f. Establishment of a Native Plant Community

After the agronomic species start to die out, efforts to establish a native plant community would be made by reseeding with native grass species and refertilization. The native plant communities established would be inspected regularly to review the success of the reclamation efforts. Any problems would be corrected by reseeding and refertilizing until a native plant community is permanently established completing the reclamation activities. More research is needed on native species to determine which are the most promising for revegetation.

VII. ECONOMIC EVALUATION

The economic evaluation of northern Alaska surface mining will consist of (1) estimating the total delivered cost of surface-mined North Slope coal at an ice-free port in southern Alaska and (2) comparing this cost with f. o. b. port prices for competing North American coals. The ice-free port that will be considered for the small-scale Kukpowruk River mine and for large-scale mines with rail transportation is Seward. Large-scale mines with seasonal tug-and-barge shipments will have Dutch Harbor as a transshipment point.

A. COAL PRICES F. O. B. ICE-FREE PORT

The estimated prices of coal delivered to an ice-free port are shown in Table 7-1. The determination of cost per million Btu's is based on a heating value of 12,000 Btu's per pound for Kukpowruk River and Kuk River bituminous coals and 8,500 Btu's per pound for Kuk River subbituminous coals. Because of the relative lack of exploration data and the lack of established mining and transportation systems in northern Alaska, these cost estimates are probably inaccurate. Although the productivity of the mining equipment upon which cost estimates have been based is probably accurate, Kaiser Engineers' estimate of wage rates and fringe benefits that would be required to attract and maintain a work force could be low. Transportation, townsite, and utility estimates are order-of-magnitude estimates.

Although it is difficult to ascertain the accuracy of the estimates summarized in Table 7-1, it would not be surprising if actual costs were more than 30 percent higher than the estimate. Cost experience with the Alaska oil pipeline suggests that this could be true.

The cost of coal delivered to an ice-free port with an annual mining rate of 500,000 tons per year is estimated to be $49.23 per ton or $2.05 per million Btu's. This is the maximum level of output that can be justified with current demonstrated coal reserves in northern Alaska.

In Kaiser Engineers' judgement, a seasonal mining operation producing 500,000 tons of run-of-mine coal per year would be too small to be feasible. Therefore, estimates were made for mining operations with annual outputs of 10 times that which would be justified by current demonstrated reserves.

As can be seen in Table 7-1, a 5-million-ton mine with railway transportation would produce very expensive coal. Estimated costs range from $100 to $115 per ton, or $4.20 to $6.75 per million Btu's. Seasonal shipping by tug and barge would yield significantly lower cost coal. The land-transportation component of the tug-and-barge system does not appear to have a significant impact upon the delivered cost of coal. Also the range in coal prices from the least costly mining method (draglines) to the most costly mining system (shovels and trucks) is within 10 percent.

With the lowest-cost mining method and the lowest cost transportation system, the price of Kukpowruk River bituminous coal at an ice-free port is $29.58 or $1.23 per million Btu's. The lowest cost mining and transportation costs for Elusive Creek coals would result in a coal price of $44.79 per ton or $1.87 per million Btu's at an ice-free port. Similarly, Kuk River subbituminous coals would have an estimated price of $40.55 per ton or $2.38 per million Btu's at an ice-free port.

B. ECONOMIC ANALYSIS

One way to determine whether or not northern Alaskan coal mining is economically justified is to compare the estimated coal prices shown in Table 7-1 with the current price of competing coals. Competing coals have been costed on a f.o.b. ship basis at west coast ports. This will give an indication of competitiveness for the Asian market. Obviously, these coals would have an even greater price advantage over Alaskan coals in the western North American market.

The current selling price of bituminous coal from the Crowsnest Pass area of British Columbia is $32.50 loaded on ships at Vancouver, B.C. With heating value of 11,500 Btu's per pound, this coal has an energy cost of $1.41 per million Btu's. This compares with $2.05 per million Btu's for Kukpowruk River coal with current reserves, $1.23 per million Btu's from hypothetical Kukpowruk deposits, and $1.87 per million Btu's from hypothetical Elusive Creek deposits.

Subbituminous coal could be shipped from the Powder River area of Wyoming and Montana. Current mine prices are $15.00 for 9,500 Btu's per pound of coal and $7.50 for 8,500 Btu's coal. Rail freight to existing port facilities near Vancouver, British Columbia, is estimated to be $12.50 per ton and port charges would be $2.00 per ton. Therefore, the f.o.b. price for Wyoming coals at Vancouver would

be $22.00 for 8,500 Btu's per pound coal ($1.29 per million Btu's) or $29.50 for 9,500 Btu's per pound coal ($1.55 per million Btu's).

A second source of subbituminous coal is the Nenana coal field in southern Alaska. Cost estimates are based on escalated price and transportation data from Rao and Wolff (1975). Mine selling price is estimated to be $13.00 per ton. Rail freight from Healy to Whittier would be approximately $8.00 plus port charges. These costs would give an f.o.b. cost of $23.50 per ton for 8,500-9,500 Btu's per pound coal. This would give an energy cost of approximately $1.31 per million Btu's.

A third source of subbituminous coal would be the Beluga coal field near Cook inlet, 50 to 60 miles west of Anchorage. It is estimated that 8,000-Btu subbituminous coal could be loaded on ships at Cook inlet for approximately $15.00 per ton at a production rate of approximately 5 million tons per year. Beluga coal would cost approximately $0.94 per million Btu's. From this analysis it can be seen that competing subbituminous coal can be loaded on ship for $0.94 to $1.55 per million Btu's. This compares with a minimum f.o.b. ship price for Kuk River subbituminous coals of $2.38 per million Btu's.

From the above analysis, it is evident that the only coal source from northern Alaska which would be competitive with other coals is Kukpowruk River coal when mined at a rate of 5 million tons per year. Assuming a minimum production life of 20 years and 80 percent recovery of in-place coal, geologic reserves would have to be 125 million tons to support the mining operation. This is far in excess of the current demonstrated geological reserves of 12 million tons to a depth of 120 feet and with a minimum seam thickness of 42 inches.

TABLE 7-1

SUMMARY OF COAL PRICES
(F.O.B. ICE-FREE PORT)
$/ton
($/million Btu)

500,000 Ton/Yr

TRANSPORTATION SYSTEM	MINE LOCATION & MINING SYSTEM
	KUKPOWRUK RIVER
	Dragline
Truck & Barge	$ 49.23 (2.05)

5,000,000 Ton/Yr

TRANSPORTATION SYSTEM	KUKPOWRUK RIVER			ELUSIVE CREEK			KUK RIVER		
	Dragline	Shovel & Truck	Combination	Dragline	Shovel & Truck	Combination	Dragline	Shovel & Truck	Combination
Railroad	$100.69 (4.20)	$102.75 (4.28)	$101.36 (4.22)	$105.13 (4.38)	$109.49 (4.56)	$107.02 (4.46)	$111.57 (6.56)	$114.75 (6.75)	$112.32 (6.61)
Truck & Barge	$ 29.74 (1.24)	$ 32.11 (1.34)	$ 30.52 (1.27)	$ 47.59 (1.98)	$ 52.56 (2.19)	$ 49.67 (2.07)	$ 41.24 (2.42)	$ 44.95 (2.64)	$ 42.16 (2.48)
Conveyor & Barge	$ 29.62 (1.23)	$ 32.02 (1.33)	$ 30.43 (1.27)	$ 47.59 (1.99)	$ 52.56 (2.19)	$ 49.67 (2.07)	$ 41.07 2.41)	$ 44.95 (2.63)	$ 41.99 (2.47)
Slurry Pipeline & Barge	$ 29.58 (1.23)	$ 31.95 (1.33)	$ 30.36 (1.27)	$ 44.79 (1.87)	$ 49.77 (2.07)	$ 46.87 (1.95)	$ 40.55 (2.38)	$ 44.26 (2.60)	$ 41.47 (2.44)

TABLE 7-1

SUMMARY OF COAL PRICES
(F.O.B. ICE-FREE PORT)
$/ton
($/million Btu)
500,000 Ton/Yr

TRANSPORTATION SYSTEM	MINE LOCATION & MINING SYSTEM
	KUKPOWRUK RIVER
	Dragline
Truck & Barge	$ 49.23 (2.05)

5,000,000 Ton/Yr

TRANSPORTATION SYSTEM	KUKPOWRUK RIVER			ELUSIVE CREEK			KUK RIVER		
	Dragline	Shovel & Truck	Combination	Dragline	Shovel & Truck	Combination	Dragline	Shovel & Truck	Combination
Railroad	$100.69 (4.20)	$102.75 (4.28)	$101.36 (4.22)	$105.13 (4.38)	$109.49 (4.56)	$107.02 (4.46)	$111.57 (6.56)	$114.75 (6.75)	$112.32 (6.61)
Truck & Barge	$ 29.74 (1.24)	$ 32.11 (1.34)	$ 30.52 (1.27)	$ 47.59 (1.98)	$ 52.56 (2.19)	$ 49.67 (2.07)	$ 41.24 (2.42)	$ 44.95 (2.64)	$ 42.16 (2.48)
Conveyor & Barge	$ 29.62 (1.23)	$ 32.02 (1.33)	$ 30.43 (1.27)	$ 47.59 (1.99)	$ 52.56 (2.19)	$ 49.67 (2.07)	$ 41.07 2.41)	$ 44.95 (2.63)	$ 41.99 (2.47)
Slurry Pipeline & Barge	$ 29.58 (1.23)	$ 31.95 (1.33)	$ 30.36 (1.27)	$ 44.79 (1.87)	$ 49.77 (2.07)	$ 46.87 (1.95)	$ 40.55 (2.38)	$ 44.26 (2.60)	$ 41.47 (2.44)

VIII. CONCLUSIONS AND RECOMMENDATIONS

The analysis of the technical and economic feasibility of surface mining northern Alaska has resulted in several conclusions. Based upon these conclusions, recommendations will be made concerning future work to be done regarding the surface mining of northern Alaskan coal deposits.

A. CONCLUSIONS

As a result of the investigation of the feasibility of surface mining the coal deposits, certain conclusions have been made:

1. Geology and Reserves

(a) The degree of exploration has not been sufficient to provide good estimates of demonstrated coal resources in coal-bearing areas of northern Alaska.

(b) Past estimates of strippable coal in northern Alaska are overstated.

(c) Coal in seams greater than 20 feet thick has not been identified to any great extent in northern Alaska. The exceptions are the 20-foot-thick Kukpowruk Seam and coal intersections of up to 30 feet in thickness which were encountered in test wells on Naval Petroleum Reserve No. 4. It is suspected much of the coal intersected by the test wells is carbonaceous shale. Generally, the coal seams encountered in northern Alaska are thinner than those encountered in other western states.

(d) Very little flat-lying coal exists in northern Alaska. Therefore coal reserves with less than 120 feet of overburden are limited.

(e) Given the geology and the costs of northern Alaska, most coal cannot be mined economically with current technology. Therefore, the criteria for calculating the reserve base in northern Alaska should be re-evaluated.

2. Environment and Reclamation

(a) The environment of northern Alaska is harsh. Special construction and equipment operating techniques will be required.

(b) The potential for success of reclamation projects in the Arctic is unknown.

(c) Insufficient data exists to make detailed environmental impact assessments of potential northern Alaskan mining activity.

3. Technical Feasibility

The coal deposits of northern Alaska could be mined with currently available equipment and mining techniques.

4. Economic Feasibility

(a) Currently identified demonstrated strippable coal resources are not economically minable. Therefore the strippable reserve of northern Alaska coal is 0 tons.

(b) The only potential minesite which showed economic promise was the Kukpowruk River coalfield. "Reserves" would have to be expanded by a factor of 10 before this coal would be competitive with existing coal sources.

B. RECOMMENDATIONS

Kaiser Engineers recommends, that no further work except for geological exploration be done until one of the following conditions is met:

- Demonstrated strippable resources for a coal deposit of more than 125 million tons at a stripping ratio of less than 5:1 are blocked out;
- Coal prices escalate at a rate which exceeds coal costs to the extent that existing demonstrated reserves become economic;
- A market for coal is found in the North Slope area.

It is tempting to make recommendations concerning equipment development, environmental baseline studies, reclamation studies, investigations of transportation systems, and sociological studies; however, presently known strippable coal deposits are not attractive enough to warrant any further work other than geologic exploration. When these studies are required, they should be done on a site-specific basis.

APPENDIX

A. MINING REQUIREMENTS AND COSTS

1. Operating Criteria

Equipment requirements and mining costs are estimated for hypothetical mining operations in each of the three selected areas with separate estimates for each of the three mining systems. Since measured or indicated reserves are inadequate to support a large strip mining operation in these locations, it is assumed, for comparison purposes only, that additional reserves can be proven in these areas to support a production level of 5 million tons of coal per year over a period of 20 years.

The Kukpowruk River area has been explored to a greater extent than any of the other areas. Measured and indicated in-situ surface minable reserves of 20 million tons of bituminous coal with some coking characteristics have been delineated. A separate estimate for a small surface mine, producing 500,000 tons per year, has been prepared to determine the feasibility of supplying a limited domestic or foregin market.

Capital cost estimates are based on equipment prices in effect in December 1976 with no escalation projected for delivery time. Allowances for freight to the North Slope have been included, assuming barge shipment from Seattle, Washington, with air freight for necessary winter shipments. Material prices are based on late 1976 costs with a factor of 50 percent added for freight and handling. Wage rates are UMW rates effective December 6, 1976, in the Western Surface Coal Wage Agreement of 1975, increased by 25 percent to reflect the Alaskan differential at the Usibelli Coal Mines, Fairbanks, Alaska. Payroll overhead is estimated at 40 percent of direct payroll cost. UMW welfare royalties are based on December 1976 rates for bituminous and subbituminous coal. Lease royalties are assumed to be $12\frac{1}{2}$ percent of the mine selling price. An annual item for deferred expense is included to cover capital that must be expended over the life of the mine for equipment replacements and additions.

All operations are based on three shifts per day seven days per week. with an average of 335 available working days per year after allowance for lost time due to weather, major equipment failures, and work stoppages.

Transportation costs are not included in mining costs because of the different modes of transport under consideration for this area. Raw coal is considered to be sold at the minesite for purposes of percentage

royalties and no preparation is anticipated other than sizing of coal in the raw coal storage and handling facilities. Heating value of bituminous coals in the Kukpowruk River and Elusive Creek areas is estimated at 12,000 Btu/lb, and subbituminous coal in the Kuk River area at 8,500 Btu/lb.

Shop, office, warehouse, and changehouse facilities with the necessary water and sewage facilities will be constructed at the mine site to provide service and supply functions for the mining operation separately from any townsite or living accommodations infrastructure. A 5-mile access road is included in mine cost on the assumption that living accommodations will not be located at the minesite.

- 500,000 - Tons Per Year (Kukpowruk River)

  Measured and indicated reserves currently indicate 20 million tons of strippable coal available in this area. Within the limits of these reserves and a mine life of at least 20 years, equipment was selected and operations planned for a mine producing 500,000 tons of bituminous coal per year. Average seam thickness is 20 feet with an average dip of 15 degrees from a surface outcrop. A cutoff point of 100 feet of overburden has been selected as the maximum practical limit for a dragline operation of this scale, resulting in an average stripping ratio of 2.4 cubic yards of overburden per ton of coal recovered.

  Overburden removal will be accomplished by a 12-cubic-yard, crawler-type dragline and coal loading by a 10-cubic-yard front-end loader into 50-ton end-dump trucks. Overburden drilling will be done by an electric-powered rotary drill drilling 9-7/8-inch holes on 20-foot centers.

  Electric power will be supplied at 7,200 volts by portable, diesel-powered generator sets with two substations, each with capacity to supply full requirements.

  Operations are based on three shifts per day seven days per week. However, equipment sized for anticipated physical and geologic conditions has greater capacity than required at this level and a seasonal operation or reduced working schedule may be indicated.

- 5 Million Tons Per Year (Kukpowruk River, Elusive Creek, and Kuk River)

  Hypothetical strip mines in these areas at a production level of 5 million tons per year have been selected for all three minesites.

The operation is designed for a production level of 5 million tons of bituminous coal per year, with a mine life of 20 years. The coal seam of Kukpowruk River averages 20 feet in thickness, with an average dip of 15 degrees from a surface outcrop. At Elusive Creek, the seam is 9.5 feet thick, with an average dip of 5 degrees from surface outcrop. The Kuk River seam was assumed to be flat lying and eight feet thick. A cutoff point at 150 feet of overburden has been established as the practical limit for the equipment selected. Mining methods are based on current mining practices in western surface mines.

Separate capital and operating cost estimates have been made for each of the three selected mining systems: dragline operation, combined dragline-shovel operation, and shovel operation.

Electric power is assumed to be purchased from a community power plant at 69 KV and reduced to 23 KV at a main substation for distribution to the pit area. Skid-mounted transformers and switchgear will supply power through training cables to operating equipment.

Raw coal storage and handling facilities are based on regular shipments of coal, and no provisions are included for large-scale storage for seasonal shipment.

2. Coal Selling Price

The capital and operating costs which have been developed for northern Alaska lack the accuracy of similar costs which would be developed for less remote areas. Whether the wage rates and fringe benefits which Kaiser Engineers has developed would attract a suitable work force is not known. Transportation costs to the minesite and construction costs could be subject to error. The cost overruns incurred during the construction of the Alaska oil pipeline demonstrate the lack of precision of cost estimates for Arctic projects.

Because of the relative lack of accuracy of the developed cost estimates, Kaiser Engineers has chosen not to use discounted cashflow techniques for estimating the selling price of coal at the minesite. Instead, the calculation of coal selling price has been done on an annuity basis. The required rate of return of the project is 15 percent after tax with a 20-year project life.

The annual after-tax cashflow which would be required is the annuity which would yield 15 percent and return initial capital after 20 years. The components of after-tax cashflow are: after-tax profit, depreciation, and depletion.

After-tax cashflow is determined by dividing initial investment by 6.259 which is the factor for determining the annuity which will yield 15 percent on initial capital and reutrn the initial investment after 20 years. Depreciation is the amount calculated from the depreciation table.

Given that depreciation and after-tax cashflow are known, depletion and after-tax profit can be determined. For coal, depletion is 15 percent of revenue, to a maximum of 50 percent of gross profit. Because of the relatively low gross profit in terms of revenue, depletion is generally 50 percent of gross revenue for coal mines. The revenue remaining after depletion is subject to Federal income tax of 50 percent. Therefore, depletion plus after-tax profit equal 75 percent of gross profit, with depletion being equal to 50 percent of gross profit and after-tax income equal to 25 percent of gross profit. After-tax cashflow then equals depreciation plus 75 percent of gross profit.

Sales volume equals production cost (including depreciation and deferred expense) plus royalty plus gross profit. Royalty expense is assumed to be 12.5 percent of sales. Therefore, 87.5 percent of sales volume equals production cost plus gross profit.

Since gross profit equals (1/.75) of after-tax cashflow minus depreciation, sales volume equals (1/.875) times the sum of production cost and 75 percent of after-tax cashflow minus depreciation.

$$\text{Sales volume} = \frac{1}{.875} \times (\text{production cost} + 1.333 \times (\text{after-tax cashflow} - \text{depreciation}))$$

This is the annual sales volume which will provide a 15 percent after-tax yield on initial capital and return initial capital after 20 years.

From these costs, it can be seen that North Slope coal will not be economically attractive unless much larger strippable reserves are blocked out. To be economically sound today, a North Slope deposit near the seacoast would have to contain a minimum of 125 million tons of bituminous coal with a stripping ratio of less than 5 cubic yards of overburden per ton of coal. This is in the order of 10 times the size of the largest demonstrated strippable resource in Northern Alaska.

TABLE A-1

KUKPOWRUK RIVER
EQUIPMENT COST SUMMARY
500,000 ton/yr

	No.	Unit Cost	Total Cost ($000's)
Dragline - 12 yd^3	1	$3,355,000	$ 3,355
Dragline		-	
Shovel - Overburden		-	
Truck - Overburden		-	
Drill - Overburden 9-7/8 inches	1	547,000	547
Shovel - Coal		-	
Truck - Coal (50 ton)	6	229,000	1,374
Front End Loader - 10 yd^3	2	307,000	614
Coal Drill	1	72,000	72
Bulldozer - Crawler	2	241,000	482
Bulldozer - R. T.		-	
Explosives Truck - 5/ton	1	36,000	36
Motor Grader	1	156,000	156
Scraper Loader		-	
Truck - 50/ton dump		-	
Fuel and Lube Truck		-	
Sand and Water Truck	1	218,000	218
Mobile Crane - 100/ton		-	
Mobile Crane - 25/ton	1	160,000	160
Tower - Floodlight	3	10,000	30
Hydroseeder Truck		-	
Utility Truck	2	21,000	42
Pickup Truck	6	7,000	42
Station Wagon	2	7,000	14
Ambulance	1	12,000	12
Communications Equipment		25,000	25
Tools and Auxiliary Equipment		250,000	250
Diesel Generator - 600 kW	5	83,000	415
Substation		75,000	75
Power Line		150,000	150
Coal Lease			150
Access Road	5 Mi.	425,000	2,125
Office and Changehouse		325,000	325
Shop and Warehouse		1,300,000	1,300
Exploration		250,000	250
Bus - 36 Passenger	1	25,000	25
Coal Transfer and Storage System			2,000
Camp Accommodation		3,000,000	3,000
TOTAL			$17,244

TABLE A-2

KUKPOWRUK RIVER
TOTAL ESTIMATED CAPITAL REQUIREMENTS
500,000 ton/yr

	$000's
Camp Accommodations	$ 3,000
Exploration, Roads, and Buildings	4,175
Mining Equipment	8,069
Coal Storage and Transfer Equipment	2,000
Total Direct	17,244
Field Indirect (7-1/2%)	1,293
Total Construction	18,537
Engineering (3%)	556
Subtotal	19,093
Overhead and Administration (7-1/2%)	1,432
Subtotal	20,525
Contingency (15%)	3,079
Subtotal	23,604
Fee (3%)	708
Total Plant Cost (Insurance - Tax Base)	24,312
Interest During Construction	3,282
Subtotal	27,594
Working Capital - {1 year material / 9 months labor}	3,307
Total Capital Requirements	30,901

TABLE A-3

KUKPOWRUK RIVER
MANNING TABLE
500,000 ton/yr

Personnel	Total	Wages - Dollars Per Day	Annual Cost
Production			
Dragline Operator	3	$112.00	$ 61,460
Dragline Oiler	3	104.60	57,421
Driller	2	99.80	33,946
Driller Helper	2	92.70	31,525
Shooter	1	99.80	3,569*
Dozer Operator	4	99.80	110,947
F. E. Loader Operator	2	112.00	42,000
Truck Operator	6	99.80	149,760
Driller and Shooter - Coal	1	99.80	14,726*
Grader Operator	1	99.80	24,960*
Service Truck Driver	1	93.80	23,460
Utility Man	8	92.70	184,490
Subtotal	34		$ 738,264
Maintenance			
Master Electrician	3	112.00	61,460
Mechanic	7	108.30	182,790
Electrician	3	108.30	62,392
Repairman	5	99.80	139,526
Subtotal	18		$ 446,168
Total Wage Personnel	52		$1,184,432

*The employee is assigned other duties when not required for his primary position; costs for secondary duties are included in the wage totals for secondary duties.

TABLE A-3 (Cont)

Personnel - Salaried	Annual Rate	Total	Annual Cost
Superintendent	$43,750	1	$ 43,750
General Foreman, Mine	31,250	1	31,250
Pit Foreman	25,250	3	78,750
General Foreman, Maintenance	31,250	1	31,250
Maintenance Foreman	26,250	2	52,500
Mine Engineer	31,250	1	31,250
Surveyor	22,500	1	22,500
Drafter	18,750	1	18,750
Paymaster	23,000	1	23,000
Accountant	23,000	1	23,000
Purchasing Agent	23,000	1	23,000
Personnel Supervisor	23,000	1	23,000
Warehouseman	15,000	4	60,000
Clerk, General	15,000	8	120,000
Total Salaried Personnel		27	$ 582,000
Total Wage and Salaried Personnel		79	$1,766,432

TABLE A-4

KUKPOWRUK RIVER
ESTIMATED ANNUAL PRODUCTION COST
500,000 ton/yr

Direct Cost	Total Annual Cost	Cost Per Ton
Wages		
Operating Labor	738,264	1.48
Maintenance Labor	446,168	.89
Subtotal	1,184,432	2.37
Salaries		
Production	153,750	.31
Maintenance	83,750	.17
Administrative	344,500	.69
Subtotal	582,000	1.17
Payroll Overhead	706,573	1.41
Total Wage and Salary Cost	2,473,005	4.95
Operating Supplies		
Spare Parts	520,368	1.04
Explosives	242,892	.49
Fuel and Lubricants	285,440	.57
Tires	175,288	.35
Miscellaneous	288,356	.46
Total, Operating Supplies	1,452,344	2.91
Camp Operation	1,100,000	2.20
Power	109,434	.22
Union Welfare	555,000	1.11
Subtotal	1,764,434	3.53
Total Direct Cost	5,689,783	11.37
Indirect Cost (15% of Labor and Material)	588,802	1.18
Taxes and Insurance - 2% of Plant Cost	486,240	.97
Depreciation	1,868,100	3.74
Deferred Expense	404,940	.81
Subtotal	3,348,082	6.70
Total Annual Production Cost	9,037,865	18.07
Royalty (12-1/2% of Selling Price)	1,875,686	3.75
TOTAL ANNUAL COST	10,913,551	21.82

TABLE A-5

KUKPOWRUK RIVER
DEPRECIATION SCHEDULE
500,000 ton/yr

	Straight Line Depreciation, Years	Yearly Charge
Camp Accommodations	20	$ 150,000
Exploration	20	12,500
Diesel Generators	20	20,750
Mine Buildings	20	81,250
Substation	20	3,750
Power Line	20	7,500
Communications Equipment	20	1,250
Roads	20	106,250
Dragline - 12 yd^3	20	167,750
Drill - Overburden	20	27,350
Truck - Coal	5	274,800
Front End Loader	10	61,400
Coal Drill	10	7,200
Bulldozers	10	48,200
Explosives Truck	10	3,600
Motor Grader	10	15,600
Sand and Water Truck	10	21,800
Mobile Crane - 25 ton	20	8,000
Tower - Floodlight	10	3,000
Utility Truck	5	8,400
Pickup Truck	3	14,000
Station Wagon	3	4,700
Ambulance	10	1,200
Tools and Auxiliary Equipment	10	25,000
Bus - 36 Passenger	10	2,500
Coal Storage and Transfer System	20	100,000
Coal Lease	20	7,500
TOTAL		$1,185,250
Depreciation for field indirect, engineering, overhead and administration, contingency, fee and interest during construction	20	682,850
TOTAL YEARLY DEPRECIATION		$1,868,100

TABLE A-6

KUKPOWRUK RIVER
DRAGLINE OPERATION
CALCULATION OF COAL SELLING PRICE
(F. O. B. Mine Site)
500,000 ton/yr

15 Percent Return on Investment - 20 Year Capital Recovery

R = $30,901,000/6.259 = $4,937,051

Less Depreciation 1,868,100

$3,068,951 = Depletion + Net Profit

Depletion + Net Profit = 3/4 Gross Profit

Gross Profit = $3,068,951/.75 = $4,091,935

Sales = Production Cost + Royalty + Gross Profit

Royalty = 12.5% of Sales

Sales = ($9,037,865 + $4,091,935)/.875 = $15,005,486

Royalty = $15,005,486 x .125 = $1,875,686

Selling Price/Ton = $15,005,486/500,000 = $30.01

Depletion = 50% of Gross Profit

F. I. T. = 50% of Taxable Income

Gross Profit	$4,091,935
Depletion	2,045,968
Taxable Income	$2,045,967
Federal Income Tax	$1,022,984
Net Profit	$1,022,983

Annual Cash Flow = Net Profit + Depreciation + Depletion

= $1,023,983 + $1,868,100 + $2,045,968

= $4,937,051

TABLE A-7

COST SUMMARY
KUKPOWRUK RIVER MINESITE
500,000 TONS PER YEAR

COST ITEM	COST
MINE	
Capital Cost ($ thousands)	$30,901
Annual Cost ($thousands)	15,005
[1] Price Per Ton ($)	30.01
[1] Price Per Million Btu ($)	1.25
SEASONAL TRUCK AND BARGE SYSTEM	
Capital Cost ($ thousands)	26,126
Annual Cost ($ thousands)	9,611
[2] Cost Per Ton ($)	19.22
[2] Cost Per Million Btu ($)	0.80
TOTAL COST	
Capital Cost ($ thousands)	57,027
Annual Cost ($ thousands)	24,616
[3] Price Per Ton ($)	49.23
[3] Price Per Million Btu ($)	2.05

[1] Price fob minesite
[2] Transportation from mine to ice-free port
[3] Price at ice-free port

TABLE A-8

KUKPOWRUK RIVER
5 MILLION TONS PER YEAR
EQUIPMENT COST SUMMARY
($1,000's)

Equipment	Unit Cost	Mining Method					
		Dragline		Shovel		Dragline & Shovel	
		No.	Cost	No.	Cost	No.	Cost
Dragline (100 yd^3)	$26,628	1	$26,628	0	$ 0	1	$26,628
Dragline (50 yd^3)	13,318	1	13,318	0	0	0	0
Shovel-Overburden (22 yd^3)	2,826	0	0	3	8,478	1	2,826
Truck-Overburden (170 ton)	630	0	0	14	8,820	5	3,150
Drill-Overburden (12$\frac{1}{4}$ inch dia.)	738	4	2,952	4	2,952	4	2,952
Shovel-Coal (15 yd^3)	1,538	1	1,538	1	1,538	1	1,538
Truck-Coal (180 ton)	647	8	5,176	8	5,176	8	5,176
Wheel Loader (15 yd^3)	396	1	396	1	396	1	396
Coal Drill	72	2	144	2	144	2	144
Bulldozer-(Crawler)	241	9	2,169	11	2,651	10	2,410
Bulldozer-(Rubber Tired)	151	2	302	3	453	2	302
Explosives Truck (10 ton)	42	2	84	2	84	2	84
Motor Grader	156	2	312	3	468	2	312
Scraper Loader (31 yd^3)	239	2	478	2	478	2	478
Dump Truck (50 ton)	259	2	518	2	518	2	518
Fuel & Lube Truck	66	1	66	1	66	1	66
Sand & Water Truck	218	1	218	1	218	1	218
Mobile Crane (100 ton)	329	1	329	1	329	1	329
Mobile Crane (50 ton)	216	1	216	1	216	1	216
Tower-Floodlight	10	5	50	7	70	5	50
Hydroseeder Truck	51	1	51	1	51	1	51
Utility Truck	21	6	126	7	147	6	126
Pickup Truck	7	20	140	21	147	20	140
Station Wagon	7	5	35	5	35	5	35
Ambulance	12	1	12	1	12	1	12
Communications Equipment	50		50		50		50
Tools & Auxiliary Equipment	500		500		500		500
Bus (36 passenger)	25	2	50		75		50
Substation	500		500		500		500
Power Line	500		500		500		500
Coal Lease			1500		1500		1500
Access Road	425	5mi	2125		2125		2125
Office & Change House	975		975		1170		1040
Shop & Warehouse	4407		4407		6955		4875
Water & Sewage System	780		780		800		780
Exploration	1500		1500		1500		1500
Coal Storage & Transfer System			4500		4500		4500
TOTAL			$72,645		$53,622		$66,077

TABLE A-9

KUKPOWRUK RIVER
TOTAL ESTIMATED CAPITAL REQUIREMENTS
5 MILLION TONS PER YEAR
($000's)

	Dragline	Shovel	Dragline & Shovel
Exploration, Roads, and Buildings	$ 11,287	$ 14,050	$ 11,820
Mining Equipment	56,858	35,072	49,757
Coal Storage and Transfer Equipment	4,500	4,500	4,500
Total Direct	72,645	53,622	66,077
Field Indirect	5,448	4,022	4,956
Total Construction	78,093	57,644	71,033
Engineering	2,343	1,729	2,131
Subtotal	80,436	59,373	73,164
Overhead & Administration	6,033	4,453	5,487
Subtotal	86,469	63,826	78,651
Contingency	12,970	9,574	11,798
Subtotal	99,439	73,400	90,449
Fee	2,983	2,202	2,713
Total Plant Cost (Insurance-Tax Base)	$102,422	$ 75,602	$ 93,162
Interest During Construction	18,436	13,608	16,769
Subtotal	120,858	89,210	109,931
Working Capital	6,000	9,000	7,000
Total Capital Requirements	$126,858	$ 98,210	$116,931

TABLE A-10

KUKPOWRUK RIVER
5 MILLION TONS PER YEAR
PERSONNEL REQUIREMENTS

Category	Daily Rate	Mining Method: Dragline No.	Dragline $/Year	Shovel No.	Shovel $/Year	Dragline & Shovel No.	Dragline & Shovel $/Year
Wage Personnel							
Production							
Dragline Operator	$112.00	8	$ 213,360	-	$	4	$ 112,560
Dragline Oiler	104.60	8	199,263	-		4	105,163
Shovel Operator	112.00	4	98,000	14	400,120	7	193,732
Shovel Oiler	104.60	4	91,560	14	373,826	7	181,001
Driller	99.80	12	284,918	12	284,918	12	284,918
Driller Helper	92.70	12	264,570	12	264,560	12	264,560
Blaster	99.80	1	18,283	1	18,283	1	18,283
Dozer Operator	99.80	27	673,171	36	909,917	33	830,269
Wheel Loader Operator	112.00	2	57,820	2	57,820	2	57,820
Truck Operator	99.80	16	417,331	57	1,420,623	29	735,322
Driller & Shooter-Coal	99.80	6	145,766	6	145,766	6	145,766
Grader Operator	99.80	4	100,339	8	200,678	6	133,786
Service Truck Driver	93.80	3	62,873	4	94,309	4	94,309
Scraper Operator	99.80	3	62,400	3	62,400	3	62,400
Utility	92.70	28	653,502	32	754,335	29	684,563
Subtotal		138	$3,343,156	201	$4,987,555	160	$3,904,452
Maintenance							
Master Electrician	112.00	10	282,618	16	444,010	12	337,946
Mechanic	108.30	40	1,093,341	63	1,717,684	48	1,307,368
Electrician	108.30	17	455,553	26	715,724	20	544,741
Repairman	99.80	17	435,677	27	666,806	21	536,016
Subtotal		84	$2,267,198	132	$3,544,224	101	$2,726,071
Total Wage Personnel		222	$5,610,345	333	$8,531,779	261	$6,630,523

TABLE A-10

KUKPOWRUK RIVER
5 MILLION TONS PER YEAR
PERSONNEL REQUIREMENTS

Category	Annual Rate	Mining Method: Dragline No.	Dragline $/Yr. Cost	Shovel No.	Shovel $/Yr. Cost	Dragline & Shovel No.	Dragline & Shovel $/Yr. Cost
Salaried Personnel							
Administrative							
General Manager	$50,000	1	$ 50,000	1	$ 50,000	1	$ 50,000
Chief Engineer	37,500	1	37,500	1	37,500	1	37,500
Environmental Engineer	28,750	1	28,750	1	28,750	1	28,750
Mine Engineer	31,250	1	31,250	1	31,250	1	31,250
Surveyor	22,500	2	45,000	2	45,000	2	45,000
Drafter	18,750	2	37,500	2	37,500	2	37,500
Manager, Administrative Services	43,750	1	43,750	1	43,750	1	43,750
Industrial Relations Supervisor	37,500	1	37,500	1	37,500	1	37,500
Personnel Supervisor	28,750	1	28,750	1	28,750	1	28,750
Safety Supervisor	28,750	1	28,750	1	28,750	1	28,750
Training Supervisor	28,750	1	28,750	1	28,750	1	28,750
Training Instructor	25,000	1	25,000	2	50,000	1	25,000
Employment Supervisor	28,750	1	28,750	1	28,750	1	28,750
Purchasing Agent	31,250	1	31,250	1	31,250	1	31,250
Buyer	25,000	1	25,000	1	25,000	1	25,000
Purchasing Clerk	15,000	2	30,000	3	45,000	2	30,000
Traffic Supervisor	28,750	1	28,750	1	28,750	1	28,750
Comptroller	37,500	1	37,500	1	37,500	1	37,500
Paymaster	26,250	1	26,250	1	26,250	1	26,250
Payroll Clerk	15,000	2	30,000	3	45,000	2	30,000
Senior Cost Accountant	28,750	1	28,750	1	28,750	1	28,750
Cost Accountant	26,250	2	52,500	2	52,500	2	52,500
Clerk-General	15,000	7	105,000	9	135,000	7	105,000
Secretary	13,750	2	27,500	2	27,500	2	27,500
Typist	11,250	2	22,500	3	33,750	2	22,500
Warehouse Supervisor	25,000	1	25,000	1	25,000	1	25,000
Warehouse Clerk	15,000	4	60,000	5	75,000	4	60,000
Warehouseman	15,000	6	90,000	9	135,000	6	90,000
Subtotal		49	$1,071,250	59	$1,227,500	49	$1,071,250
Production							
Mine Superintendent	43,750	1	43,750	1	43,750	1	43,750
General Foreman	31,250	1	31,250	1	31,250	1	31,250
Pit Foreman	26,250	4	105,000	8	210,000	4	105,000
Blaster Foreman	26,250	1	26,250	1	26,250	1	26,250
Coal Loading Foreman	26,250	4	105,000	4	105,000	4	105,000
Labor Foreman	26,250	1	26,250	1	26,250	1	26,250
Clerk	15,000	4	60,000	4	60,000	4	60,000
Subtotal		16	$ 397,500	20	$ 502,500	16	$ 397,500

TABLE A-10

KUKPOWRUK RIVER
5 MILLION TONS PER YEAR
PERSONNEL REQUIREMENTS

Category	Annual Rate	Mining Method: Dragline No.	Dragline $/Yr. Cost	Shovel No.	Shovel $/Yr. Cost	Dragline & Shovel No.	Dragline & Shovel $/Yr. Cost
Salaried Personnel							
Maintenance							
Superintendent, Maintenance	$37,500	1	$ 37,500	1	$ 37,500	1	$ 37,500
General Foreman	31,250	1	31,250	1	31,250	1	31,250
Mechanical Foreman	26,250	4	105,000	8	210,000	4	105,000
Electrical Foreman	26,250	4	105,000	4	105,000	4	105,000
Shop Foreman	26,250	4	105,000	4	105,000	4	105,000
Design Engineer	26,250	1	26,250	1	26,250	1	26,250
Drafter	18,750	1	18,750	2	37,500	1	18,750
Clerk	15,000	4	60,000	4	60,000	4	60,000
Subtotal		20	$ 488,750	25	$ 612,500	20	$ 488,750
Total Salaried Personnel		85	1,957,500	104	2,342,500	85	1,957,500
GRAND TOTAL		307	$7,567,845	437	$10,874,279	346	$8,588,023

TABLE A-11

KUKPOWRUK RIVER
5 MILLION TONS PER YEAR
ESTIMATED ANNUAL PRODUCTION COST

Cost Item	Mining Method: Dragline $/Year	Dragline $/Ton	Shovel $/Year	Shovel $/Ton	Dragline & Shovel $/Year	Dragline & Shovel $/Ton
Direct Cost						
Wages						
Operating Labor	$ 3,343,156	$ .67	$ 4,987,555	$1.00	$ 3,904,452	$ .78
Maintenance Labor	2,267,189	.45	3,544,224	.71	2,726,071	.55
Subtotal	$ 5,610,345	$1.12	$ 8,531,779	$1.71	$ 6,630,523	$1.33
Salaries						
Production	397,500	.08	502,500	.10	397,500	.08
Maintenance	488,750	.10	612,500	.12	488,750	.10
Administrative	1,071,250	.21	1,227,500	.25	1,071,250	.21
Subtotal	$ 1,957,500	$ .39	$ 2,342,500	$ .47	$ 1,957,500	$ .30
Payroll Overhead	3,027,138	.61	4,349,712	.87	3,435,209	.69
Total Wage & Salary Cost	$10,594,983	$2.12	$15,223,991	$3.05	$12,023,232	$2.41
Operating Supplies						
Spare Parts	3,884,370	.78	6,824,220	1.36	4,918,902	.98
Explosives	3,665,316	.73	3,665,316	.73	3,665,316	.73
Fuel & Lubricants	1,543,510	.31	3,060,878	.61	2,096,877	.42
Tires	784,575	.16	2,392,401	.48	1,333,665	.27
Miscellaneous	1,837,140	.37	2,273,346	.45	2,198,222	.44
Total, Operating Supplies	$11,714,911	$2.35	$18,216,161	$3.63	$14,212,982	$2.84
Power	1,897,140	.38	572,240	.11	1,425,306	.29
Union Welfare	4,800,000	.96	5,150,000	1.03	4,900,000	.98
Subtotal	$ 6,679,140	$1.34	$ 5,722,240	$1.14	$ 6,325,306	$1.27
Total Direct Cost	$28,989,034	$5.81	$39,088,892	$7.82	$32,561,520	$6.52
Indirect Cost (15% of Labor & Material)	3,346,484	.67	4,977,435	1.00	3,935,432	.79
Taxes & Insurance - 2% of Plant Cost	2,048,440	.41	1,512,040	.30	1,863,240	.37
Depreciation	7,234,000	1.45	7,042,350	1.41	7,193,150	1.44
Deferred Expense	1,518,625	.30	3,231,063	.65	2,124,313	.42
Subtotal	$14,147,549	$2.83	$16,762,888	$3.36	$15,116,135	$3.02
Total Annual Production Cost	$43,136,583	$8.64	$55,851,780	$11.18	$47,677,655	$9.54
Royalty (12½% of Selling Price)	8,645,054	1.73	9,626,189	1.93	8,999,457	1.80
TOTAL ANNUAL COST	$51,781,637	$10.37	$65,477,969	$13.11	$56,677,112	$11.34

TABLE A-12

KUKPOWRUK RIVER
5 MILLION TONS PER YEAR
DEPRECIATION SCHEDULE
(Yearly Charge)

Capital Cost Item	Straight Line Depreciation Years	Mining Method		
		Dragline	Shovel	Dragline & Shovel
Exploration	20	$ 75,000	$ 75,000	$ 75,000
Coal Storage & Transfer System	20	225,000	225,000	225,000
Mine Buildings	20	308,100	446,250	334,750
Substation	20	25,000	25,000	25,000
Power Line	20	25,000	25,000	25,000
Communications Equipment	20	2,500	2,500	2,500
Roads	20	106,250	106,250	106,250
Dragline (100 yd^3)	20	1,331,400	-	1,331,400
Dragline (50 yd^3)	20	665,900	-	-
Shovel-Overburden (22 yd^3)	20	-	423,900	141,300
Truck-Overburden (170 ton)	5	-	1,764,000	630,000
Drill Overburden (12-1/4 inch dia.)	20	147,600	147,600	147,600
Shovel-Coal	20	76,900	76,900	76,900
Truck-Coal (180 ton)	5	1,035,200	1,035,200	1,035,200
Wheel Loader (15 yd^3)	10	39,600	39,600	39,600
Coal Drill	10	14,400	14,400	14,400
Bulldozers (Crawler & Rubber Tired)	10	247,100	310,400	271,200
Explosives Truck	10	8,400	8,400	8,400
Motor Grader	10	31,200	46,800	31,200
Scraper Loader	5	95,600	95,600	95,600
Dump Truck (50 ton)	5	103,600	103,600	103,600
Fuel & Lube Truck	10	6,600	6,600	6,600
Sand & Water Truck	10	21,800	21,800	21,800
Mobile Crane (100 ton)	20	16,450	16,450	16,450
Mobile Crane (50 ton)	20	10,800	10,800	10,800
Tower-Floodlight	10	5,000	7,000	5,000
Hydroseeder Truck	10	5,100	5,100	5,100
Utility Truck	5	4,200	29,400	25,200
Pickup Truck	3	46,700	49,000	46,700
Station Wagon	3	11,700	11,700	11,700
Ambulance	10	1,200	1,200	1,200
Tools & Auxiliary Equipment	10	50,000	50,000	50,000
Bus (36 passenger)	10	5,000	7,500	5,000
Coal Lease	20	75,000	75,000	75,000
TOTAL		$7,234,000	$5,262,950	$5,000,450
Depreciation for field indirect, engineering, overhead and administration, contingency, fee and interest during construction	20	2,410,000	1,779,400	2,192,700
TOTAL YEARLY DEPRECIATION		$7,234,000	$7,042,350	$7,193,150

TABLE A-13

KUKPOWRUK RIVER
5 MILLION TONS PER YEAR
CALCULATION OF COAL SELLING PRICE

20 YEAR PROJECT LIFE - 15% RETURN ON INVESTMENT

	Mining Method		
	Dragline	Shovel	Dragline & Shovel
Annual Gross Profit			
After-Tax Cash Flow (Initial Investment/6.259)	$20,268,094	$15,691,005	$18,682,058
Less Depreciation	7,234,000	7,042,350	7,193,150
Depletion & After-Tax Profit (=3/4 Gross Profit)	13,034,094	8,648,655	11,488,908
GROSS PROFIT	$17,378,792	$11,531,540	$15,318,544
Annual Sales			
(Sales= Production Cost + Royalty + Gross Profit)			
Production Cost	$43,136,583	$55,851,780	$47,677,655
Gross Profit	17,398,792	11,531,540	15,318,544
Subtotal	60,515,375	67,383,320	62,996,199
Royalty (12.5 x subtotal) (87.5) ($12\frac{1}{2}$% of Sales)	8,645,054	9,626,189	8,999,457
Annual Sales	69,160,429	77,009,509	71,995,656
Selling Price Per Ton	$ 13.83	$ 15.40	$ 14.40
Cash Flow			
Gross Profit	$17,378,792	$11,531,540	$15,318,544
Depletion (50% of Gross Profit)	8,689,396	5,765,770	7,659,272
Taxable Income	8,689,396	5,765,770	7,659,272
Federal Income Tax	4,344,698	2,882,885	3,829,636
After Tax Income	4,344,698	2,882,885	3,829,636
After Tax Income	4,344,698	2,882,885	3,829,636
Plus Depreciation	7,234,000	7,642,350	7,193,150
Plus Depletion	8,689,396	5,765,770	7,659,272
Cash Flow	$20,268,094	$15,691,005	$18,682,058

TABLE A-14

ELUSIVE CREEK
5 MILLION TONS PER YEAR
EQUIPMENT COST SUMMARY
($1000's)

Equipment	Unit Cost	Mining Method: Dragline No.	Dragline Cost	Shovel No.	Shovel Cost	Dragline & Shovel No.	Dragline & Shovel Cost
Dragline (100 yd^3)	$26,628	2	$ 53,256	-	$ -	2	$ 53,256
Dragline (50 yd^3)	13,318	2	26,636	-	-	-	-
Shovel-Overden (22 yd^3)	2,826	-	-	7	19,782	3	8,478
Truck-Overburden (170 ton)	630	-	-	30	18,900	13	8,190
Drill-Overburden (12$\frac{1}{4}$ inch dia.)	738	8	5,904	8	5,904	8	5,904
Shovel-Coal (15 yd^3)	-	-	-	-	-	-	-
Truck-Coal (180 ton)	647	10	6,470	10	6,470	10	6,470
Wheel Loader (15 yd^3)	396	3	1,188	3	1,188	3	1,188
Coal Drill	72	2	144	2	144	2	144
Bulldozer-(Crawler)	241	15	3,615	18	4,338	17	4,097
Bulldozer-(Rubber Tired)	151	2	302	4	604	2	302
Explosives Truck (10 ton)	42	2	84	2	84	2	84
Motor Grader	156	2	312	2	312	2	312
Scraper Loader (31 yd^3)	239	2	478	2	478	2	478
Dump Truck (50 ton)	259	2	518	2	518	2	518
Fuel & Lube Truck	66	1	66	2	132	1	66
Sand & Water Truck	218	1	218	1	218	1	218
Mobile Crane (100 ton)	329	1	329	1	329	1	329
Mobile Crane (50 ton)	216	1	216	1	216	1	216
Tower-Floodlight	10	7	70	11	110	7	70
Hydroseeder Truck	51	1	51	1	51	1	51
Utility Truck	21	8	168	10	210	8	168
Pickup Truck	7	23	161	25	175	23	161
Station Wagon	7	5	35	5	35	5	35
Ambulance	12	1	12	1	12	1	12
Communications Equipment	60		60		80		60
Tools & Auxiliary Equipment	500		500		500		500
Bus (36 passenger)	25	5	125	7	175	6	150
Substation	750		750		500		750
Power Line	750		750		750		750
Coal Lease			1,500		1,500		1,500
Access Road	425	5mi	2,125	5mi	2,125	5mi	2,125
Office & Change House	1,380		1,380		1,940		1,500
Shop & Warehouse	8,400		8,400		11,250		9,400
Water & Sewage System							
Exploration	1,500		1,500		1,500		1,500
Coal Storage & Transfer System			4,500		4,500		4,500
TOTAL			$121,823		$85,030		$113,482

TABLE A-15

ELUSIVE CREEK
TOTAL ESTIMATED CAPITAL REQUIREMENTS
5 MILLION TONS PER YEAR
($000's)

	Dragline	Shovel	Dragline & Shovel
Exploration, Roads, and Buildings	$ 14,905	$ 18,315	$ 16,025
Mining Equipment	102,418	62,215	92,957
Coal Storage and Transfer Equipment	4,500	4,500	4,500
Total Direct	121,823	85,030	113,482
Field Indirect	9,137	6,377	8,511
Total Construction	130,960	91,407	121,993
Engineering	3,929	2,742	3,660
Subtotal	134,889	94,149	125,653
Overhead & Administration	10,117	7,061	9,424
Subtotal	145,006	101,210	135,077
Contingency	21,751	15,182	20,262
Subtotal	166,757	116,392	155,339
Fee	5,003	3,492	4,660
Total Plant Cost (Insurance-Tax Base)	171,760	119,884	159,999
Interest During Construction	30,917	21,579	28,800
Subtotal	202,677	141,463	188,799
Working Capital	10,775	17,400	13,400
Total Capital Requirements	$213,452	$158,863	$202,199

TABLE A-16

ELUSIVE CREEK
5 MILLION TONS PER YEAR
PERSONNEL REQUIREMENTS

Category	Daily Rate	Mining Method: Dragline No.	Dragline $/Year	Shovel No.	Shovel $/Year	Dragline & Shovel No.	Dragline & Shovel $/Year
Wage Personnel							
Production							
Dragline Operator	$112.00	16	$ 476,560	-	$ -	8	$ 225,120
Dragline Oiler	104.60	16	445,243	-	-	8	210,326
Shovel Operator	112.00	-	-	24	663,180	9	250,600
Shovel Oiler	104.60	-	-	24	619,600	9	234,132
Driller	99.80	25	625,373	25	625,373	25	625,373
Driller Helper	92.70	25	580,775	25	580,775	25	580,775
Blaster	99.80	2	40,123	2	40,123	2	40,123
Dozer Operator	99.80	45	1,115,837	56	1,407,994	51	1,282,320
Wheel Loader Operator	112.00	8	203,420	7	203,420	7	203,420
Truck Operator	99.80	19	479,731	112	2,800,387	54	1,356,451
Driller & Shooter-Coal	99.80	6	145,766	6	145,766	6	145,766
Grader Operator	99.80	6	133,786	7	167,232	7	167,232
Service Truck Driver	93.80	4	94,309	5	125,746	5	125,746
Scraper Operator	99.80	5	125,800	5	124,800	5	124,800
Utility	92.70	43	991,119	48	1,126,826	44	1,022,180
Subtotal		220	$5,456,842	346	$8,631,222	265	$6,594,364
Maintenance							
Master Electrician	112.00	18	498,400	30	838,180	22	627,200
Mechanic	108.30	71	1,932,429	119	3,242,559	89	2,426,368
Electrician	108.30	30	792,699	50	1,351,130	37	1,011,154
Repairman	99.80	29	733,574	45	1,118,083	34	858,998
Subtotal		148	$3,957,102	244	$6,549,952	182	$4,923,720
Total Wage Personnel		368	$9,413,944	590	$15,181,174	447	$11,518,084

TABLE A-16

ELUSIVE CREEK
5 MILLION TONS PER YEAR
PERSONNEL REQUIREMENTS

Category	Annual Rate	Mining Method: Dragline No.	Dragline $/Yr. Cost	Shovel No.	Shovel $/Yr. Cost	Dragline & Shovel No.	Dragline & Shovel $/Yr. Cost
Salaried Personnel							
Administrative							
General Manager	$50,000	1	$ 50,000	1	$ 50,000	1	$ 50,000
Chief Engineer	37,500	1	37,500	1	37,500	1	37,500
Environmental Engineer	28,750	1	28,750	1	28,750	1	28,750
Mine Engineer	31,250	2	62,500	2	62,500	2	62,500
Surveyor	22,500	4	90,000	4	90,000	4	90,000
Drafter	18,750	4	75,000	4	75,000	4	75,000
Manager, Administrative Services	43,750	1	43,750	1	43,750	1	43,750
Industrial Relations Supervisor	37,500	1	37,500	1	37,500	1	37,500
Personnel Supervisor	28,750	1	28,750	1	28,750	1	28,750
Safety Supervisor	28,750	1	28,750	1	28,750	1	28,750
Training Supervisor	28,750	1	28,750	1	28,750	1	28,750
Training Instructor	25,000	2	50,000	3	75,000	2	50,000
Employment Supervisor	28,750	1	28,750	1	28,750	1	28,750
Purchasing Agent	31,250	1	31,250	1	31,250	1	31,250
Buyer	25,000	2	50,000	3	75,000	2	50,000
Purchasing Clerk	15,000	3	45,000	4	60,000	3	45,000
Traffic Supervisor	28,750	1	28,750	1	28,750	1	28,750
Comptroller	37,500	1	37,500	1	37,500	1	37,500
Paymaster	26,250	1	26,250	1	26,250	1	26,250
Payroll Clerk	15,000	3	45,000	3	45,000	3	45,000
Senior Cost Accountant	28,750	1	28,750	1	28,750	1	28,750
Cost Accountant	26,250	2	52,500	2	52,500	2	52,500
Clerk-General	15,000	11	165,000	15	225,000	12	180,000
Secretary	13,750	2	27,500	2	27,500	2	27,500
Typist	11,250	3	33,750	5	56,250	4	45,000
Warehouse Supervisor	25,000	1	25,000	1	25,000	1	25,000
Warehouse Clerk	15,000	5	75,000	6	90,000	5	75,000
Warehouseman	15,000	9	135,000	10	150,000	9	135,000
Assistant Paymaster	22,500	1	22,500	1	22,500	1	22,500
Subtotal		68	$1,418,750	78	$1,596,250	70	$1,445,000
Production							
Mine Superintendent	43,750	1	43,750	1	43,750	1	43,750
General Foreman	31,250	1	31,250	1	31,250	1	31,250
Pit Foreman	26,250	8	210,000	8	210,000	8	210,000
Blaster Foreman	26,250	2	52,500	2	52,500	2	52,500
Coal Loading Foreman	26,250	4	105,000	4	105,000	4	105,000
Labor Foreman	26,250	2	52,500	2	52,500	2	52,500
Clerk	15,000	8	120,000	8	120,000	8	120,000
Equipment Foreman	26,250	-	-	4	105,000	-	-
Subtotal		26	$ 615,000	30	$ 720,000	26	$ 615,000

TABLE A-16

ELUSIVE CREEK
5 MILLION TONS PER YEAR
PERSONNEL REQUIREMENTS

Category	Annual Rate	Mining Method: Dragline No.	Dragline $/Yr. Cost	Shovel No.	Shovel $/Yr. Cost	Dragline & Shovel No.	Dragline & Shovel $/Yr. Cost
Salaried Personnel							
Maintenance							
Superintendent, Maintenance	$37,500	1	$ 37,500	1	$ 37,500	1	$ 37,500
General Foreman	31,250	1	31,250	1	31,250	1	31,250
Mechanical Foreman	26,250	8	210,000	8	210,000	8	210,000
Electrical Foreman	26,250	4	105,000	8	210,000	4	105,000
Shop Foreman	26,250	4	105,000	4	105,000	4	105,000
Design Engineer	26,250	1	26,250	1	26,250	1	26,250
Drafter	18,750	2	37,500	3	56,250	2	37,500
Clerk	15,000	4	60,000	4	60,000	4	60,000
Subtotal		25	612,500	30	736,250	25	612,500
Total Salaried Personnel		118	2,646,250	137	3,052,500	121	2,672,500
GRAND TOTAL		464	$11,502,211	727	$18,233,674	527	$13,114,411

TABLE A-17

ELUSIVE CREEK
5 MILLION TONS PER YEAR
ESTIMATED ANNUAL PRODUCTION COST

Cost Item	Mining Method: Dragline $/Year	Dragline $/Ton	Shovel $/Year	Shovel $/Ton	Dragline & Shovel $/Year	Dragline & Shovel $/Ton
Direct Cost						
Wages						
Operating Labor	$ 5,456,842	1.09	$ 8,631,222	1.73	$ 6,594,364	1.32
Maintenance Labor	3,957,102	.79	6,549,952	1.31	4,923,720	.98
Subtotal	9,413,944	1.88	15,181,174	3.04	11,518,084	2.30
Salaries						
Production	615,000	.12	720,000	.14	615,000	.12
Maintenance	612,500	.12	736,250	.15	612,500	.12
Administrative	1,418,750	.28	1,596,250	.32	1,445,000	.29
Subtotal	2,646,250	.52	3,052,500	.61	2,672,500	.53
Payroll Overhead	4,824,078	.96	7,293,470	1.46	5,676,234	1.14
Total Wage & Salary Cost	16,884,272	3.36	25,527,144	5.11	19,866,818	3.97
Operating Supplies						
Spare Parts	6,702,120	1.34	12,854,085	2.57	9,013,395	1.80
Explosives	7,692,381	1.54	7,692,381	1.54	7,692,381	1.54
Fuel & Lubricants	2,372,312	.47	5,525,900	1.11	3,606,651	.72
Tires	1,097,805	.22	4,568,475	.91	2,452,755	.49
Miscellaneous	3,687,615	.74	4,153,092	.83	4,016,277	.80
Total, Operating Supplies	21,552,233	4.31	34,793,933	6.96	26,781,459	5.35
Power	3,968,800	.79	1,090,090	.22	2,796,444	.56
Union Welfare	5,250,000	1.05	5,900,000	1.18	5,500,000	1.10
Subtotal	9,218,800	1.84	6,990,090	1.40	8,296,444	1.66
Total Direct Cost	47,655,305	9.51	67,311,167	13.47	54,944,721	10.98
Indirect Cost (15% of Labor & Material)	5,765,476	1.15	9,048,162	1.81	6,997,242	1.40
Taxes & Insurance - 2% of Plant Cost	3,435,200	.69	2,397,680	.48	3,199,980	.64
Depreciation	11,678,040	2.34	11,511,650	2.30	12,437,990	2.49
Deferred Expense	1,922,813	.38	5,553,500	1.11	3,490,125	.70
Subtotal	22,801,529	4.56	28,510,992	5.70	26,125,337	5.23
Total Annual Production Cost	70,456,834	14.07	95,822,159	19.17	81,070,058	16.21
Royalty (12-1/2% of Selling Price)	14,336,723	2.87	16,330,762	3.27	15,365,690	3.07
TOTAL ANNUAL COST	$84,793,557	16.94	$112,152,921	22.44	$96,435,748	19.28

TABLE A-18

ELUSIVE CREEK
5 MILLION TONS PER YEAR
DEPRECIATION SCHEDULE
(Yearly Charge)

Capital Cost Item	Straight Line Depreciation Years	Mining Method		
		Dragline	Shovel	Dragline & Shovel
Exploration	20	$ 75,000	$ 75,000	$ 75,000
Coal Storage & Transfer System	20	225,000	225,000	225,000
Mine Buildings	20	489,000	659,500	545,000
Substation	20	37,500	25,000	37,500
Power Line	20	37,500	37,500	37,500
Communications Equipment	20	3,000	4,000	3,000
Roads	20	106,250	106,250	106,250
Dragline (100 yd^3)	20	2,662,800	-	2,662,800
Dragline (50 yd^3)	20	1,331,800	-	-
Shovel-Overburden (22 yd^3)	20	-	989,100	423,900
Truck-Overburden (170 ton)	5	-	3,780,000	1,638,000
Drill Overburden (12-1/4 inch dia.)	20	295,200	295,200	295,200
Shovel-Coal				
Truck-Coal (180 ton)	5	1,294,000	1,294,000	1,294,000
Wheel Loader (15 yd^3)	10	118,000	118,000	118,000
Coal Drill	10	14,400	14,400	14,400
Bulldozers (Crawler & Rubber Tired)	10	391,700	494,200	439,900
Explosives Truck	10	8,400	8,400	8,400
Motor Grader	10	31,200	31,200	31,200
Scraper Loader	5	95,600	95,600	95,600
Dump Truck (50 ton)	5	103,600	103,600	103,600
Fuel & Lube Truck	10	6,600	13,200	6,600
Sand & Water Truck	10	21,800	21,800	21,800
Mobile Crane (100 ton)	20	16,450	16,450	16,450
Mobile Crane (50 ton)	20	10,800	10,800	10,800
Tower-Floodlight	10	7,000	11,000	7,000
Hydroseeder Truck	10	5,100	5,100	5,100
Utility Truck	5	33,600	42,000	33,600
Pickup Truck	3	63,670	58,330	63,670
Station Wagon	3	11,670	11,670	11,670
Ambulance	10	1,200	1,200	1,200
Tools & Auxiliary Equipment	10	50,000	50,000	50,000
Bus (36 passenger)	10	12,500	17,500	15,000
Coal Lease	20	75,000	75,000	75,000
TOTAL		$ 7,635,340	$ 8,690,000	$ 8,672,140
Depreciation for field indirect, engineering, overhead and administration, contingency, fee and interest during construction	20	4,042,700	2,821,650	3,765,850
TOTAL YEARLY DEPRECIATION		$11,678,040	$11,511,650	$12,437,990

TABLE A-19

ELUSIVE CREEK
5 MILLION TONS PER YEAR
CALCULATION OF COAL SELLING PRICE
20 YEAR PROJECT LIFE - 15% RETURN ON INVESTMENT

	Mining Method		
	Dragline	Shovel	Dragline & Shovel
Annual Gross Profit			
After-Tax Cash Flow (Initial Investment/6.259)	$34,103,211	$25,381,530	$32,305,320
Less Depreciation	11,678,040	11,511,650	12,437,990
Depletion & After-Tax Profit (= 3/4 Gross Profit)	22,425,171	13,869,880	19,867,330
GROSS PROFIT	29,900,228	18,493,173	26,489,773
Annual Sales			
(Sales = Production Cost + Royalty + Gross Profit)			
Production Cost	70,456,834	95,822,159	81,070,058
Gross Profit	29,900,228	18,493,173	26,489,773
Subtotal	100,357,062	114,315,332	107,559,831
Royalty ($\frac{12.5}{87.5}$ x subtotal) (12-1/2% of Sales)	14,336,723	16,330,762	15,365,690
Annual Sales	114,693,785	130,646,094	122,925,521
Selling Price Per Ton	22.94	26.13	24.59
Cash Flow			
Gross Profit	29,900,228	18,493,173	26,489,773
Depletion (50% of Gross Profit)	14,950,114	9,246,587	13,244,887
Taxable Income	14,950,114	9,246,586	13,244,886
Federal Income Tax	7,475,057	4,623,293	6,622,443
After Tax Income	7,475,057	4,623,293	6,622,443
After Tax Income	7,475,057	4,623,293	6,622,443
Plus Depreciation	11,678,040	11,511,650	12,437,990
Plus Depletion	14,950,114	9,246,587	13,244,887
Cash Flow	$34,103,211	$25,381,530	$32,305,320

TABLE A-20

KUK RIVER
5 MILLION TONS PER YEAR
EQUIPMENT COST SUMMARY

Equipment	Unit Cost	Mining Method: Dragline No.	Dragline Cost	Shovel No.	Shovel Cost	Dragline & Shovel No.	Dragline & Shovel Cost
Dragline (100 yd^3)	$26,628	2	$ 53,256	-	$ -	2	$ 53,256
Dragline (50 yd^3)	13,318	2	26,636	-	-	-	-
Shovel-Overburden (22 yd^3)	2,826	-	-	6	16,956	2	5,652
Truck-Overburden (170 ton)	630	-	-	27	17,010	10	6,300
Drill-Overburden (12$\frac{1}{4}$ inch dia.)	738	7	5,166	7	5,166	7	5,166
Shovel-Coal (15 yd^3)						-	-
Truck-Coal (180 ton)	647	10	6,470	10	6,470	10	6,470
Wheel Loader (15 yd^3)	396	3	1,188	3	1,188	3	1,188
Coal Drill	72	2	144	2	144	2	144
Bulldozer-(Crawler)	241	14	3,374	17	4,097	16	3,856
Bulldozer-(Rubber Tired)	151	2	302	4	604	3	453
Explosives Truck (10 ton)	42	2	84	2	84	2	84
Motor Grader	156	2	312	2	312	2	312
Scraper Loader (31 yd^3)	239	2	478	2	478	2	478
Dump Truck (50 ton)	259	2	518	2	518	2	518
Fuel & Lube Truck	66	1	66	2	132	1	66
Sand & Water Truck	218	1	218	1	218	1	218
Mobile Crane (100 ton)	329	1	329	1	329	1	329
Mobile Crane (50 ton)	216	1	216	1	216	1	216
Tower-Floodlight	10	7	70	10	100	7	70
Hydroseeder Truck	51	1	51	1	51	1	51
Utility Truck	21	8	168	10	210	8	168
Pickup Truck	7	23	161	25	175	23	161
Station Wagon	7	5	35	5	35	5	35
Ambulance	12	1	12	1	12	1	12
Communications Equipment	60	-	60	-	80	-	60
Tools & Auxiliary Equipment	500	-	500	-	500	-	500
Bus (36 passenger)	25	4	100	7	175	5	125
Substation			750		500		750
Power Line			750		750		750
Coal Lease			1,500		1,500		1,500
Access Road	425	5mi	2,125	5mi	2,125	5mi	2,125
Office & Change House			1,365		1,885		1,430
Shop & Warehouse			8,151		10,595		8,944
Water & Sewage System							
Exploration			1,500		1,500		1,500
Coal Storage & Transfer System			4,500		4,500		4,500
TOTAL			$120,555		$ 78,615		$107,387

TABLE A-21

KUK RIVER
TOTAL ESTIMATED CAPITAL REQUIREMENTS
5 MILLION TONS PER YEAR
($000's)

	Dragline	Shovel	Dragline & Shovel
Exploration, Roads, and Buildings	$ 14,641	$ 17,605	$ 15,499
Mining Equipment	101,414	56,510	87,388
Coal Storage and Transfer Equipment	4,500	4,500	4,500
Total Direct	120,555	78,615	107,387
Field Indirect	9,042	5,896	8,054
Total Construction	129,597	84,511	115,441
Engineering	3,888	2,535	3,463
Subtotal	133,485	87,046	118,904
Overhead & Administration	10,011	6,528	8,918
Subtotal	143,496	93,574	127,822
Contingency	21,524	14,036	19,173
Subtotal	165,020	107,610	146,995
Fee	4,951	3,228	4,410
Total Plant Cost (Insurance-Tax Base)	169,971	110,838	151,405
Interest During Construction	30,595	19,951	27,253
Subtotal	200,566	130,789	178,658
Working Capital	10,000	16,000	12,000
Total Capital Requirements	$210,566	$146,789	$190,658

TABLE A-22

KUK RIVER
5 MILLION TONS PER YEAR
PERSONNEL REQUIREMENTS

Category	Daily Rate	Mining Method: Dragline No.	Dragline $/Year	Shovel No.	Shovel $/Year	Dragline & Shovel No.	Dragline & Shovel $/Year
Wage Personnel							
Production							
Dragline Operator	$112.00	15	$ 411,180	-	$ -	8	$ 225,120
Dragline Oiler	104.60	15	384,160	-	-	8	210,326
Shovel Operator	112.00	-	-	21	589,540	6	176,820
Shovel Oiler	104.60	-	-	21	550,799	6	165,200
Driller	99.80	22	555,984	22	555,984	22	555,984
Driller Helper	92.70	22	516,334	22	516,335	22	516,335
Blaster	99.80	2	35,693	2	35,668	2	35,693
Dozer Operator	99.80	48	1,057,555	54	1,342,349	49	1,216,550
Wheel Loader Operator	112.00	8	203,420	8	203,420	7	203,420
Truck Operator	99.80	19	479,731	101	2,542,550	44	1,098,365
Driller & Shooter-Coal	99.80	6	145,766	6	145,766	6	145,766
Grader Operator	99.80	6	133,786	7	167,232	7	167,232
Service Truck Driver	93.80	4	94,309	5	125,746	5	125,746
Scraper Operator	99.80	5	124,800	5	124,800	5	124,800
Utility	92.70	42	978,694	48	1,114,402	43	1,009,756
Subtotal		208	5,121,412	322	8,014,591	240	5,977,113
Maintenance							
Master Electrician	112.00	16	463,078	27	767,452	20	556,416
Mechanic	108.30	66	1,791,450	109	2,968,916	79	2,152,508
Electrician	108.30	27	746,447		1,237,055	33	896,876
Repairman	99.80	29	733,574		1,118,083	34	858,998
Subtotal		138	3,374,549	226	6,091,506	166	4,464,798
Total Wage Personnel		346	$8,855,961	548	$14,106,097	406	$10,441,911

TABLE A-22

KUK RIVER
5 MILLION TONS PER YEAR
PERSONNEL REQUIREMENTS

Category	Annual Rate	Mining Method: Dragline No.	Dragline $/Yr Cost	Shovel No.	Shovel $/Yr Cost	Dragline & Shovel No.	Dragline & Shovel $/Yr Cost
Salaried Personnel							
Administrative							
General Manager	$50,000	1	$ 50,000	1	50,000	1	$ 50,000
Chief Engineer	37,500	1	37,500	1	37,500	1	37,500
Environmental Engineer	28,750	1	28,750	1	28,750	1	28,750
Mine Engineer	31,250	2	62,500	2	62,500	2	62,500
Surveyor	22,500	4	90,000	4	90,000	4	90,000
Drafter	18,750	4	75,000	4	75,000	4	75,000
Manager, Administrative Services	43,750	1	43,750	1	43,750	1	43,750
Industrial Relations Supervisor	37,500	1	37,500	1	37,500	1	37,500
Personnel Supervisor	28,750	1	28,750	1	28,750	1	28,750
Safety Supervisor	28,750	1	28,750	1	28,750	1	28,750
Training Supervisor	28,750	1	28,750	1	28,750	1	28,750
Training Instructor	25,000	2	50,000	3	75,000	2	50,000
Employment Supervisor	28,750	1	28,750	1	28,750	1	28,750
Purchasing Agent	31,250	1	31,250	1	31,250	1	31,250
Buyer	25,000	2	50,000	3	75,000	2	50,000
Purchasing Clerk	15,000	3	45,000	4	60,000	3	45,000
Traffic Supervisor	28,750	1	28,750	1	28,750	1	28,750
Comptroller	37,500	1	37,500	1	37,500	1	37,500
Paymaster	26,250	1	26,250	1	26,250	1	26,250
Payroll Clerk	15,000	3	45,000	3	45,000	3	45,000
Senior Cost Accountant	28,750	1	28,750	1	28,750	1	28,750
Cost Accountant	26,250	2	52,500	2	52,500	2	52,500
Clerk-General	15,000	11	165,000	15	225,000	12	180,000
Secretary	13,750	2	27,500	2	27,500	2	27,500
Typist	11,250	3	33,750	5	56,270	4	45,000
Warehouse Supervisor	25,000	1	25,000	1	25,000	1	25,000
Warehouse Clerk	15,000	5	75,000	6	90,000	5	75,000
Warehouseman	15,000	9	135,000	10	150,000	9	135,000
Assistant Paymaster	22,500	1	22,500	1	22,500	1	22,500
Subtotal		68	$ 1,418,750	78	$ 1,596,250	70	$ 1,445,000
Production							
Mine Superintendent	$43,750	1	43,750	1	43,750	1	43,750
General Foreman	31,250	1	31,250	1	31,250	1	31,250
Pit Foreman	26,250	8	210,000	8	210,000	8	210,000
Blaster Foreman	26,250	2	52,500	2	52,500	2	52,500
Coal Loading Foreman	26,250	4	105,000	4	105,000	4	105,000
Labor Foreman	26,250	2	52,500	2	52,500	2	52,500
Clerk	15,000	8	120,000	8	120,000	8	120,000
Equipment Foreman	26,250			4	105,000		
Subtotal		26	$ 615,000	30	$ 720,000	26	$ 615,000
Maintenance							
Superintendent, Maintenance	$37,500	1	37,500	1	37,500	1	37,500
General Foreman	31,250	1	31,250	1	31,250	1	31,250
Mechanical Foreman	26,250	8	210,000	8	210,000	8	210,000
Electrical Foreman	26,250	4	105,000	8	210,000	4	105,000
Shop Foreman	26,250	4	105,000	4	105,000	4	105,000
Design Engineer	26,250	1	26,250	1	26,250	1	26,250
Drafter	18,750	2	37,500	3	56,250	2	37,500
Clerk	15,000	4	60,000	4	60,000	4	60,000
Subtotal		25	$ 612,500	30	$ 736,250	25	$ 612,500
Total Salaried Personnel		118	$ 2,646,250	137	$ 3,052,500	121	$ 2,672,500
GRAND TOTAL		469	$ 11,502,211	685	$17,158,597	527	$ 13,114,411

TABLE A-23

KUK RIVER
5 MILLION TONS PER YEAR
ESTIMATED ANNUAL PRODUCTION COST

Cost Item	Mining Method: Dragline $/Year	Dragline $/Ton	Shovel $/Year	Shovel $/Ton	Dragline & Shovel $/Year	Dragline & Shovel $/Ton
Direct Cost						
Wages						
Operating Labor	$ 5,121,412	1.02	$ 8,014,591	1.60	$ 5,977,113	1.20
Maintenance Labor	3,734,549	.75	6,091,506	1.22	4,464,798	.89
Subtotal	8,855,961	1.77	14,106,097	2.82	10,441,911	5.09
Salaries						
Production	615,000	.12	720,000	.14	615,000	.12
Maintenance	612,500	.12	736,250	.15	612,500	.12
Administrative	1,418,750	.28	1,596,250	.32	1,445,000	.29
Subtotal	2,646,250	.52	3,052,500	.61	2,672,500	.53
Payroll Overhead	4,600,884	.92	6,863,439	1.37	5,245,764	1.05
Total Wage & Salary Cost	$16,103,095	3.21	$24,022,036	4.80	$18,360,175	3.67
Operating Supplies						
Spare Parts	6,260,543	1.25	11,821,223	2.36	7,979,243	1.60
Explosives	6,869,709	1.37	6,869,709	1.37	6,869,709	1.37
Fuel & Lubricants	2,283,990	.46	5,115,586	1.02	3,195,846	.64
Tires	1,095,660	.22	4,194,450	.84	2,078,370	.42
Miscellaneous	3,442,972	.69	3,928,722	.79	3,791,740	.76
Total, Operating Supplies	$19,952,874	3.99	$31,929,690	6.38	$23,914,908	4.79
Power	3,517,600	.70	973,834	.19	2,680,028	.54
Union Welfare	1,800,000	.36	2,450,000	.49	2,000,000	.40
Subtotal	5,317,600	1.06	3,423,834	.68	4,680,028	.94
Total Direct Cost	41,373,569	8.26	59,375,560	11.86	46,955,111	9.40
Indirect Cost (15% of Labor & Material)	5,408,395	1.08	8,392,759	1.68	6,341,262	1.27
Taxes & Insurance - 2% of Plant Cost	3,399,420	.68	2,216,760	.44	3,028,100	.61
Depreciation	11,550,000	2.31	10,728,600	2.15	11,433,490	2.29
Deferred Expense	1,906,188	.38	5,183,438	1.04	3,128,563	.63
Subtotal	22,264,003	4.45	26,521,557	5.31	23,931,415	4.80
Total Annual Production Cost	63,637,572	12.71	85,897,117	17.17	70,886,526	14.20
Royalty (12-1/2% of Selling Price)	13,299,104	2.66	14,694,611	2.94	13,751,014	2.75
TOTAL ANNUAL COST	$76,936,676	15.37	$100,591,728	20.11	$84,637,540	16.95

TABLE A-24

KUK RIVER
5 MILLION TONS PER YEAR
DEPRECIATION SCHEDULE
(Yearly Charge)

Capital Cost Item	Straight Line Depreciation Years	Mining Method		
		Dragline	Shovel	Dragline & Shovel
Exploration	20	$ 75,000	$ 75,000	$ 75,000
Coal Storage & Transfer System	20	225,000	225,000	225,000
Mine Buildings	20	475,800	624,000	518,700
Substation	20	37,500	25,000	37,500
Power Line	20	37,500	37,500	37,500
Communications Equipment	20	3,000	4,000	3,000
Roads	20	106,250	106,250	106,250
Dragline (100 yd^3)	20	2,662,800	-	2,662,800
Dragline (50 yd^3)	20	1,331,800	-	-
Shovel-Overburden (22 yd^3)	20	-	847,800	282,600
Truck-Overburden (170 ton)	5	-	3,402,000	1,260,000
Drill Overburden (12-1/4 inch dia.)	20	258,300	258,300	258,300
Shovel-Coal	20	-	-	-
Truck-Coal (180 ton)	5	1,294,000	1,294,000	1,294,000
Wheel Loader (15 yd^3)	10	118,800	118,800	118,800
Coal Drill	10	14,400	14,400	14,400
Bulldozers (Crawler & Rubber Tired)	10	367,600	470,100	430,900
Explosives Truck	10	8,400	8,400	8,400
Motor Grader	10	31,200	31,200	31,200
Scraper Loader	5	95,600	95,600	95,600
Dump Truck (50 ton)	5	103,600	103,600	103,600
Fuel & Lube Truck	10	6,600	13,200	6,600
Sand & Water Truck	10	21,800	21,800	22,800
Mobile Crane (100 ton)	20	16,450	16,450	16,450
Mobile Crane (50 ton)	20	10,800	10,800	10,800
Tower-Floodlight	10	7,000	10,000	7,000
Hydroseeder Truck	10	5,100	5,100	5,100
Utility Truck	5	33,600	42,000	33,600
Pickup Truck	3	53,700	58,300	53,670
Station Wagon	3	11,700	11,700	11,670
Ambulance	10	1,200	1,200	1,200
Tools & Auxiliary Equipment	10	50,000	50,000	50,000
Bus (36 passenger)	10	10,000	17,500	12,500
Coal Lease	20	75,000	75,000	75,000
TOTAL		$ 7,549,500	$ 8,119,900	$ 7,869,940
Depreciation for field indirect, engineering, overhead and administration, contingency, fee and interest during construction	20	4,000,500	2,608,700	3,563,550
TOTAL YEARLY DEPRECIATION		$11,550,000	$10,728,600	$11,433,490

TABLE A-25

KUK RIVER
5 MILLION TONS PER YEAR
CALCULATION OF COAL SELLING PRICE
20 YEAR PROJECT LIFE - 15% RETURN ON INVESTMENT

	Mining Method		
	Dragline	Shovel	Dragline & Shovel
Annual Gross Profit			
After-Tax Cash Flow (Initial Investment/6.259)	$ 33,642,115	$ 23,452,468	$ 30,461,416
Less Depreciation	11,550,000	10,728,600	11,433,490
Depletion & After-Tax Profit (= 3/4 Gross Profit)	22,092,115	12,723,868	19,027,926
GROSS PROFIT	29,456,153	16,965,157	25,370,568
Annual Sales			
(Sales = Production Cost + Royalty + Gross Profit)			
Production Cost	63,637,572	85,897,117	70,886,526
Gross Profit	29,456,153	16,965,157	25,370,568
Subtotal	93,093,725	102,862,274	96,257,094
Royalty ($\frac{12.5}{87.5}$ x subtotal) (12-1/2% of Sales)	13,299,104	14,694,611	13,751,014
Annual Sales	106,392,829	117,556,885	110,008,108
Selling Price Per Ton	21.28	23.51	22.00
Cash Flow			
Gross Profit	29,456,153	16,965,157	25,370,568
Depletion (50% of Gross Profit)	14,728,077	8,482,579	12,685,284
Taxable Income	14,728,076	8,482,578	12,685,284
Federal Income Tax	7,364,038	4,241,289	6,342,642
After Tax Income	7,364,038	4,241,289	6,342,642
After Tax Income	7,364,038	4,241,289	6,342,642
Plus Depreciation	11,550,000	10,728,600	11,433,490
Plus Depletion	14,728,077	8,482,579	12,685,284
Cash Flow	$ 33,642,115	$ 23,452,468	$ 30,461,416

TABLE A-26

MINING COST SUMMARY
(5,000,000 Tons Per Year)

COST ITEM	MINESITE LOCATION AND MINING SYSTEM								
	KUKPOWRUK RIVER			ELUSIVE CREEK			KUK RIVER		
MINING	Dragline	Shovel	Dragline & Shovel	Dragline	Shovel	Dragline & Shovel	Dragline	Shovel	Dragline & Shovel
Capital Cost ($ thousands)	126,858	98,210	116,931	213,452	158,863	202,199	210,556	146,789	190,658
Annual Cost ($ thousands)	51,782	65,477	56,677	84,794	112,153	96,436	76,937	100,592	84,638
*Selling Price ($/ton)	13.83	15.40	14.40	22.94	26.13	24.59	21.28	23.51	22.00
*Selling Price ($/million Btu)	0.58	0.64	0.60	0.96	1.09	1.02	1.25	1.38	1.29
TOWNSITE & UTILITIES									
Capital Cost ($ thousands)	85,294	79,856	82,913	138,788	140,419	134,550	136,556	134,906	129,169
Annual Cost ($ thousands)	20,747	23,183	21,267	31,987	39,279	34,663	32,695	37,425	32,854
Cost Per Ton ($)	4.15	4.64	4.25	6.40	7.86	6.93	6.54	7.49	6.57
Cost Per Million Btu ($)	0.17	0.19	0.18	0.27	0.33	0.29	0.38	0.44	0.39
TOTAL MINING									
Capital Cost ($ thousands)	212,152	178,066	199,844	352,240	299,282	336,749	347,112	281,695	319,827
Annual Cost ($ thousands)	72,529	88,660	77,944	116,781	151,432	131,099	109,632	138,017	117,492
*Price Per Ton ($)	17.98	20.04	18.65	29.63	33.99	31.52	27.82	31.00	28.57
*Price Per Million Btu ($)	0.75	0.84	0.78	1.23	1.42	1.31	1.64	1.82	1.68

*Price at minesite

B. TRANSPORTATION COSTS

The following data is included as a guide to demonstrate order-of- magnitude total cost for coal from the North Slope of Alaska at a deep-water, year-round shipping port.

Capital and operating costs for the different modes of transportation are based on estimates and data contained in Clark (1973), "Transportation Economics of Coal Resources of Northern Slope Coal Fields, Alaska."

Clark's estimates were not based on site specific data. In some instances portions of the systems involve designs or methods which have not been proven technically feasible.

Clark's estimates have been escalated in accordance with the highway bid price index and building cost index published in "Engineering News Record," December 23, 1976. Escalation factors of 1.7 for road and railway construction and 1.96 for equipment and other construction have been applied to the 1969 data and a factor of 1.47 to 1972 data.

For the 5-million-ton-per-year mines, the transportation systems considered consist of the following:

- Year-round shipping by railroad from the minesite to a deep water port at Seward. A new railroad would be constructed from the existing railroad at Nenana to the minesite. New locomotives and cars would be required and a port with stockpiling and shiploading facilities would be constructed at Seward.

- Seasonal shipping by barge from a point on the Chukchi Sea Coast near the minesite to Dutch Harbor in the Aleutian Islands for stockpiling and year-round shipping by barge or large bulk cargo vessels.

This would require construction of: a port on the Chukchi Sea Coast for shallow draft tugs and barge loading facilities; a deep-water port at Dutch Harbor with barge unloading, coal storage and ship-loading facilities. Tugs and barges required for seasonal movement of coal to Dutch Harbor could be used the remainder of the year to transport coal to the final destination.

Transportation from the minesite to the barge port on the Chukchi Sea is estimated for three modes: truck haulage in large coal haulers; conveyor belt; and pipelining of a coal-water slurry with a return line for water. In the case of pipelining, dewatering facilities are required and dry storage, reclaiming and barge loading would be used in all cases.

For the 500,000-ton-per-year mine at Kukpowruk River, the following transportation system would be used:

- truck haulage from the mine to a barge port on the Chukchi Sea
- seasonal barge transport to an assumed existing transshipment facility in the Seward-Whittier area

TABLE A-27

CRITERIA FOR TRANSPORTATION ESTIMATES

Railroad

Operating Basis

Production	5,000,000 tons/yr
Schedule	350 Operating d/yr
Average Travel Speed	30 mi/h
Loading Time	3 h/train
Unloading Time	4 h/train
Size of Train	13,000 tons/train (8 locomotives, 125 cars)
Number of Operating Trains	5

Cost of Equipment

Locomotive - 6 Axle, 3,000 HP @ $660,000 ea.	$26,400,000
Gondola Cars @ $30,000 ea.	18,750,000
Loading Equipment	1,100,000
Unloading Equipment	2,850,000
Total	$49,100,000

Cost of Railroad

Construction, Engineering, and Contingency	$3,060,000 per mile
Communications	$8,500 per mile
Buildings and Auxiliary Equipment	$8,500,000

Train Operating Cost

Locomotives	$2.35 per locomotive mile
Gondola Cars	$0.12 per car mile
Labor - 87 men	$40,000 per man per year

TABLE A-27 (Cont)

Annual Maintenance Cost	
Railroad	$27,500 per mile
Loading and Unloading Equipment	$100,000 per year
Harbor at Seward	
Capital Costs	
Stockpile Area	$ 225,000
Dock and Shiploader	15,000,000
Stacker-Reclaimers	6,000,000
Total	$21,225,000
Operating Cost	
Labor, Supervision	$ 300,000 per year
Stacking, Reclaiming, Shiploading	3,000,000 per year
Maintenance	300,000 per year
Total	$ 3,600,000 per year
Pipeline	
Construction Cost	
Slurry Line - 16 in (Incl. Pumps, Controls)	$ 600,000 per mile
Water Line - 12 in (Incl. Pumps, Controls)	300,000 per mile
Preparation Facility	$15,000,000
Receiving Facility	$15,000,000
Operating Cost	
Slurry Line	
Power @ $0.045 per KWH	$ 62,700 per mile
Pumps	3,500 per mile

TABLE A-27 (Cont)

Pipeline - 2% of Original Cost	$ 12,000 per mile
Inhibitor @ $0.15 per Ton	$ 750,000 per year
Labor, Administration, etc. @ $0.15 per ton	$ 750,000 per year

Water Line

Power	$ 4,000 per mile
Maintenance - 2% of Original Cost	$ 6,000 per mile
Pipe Heating	$ 2,500 per mile
Labor, Administration, etc.	$ 3,000 per mile
Total	$ 15,500 per mile

Belt Conveyor

Construction Cost

Conveyor - 36 in	$ 1,830,000 per mile

Operating Cost - Annual

Power	$ 140,000 per mile
Labor	40,000 per mile
Maintenance	10,000 per mile
Total	$ 190,000 per mile

Truck Haulage

Operating Basis

Average Travel Speed	30 miles per hour
Load and Unload	.10 hrs/trip
Delay Allowance	10%
Tons per Load	180
Mechanical Availability	70%

TABLE A-27 (Cont)

Equipment Cost	
Truck - 180 Ton Bottom Dump	$ 647,000 each
Construction Cost	
Haul Road	$ 425,000 per mile
Operating Cost (Annual)	
Haul Road Maintenance @ $0.30/Ton Mile	$ 150,000 per mile
Truck Operating Cost @ $84.00 per Hour	$ 675,000
Barge Transport to Dutch Harbor	
Operating Basis	
Tug-Barge Speed	11 knots
Barge Size	60,000 tons
Tug Size	4,400 hp
Crew Size	10 men
Ice-Free Season	90 days
Distance to Dutch Harbor	1,000 nautical miles
Loading and Unloading Time	2 days per barge
Round-Trip Time	9.5 days
Number of Barges	9
Number of Tugs	7
Chukchi Sea Harbor	
Construction Cost	
Stockpile Area	$ 825,000
Pier-Rock and Gravel	30,000,000
Total	$30,825,000

TABLE A-27 (Cont)

Equipment	
Stacker-Reclaimers	$ 6,000,000
Shiploader and Conveyor	9,000,000
Total	$15,000,000
Operating Cost - Annual	$ 5,000,000
Dutch Harbor	
Construction Cost	
Dock and Stockpile Area	$15,500,000
Equipment	15,000,000
Total	$30,500,000
Operating Cost, Annual	$ 5,200,000
Barges and Tugs	
Capital Cost	
Barges @ $12,130,000 each	$109,170,000
Tugs @ $2,365,000 each	16,555,000
Total	$125,715,000
Operating Costs - Annual	
Barges	$ 1,593,000
Tugs	7,182,000
Total	$ 8,775,000
Total Capital	$202,050,000

TABLE A-27 (Cont)

Total Annual Cost	
Capital	
Chukchi Sea Harbor	$ 4,624
Coal Handling Equipment	2,400
Dutch Harbor - Dock & Stockpile Area	2,325
Coal Handling Equipment	2,400
Barges & Tugs (3 mos.)	5,029
Total Capital	$16,778
Operating	
Chukchi Harbor	5,000
Dutch Harbor	5,200
Barges & Tugs	8,775
	$18,975
Access Road to Mine and Townsite Area	
Construction Cost per mile	$425,000
Maintenance Cost per mile	75,000
Kikpowruk River	
Capital Cost	**$ 000's**
Road Construction - 25 miles	$ 10,625
Annual Cost	
Capital	$ 1,594
Maintenance	1,875
Total Annual Cost	$ 3,469

TABLE A-27 (Cont)

Elusive Creek

Capital Cost

Road Construction - 75 miles	$ 31,875

Annual Cost

Capital	$ 4,781
Maintenance	5,625
Total Annual Cost	$ 10,406

Kuk River

Capital Cost

Road Construction - 35 miles	$ 12,750

Annual Cost

Capital	$ 1,913
Maintenance	2,625
Total Annual Cost	$ 4,538

Additional Power Plant Costs for Transportation

Conveyor Belt

36-in Conveyor Belt - 1,680 installed hp for 3 mi	= 560 hp/mile
kVA @ 75% x .746	= 313 kVA/mile
Capital Cost @ $1,000/kVA	= $313,000/mile

Pipe Line

Slurry Line - 237 hp/mile	
Water Line - 15.3 hp/mile	
Total hp (Operating)	252.3/mile
kVA @ .746	188.2/mile
Capital Cost @ $1,000/kVA	$188,200/mile

TABLE A-27 (Cont)

Additional Capital & Annual Costs for Power Plant

	$ 000's
Kukpowruk River	
Conveyor	
Capital Cost - 25 miles	$ 7,825
Annual Cost	1,252
Pipeline	
Capital Cost	4,705
Annual Cost	753
Elusive Creek	
Conveyor	
Capital Cost - 75 miles	23,475
Annual Cost	3,756
Pipe Line	
Capital Cost - 75 miles	14,115
Annual Cost	2,258
Kuk River	
Conveyor	
Capital Cost - 35 miles	10,955
Annual Cost	1,753
Pipe Line	
Capital Cost - 35 miles	6,587
Annual Cost	1,054

TABLE A-28

TRANSPORTATION COST ESTIMATE
ALL-YEAR RAILWAY SYSTEM
(5 MILLION TONS PER YEAR)

COST ITEM	MINESITE					
	Kukpowruk River		Elusive Creek		Kuk River	
	No.	Cost($000)	No.	Cost($000)	No.	Cost($000)
Capital Cost						
Track and Communication Equipment	720 mi	2,209,320	650 mi	1,994,525	730 mi	2,240,005
Buildings		8,500		8,500		8,500
Rolling Stock and Coal Handling Equipment		49,100		49,100		49,100
Harbor Facilities - Seward		15,225		15,225		15,225
Stackers and Reclaimers		6,000		6,000		6,000
Working Capital	3 mo	16,802	3 mo	15,866		16,936
TOTAL CAPITAL COST		2,304,947		2,089,216		2,335,766
Annual Cost						
Capital						
Track and Communication Equipment		331,398		299,179		336,001
Buildings		1,360		1,360		1,360
Rolling Stock and Coal Handling Equipment		7,856		7,856		7,856
Harbor Facilities - Seward		2,284		2,284		2,284
Stackers and Reclaimers		960		960		960
Working Capital		2,520		2,380		2,540
TOTAL CAPITAL COST		346,378		314,019		351,001
Operating						
Train Operations	1,122 mi	32,652	1,052 mi	30,832	1,132 mi	32,912
Track Maintenance		30,855		28,930		31,130
Coal Handling Equipment		100		100		100
Harbor		3,600		3,600		3,600
Total Operating Cost		67,207		63,462		67,742
TOTAL ANNUAL COST		413,585		377,481		418,743

TABLE A-29

TRANSPORTATION COST ESTIMATE
SEASONAL BARGE SYSTEM
(5 MILLION TONS PER YEAR)

COST ITEM	MINESITE					
	Kukpowruk River		Elusive River		Kuk River	
	No.	Cost($000)	No.	Cost($000)	No.	Cost($000)
Truck Haul to Chukci Sea Coast						
Capital Cost						
Haul Road Construction	25 mi	10,625	75 mi	31,875	35 mi	14,875
Trucks	12	7,764	33	21,351	16	10,352
Working Capital (1 yr)		9,205		26,806		12,750
TOTAL CAPITAL COST		27,594		80,032		37,977
Annual Cost						
Capital						
Haul Road		1,594		4,781		2,231
Trucks (5 yr life)		2,198		6,045		2,931
Working Capital		1,381		4,021		1,913
TOTAL CAPITAL COST		5,173		14,847		7,075
Operating						
Haul Road Maintenance		3,750		11,250		5,250
Truck Operating Cost		5,455		15,556		7,500
TOTAL OPERATING COST		9,205		26,806		12,750
TOTAL ANNUAL COST		18,128		41,653		19,825
Conveyor to Chukchi Sea Coast						
Capital Cost						
Conveyor and Power Plant	25 mi	53,575	75 mi	160,725	35 mi	75,005
Working Capital (1 yr)		4,750		14,250		6,650
TOTAL CAPITAL COST		58,325		174,975		81,655

TABLE A-29 (Cont)

COST ITEM	MINESITE					
	Kukpowruk River		Elusive Creek		Kuk River	
	No.	Cost($000)	No.	Cost($000)	No.	Cost($000)
Annual Cost						
Capital						
Conveyor and Power Plant		8,482		25,716		12,001
Working Capital		713		2,138		998
TOTAL CAPITAL COST		9,195		27,854		12,999
Operating		4,750		14,250		6,650
TOTAL ANNUAL COST		13,945		42,104		19,649
Slurry Pipeline to Chuckchi Sea Coast						
Capital Cost						
Slurry Line	25 mi	15,000	75 mi	45,000	35 mi	21,000
Water Line	25 mi	7,500	75 mi	22,500	35 mi	10,500
Preparation and Receiving Facilities		30,000		30,000		30,000
Power Plant		4,705		14,115		6,587
Working Capital (1 yr)		3,843		8,528		4,780
TOTAL CAPITAL COST		61,048		120,143		72,867
Annual Cost						
Capital Cost						
Equipment		9,153		17,858		10,894
Working Capital		576		1,279		717
TOTAL CAPITAL COST		9,729		19,137		11,611
Operating Cost		3,843		8,528		4,780
TOTAL ANNUAL COST		13,572		27,665		16,391

TABLE A-29 (Cont)

COST ITEM	MINESITE					
	Kukpowruk River		Elusive River		Kuk River	
	No.	Cost($000)	No.	Cost($000)	No.	Cost($000)
Barge Transport to Dutch Harbor						
Capital Cost						
Chukchi Harbor Facility		15,000		15,000		15,000
Dutch Harbor Facility		30,500		30,500		30,500
Tugs and Barges		125,715		125,715		125,715
Working Capital (1 yr)		18,975		18,975		18,975
TOTAL CAPITAL COST		221,025		221,025		221,025
Annual Cost						
Capital Cost						
Chukchi Harbor Facility		7,024		7,024		7,024
Dutch Harbor Facility		4,725		4,725		4,725
Barges and Tugs (3 mo/yr)		5,029		5,029		5,029
Working Capital		2,846		2,846		2,846
TOTAL CAPITAL COST		19,624		19,624		19,624
Operating Cost						
Chukchi Harbor		5,000		5,000		5,000
Dutch Harbor		5,200		5,200		5,200
Barges and Tugs		8,775		8,775		8,775
TOTAL OPERATING COST		18,975		18,975		18,975
TOTAL ANNUAL COST		38,599		38,599		38,599
Stockpile Cost (9 month stockpile)						
Capital Cost						
Dragline Operation		38,836		63,596		57,702
Shovel and Truck Operation		49,109		84,115		75,444
Combination Operation		42,507		72,327		63,479

TABLE A-29 (Cont)

COST ITEM	MINESITE					
	Kukpowruk River		Elusive Creek		Kuk River	
	No.	Cost($000)	No.	Cost($000)	No.	Cost($000)
Annual Cost						
Dragline Operation		5,825		9,539		8,655
Shovel and Truck Operation		7,366		12,617		11,317
Combination Operation		6,376		10,489		9,522

TABLE A-30

SUMMARY OF TRANSPORTATION COSTS BY LOCATION, MINING METHOD, AND TRANSPORTATION MODE (5 MILLION TONS PER YEAR)

Railroad Transportation to Ice-Free/Port at Seward

Mine	Total Capital ($000)	Annual Costs ($000) Capital	Operating	Total	Cost per Ton
Kukpowruk River	2,304,947	346,378	67,207	413,585	$82.71
Elusive Creek	2,089,216	314,019	63,462	377,481	$75.50
Kuk River	2,335,766	351,001	67,742	418,743	$83.75

Truck and Barge Transportation to Ice-Free/Port at Dutch Harbor

	Total Capital ($000)	Annual Costs ($000) Capital	Operating	Total	Cost per Ton
Kukpowruk River					
Dragline	287,455	30,622	28,180	58,802	$11.76
Truck and Shovel	297,718	32,163	28,180	60,343	$12.07
Combination	291,116	31,173	28,180	59,353	$11.87
Elusive Creek					
Dragline	364,653	44,010	45,781	89,791	$17.96
Truck and Shovel	373,384	47,088	45,781	92,869	$18.57
Combination	385,172	44,960	45,781	90,741	$18.15
Kuk River					
Dragline	316,704	35,354	31,725	67,079	$13.42
Truck and Shovel	334,446	38,016	31,725	69,741	$13.95
Combination	322,481	36,221	31,725	67,946	$13.59

TABLE A-30 (Cont)

Mine	Total Capital ($000)	Annual Costs ($000) Capital	Operating	Total	Cost per Ton
Conveyor and Barge Transportation to Ice-Free Port at Dutch Harbor					
Kukpowruk River					
Dragline	318,186	34,644	23,725	58,369	$11.64
Truck and Shovel	328,459	36,185	23,725	59,910	$11.98
Combination	321,857	35,195	23,725	58,920	$11.78
Elusive Creek					
Dragline	459,596	57,017	33,225	90,242	$18.05
Truck and Shovel	480,115	60,095	33,225	93,320	$18.66
Combination	468,327	57,967	33,225	91,192	$18.24
Kuk River					
Dragline	360,382	40,629	25,625	66,254	$13.25
Truck and Shovel	378,124	43,291	25,625	68,916	$13.78
Combination	366,159	41,496	25,625	67,121	$13.42

Slurry Pipeline Transportation to Ice-Free Port at Dutch Harbor

Mine	Total Capital ($000)	Annual Costs ($000) Capital	Operating	Total	Cost per Ton
Kukpowruk River					
Dragline	320,929	35,178	22,818	57,996	$11.60
Truck and Shovel	331,202	36,719	22,818	59,537	$11.91
Combination	324,600	35,729	22,818	58,547	$11.71
Elusive Creek					
Dragline	404,764	48,300	27,503	75,803	$15.16
Truck and Shovel	425,283	51,378	27,503	78,881	$15.78
Combination	413,495	49,250	27,503	76,753	$15.35
Kuk River					
Dragline	351,594	39,890	23,755	63,645	$12.73
Truck and Shovel	369,336	42,552	23,755	66,307	$13.26
Combination	357,371	40,757	23,755	64,512	$12.90

TABLE A-31

TRANSPORTATION COST SUMMARY
(5,000,000 Tons Per Year)

TRANSPORTATION SYSTEM AND COST ITEM	MINESITE LOCATION AND MINING SYSTEM								
	KUKPOWRUK RIVER			ELUSIVE CREEK			KUK RIVER		
	Dragline	Shovel	Dragline & Shovel	Dragline	Shovel	Dragline & Shovel	Dragline	Shovel	Dragline & Shovel
ALL YEAR RAILROAD									
Capital Cost ($ thousands)	2,304,947	2,304,947	2,304,947	2,089,216	2,089,216	2,089,216	2,335,766	2,335,766	2,335,766
Annual Cost ($ thousands)	413,585	413,585	413,585	377,481	377,481	377,481	418,743	418,743	418,743
Cost Per Ton ($)	82.71	82.71	82.71	75.50	75.50	75.50	83.75	83.75	83.75
Cost Per Million Btu ($)	3.45	3.45	3.45	3.15	3.15	3.15	4.93	4.93	4.93
SEASONAL TRUCK AND BARGE									
Capital Cost ($ thousands)	287,455	297,718	291,116	364,653	373,384	385,172	316,704	334,446	322,481
Annual Cost ($ thousands)	58,802	60,343	59,353	89,791	92,869	90,741	67,079	69,741	67,946
Cost Per Ton ($)	11.76	12.07	11.87	17.96	18.57	18.15	13.42	13.95	13.59
Cost Per Million Btu ($)	0.49	0.50	0.49	0.75	0.77	0.76	0.79	0.82	0.80
SEASONAL CONVEYOR AND BARGE									
Capital Cost ($ thousands)	318,186	328,459	321,857	459,596	480,115	468,327	360,382	378,124	366,159
Annual Cost ($ thousands)	58,369	59,910	58,920	90,242	93,320	91,192	66,254	68,916	67,121
Cost Per Ton ($)	11.64	11.98	11.78	18.05	18.66	18.24	13.25	13.78	13.42
Cost Per Million Btu ($)	0.49	0.50	0.49	0.75	0.78	0.76	0.78	0.81	0.79
SEASONAL SLURRY PIPELINE AND BARGE									
Capital Cost ($ thousands)	320,929	331,202	324,600	404,764	425,283	413,495	351,594	369,336	357,371
Annual Cost ($ thousands)	57,996	59,537	58,547	75,803	78,881	76,753	63,645	66,307	64,512
*Cost Per Ton ($)	11.60	11.91	11.71	15.16	15.78	15.35	12.73	13.26	12.90
*Cost Per Million Btu ($)	0.48	0.49	0.49	0.63	0.66	0.64	0.75	0.78	0.76

*Transportation cost from minesite to ice-free port (Seward for railway system; Dutch Harbor for other systems)

TABLE A-32

KUKPOWRUK RIVER COAL FIELD
TRANSPORTATION CHARGES
500,000 ton/yr

Capital Costs

Camp Facilities		1,600,000
Power Plant		250,000
Shops, Office, Warehouse		500,000
Conveying Equipment		700,000
Dock Facilities		3,000,000
Haul Road	20 mi @ $300,000	6,000,000
Haulage Trucks	4 @ 415,000	1,660,000
Front-End Loaders	2 @ 307,000	614,000
Wheel Dozer	1 @ 151,000	302,000
Grader		156,000
Utility Vehicles		100,000
TOTAL DIRECT COST		14,882,000
Field Indirect Cost		1,117,000
TOTAL CONSTRUCTION		15,999,000
Engineering		480,000
Subtotal		16,479,000
Overhead and Administration		1,236,000
Subtotal		17,715,000
Contingency		2,657,000
Subtotal		20,372,000
Fee		611,000
TOTAL PLANT COST		20,983,000
Interest During Construction		2,833,000
Subtotal		23,816,000
Working Capital (3 month operating cost)		2,310,000
TOTAL CAPITAL REQUIREMENTS		26,126,000

TABLE A-33

KUKPOWRUK RIVER COAL FIELD
TRANSPORTATION CHARGES
OPERATING COSTS
500,000 ton/yr

Annual Costs

Capital Costs

Mobile Equipment	(5 year life)	805,000
Fixed Facilities	(20 year life)	1,925,000
Indirect Charges	(20 year life)	1,796,000
Total Capital		4,526,000

Operating Costs

Haul Road Maintenance	($.02 per ton mile)	250,000
Truck Operating	($.06 per ton mile)	750,000
Barge Loading	($.75 per ton)	375,000
Camp Operation	($5,000/direct employee)	210,000
Administration and Overhead	($.50 per ton)	250,000
Shipping Charges	($4.00 per ton)	2,000,000
Transshipment Charges	($2.50 per ton)	1,250,000
Total Operating		5,085,000
TOTAL ANNUAL CHARGES		9,611,000
Freight Rate for Kukpowruk Coal		$19.22/ton

C. Townsite and Power Plant Costs

Any mining operation on the northern slope of Alaska will require construction of housing and service facilities for mine employees, since there are no such facilities in the area. The cost of these facilities will, more than likely, have to be borne by the mining operation to a great extent, although some state or federal aid may become available. In order to provide an overview of the total cost associated with a mining operation in this area, an order-of-magnitude estimate has been made for the capital and operating cost of a townsite, employee housing, service facilities and a power plant to supply all power requirements for the complex. An estimate has been made for each of the selected areas and mining systems, since the number of employees and power requirements vary for these combinations.

These estimates are based on estimated space requirements and estimated construction costs per square foot for the general type of construction anticipated. Conceptual designs and specific requirements for housing and services in isolated arctic areas would have to be determined before an accurate estimate could be made. The following summary is therefore intended only as a guide to indicate the general magnitude of costs for living accommodations that may have to be supported by the mining operation.

TABLE A-34

NORTH SLOPE INFRASTRUCTURE CRITERIA

Capital Costs:

Townsite and Employee Housing

Housing - 400 ft^2 per person.

Business and Commercial - 100 ft^2 per person.

Total Building Area - 500 ft^2 per person.

Service Personnel - 0.5 for each basic mine employee.

Dependent Personnel - 1.5 for each basic and service employee.

Total Population - 3.75 x number of basic mine employees.

Construction Cost estimated at \$50/ft^2.

Service facilities, water, sewage, and power distribution estimated at \$10,000 per person.

Total cost per basic employee:

Buildings - 500 ft^2 x 3.75 x \$50/ft^2	= \$ 93,750
Service Facilities - \$10,000 x 3.75	= \$375,000
Total per Basic Employee	= \$131,250

Power Plant - Coal-fired, estimated at \$1,000 per installed kW.

Operating Costs:

Townsite and Employee Housing

Labor - 0.5 service employees/basic employee at \$35,000.

Maintenance - 2 percent of total capital cost.

Power - 100,000 kWh per basic employee annually at \$0.03 per kWh or \$3,000 per basic employee.

TABLE A-35

TOWNSITE AND UTILITY COSTS

		Mining System					
		Dragline		Shovel and Truck		Combination	
		No.	($000)	No.	($000)	No.	($000)
Kukpowruk River							
Capital Cost							
Townsite and Services	(131,250/employee)	307	40,294	437	57,356	346	45,413
Power Plant	($1 million/MVA)	45.0	45,000	22.5	22,500	37.5	37,500
Total Capital Cost			85,294		79,856		82,913
Annual Cost							
Capital			13,647		12,777		13,266
Operating							
Labor			5,373		7,648		6,055
Town Maintenance			806		1,447		908
Town Power			921		1,311		1,038
Total Operating			7,100		10,406		8,001
Total Annual Cost			20,747		23,183		21,267
Elusive Creek							
Capital Cost							
Townsite and Services	($131,250/employee)	486	63,788	727	95,419	568	74,550
Power Plant	($1 million/MVA)	75.0	75,000	45	45,000	60	60,000
Total Capital Cost			138,788		140,419		134,550
Annual Cost							
Capital			22,206		22,467		21,528
Operating							
Labor			8,505		12,743		9,940
Town Maintenance			1,276		1,908		1,491
Town Power			1,458		2,181		1,704
Total Operating			9,781		16,812		13,135
Total Annual Cost			31,987		39,279		34,663
Kuk River							
Capital Cost							
Townsite and Services	($131,250/employee)	469	61,556	685	89,906	527	69,169
Power Plant	($1 million/MVA)	75.0	75,000	45.0	45,000	60.0	60,000
Total Capital Cost			136,556		134,906		129,169
Annual Cost							
Capital			21,849		21,585		20,667
Operating							
Labor			8,208		11,987		9,223
Town Maintenance			1,231		1,798		1,383
Town Power			1,407		2,055		1,581
Total Operating			10,846		15,840		12,187
Total Annual Cost			32,695		37,425		32,854

TABLE A-36

DELIVERED COAL COST AT ICE-FREE PORT*
(5,000,000 Tons Per Year)

TRANSPORTATION SYSTEM AND COST ITEM	MINESITE LOCATION AND MINING SYSTEM								
	KUKPOWRUK RIVER			ELUSIVE CREEK			KUK RIVER		
	Dragline	Shovel	Dragline & Shovel	Dragline	Shovel	Dragline & Shovel	Dragline	Shovel	Dragline & Shovel
ALL YEAR RAILROAD									
Capital Cost ($ thousands)	2,517,099	2,483,013	2,504,791	2,441,456	2,338,498	2,425,965	2,682,878	2,617,461	2,655,593
Annual Cost ($ thousands)	486,114	502,245	491,529	494,262	528,913	508,580	528,375	556,760	536,235
Cost Per Ton ($)	100.69	102.75	101.36	105.13	109.49	107.02	111.57	114.75	112.32
Cost Per Million Btu ($)	4.20	4.28	4.22	4.38	4.56	4.46	6.56	6.75	6.61
SEASONAL TRUCK AND BARGE									
Capital Cost ($ thousands)	499,607	475,784	490,960	716,893	672,666	721,921	663,816	616,141	642,308
Annual Cost ($ thousands)	131,331	149,003	137,297	206,572	244,301	221,840	176,711	207,758	185,438
Cost Per Ton ($)	29.74	32.11	30.52	47.59	52.56	49.67	41.24	44.95	42.16
Cost Per Million Btu ($)	1.24	1.34	1.27	1.98	2.19	2.07	2.43	2.64	2.48
SEASONAL CONVEYOR AND BARGE									
Capital Cost ($ thousands)	530,338	506,525	521,701	811,836	779,397	805,076	707,494	659,819	685,986
Annual Cost ($ thousands)	130,898	148,570	136,864	207,023	244,752	222,291	175,886	206,933	184,613
Cost Per Ton ($)	29.62	32.02	30.43	47.68	52.65	49.76	41.07	44.78	41.99
Cost Per Million Btu ($)	1.23	1.33	1.27	1.99	2.19	2.07	2.42	2.63	2.47
SEASONAL SLURRY PIPE-LINE AND BARGE									
Capital Cost ($ thousands)	533,081	509,268	524,444	757,004	724,565	750,244	698,706	651,031	677,198
Annual Cost ($ thousands)	130,525	148,197	136,491	192,584	230,313	207,852	173,277	204,324	182,004
Cost Per Ton ($)	29.58	31.95	30.36	44.79	49.77	46.87	40.55	44.26	41.47
Cost Per Million Btu ($)	1.23	1.33	1.27	1.87	2.07	1.95	2.39	2.60	2.44

*Ice-free port is Seward for railway system and Dutch Harbor for other systems.

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