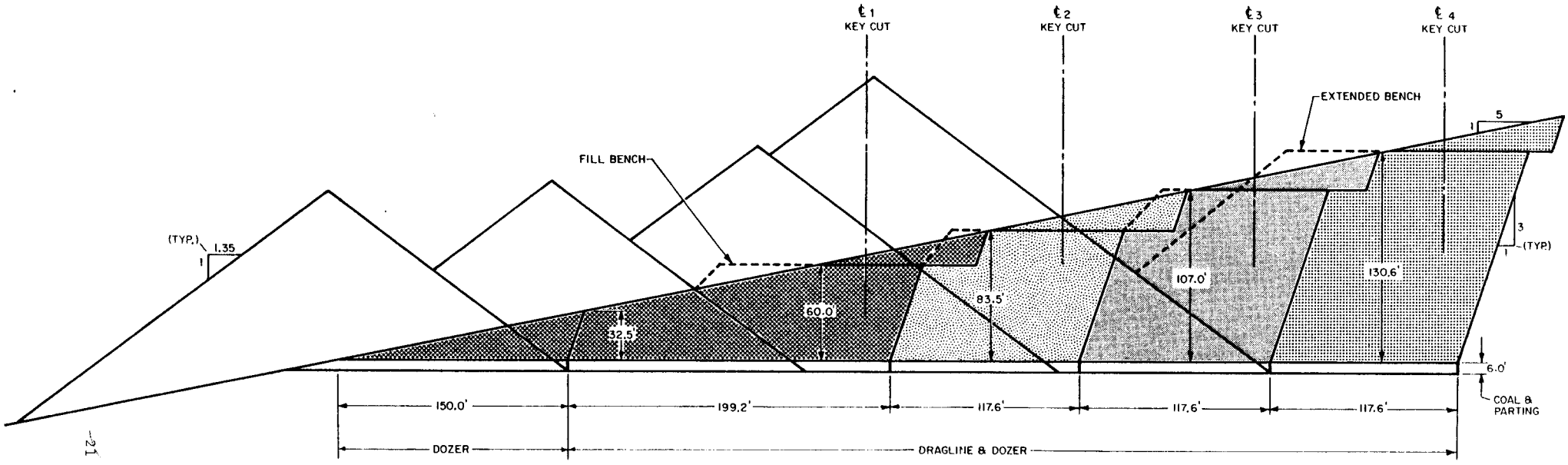


FIGURE 4-3

RANGE DIAGRAM
B.E. 1570-W DRAGLINE - 65 CY.
OVERBURDEN SPOIL SEQUENCE

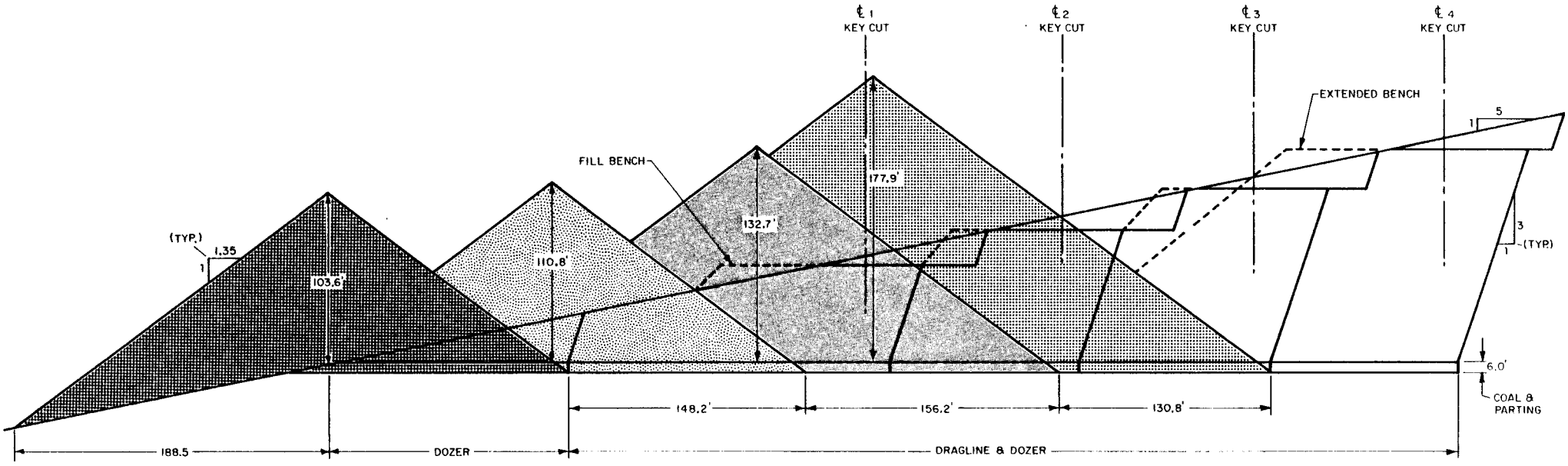
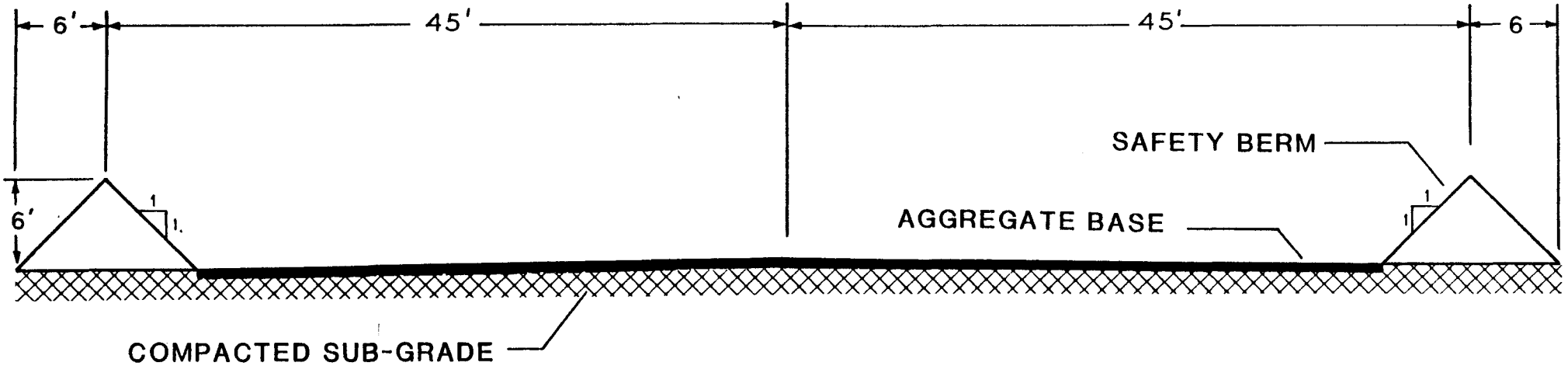


FIGURE 4-4

COAL HAULAGE ROAD

TYPICAL SECTION ON FILL



5.0 EQUIPMENT SELECTION

This section describes the equipment selected for operating the mine and for reclaiming the land areas affected by the mining operations. All cited figures may be found at the end of this section.

5.1 Overburden Removal

Dragline

A dragline having a bucket capacity of 65 cubic yards was selected to remove the overburden from 30-140+ feet of cover. This size machine was selected based on range diagrams of various machines which simulate mining the reserves. (See Figures 5-2 and 5-3) These diagrams demonstrate, on the average, the ability of a given machine to remove overburden from successive cuts while advancing toward higher cover into the slope and to sidecast or spoil this material, volumetrically expanded due to material swell. This must be performed such that the working pit exposed by removing the overburden cut is left completely open for the performance of coal loading operations. These diagrams also demonstrate the depth of cover to which a given machine can operate until the volume of the overburden cut removed cannot be sidecast or spoiled without overlapping into the working pit being exposed by the cut. The point at which this occurs is commonly referred to as the critical depth of the machine. In order to exceed this critical depth, a method referred to as extended bench rehandle is employed. (See Figure 5-1) This procedure allows the dragline to displace toward the spoil side of the cut, sidecasting or spoiling the overburden away from the working pit. This technique requires that yardage removed from the cut be rehandled. The range diagrams are used to evaluate the critical depth of the machine and the depths that the machine may feasibly attain using the extended bench method. Based on evaluations of the range diagrams, a Bucyrus Erie 1570 Series Dragline, or a Marion 8200 Series Dragline having approximately a 65 cubic yard bucket and operating radius in the 300-310 foot range appear to be the class of machine that could mine the field. The Bucyrus Erie 1570-W (See Figure 5-4) was tentatively selected for this project due to the lower initial capital cost, although either machine might be selected based on operational characteristics.

The 1570-W will remove overburden from 30-140+ feet of cover as previously described in the mine plan section of this report. Based on evaluation of the distribution of overburden in the field, approximately 90 percent of the total overburden is in the range of 30-140+ feet of cover. The dragline will produce 14,133,000 cubic yards per year equivalent to 12,397,000 virgin cubic yards per year at 14 percent rehandle.

The key pit parameters and dragline specifications are shown below:

Dragline Pit Parameters

Material Swell	30 percent
Ground Slope run/rise	5:1
Highwall Slope run/rise	0.33:1
Spoil Slope run/rise	1.35:1
Extended Bench Slope run/rise	1.35:1
Standoff on Soft	15 feet
Standoff on Hard	10 feet

BE 1570-W Dragline Specifications

Bucket Capacity	65 cubic yards
Boom Length	320 feet
Boom Angle	30°
Operating Radius	307 feet
Boom Point Height	175 feet
Dumping Clearance	55 feet
Digging Depth	170 feet
Tub Diameter	65.5 feet
Tail Clearance	68.0 feet

It is estimated that the dragline will be operated for 6,281 hours per year on the average. This estimate allows time for holidays, maintenance, deadhead time, and operating delays. Dragline production will average 2,250 cubic yards per operating hour.

The weighted average field dragline rehandle due to the use of the extended bench method at 130- foot cover was estimated based on the distribution of overburden in the field. The estimated rehandle to be encountered due to normal operation of the dragline was estimated to be four percent. The total rehandle is therefore estimated to be 14 percent for this project.

The dragline pit parameters used in this study are based primarily on measured data and operating experience derived from operating surface mines in Ohio. The pit conditions, with respect to the type of overburden material, highwall slope, and spoil slopes, are quite similar to conditions that will be encountered in Noble County.

Dozers

Dozers were selected to remove the overburden from 0-30 feet of cover based on the following analysis:

Evaluation of the range diagrams for the dragline demonstrated that the dragline should begin operation at an initial bench elevation of approximately 60 feet mining parallel to the outcrop. However, based on the average ground slope of 20

percent, the dragline would not be able to dig effectively the overburden from approximately 0-30 feet of cover without extensive bench construction and machine maneuvering. This problem becomes even more pronounced due to the geometry of the long ridges that characteristically overlie the coal in Noble County. These ridges tend to be very elongated and have a somewhat lesser slope than on a side hill cross section. This results in a coal overlain by low cover, approximately 0-30 feet of cover, being out of range of the dragline. These areas might be mined by walking the dragline to a lower bench level, but this maneuvering would result in lost productivity. The evaluation pointed out the need for a supplemental means of removing the overburden from 0-30 feet of cover. Further evaluation of the distribution of overburden in the field revealed that approximately 10 percent of the total overburden was in the range of 0-30 feet of cover. Based on the annual productivity of the dragline and corresponding life of the mine, this percentage equates on the average to 1,303,000 cubic yards per year to be moved by supplemental equipment. This annual yardage was considered small enough to be moved by dozers. Combining this yardage with approximately 1,000,000 cubic yards per year to be moved in preparing the dragline benches and roads amounts to approximately 2,303,000 cubic yards per year to be moved by dozers. Based on operating experience and estimated productivity from the "Caterpillar Performance Handbook," three D-9H dozers were selected to move this annual yardage.

5.2 Overburden Drilling

Yardage to be moved by the dozers in mining from 0-30 feet of cover and in preparation of dragline benches and roads will be prepared for blasting by drilling vertical drill holes with two Airtrack Drills. Yardage to be moved by the dragline will be prepared for blasting by drilling vertical drill holes with a rotary drill similar to a Bucyrus Erie 60-R Drill.

The Airtrack Drills were selected based on operating experience in the mining and construction industry. The BE 60-R Rotary Drill was selected based on operating experience at surface mines operated by Consol in Ohio.

Drilling and Blasting Parameters - BE 60-R

Drill Type	BE 60-R
Drill Hole Size	12 1/4 inch
Drilling Rate	784 feet per shift
Powder Factor	0.5 pounds per cubic yard
Drill Hole Spacing	
Square Pattern	40 feet by 40 feet
Average Hole Depth	70 feet
Days Scheduled	230 days per year
Shift Schedule	2 shifts per day

Table 5-1 is a computer calculated drilling and blasting summary for the Bucyrus Erie 60-R Drill.

Drilling and Blasting Parameters - Airtrack Drills

The two Airtrack Drills selected for this mine will provide ample drilling capacity for the overburden removal operations to be performed by the dozers for stripping and for road and bench preparation. This type of drill has the capability to traverse and drill in rugged, sloped terrain with minimal drill road preparation such as will be encountered at this mine. Additionally, this drill will help to provide the necessary dragline bench slope and grade control and thus minimize re-work by the dozers or dragline.

Drilling Parameters - Airtrack Drill

The drill parameters for the Airtrack Drill are:

Drill Type	Airtrack Drill
Drill Hole Size	4 inch
Drilling Rate	316 feet per shift
Powder Factor	0.8 pounds per cubic yard
Drill Hole Spacing	12 feet x 12 feet
Average Hole Depth	12 feet
Days Scheduled	230 days per year
Shift Schedule	2 shifts per day

TABLE 5-1

DRILLING AND BLASTING SUMMARY - BE 60-R DRILL

DAYS/YEAR SCHEDULED	267
SHIFTS/DAY	1
HOURS/YEAR SCHEDULED	2,135
HOURS/YEAR OPERATED	1,900
BCY/YEAR DRILLED	12,397,000
DRILLS SCHEDULED/SHIFT	1
DRILLS PURCHASED/YEAR	1
HOLES REQUIRED/YEAR	2,989
HOLES DRILLED/SHIFT	11
FEET DRILLED/YEAR (000)	209,200
FEET DRILLED/SHIFT	783,900
PENETRATION RATE/DRILL:	
FEET/HR-DRILLED	150.66
FEET/HR-OPERATED	110.10
FEET/HR-SCHEDULED	97.99
FEET/SHIFT-SCHEDULED	783.91
PATTERN ANALYSIS:	
SQUARE PATTERN, FT	40 x 40
STAG PATTERN, FT SPACING X BURDEN	56 x 28
MINIMUM REQUIRED STEMMING, FT	18.6
STEMMING USED, FT	20.4
HARDNESS FACTOR	H<20
HOLE-DIAMETER, IN	12-1/4
HOLE-DEPTH, FT	70.0
HOLE-STEMMING, FT	20.4
HOLE-POWDER COL, FT	49.6
HOLE BCY/HOLE	4,148.1
HOLE-AREA INFLUENCE, SQ FT	1,600.0
POWDER DENSITY, GM/CC	0.80
POWDER FACTOR, BCY:LBS	2.05:1
POWDER/HOLE, LBS	2,026.84
POWDER/FT-HOLE, LBS	40.88

TABLE 5-1 CONTINUED

POWDER REQUIRED:	
PER MONTH, LBS	505,000
PER YEAR, LBS	6,057,000
PER MONTH, TONS	252
PER YEAR, TONS	3,029
PRIMACORD REQUIRED:	
PER MONTH, FT	45,000
PER YEAR, FT	546,000
AREA DRILLED:	
PER YEAR, ACRES	110
PER MONTH, ACRES	9
PER YEAR, SQ FT-000	4,782,000
PER MONTH, SQ FT-000	398,000

5.3 Reclamation Equipment

Scrapers

Topsoil handling will be performed by scrapers similar to Caterpillar 637-D Scrapers assisted by Caterpillar D-9H Dozers. The selection of this type of equipment is based on experience from operating surface mines in Ohio.

The overall scraper requirement for topsoil handling was calculated from the "Caterpillar Performance Handbook," Edition 7 in the following manner.

Two specific haulage cases were compared for operation of the 637-D scraper. Case 1 simulates the loading of topsoil and haulage uphill on an average grade of 20 percent for a distance of one mile to a stockpile. Case 2 simulates the loading of topsoil and haulage downhill on an average grade of 20 percent to a stockpile for a distance of one mile. These two cases were selected to represent the highly varied conditions under which topsoil is handled at surface operations in Ohio. The travel cycle times for these two conditions have been calculated from the appropriate Rimpull and Retarding performance curves for the 637-D.

Calculations

Scraper Type	Caterpillar 637-D Wheel Scraper (Tandem Powered)
Bowl Capacity	31 cubic yards (heaped)
GVW Loaded	175,600 pounds
Material Handled	Topsoil
Material Weight	2,550 pounds per loose cubic yard = 3,200 pounds per bank
Material Swell	25 percent
Load Factor	0.80
Average Depth Topsoil	1.0 feet
Average Slope	+ 20 percent
Rolling Resistance	80 pounds per ton

Effective Grade from Rolling Resistance = $\frac{80 \text{ lb/ton}}{20 \text{ lb/ton}}$ = 4 percent

The Case 1 effective grade is 24 percent (grade plus rolling resistance)

The Case 2 effective grade is 16 percent (grade minus rolling resistance)

Case 1 Cycle Time

	Minutes per Cycle
Position Time	0.5
Fixed Time Loading	0.7
Travel Cycle Time Loaded	13.3
Maneuver Time & Spread	0.7
Travel Time Empty	4.8
TOTAL CYCLE TIME	20.0

Case 2 Cycle Time

	Minutes per Cycle
Position Time	0.5
Fixed Time Loading	0.7
Travel Time Loaded	6.3
Maneuver & Spread Time	0.7
Travel Time Empty	7.5
TOTAL CYCLE TIME	15.7

Based on these cycle times and estimated productivity gleaned from Consol's experience with this type of surface mining, a minimum of three scrapers will be needed to remove and stockpile the topsoil. However, this does not account for the fact that topsoil removal and topsoil replacement will be performed simultaneously throughout the project at different locations. An additional three scrapers will probably be required to handle topsoil replacement. Therefore, the total number of scrapers specified is six 637-D Wheel Scrapers.

D-9H Dozers

The primary function of the D-9H Dozers will be to assist loading of the 637-D Scrapers by pushing the scrapers. Additionally, the dozers will prepare haulage roads for the scrapers and will be used to level the stockpile.

One D-9H Dozer is needed for pushing the scrapers. One additional D-9H Dozer is needed to handle haulage road construction for the scrapers, tree stump removal, leveling of stockpiles and resoiled areas, etc.

HD-41 Dozers

The final spoil leveling and grading to the approximate original contour will be performed by Fiat Allis HD-41 Dozers. These dozers were selected based on Consol's experience in Ohio surface mining operations where this type of dozer is used extensively for final grading. Three HD-41 Dozers will be required.

5.4 Coal Loading and Haulage

The annual tonnages of ROM coal to be loaded from the exposed operating pits and hauled to the coal preparation plant are 436,000 tons in the first year of production (Project Year 2) and 1,468,000 tons in Year 2 through Year 25 of production (Project Years 3-26). The 436,000 tons produced in the first year of mining will be loaded by a Caterpillar 992 Front End Loader (10 CY) into two Euclid CH-120 one hundred twenty ton bottom dump coal trucks and hauled to the coal preparation plant. Table 5-2 is a summary of haulage cycle times for these trucks calculated from two assumed profiles for the field. The assumed weighted average haul distance is approximately three miles. The resultant cycle times were then input into

a truck/shovel computer program which simulates loading and haulage of the 436,000 tons during the second year of production. The results from this program indicate that one CAT 992 Front End Loader and two Euclid CH-120 trucks will be required for loading and haulage of ROM coal during the first year of production. The 1,468,000 tons produced in Years 2 through 25 of mining will be loaded primarily by a Bucyrus Erie 155-B Coal Loading Shovel (13 CY). The loading will be supplemented by the CAT 992 Front End Loader. The BE-155B will load the tonnage into three CH-120 trucks for haulage to the preparation plant. The haulage cycle times from Table 5-2 were input to a truck/shovel computer program simulating the loading and haulage of the 1,468,000 annual tons.

The results of this program show that the required number of 155-B shovels is one and the required number of CH-120 trucks is three, which is the maximum number required for this mine.

The haulage profiles selected and calculated loader and truck requirements represent two widely varied conditions which should represent the extremes of loading and haulage to be encountered in the field.

Coal loading and haulage operations are scheduled 230 days per year and two shifts per day.

TABLE 5-2

TRUCK HAULAGE CYCLE TIMES

Profile No. 1

Road Segment	Distance Feet	Rolling Resistance, Percent	Grade Percent	Top Speed, MPH	Time Minutes	Final Speed MPH
Haul Road*						
1	150	5.0	0.0	10.10	0.22	10.10
2	1,050	4.0	0.0	15.00	0.86	15.00
3	2,500	3.0	6.0	15.00	3.82	7.13
4	10,600	3.0	0.0	23.12	5.66	23.12
5	1,550	3.0	-6.0	25.00	0.72	15.00
6	150	4.0	0.0	15.00	0.14	0.00
TOTAL	16,000				11.42	
Return Road*						
1	150	4.0	0.0	15.00	0.16	15.00
2	1,550	3.0	6.0	17.47	1.05	17.47
3	10,600	3.0	0.0	32.00	3.91	25.00
4	2,500	3.0	-6.0	25.00	1.14	15.00
5	1,050	4.0	0.0	15.00	0.80	10.00
6	150	5.0	0.0	10.00	0.19	0.00
TOTAL	16,000				7.25	

Profile No. 2

Haul Road*						
1	150	5.0	0.0	10.10	0.22	10.10
2	1,050	4.0	0.0	15.00	0.86	15.00
3	2,500	3.0	-6.0	25.00	1.17	25.00
4	9,800	3.0	1.5	25.00	7.37	14.37
5	2,350	3.0	6.0	14.37	3.60	7.13
6	150	4.0	0.0	11.00	0.20	0.00
TOTAL	16,000				13.42	
Return Road*						
1	150	4.0	0.0	15.00	0.16	15.00
2	2,350	3.0	-6.0	25.00	1.10	25.00
3	9,800	3.0	-1.5	32.00	3.51	25.00
4	2,500	3.0	6.0	25.00	1.46	15.00
5	1,050	4.0	0.0	15.00	0.80	10.00
6	150	5.0	0.0	10.00	0.19	0.00
TOTAL	16,000				7.22	

*Truck is in stopped position at the start

5.5 Miscellaneous Equipment

The following equipment is required to provide support to the major mining activities such as overburden removal, drilling and blasting, coal loading and haulage, and reclamation. The types and quantities of equipment selected are typical of equipment employed for surface mine operations.

Overburden Drilling and Blasting

a. Caterpillar D-4 Dozer - This dozer is a utility dozer used to handle 60-R drill electrical cable, backfill drill stemming into blast holes, and to perform general clean-up around the drills.

b. Powder Truck - This truck is used to transport explosives from the storage magazines to the drilling and blasting site.

c. Blast Machine - An electronic blast machine is used to control blasting by controlling the amount of charge detonated during a particular interval of time. This machine will help to assure compliance with the "Surface Mine Control and Reclamation Act of 1977."

d. Nitrate Tractor and Trailers - These over-the-highway trucks will be used to transport the ANFO from the Nitrate Plant at Cadiz, Ohio to the mine site. The trailers will be used as magazines for temporary storage at the mine site until empty.

e. Magazine - This structure will be used for the storage of primers and electrical caps.

Coal Haulage

a. Caterpillar 16-G Grader - This heavy duty grader will be used to maintain the coal haulage road on a daily basis.

b. Water Truck - This truck is used to control dust on haulage roads at the mine.

c. Gradeall - This machine is used for maintaining drainage on the haulage roads and is utilized for culvert installation and slope dressing in areas not accessible to other machines.

d. Caterpillar D-9H Dozer - This dozer will be used for the construction of additional haulage ramps and roads and other general construction (sedimentation ponds, etc.) during the life of the project.

e. Caterpillar 637-D Scraper - This scraper will be used for the construction of haulage ramps and roads and other general construction (sedimentation ponds, etc.) during the life of the project.

f. Cable Arches - These arches are used in the operating pit during coal loading and haulage operations to prevent damage to the 155-B electrical cable by the coal trucks.

Miscellaneous Stripping Equipment

a. Pit Pumps (4 inch x 6 inch) - These pumps are used to maintain the operating pit during coal loading and haulage operations.

b. Auxiliary Light Units - These units are used to provide illumination for the mining and reclamation activities. These units are portable and are positioned to assist safe operation of equipment.

c. Supply Truck - This truck will haul supplies to the mining and reclamation sites during the project. This truck is normally in the 2 1/2 - 5 ton class vehicle.

d. 1/2 Ton Trucks - These trucks are to be used by the mining and reclamation supervisory personnel. One truck will be used by the Engineering and Survey staff at the mine.

e. Buses - These buses are used to transport personnel from a designated parking area to the job site.

f. Cable Truck - This truck is used to handle electrical cable for the dragline, drill, and coal loading shovel.

Reclamation

a. Tractor - This farm-type tractor is used to prepare the final graded and topsoiled areas for revegetation.

b. Seed Machine - This machine is used to apply seed and mulch onto the final graded and topsoiled areas.

Maintenance

a. 25-ton and 100-ton Cranes - These cranes are used to assist handling of large machine components during maintenance.

b. Lowboy 50-ton Truck - This equipment is used to transport tracked vehicles such as the D-9H dozers over public roads to the job site. This truck will also be used to haul mechanical and electrical components to the mine.

c. Forklift - A forklift is used for materials handled at the warehouse and shop.

d. Lube Truck - This truck is used for bulk handling and transporting of lubricants to the job sites at the mine.

e. Lube Storage - This fixed facility is used for bulk handling and inventory control of the varied lubricants required at the mine.

f. Fuel Truck - This truck is designed for bulk handling and transport of diesel fuels to the job sites.

g. Fuel Facility - This fixed facility is used for bulk storage and controlled dispensing of gasoline and diesel fuel at the mine.

h. Welding Machines - These machines are located in the shop area to handle the welding requirements of major mobile equipment moved to the shop.

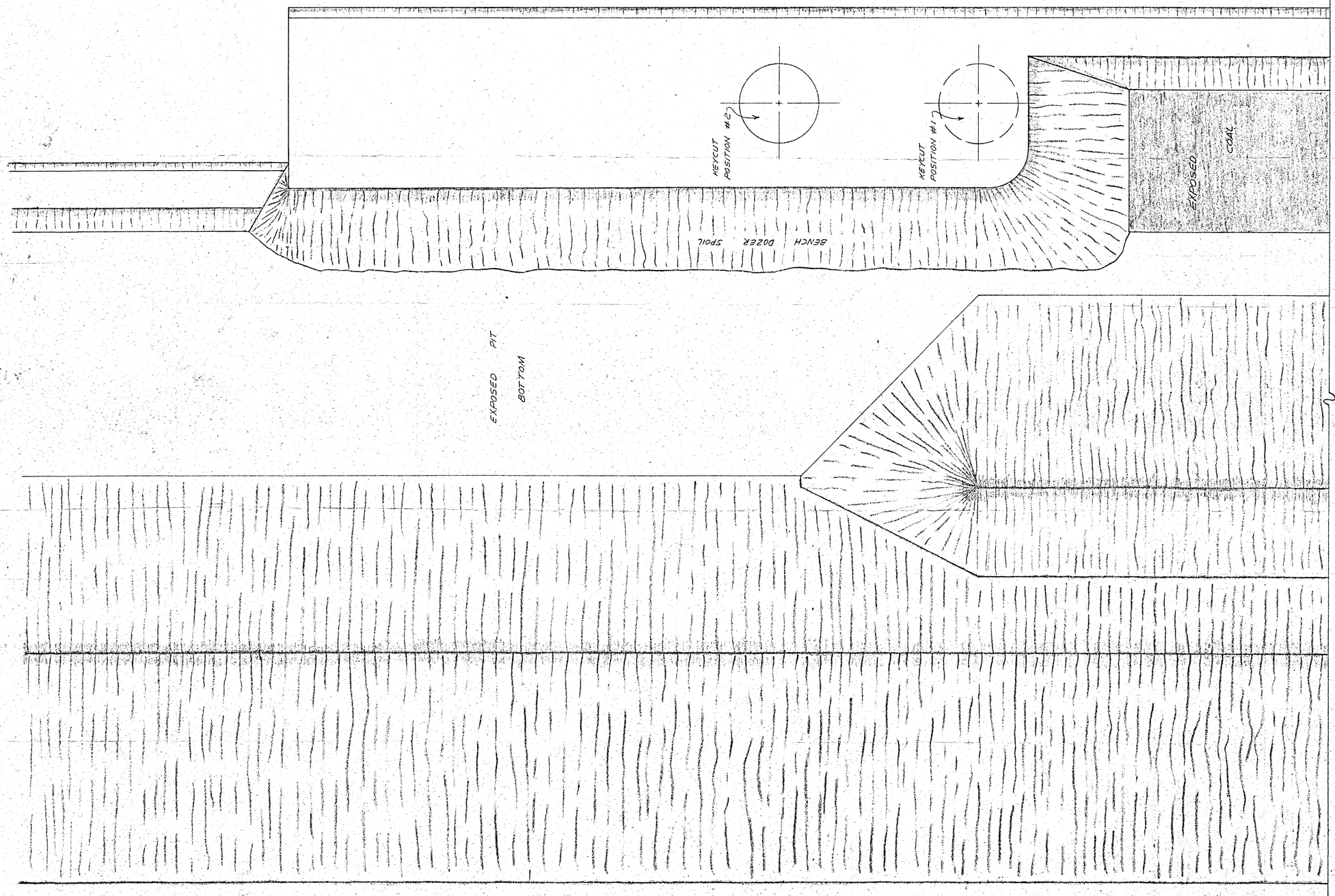
i. Welding Trucks - These trucks are used to handle field welding requirements primarily on the dragline, drills, and coal loading shovel, and to some extent the welding requirements of mobile equipment not moved to the shop area.

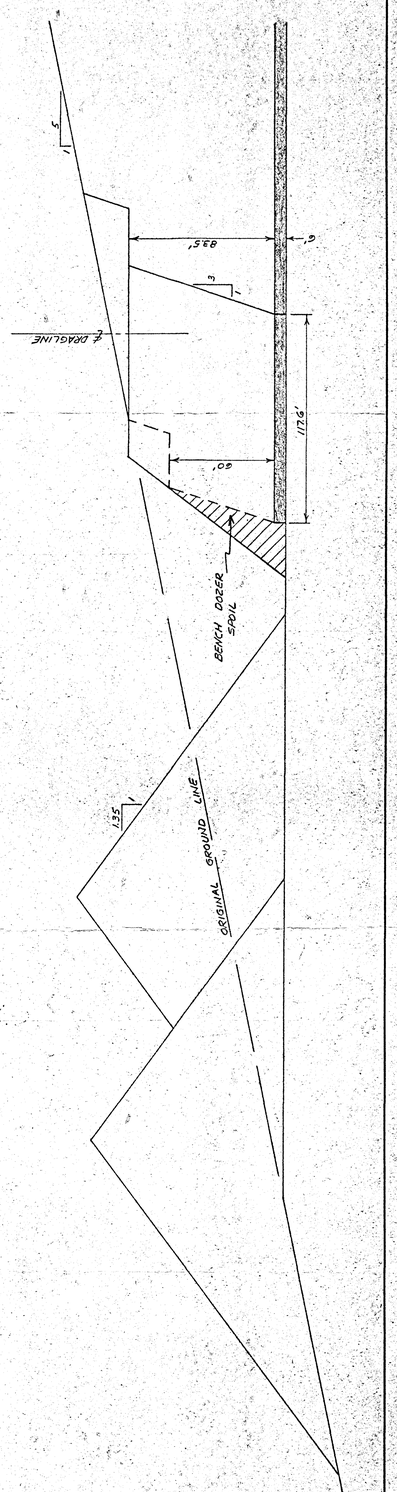
j. Mechanic Trucks - These service trucks are used to transport personnel and small maintenance equipment to the job sites at the mine.

k. Electrical Truck - This service truck is used to transport personnel and small equipment to the job site.

l. Tools - This category covers the full range of tools necessary for small and large equipment normally required for maintenance at a mine of this size.

m. Flat Bed Truck - This truck is in the 5-10 ton class of vehicles and is used to transport large mechanical and electrical components to job sites in the field.





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CONSOLIDATION COAL COMPANY
PITTSBURGH PA.
OFFICE CENTRAL ENGINEERING

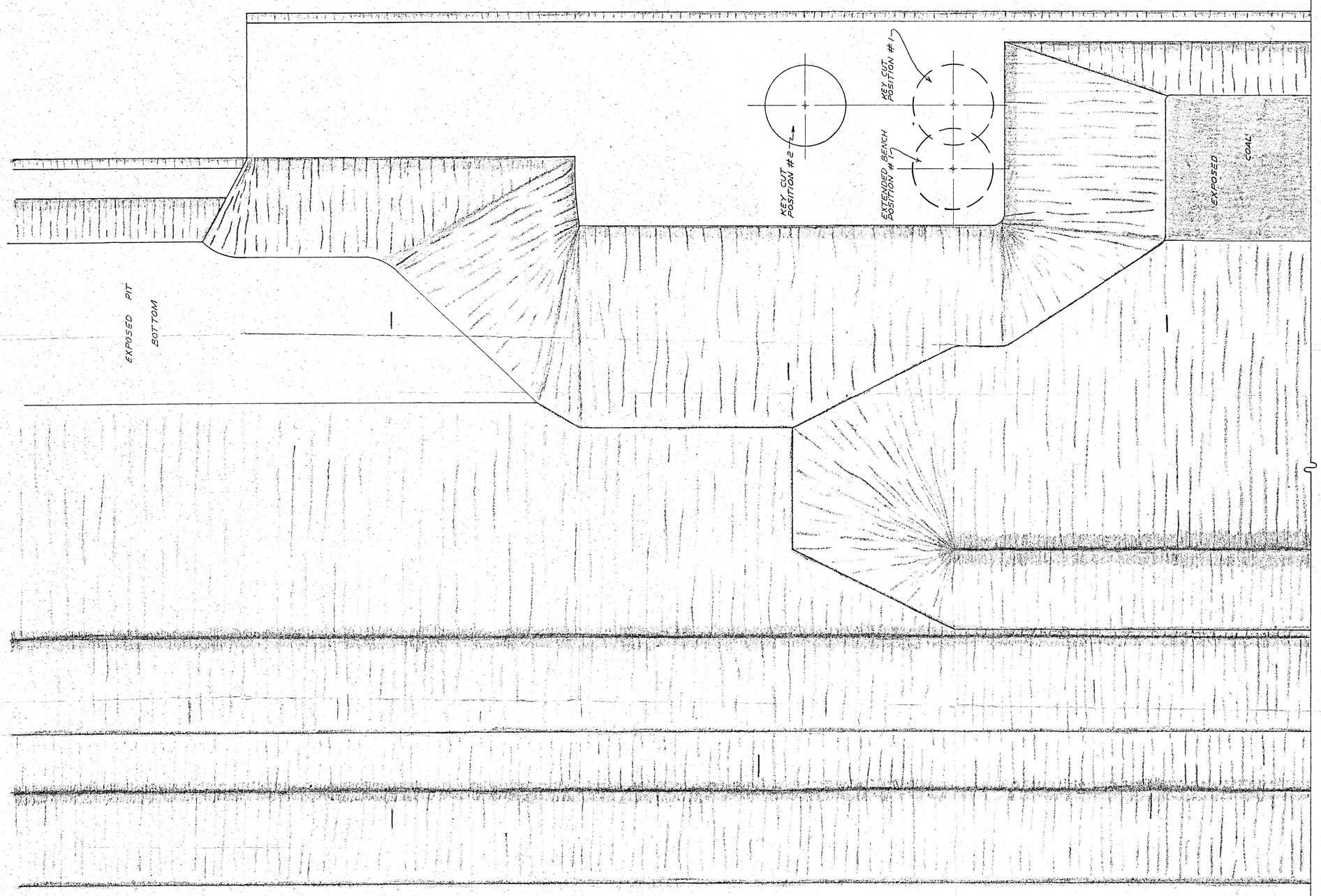
DRAWN BY G. EDWARDS DATE 2-4-78
TRACED BY DATE
CHECKED BY DATE
APPROVED BY D. WAGNER DATE

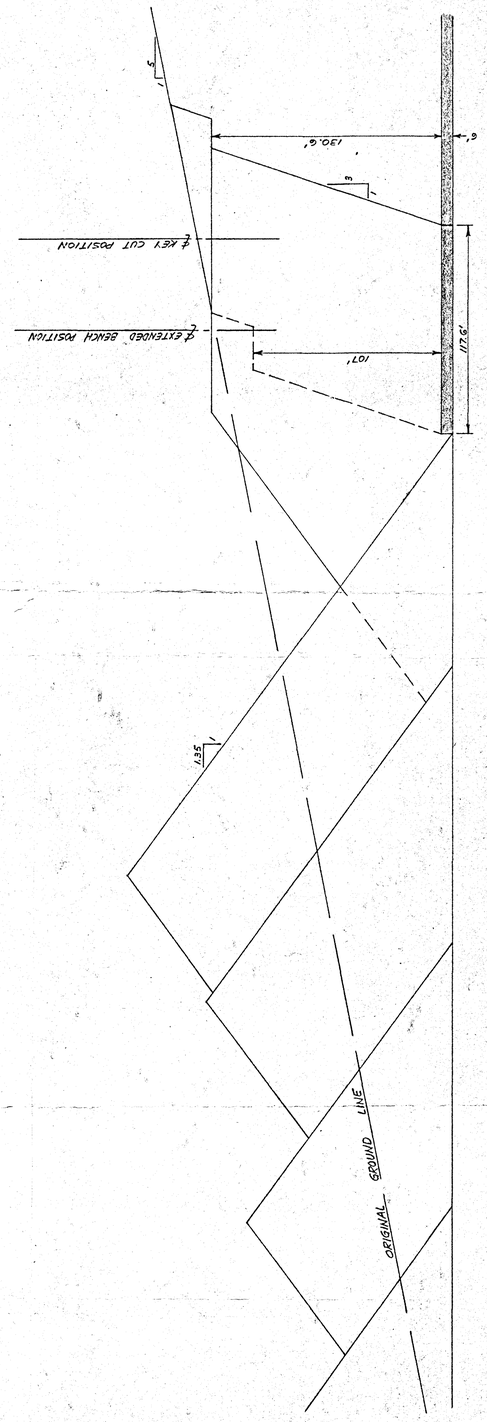
NOBLE CO., OHIO - GASIFICATION
PROJECT - PLAN & PROFILE -
TYPICAL PIT

NO. DWGS. THIS PROJECT 2
SCALE 1"=40'
PROJECT NO. 50-03-05
DRAWING NO. 1 OF 2

FIG. 4-1

BRUNING 26701





REV.	REVISION DESCRIPTION	MADE BY	CHECKED BY	DATE
4				
3				
2				
1				

CONSOLIDATION COAL COMPANY
PITTSBURGH PA.
OFFICE CENTRAL ENGINEERING

DRAWN BY G. EDWARDS DATE 1-3-78
TRACED BY DATE
CHECKED BY D. WAGNER DATE
APPROVED BY DATE

NOBLE CO., OHIO - GASIFICATION
PROJECT - PLAN & PROFILE -
EXTENDED BENCH PIT

NO. DWGS. THIS PROJECT 2

SCALE 1"=40'

PROJECT NO. 50-03-05

DRAWING NO. 2 OF 2

BRUNING 26701

FIG. 5-1

FIGURE 5-2

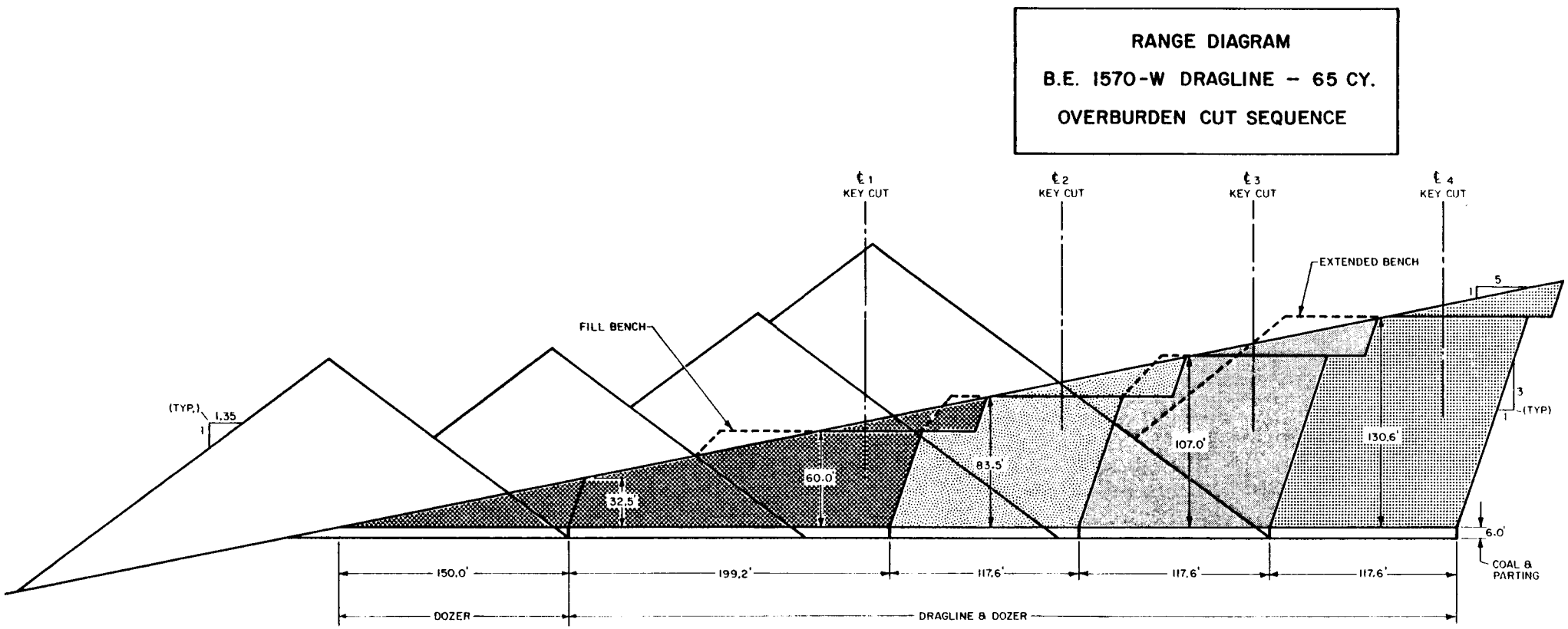

RANGE DIAGRAM
B.E. 1570-W DRAGLINE - 65 CY.
OVERBURDEN CUT SEQUENCE
℄ 1 KEY CUT
℄ 2 KEY CUT
℄ 3 KEY CUT
℄ 4 KEY CUT
EXTENDED BENCH
FILL BENCH
(TYP.) 1.35 1
5 1
3 1 (TYP)
32.5'
60.0'
83.5'
107.0'
130.6'
6.0'
COAL & PARTING
150.0'
199.2'
117.6'
117.6'
117.6'
DOZER
DRAGLINE & DOZER

FIGURE 5-3

RANGE DIAGRAM
B.E. 1570-W DRAGLINE - 65 CY.
OVERBURDEN SPOIL SEQUENCE

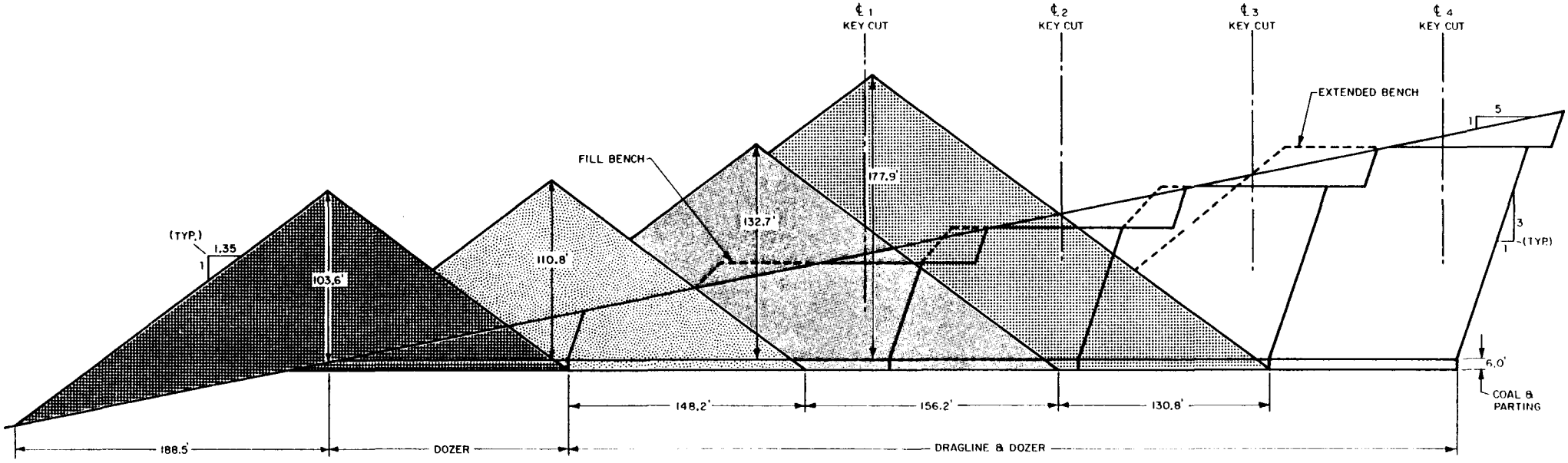
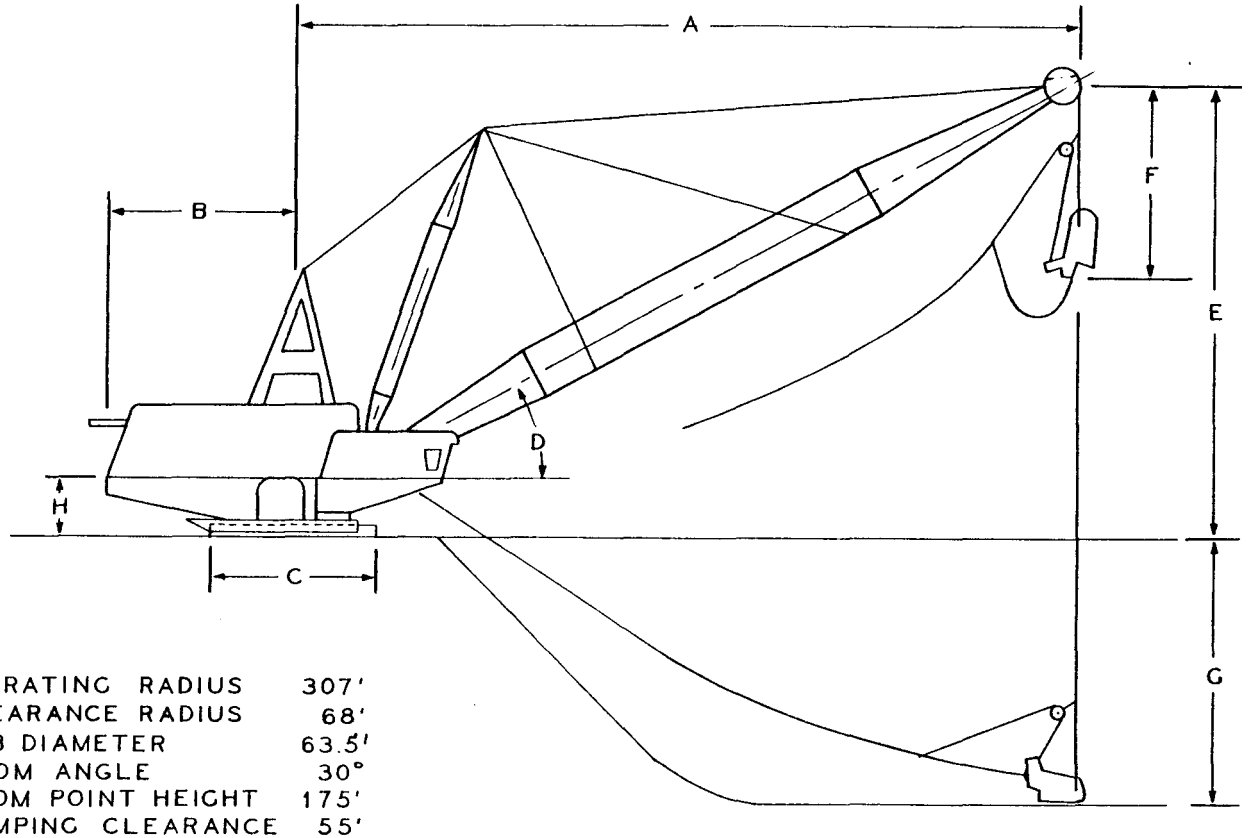


FIGURE 5-4

BE 1570-W DRAGLINE

BUCKET CAPACITY : 65 CY.



A	- OPERATING RADIUS	307'
B	- CLEARANCE RADIUS	68'
C	- TUB DIAMETER	63.5'
D	- BOOM ANGLE	30°
E	- BOOM POINT HEIGHT	175'
F	- DUMPING CLEARANCE	55'
G	- DIGGING DEPTH	170'
H	- CLEARANCE HEIGHT	8.5'

6.0 MINE DEVELOPMENT COSTS

The development costs for this project are summarized in Table 6-1 at the end of this section. This table illustrates in a very general manner the categories of expenditures that would be normally encountered in the development of new surface mines in Ohio. The times shown for expenditure of this money are relative to the mine life assumed for this project. This schedule of expenditures has been compressed in order to facilitate the explanation of the expenditures and their cost. The items and costs are based primarily upon experience derived from existing surface operations in the Ohio area. The following is an explanation of the expenditures for this project.

Exploration

Additional drilling will be required to supplement previous drilling programs. The information obtained will be used to compile detailed mine projections on a month-to-month operating basis. The major use of this drilling program is to define the specific limits of crop coal (oxidized), to detail the coal structure and thickness in specific areas, and to provide additional quality information for the detailed mine projections.

Engineering

Pre-engineering work such as detailed mine projections, mining and reclamation permit preparation, site location work, and engineering review of fixed facility design and construction are included under this category.

Mapping

Additional mapping at a scale of 1" = 100' will be required for the detail mine projections and site development work. This mapping will also be used to control drainage and reclamation activities at the mine. Aerial photography from 3,000 feet was conducted in 1976 and will be used to construct the 1" = 100' mapping of the field. The required mapping and planning would begin approximately one year prior to the purchase of mining capital.

Office Trailer

This trailer would be utilized as temporary office space for Consol's personnel to coordinate and control activities during construction of the mine facilities and development of the mining site.

Training

This expenditure will be used to train needed personnel for the mine. It is anticipated that this training will be conducted at Consol's training facility near Cadiz, Ohio. The

major portion of this expenditure would be to cover the cost of training personnel at this facility. The major emphasis of this program would be to cover the required safety and first aid orientation of new personnel. It is anticipated that a majority of the skilled labor positions at the mine will be filled by personnel drawn from the eastern Ohio area. However, there will be some operational training of new personnel required for some positions. This training will be also conducted at existing facilities operated by Consol.

Road Relocation

The common practice at existing operations in Ohio is to obtain road closings of township, county and some state roads which pass through areas to be mined. These roads are either abandoned or are rebuilt upon completion of mining activity within a specific mining area. However, some roads have to be relocated to maintain service to specific areas such as mail delivery or access to property. Based on the distribution of the reserves in the North Field area with respect to inhabited property, it is anticipated that approximately three miles of road would have to be relocated initially in the field. This figure could vary based on the specific area in which mining would begin.

Pre-Mining Application Studies

Based on regulations which implement the "Surface Mining Control and Reclamation Act of 1977," pre-mining application studies will have to be conducted pursuant to obtaining a mining permit for the North Field Reserves. The results of these studies will serve as a basis upon which a permit will be granted by the Ohio Department of Natural Resources. These studies will include hydrological studies utilizing core drilling to determine the location of aquifers and true water tables, stream monitoring and an analysis to determine the natural drainage based on topography. These tests will establish the pre-mining "hydrological regime" in the mining area and define the pre-mining hydrological balance in the field with respect to quantity and quality of water sources. The previously mentioned core drilling will also be used for overburden analysis to define the geological zones of formations and presence of acid producing strata which might adversely affect water quality. Studies will also be conducted with respect to wildlife and plant life in the field to determine the presence of endangered species that might be adversely affected by mining. Additionally, studies such as pre-mining land use, population and archeology studies will be conducted. These studies will provide a pre-mining environmental baseline from which a mining and reclamation plan will be designed to restore or protect. The cost of these studies and corresponding reports is estimated to be $500,000.

Soil Survey

A soil survey conducted by the Soil Conservation Service will be required to classify the agricultural soil zones that are present in the North Field. These studies will define the pre-mining land use and potential land use in the North Field with respect to these agricultural zones. This study includes aerial mapping and field sampling and testing by the Soil Conservation Service. The cost of these studies is normally covered by a "donation" from the party requesting the study (Consol). This cost is estimated to be approximately $15,000.

Access Roads

An access road to handle the movement of mining equipment and supplies to the initial mining area will be required. This road would extend to the shop and office site and to the initial mining area. The length of this road is assumed to be one mile. The estimated cost of this road is $25,000.

Coal Haulage Roads

A coal haulage road will have to be constructed from the initial mining site to the Demonstration Plant site. This road will be designed to handle the large off-highway coal haulers such as the CH-120 trucks. The weighted average distance, based on the distribution of reserves in the field, is estimated to be three miles. This haul road will cost approximately $100,000 per mile or a total cost of $300,000. For the purpose of this study, this expenditure is assumed to be made in Year 1 of the project. However, depending upon the initial mine site selected, this expenditure might be distributed over several years as the haul distance increases.

Coal Haulage Bridge

A grade separation structure over State Route 146 which runs from Sarahsville through Whigville to Summerfield in the coal reserve area (see map, Appendix A) will have to be constructed to accommodate the coal haulage trucks. This expenditure is assumed to be made in Year 1 of the project but may be deferred depending on the locations of initial mining areas in which production will begin. This structure is similar to bridges currently being utilized by Consol in Ohio. The cost of this structure is estimated to be $600,000.

Gas Line Relocation

There are several natural gas pipeline corridors which pass through the coal reserve area. One of these corridors is maintained by Columbia Gas Company in which an 8-inch pipeline runs from the vicinity of Summerfield in the southeast area of the field to Mt. Ephriam in the northwest area. (see map, Appendix A) This pipeline corridor intersects the coal reserve in several locations and will require either that mining

be planned around this line or that the line be relocated. Based on the experience from the existing Ohio surface operations, this line could be economically relocated to a position out of the way of areas anticipated to be mined. One possible route considered for this study would be from Summerfield along the existing road corridor of State Route 146. This route would then connect to approximately the line of the existing corridor northwest of State Route 146 and continue into Mt. Ephriam. The relocation of this pipeline will involve approximately six miles of construction at an estimated cost of $80,000 per mile and is planned for Year 1 of the project.

138/69 KV Substation

Ohio Power Company currently owns and operates a 138 KV transmission line which passes through the North Field Reserves. (see map, Appendix A) The power for this mine will be obtained by constructing a substation along this line which will reduce the power from 138 KV down to 69 KV. The cost of this substation is estimated to be $250,000. (Project Year 1)

Power Line Construction

Power lines will have to be constructed from the 138/69 KV substation to the mining site to provide usable power to the fixed facilities and mining equipment. For the purpose of this study, this distance is assumed to be two miles. The estimated cost of this construction is $63,400 per mile for a total of $127,000. This construction cost might vary depending on the proximity of the initial mining site, where production begins, to the 138/69 KV substation. (Project Year 1)

Site Preparation for Office, Shop, Warehouse and Bath

The initial cost of preparing the site for these facilities includes the cost of leveling and developing the sites where these structures will be erected. This cost is estimated to be $50,000. (Project Year 1)

Sedimentation Ponds, Clearing and Grubbing

The preparation of the sites for the fixed facilities and premining preparation of the initial mining site will require the construction of sedimentation ponds and the clearing and grubbing of trees and brush from the site. This cost is estimated to be $150,000 which includes approximately $50,000 for pond construction and $100,000 for clearing 320 acres of land. The initial acreage cleared represents the initial acreage to be affected by topsoiling operations in preparation for the first two years of production. (Project Years 2 and 3)

Construction Management

This cost will cover the cost of maintaining supervisory

personnel to coordinate construction of fixed facilities and other development work in the first year of the project. These personnel will be representatives of Consol and will inspect and monitor all work performed either by Consol personnel or by outside contractors. (Project Year 1)

Other Development Costs

Contingency -- A 10 percent contingency is included to cover any unforeseen costs in development of the mine.

Sales Tax -- The current Ohio sales tax level is four percent of capital invested. This expenditure is normally included under development expenses for tax purposes.

Comments

As stated previously, a great number of the expenditures outlined under development costs may be expended over an extended period of time. However, for the purpose of this study, these items are shown to be expended during finite periods of time to illustrate the types of expenditures to be incurred and their associated costs. Secondly, the cost of these expenditures is an estimate designed to cover the performance of studies and construction by either Consol personnel or outside contractors.

TABLE 6-1

SUMMARY OF MINE DEVELOPMENT COSTS BY YEARS

Project Year**	Item	Cost, Dollars*
0	Exploration, Engineering, Mapping	115,000
	Pre-Mining Application Studies	500,000
	Contingency	62,000
	Subtotal, Year 0	677,000
1	Management, Engineering Training	272,000
	Roads, Gas Lines, Site Preparation	1,800,000
	Electrical Substation & Power Line	377,000
	Contingency	245,000
	Sales Tax on Investment Capital	306,000
	Subtotal, Year 1	3,000,000
2	Sales Tax on Investment Capital	853,000
4	Sales Tax on Investment Capital	7,000
6	Sales Tax on Investment Capital	167,000
7	Sales Tax on Investment Capital	124,000
10	Sales Tax on Investment Capital	7,000
11	Sales Tax on Investment Capital	361,000
12	Sales Tax on Investment Capital	134,000
13	Sales Tax on Investment Capital	7,000
16	Sales Tax on Investment Capital	165,000
17	Sales Tax on Investment Capital	117,000
19	Sales Tax on Investment Capital	7,000
21	Sales Tax on Investment Capital	224,000
22	Sales Tax on Investment Capital	141,000
25	Sales Tax on Investment Capital	7,000
26	Sales Tax on Investment Capital	158,000

* Costs are in fourth quarter, CY-1977, dollars; no inflation is assumed.

** Project Year 1 starts on the date on which Consolidation Coal is authorized to open the mine to supply coal to the Demonstration Plant. Opening of the mine, however, cannot start until after all Federal, state, and local permits are obtained. Certain mine development costs (see Paragraph 6.0, page 41, and Paragraph 10.0, page 60) occur during a two year period prior to Project Year 1. For simplicity in preparing the report, this pre-mine opening period is referred to as Project Year 0. Overburden removal and coal production start during Project Year 2.

7.0 CAPITAL INVESTMENT

Most of the capital required to open and operate the mine is invested in mining equipment, and some equipment items have a relatively short useful life. Consequently, the capital investment in the mine is a continuing expense throughout the life of the project.

The estimated costs for equipment and buildings required for the mine are summarized in Table 7-1. This table also gives the usable life before replacement for each item. Table 7-2 summarizes the investment cost by years for the life of the project.

An office building, shop, bathhouse, and warehouse have been included in the mine investment. These have been sized based on Consol's experience of the needs for such buildings. The office building contains nine 160-square foot offices. The shop consists of ten 20-feet by 30-feet bays — six for equipment repair work, three for routine maintenance work, and one for welding. The bathhouse allows locker space for 131 employees.

It has been assumed that the water supply for mine facilities will be provided by the Demonstration Plant, and no water treatment or storage facilities have been included in the mine design.

TABLE 7-1

ESTIMATED COST OF EQUIPMENT AND BUILDINGS

Item	Usable Life, Years	Estimated Cost, Dollars
Bucyrus Erie 1570-W Dragline	LOM	12,900,000
Erection Cost	LOM	2,000,000
Caterpillar D-9H Dozer	5	230,800
Bucyrus Erie 60-R Drill	5	770,700
Airtrack Drill	5	100,000
Caterpillar 637-D Scraper	5	321,200
Fiat Allis HD-41 Dozer	5	321,000
Caterpillar 992 Front End Loader	5	310,600
Euclid CH-120 Truck	10	400,000
Bucyrus Erie 155-B Shovel	LOM	1,800,000
Erection Cost	LOM	168,000
Caterpillar D-4 Dozer	5	50,700
Powder Truck	10	68,900
Blast Machine	10	3,000
Nitrate Tractor	10	36,000
Nitrate Trailer	5	29,000
Magazine	LOM	37,100
Caterpillar 16-G Grader	5	139,800
Water Truck	10	100,000
Gradeall	5	103,500
Cable Arch	5	4,000
Pit Pump (4-inch)	5	5,600
Pit Pump (6-inch)	5	7,800
Auxiliary Light Unit	5	6,800
Supply Truck	3	16,400
1/2-Ton Truck	3	6,800
Bus	3	8,500
Cable Truck	5	57,500
Farm Tractor	10	20,000
Seed Machine	10	13,800
25-Ton Crane	10	120,500
50-Ton Crane	10	309,000
50-Ton Lowboy	10	74,800
Forklift	10	31,800
Lube Truck	5	76,300
Lube Storage	LOM	53,000
Fuel Truck	5	61,500
Fuel Facility	LOM	79,500
Welding Machine	5	3,300
Welding Truck	3	16,000
Mechanic Truck	3	11,000
Electrical Truck	3	11,000
Flat Bed Truck	3	16,400
Tools	LOM	180,000
Electrical Substation (69KV)	LOM	157,400
Electrical Switching Gear	LOM	568,000
Cable and Power Line	LOM	405,000

Item	Usable Life, Years	Estimated Cost, Dollars
Lime Plant	LOM	150,000
Sodium Hydroxide Plant	LOM	35,000
Water Laboratory	LOM	75,000
Office Building	LOM	57,600
Bathhouse	LOM	104,800
Warehouse	LOM	90,000
Parking Lot	LOM	53,000
Furniture	LOM	40,000
Lighting	LOM	26,500
Sewage System	LOM	132,500
Fire Protection	LOM	150,000
Communications System	LOM	50,000
First Aid/Safety Facilities	LOM	10,600

Notes: (a) LOM = Life of Mine
(b) Costs represent fourth quarter, CY-1977, dollars.

TABLE 7-3

SUMMARY OF CAPITAL INVESTMENT BY YEARS

Project Year *	Investment, Dollars
1	7,802,100
2	21,738,200
4	173,800
6	4,263,600
7	3,164,500
10	173,800
11	9,193,800
12	3,418,800
13	173,800
16	4,202,000
17	2,990,800
19	173,800
21	5,716,300
22	3,592,500
25	173,800
26	4,028,200

Notes: (a) Coal production commences during the second year of the project.

(b) Investment represents fourth quarter, CY-1977, dollars; no inflation is assumed.

*Project Year 1 starts on the date on which Consolidation Coal is authorized to open the mine to supply coal to the Demonstration Plant. Opening of the mine, however, cannot start until after all Federal, state, and local permits are obtained. Certain mine development costs (see Paragraph 6.0, page 41, and Paragraph 10.0, page 60) occur during a two year period prior to Project Year 1. For simplicity in preparing the report, this pre-mine opening period is referred to as Project Year 0. Overburden removal and coal production start during Project Year 2.

8.0 MANPOWER REQUIREMENTS

8.1 Operating Labor

The hourly manpower requirements for this mine are based on the amount of equipment required and experience from surface mines currently being operated in Ohio. Table 8-1 is a summary of the hourly labor requirements over the life of the mine. Table 8-2 is a summary of the labor rates to be paid to the various hourly labor positions at the mine. Both the manpower requirements and labor rates are in accordance with the "National Bituminous Coal Wage Agreement of 1974" current to December 6, 1977. This agreement expired on December 6, 1977 and has been renegotiated by the Bituminous Coal Operators Association and the United Mine Workers. Therefore, the manpower requirements and labor rates will require a revision based on the new agreement.

The following is a list of parameters which were used in determining the number of union operating personnel required for the mine. Equipment which will operate on a seven-day-per-week schedule has been staffed by rotating crews, and equipment operating on a five-day-per-week schedule has been staffed by non-rotating crews.

Hourly Manpower/Equipment	Quantity of Equipment	Total Men Required
4 Dragline Operators/Dragline	1	4
4 Dragline Oilers/Dragline	1	4
4 Dragline Groundmen/Dragline	1	4
4 Dragline Mechanics/Dragline	1	4
2 Dozer Operators/Dozer	3	6
2 Drill Operators/Drill	3	6
2 Drill Helpers/Drill	3	6
1 Overburden Shooter/3 Drills	1	1
2 Overburden Shooters Helpers/ 3 Drills	1	2
2 Shovel Operators/Shovel	1	2
2 Shovel Oilers/Shovel	1	2
2 Front End Loader Operators/ Loader	1	2
2 Coal Truck Drivers/Coal Truck	3	6
2 Grader Operators/Grader	1	2
2 Water Truck Drivers/Water Truck	1	2
2 Gradeall Operators/Gradeall	1	2
2 Dozer Operators/Dozer	1	2
2 Scraper Operators/Scraper	1	2
4 Pumpers/Dragline Pit	1	4
3 Truck Drivers/Supply Truck	1	3
12 General Labor/Mine	1	12

Hourly Manpower/Equipment	Quantity of Equipment	Total Men Required
2 Dozer Operators/Dozer	5	10
2 Scraper Operators/Scraper	6	12
Total Operating Labor		100

8.2 Maintenance Labor

Maintenance labor requirement is based on mechanical availability of major mining equipment and operating experience from operating mines in Ohio. The following is a summary of of maintenance labor requirements:

Mechanics (5 per shift):	15
Welders (3 per shift):	9
Electricians (2 per shift):	6
Master Electrician:	1
Total Maintenance Labor	31

8.3 Hourly Labor Work Schedule

The method used to schedule an operation to work seven days per week is to establish a four crew rotation system. The following five positions at this mine are scheduled to work seven days per week:

Dragline Operator
Dragline Oiler
Dragline Groundman
Dragline Mechanic
Pump (Dragline Pit)

In order to schedule the four crew rotation, an annual work cycle must be established to insure that the number of straight time days, time and one-half days (Saturday), and double-time days (Sunday) are distributed equally among the employees working the rotation. The "National Bituminous Coal Wage Agreement of 1974" (effective through December 6, 1977) provides the following annual paid days off:

Vacation	12 days
Sick	5 days
Jury or Bereavement	1 day
Holidays	10 days

An employee on a seven-day rotation crew would normally work 21 days in each four-week cycle less the 28 paid non-working days per year. This totals 245 normally scheduled days per year. The dragline is scheduled to operate 24 hours per day, 354 days per year, and the normal seven-day rotation crew schedule covers only 327 days per year. Thus, each employee must work 20 or 21 extra days per year — paid days on which he would normally not work. Miners are paid time and one-half

for working on Saturday; double-time for working on Sunday; double-time for working on a vacation day; and triple-time for working on a holiday.

In summary, an employee working on a seven-day schedule on the dragline normally works and is paid as follows:

	Days per Year
Straight Time	176
Time and One-half	37
Double Time	44
Triple Time	8
Total	265

Also, he is paid for those holidays and other allowable days off on which he does not work.

All other employees normally work a five-day schedule which is summarized below:

	Days per Year
Scheduled Work (Paid)	230
Weekends (Not Paid)	104
Vacation (Paid)	12
Sick (Paid)	5
Jury or Bereavement (Paid)	1
Holidays (Paid)	10
Other (Not Paid)	3
Total	365

8.4 Hourly Wage Rates

The wage rates have been taken from the "National Bituminous Coal Wage Agreement of 1974." This agreement lists wages for Strip and Auger mines for December 6, 1976. These rates are based on a 7.25 hour shift. Additionally, a $5.29/shift cost of living adjustment (COLA) is "rolled in" to the daily wage rates. A summary of the wage rates to be paid is listed in Table 8-2.

The union employees for this mine are scheduled to work eight hours per shift. Therefore, each man is paid at the straight time rate for 7.25 hours of each shift and at the time and one-half rate for the additional 0.75 hours of each shift. In addition to the daily wage rates shown in Table 8-2, a shift differential is paid for those employees scheduled to work the afternoon and midnight shifts. Those personnel working the afternoon shift are paid an additional 15 cents per hour worked. Those personnel working the midnight shift are paid an additional 20 cents per hour worked.

TABLE 8-1

HOURLY MANPOWER REQUIREMENTS

Job Title	Project Year 2	Project Years 3-26
Dragline Operator	0	4
Dragline Oiler	0	4
Dragline Groundman	0	4
Dragline Mechanic	0	4
D-9 Dozer Operator	6	6
Coal Shovel Operator	0	2
Coal Shovel Oiler	0	2
Front End Loader Operator	2	2
60-R Drill Operator	0	2
60-R Drill Helper	0	2
Airtrack Drill Operator	4	4
Airtrack Drill Helper	4	4
Overburden Shooter	1	1
Overburden Shooter Helper	2	2
Coal Truck Driver	4	6
Grader Operator	2	2
Water Truck Driver	2	2
Gradeall Operator	2	2
D-9 Dozer Operator	2	2
637-D Scraper Operator	2	2
Pumper	4	4
Supply Truck Driver	2	3
General Labor	12	12
D-9 Dozer Operator	4	4
637-D Scraper Operator	6	12
HD-41 Dozer Operator	0	6
Master Electrician	1	1
Electrician	6	6
Mechanic	15	15
Welder	9	9
Total	92	131

TABLE 8-2

BITUMINOUS COAL AGREEMENT LABOR RATES*

Job Title	Classification	Base Rate Per Day (7.25 hrs)	Cola Roll-In Per Day (7.25 hrs)	Overtime Per Day (0.75 hrs)	Daily Rate (8 hrs)
Dragline Operator	5B	$ 58.92	$ 5.29	$ 9.96	$ 74.17
Dragline Oiler	4E	54.20	5.29	9.23	68.72
Dragline Groundman	4F	54.20	5.29	9.23	68.72
Dragline Mechanic	4C	54.20	5.29	9.23	68.72
D-9 Dozer Operator (overburden)	5B	58.92	5.29	9.96	74.17
Coal Shovel Operator	5B	58.92	5.29	9.96	74.17
Coal Shovel Oiler	4E	54.20	5.29	9.23	68.72
Front End Loader Operator	5B	58.92	5.29	9.96	74 17
60-R Drill Operator	3E	51.56	5.29	8.82	65.67
60-R Drill Helper	1F	48.90	5.29	8.41	62.60
Airtrack Drill Operator	3E	51.56	5.29	8.82	65.67
Airtrack Drill Helper	1F	48.90	5.29	8.41	62.60
Overburden Shooter	3E	51.56	5.29	8.82	65.67
Overburden Shooter Helper	1G	48.90	5.29	8.41	62.60
Coal Truck Driver	3A	51.56	5.29	8.82	65.67
Grader Operator	3A	51.56	5.29	8.82	65.67
Water Truck Driver	1E	48.90	5.29	8.41	62.60
Gradeall Operator	3A	51.56	5.29	8.82	65.67
D-9 Dozer Operator	3A	51.56	5.29	8.82	65.67
637-D Scraper Operator	3A	51.56	5.29	8.82	65.67
Pumper	1F	48.90	5.29	8.41	62.60
Supply Truck Driver	1E	48.90	5.29	8.41	62.60
General Labor	1G	48.90	5.29	8.41	62.60
D-9 Dozer Operator	3A	51.56	5.29	8.82	65.67
637-D Scraper Operator	3A	51.56	5.29	8.82	65.67
HD-41 Dozer Operator	3A	51.56	5.29	8.82	65.67
Master Electrician	5C	58.92	5.29	9.96	74.17
Electrician	4A	54.20	5.29	9.23	68.72
Mechanic	4C	54.20	5.29	9.23	68.72
Welder	3D	51.56	5.29	8.82	65.67

*Omits extra pay for working on Saturdays, Sundays, holidays, vacations, and shift differentials.

8.5 Salaried Labor

Table 8-3 lists the salaried manpower requirements for this mine by job and production period. The salaried labor requirements are based on operating experience of surface mines in Ohio.

TABLE 8-3

SALARIED MANPOWER REQUIREMENTS

Salaried Job Title	Project Year 2	Project Years 3-26
Mine Superintendent	1	1
General Mine Foreman	1	1
Pit Foreman	2	4
Loading Foreman	2	2
Foreman Trainee	2	2
General Maintenance Foreman	1	1
Field Maintenance Foreman	4	4
Shop Foreman	4	4
Electrical Supervisor	1	1
Office Manager	1	1
Mine Clerk	1	1
Maintenance Clerk	1	1
Warehouse Manager	1	1
Warehouseman	1	1
Chief Mine Engineer	1	1
Surveyor	1	1
Draftsman/Survey Helper	1	1
Secretary	1	1
Time Keeper	1	1
Reclamation General Foreman	1	1
Reclamation Foreman	3	3
Seismograph Operator	1	1
Road Watchman	1	1
Chemist	1	1
Total	35	37

9.0 MINE CLOSING COSTS

The current mining laws require that upon completion of mining all fixed facilities and mining equipment be removed from the mining property and that all reclamation work be completed before the permitted mining area is vacated. Table 9-1 is a summary of expenditures that will be required to meet this obligation. These expenditures are classified as "Development and Other Expensed Items" and are not capitalized for tax depreciation. The following is an explanation of these expenditures.

Reclamation

This expenditure is designed to cover the completion of the reclamation obligation of the mine. It is assumed in this study that the reclamation obligation left after conclusion of production would involve approximately 161 coal acres or 322 surface acres which represents the area disturbed during the last year of overburden removal operations. The cost of grading, topsoiling, revegetating and sedimentation pond construction in this area is included in this cost. The estimated cost of this obligation is $2,232,000.

Dismantle Shop, Office, Warehouse/Bath, Power, Haulage Roads and Haulage Bridge

The shop, office and warehouse/bath must be dismantled and their sites reclaimed and vegetated to complete mine closing. The power substations and power lines must be removed from the mine site. Haulage roads must be graded to conform with the adjacent contour, topsoiled and revegetated. The haulage bridge must be dismantled and site graded, topsoiled and revegetated. This cost is estimated to be approximately $500,000.

Dismantle Major Equipment

This major mining equipment must be dismantled and removed from the mining property. The dismantling of this equipment will involve the same costs incurred during erection since the equipment may be sold for future mining use. This cost is estimated to be $2,500,000.

Mine Closing Power

This expenditure represents the minimum demand charge for one year of mine activity as would be anticipated in performing the above operations. The majority of the power required would be used in dismantling the mining equipment.

TABLE 9-1

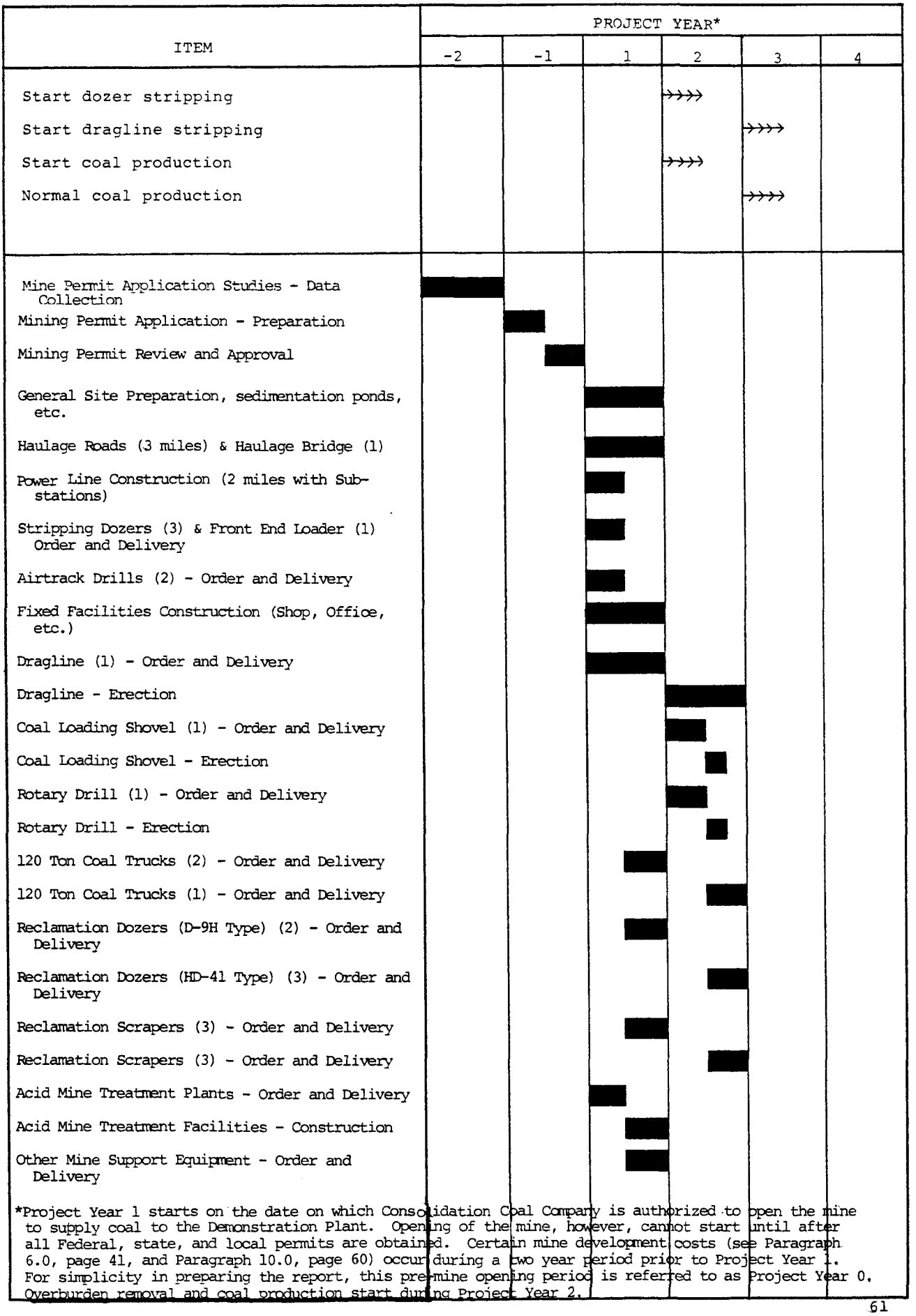
MINE CLOSING COSTS

	Project Year 27
Reclamation	$ 2,232,000
Dismantle (shop, office, warehouse/ bath, power, haulage roads, bridge)	500,000
Dismantle (1570-W, 155-B & BE 60-R)	2,500,000
Mine Closing Power	192,000
Sub-total	5,424,000
Contingency @ 10%	542,000
Total Mine Closing Costs	5,966,000

10.0 DEVELOPMENT SCHEDULE - MAJOR LEAD-TIME ITEMS

Figure 10-1 is a summary of the development schedule and major lead-time items for this mine.

DEVELOPMENT SCHEDULE
MAJOR LEAD TIME ITEMS



*Project Year 1 starts on the date on which Consolidation Coal Company is authorized to open the mine to supply coal to the Demonstration Plant. Opening of the mine, however, cannot start until after all Federal, state, and local permits are obtained. Certain mine development costs (see Paragraph 6.0, page 41, and Paragraph 10.0, page 60) occur during a two year period prior to Project Year 1. For simplicity in preparing the report, this pre-mine opening period is referred to as Project Year 0. Overburden removal and coal production start during Project Year 2.

FIGURE 10-1

11.0 APPENDIX A - MINEABLE RESERVES

The following page is a map of the mineable reserves covered by the Preliminary Coal Mining Plan.

Pg-6

GENERAL SITE BOUNDARY

PREPARATION PLANT
GASIFICATION PLANT &
STOCKPILE FACILITIES

MINEABLE RESERVES
ADVERSE, MINED-OUT & UNMINEABLE RESERVES
FIELD BOUNDARY
COVER LINE
COAL OUTCROP

CONSOLIDATION COAL COMPANY

CENTRAL ENGINEERING

NOBLE CO. OHIO

NORTH FIELD AREA

MINEABLE RESERVES

0 1000 2000
SCALE 1" = 1000'

Drawn by: CENT. ENGR'G.
Approved by: D. WAGNER

Date: 1-23-78
50-03-05