

## SECTION 14

### ECONOMICS

The estimated capital requirements, project and fund drawdown schedules, operating costs, and required selling prices for representative project financial structures are presented in this section. All economics are based on fourth quarter, 1975 dollars.

For estimating purposes, the complex was divided into four cost centers:

- (1) Coal mine
- (2) Coal preparation plant
- (3) Process plant
- (4) Offsites

For further economic analysis, sensitivities of required selling prices to the key parameters of capital investment, operating costs, and profitability level are summarized.

#### 14.1 FIXED CAPITAL INVESTMENT

##### 14.1.1 SCOPE

The preliminary fixed capital investment was estimated for a grassroots complex producing gas and liquid products from coal obtained from a captive coal mine. The complex consists of principal process units described in Sections 4 and 5 and shown on the block flow diagram, Figure 4-1.

Necessary ancillary facilities are included: administration, warehouse, laboratory, changehouse, and related buildings and equipment; computer capability and communications systems; rolling stock, including trucks and automobiles for transportation within the confines of the complex; road paving; utilities distribution; and other items required for the efficient operation of an industrial complex of this magnitude.

##### 14.1.2 SUMMARY

The estimated fixed capital investment for this complex is approximately \$1,225 million.

The constructed costs are shown for each of the unit areas in Table 12.1. The total is approximately \$1,200 million. To this have been added Home Office and related costs plus sales taxes, which result in the total project fixed capital investment cost shown above.

Major equipment costs for 18 units are presented in Table 12-2.

The fixed capital investment estimate was independently evaluated by the U.S. Army Engineer Division, Huntsville, Alabama (USAEDH). This work was done under contract to ERDA, Contract No. EX-76-C-01-1759. USAEDH estimate was approximately 4% lower than Parsons, and they report an indicated overall estimate confidence factor of +4%.

#### 14.1.3 PROCEDURES

The fixed capital investment is a preliminary cost estimate for the design, engineering, procurement, and construction of facilities to process approximately 47,000 TPD of high sulfur ROM coal to produce SNG and low sulfur liquid products, with sulfur and ammonia as byproducts.

The estimate is considered to be within the -5, +20% accuracy range. It includes the costs of equipment, engineering, design and drafting, project management, field direct and indirect costs, procurement, contractor's fee, and supporting services. Allowances for instrument checkout and mechanical run-in are also included.

#### 14.1.4 BASIS FOR UNIT AREAS

The project is divided into the facilities designated as unit areas, as described in Section 5. The basis for each unit estimate is discussed in the following paragraphs.

Unit 9, 10, and 11: the coal mine, coal preparation, and coal drying facility pricing was developed on the basis of equipment and ancillaries required for the production of 47,000 TPD-ROM and 36,000-TPD dried coal. The equipment pricing was obtained through a combination of in-house data and vendor sources. Equipment installation costs were estimated on the basis of in-house experience.

Most major process unit estimates were developed using a combination of in-house pricing and vendor pricing information for major equipment. The totals of major equipment were then used with historical multipliers to obtain the total constructed cost estimates for each unit. The following units were estimated using this procedure.

<u>Unit No.</u>	<u>Description</u>
12	Coal Slurrying and Dissolving
13	Filtration and Filter Cake Drying
14	Distillation
16	Naphtha Hydrogenation
17	Dissolver Acid Gas Removal

<u>Unit No.</u>	<u>Description</u>
18	SNG and LPG Production (partially)
19	Methanation
20	Process Gasifier
21	Shift Conversion
22	Gasifier Acid Gas Removal
24	Fuel Gas Gasifier
26	Sour Water Treating
29	Storage
30	Instrument and Plant Air
30-1	Raw Water Treating

The Fuel Gas Sulfur Removal - Unit 25, and the Sulfur Plant - Unit 27, as well as some package subunits in SNG and LPG Production - Unit 18, were estimated on the basis of capacities using appropriate Parsons in-house historical data. The costs for the Oxygen Plant - Unit 23, for the cryogenic separation portion, plus the glycol dryer of SNG and LPG Production - Unit 18, were supplied by a vendor. The Units 31-3 - Potable and Sanitary Water System, and 31-4 - Fire Water System, were estimated on the basis of historical factors applied to the totals of the process unit installed costs. Units 34 - Effluent Water Treatment, and 35 - General Facilities, were estimated on the basis of preliminary material takeoffs to which appropriate in-house unit pricing was applied to arrive at constructed costs. The Power Generation - Unit 32, was estimated, based on the name-plate capacity. The pricing used was in-house historical data.

#### 14.1.5 BASIS FOR COST CATEGORIES

The basic criteria for determining various cost categories for the estimate are detailed below:

##### A. Major Equipment Costs

Process and major equipment costs are based on preliminary vendor pricing combined with historical in-house data experience. The vendor-priced equipment was solicited for certain special process equipment where historical in-house pricing data were not completely applicable.

##### B. Constructed Cost

Constructed cost is computed by applying a factor to major equipment cost for field direct and field indirect costs.

1. Field Direct Materials, Labor, and Other Direct Costs.

Estimates for concrete, structural steel, piping, instrumentation, electrical, and labor for construction of the various units, were made by factoring the major equipment cost with a multiplier. The factoring method relies on previous job experience for similar process-type plants, and the multiplier is determined by using the ratio of constructed costs to major equipment costs.

Included in this category are other direct costs such as miscellaneous freight, instrument checkout and run-in services, soil investigation, nonproductive time, and taxes that cannot be allocated to specific unit areas but are considered direct costs.

The included labor costs reflect fourth quarter, 1975, average hourly rates for the eastern interior area and expected labor productivity for that area. The estimate is based on the work being performed during a standard work week defined as five 8-hour days, Monday through Friday. No provision for premium costs for scheduled overtime work is included. However, an allowance for limited nonscheduled overtime has been included.

2. Field Indirect Costs. The following indirect costs are included:

- (a) Temporary construction facilities and job conditions, including craft subsistence and transportation.
- (b) Field administration and field office expense.
- (c) Construction equipment, small tools, and consumables.
- (d) Payroll taxes, insurance, union welfare, fringe benefits, permits, and bonds.

C. Home Office Costs

Engineering-construction Home Office costs include management and administration, process and project engineering, construction support, design, drafting, accounting, estimating, scheduling, cost engineering, procurement, expediting, inspection, stenographic, clerical, engineering construction fee, overhead, and direct expenses such as printing, reproduction, computer charges, communications, and travel.

D. Spare Parts

Costs for spare parts are included in working capital.

E. Sales Tax

A 5% sales tax and/or use tax is included for materials and equipment.

F. Escalation

Escalation for the period after the fourth quarter, 1975, is not included.

G. Contingency

No contingency allowance has been included.

H. Exclusions from Fixed Capital Investment

The following cost items are excluded from the estimate:

- (1) Owner's expenses connected with project.
- (2) All taxes, except sales and payroll taxes.
- (3) Client's local, state, and federal permits.
- (4) Premium time costs, except nonscheduled overtime premium.
- (5) Piling and unusual foundation conditions.
- (6) Process licensing fees.

Allowances for the following items, while not included in the fixed capital investment estimate, are included in the total capital requirements estimate:

- (1) Land acquisition, water rights, and rights-of-way.
- (2) Working capital, interest, and financing.
- (3) Raw materials and supplies for initial operation.
- (4) Startup cost, operator training, and preparation of operating manuals.

14.2 TOTAL CAPITAL REQUIREMENTS

In addition to the fixed capital investment of approximately \$1,225 million, total capital requirements include land acquisition and rights of way, initial charges of catalysts and chemicals, startup costs and provision for working capital. These items are estimated to total approximately \$189 million, as follows:

<u>Item</u>	<u>\$ million</u>
Initial raw materials, catalysts, and chemicals (see Table 14-5)	8.0
Allowance for startup costs (see Table 14-6)	80.0
Initial working capital (see Table 14-7)	100.0
Allowance for land acquisition, rights-of-way	<u>1.0</u>
	189.0

Total capital costs for the four cost centers used for estimating operating costs are summarized in Table 14-3.

The estimated total capital requirement for the project amounts to about \$1,414 million exclusive of construction financing costs that depend on the project schedule, fund drawdown, and method of financing the project. This is discussed in subsections 14.4 and 14.6.

The fixed capital investment is summarized by cost centers in Table 14-4. The initial and annual costs for catalysts and chemicals are shown in Table 14-5. The estimate of startup costs is summarized in Table 14-6, with construction changes and additional first-year maintenance based on experience factors for the types of units used. The estimated working capital requirements are shown in Table 14-7.

Capital expenditures for replacement of coal mining equipment are based on the costs and useful lives shown in Table 14-8.

The allowance for mineral rights is included in annual operating expenses in the form of royalties.

### 14.3 PROJECT SCHEDULE

The estimated project schedule is summarized in Figure 14-1. This schedule was developed based on analysis of the design, procurement of schedule-controlling equipment, and construction schedules. The results indicate a schedule of 56 months from start to mechanical completion and an achievement of capacity production rate one year later.

### 14.4 FUND DRAWDOWN SCHEDULE

The fund requirements during the design, engineering, procurement, construction, and startup period are illustrated in Figure 14-2; fund requirements are shown for six-month intervals. The cumulative fund drawdowns are shown in Figure 14-3.

The Figure 14-2 and 14-3 fund drawdown schedules were developed based on the sum of the estimated individual fund requirement schedules for the

separate sections consisting of coal mine, coal preparation plant, coal conversion plant, and offsites.

#### 14.5 OPERATING COSTS

Estimated operating costs for each of the four cost centers are summarized in Table 14-9. Total operating costs of approximately \$193 million per year are equivalent to \$0.89 per MM Btu of energy products.

##### 14.5.1 GENERAL BASIS

The economic analysis is based on a plant operating period of 20 years. The operating rate is 330 stream days per year, equal to 90.4% operating efficiency except for the first year of operation, when the complex is assumed to produce at a rate equal to 50% of capacity. Plant overhead is based on an estimated requirement for administrative and support personnel consisting of plant management, accounting, personnel, first aid, cafeteria, fire and safety, quality assurance, engineering, motor pool, material control, and other support personnel and associated indirect materials and supplies. A payroll burden of 35% of total payroll cost, excluding plant overhead personnel, was used. The general and administrative expense amounts to 1.5% of the total operating cost. Property tax and insurance is based on 2.75% of the initial fixed capital investment. The estimated manpower requirements for the complex, approximately 2,350 employees, are summarized in Table 14-10. The total number of operating and maintenance employees includes those working in the plant; it does not include those on vacation, sick leave, etc.

Mining production labor cost is calculated using total operators at 260 days per year at the indicated daily usage rate. All other operating labor costs are based on the men per shift at 24 hours per day, 365 days per year at the indicated hourly wage rate.

Mine maintenance labor costs are based on total employees for 260 days at the indicated daily rate. All other maintenance labor is calculated using total employees at 8 hours per day for 260 days, using the indicated hourly wage rate.

Annual maintenance costs are summarized in Table 14-11.

##### 14.5.2 BASIS FOR COST CENTERS

The basis for estimating the annual operating costs for each cost center are presented below.

###### A. Coal Mine

A royalty of \$1.50 per ton of clean coal was used. Operating supplies consist of explosives and associated supplies used in the mining operation. Equipment operating costs shown in Table 14-8 include operating and maintenance materials. Direct costs for operating labor and supervision are shown in Table 14-12. Maintenance labor is shown in Table 14-13.

Payments to the Union Welfare Fund of \$1.15 per ton of clean coal are also included, together with miscellaneous expenses that consist of permits, bonds, and land reclamation.

#### B. Coal Preparation

Operating and maintenance labor for the coal preparation area are shown on Table 14-14. The total cost of maintenance is approximately 3% of the fixed capital investment. This is considered to be composed of approximately 35% labor and 65% materials.

#### C. Process Plant

Catalysts and chemicals required for the Process Plant are shown in Table 14-5. The cost of maintenance amounts to approximately 4% of the fixed capital investment. As shown in Table 14-11, this is considered to be composed of preventive and routine work (60%) carried out by plant maintenance labor, and major maintenance tasks (40%) carried out by contract labor during unit shutdowns. The routine work is composed of 40% labor and 60% material.

The process plant labor costs are summarized in Table 14-5.

#### D. Offsites

Annual consumption and cost of chemicals for water treatment are shown in Table 14-16. Operating and maintenance labor costs are shown in Table 14-17 and 14-16. Power plant annual maintenance costs correspond to three-fourth mil per average production kWh, where average production is about 210 MW. Other maintenance costs correspond to 2% of fixed capital investment with about 30% allocated to labor and the balance to materials.

### 14.6 FINANCIAL PARAMETERS

Economics were developed for three types of project financial structures.

#### 14.6.1 FINANCIAL STRUCTURES

- (1) 100% equity capital.
- (2) Borrowed capital; 65% of the total investment borrowed at 9% interest, including construction financing with a 0.75% commitment fee and with principal repaid in equal installments over the 20-year project term; and all working capital borrowed for the 20-year term.
- (3) A nonprofit (0% discounted cash flow rate of return) or breakeven boundary case.



#### 14.6.2 RETURN ON INVESTMENT

For each of the above cases, a discounted cash flow (DCF) rate of return after tax is specified, and the revenue required to meet this objective is calculated. The DCF computations take into consideration the 10% depletion allowance on the coal mine operation, depreciation allowances as shown in Table 14-3, an investment tax credit of 10% on 90% of the fixed capital investment, and a combined income tax rate of 52% for state and federal taxes. The basis is that the plant will be operated as an integrated subsidiary of profit-making industries that can write initial losses off against current earnings for tax purposes; if an alternate basis were selected in which the plant were a separate taxable entity and must defer the tax benefits of accelerated depreciation rates and investment tax credits to future earnings, the required selling prices would be increased by approximately 2% in the case of 100% equity financing and 14% in the case with 65% debt.

Useful lives for asset depreciation purposes conform with "Depreciation Guidelines and Rules, Revenue Procedure 62-21." The double declining balance method of depreciation was used for all assets except the coal mine. Coal mine depreciation is based on the guidelines for the mining industry. The guidelines for the chemicals and allied products industry under Group Three, Guidelines for Manufacturing, were used for the Coal Preparation and Process Plant.

#### 14.7 REQUIRED PRODUCT SELLING PRICE

The revenue required to achieve a specified rate of return based on the DCF method is presented for each of the three financial structure cases. Sensitivities of required selling price to variations in operating costs, fixed capital investment, and profitability levels, are presented in subsection 14.8.

The results for the base cases are summarized in Table 14-19, showing the contribution of each of the four cost centers to the total required revenue. The printouts of cash flow case evaluations for the base cases representative of each of the types of financing are shown in Tables 14-20 through 14-22. Table 14-20 contains the cash flow for the case with 100% equity financing with a 12% DCF after tax rate of return. The required revenue after taking credit for the byproducts sulfur and ammonia at \$60 and \$120 per ton, respectively, is \$505 million per year, or about \$2.35 per MM Btu. Table 14-21 contains the cash flow for the case with 65% debt at 9% per year interest. The required revenue is reduced to \$395 million, or \$1.80 per MM Btu by the debt financing. Table 14-22 contains the cash flow for the break-even case with no return on invested funds. The resulting revenue requirement is \$245 million per year, or \$1.15 per MM Btu.

A potential improvement in economics would result from use of a lower solvent-to-coal ratio (S/C) in the feed to the Unit 12 coal dissolvers. A reduction in the S/C from 3 to 1.5 could result in reductions in fixed capital investment, operating costs, and required product selling price of approximately 6%, 3%, and 5%, respectively.

#### 14.8 SENSITIVITY ANALYSIS

The sensitivity of the required revenues to variations in selected variables was analyzed. The effects on the required selling prices of a 10% change in cost elements are:

<u>Cost Element</u>	<u>% Change in Required Selling Price</u>	
	<u>100% Equity</u>	<u>65% Debt</u>
Operating costs	2.1	2.7
Capital associated costs	8.2	7.8
ROM coal cost	3.0	3.4
Clean coal cost	3.2	3.6

The effects of variations in the DCF are shown in Figure 14-4. Typical values follow:

<u>Rate of Return (% DCF)</u>	<u>% of Base Case</u>	
	<u>100% Equity</u>	<u>65% Debt</u>
0	49.4	77.2
6	69.3	85.6
12	100.0	100.0
18	142.8	122.0

#### 14.9 POSSIBLE PRODUCT MARKET VALUES

A brief assessment of the possible product market values and the effect of the resulting project revenues on profitability was completed. The results are summarized below.

The plant produces 34.6 million barrels (F.O.E.) of energy products per year with a heating value of  $2.13 \times 10^8$  MM Btu/yr. These products are listed in Table 14-23 together with possible product market values for each product. To obtain these values, a comparative analysis was made of the projected characteristics of these products with those of conventional crude oil based products. This comparative evaluation is predicated on discussions with major petroleum/chemical companies, utility companies, industry reports, and current literature.

The possible unit sales values shown in Table 14-23 were used as a basis to illustrate the effect of sales values on the economics and, perhaps, to stimulate further effort on firmly establishing marketability and product values. The results indicate a possible annual revenue of approximately \$515

million, 2% MDT, which is about 30% and 2% greater than that required to achieve a 12% DCF with 65% debt and 100% equity financing, respectively.

Table 14-23 shows prorated required product sales values for the separate energy products required to produce the revenues earlier shown in Tables 14-20 through 14-22 to achieve a 12% DCF. The possible annual revenue shown in Table 14-23, however, would result in the following DCFs:

65% debt - 19% DCF

100% equity - +12%

The sensitivity of DCF to changes in sales price, investment, and operating costs, using the annual product sales values of \$514 million shown in Table 14-23 and the debt financing case, are shown in Figure 14-5.

This analysis is considered only a starting point in the survey of possible U.S. market values for the products. The results, however, clearly emphasize the importance of definition of coal liquefaction product characteristics, marketability, and market values. This type of information should be developed for Oil/Gas products and also for all other coal liquefaction product types.

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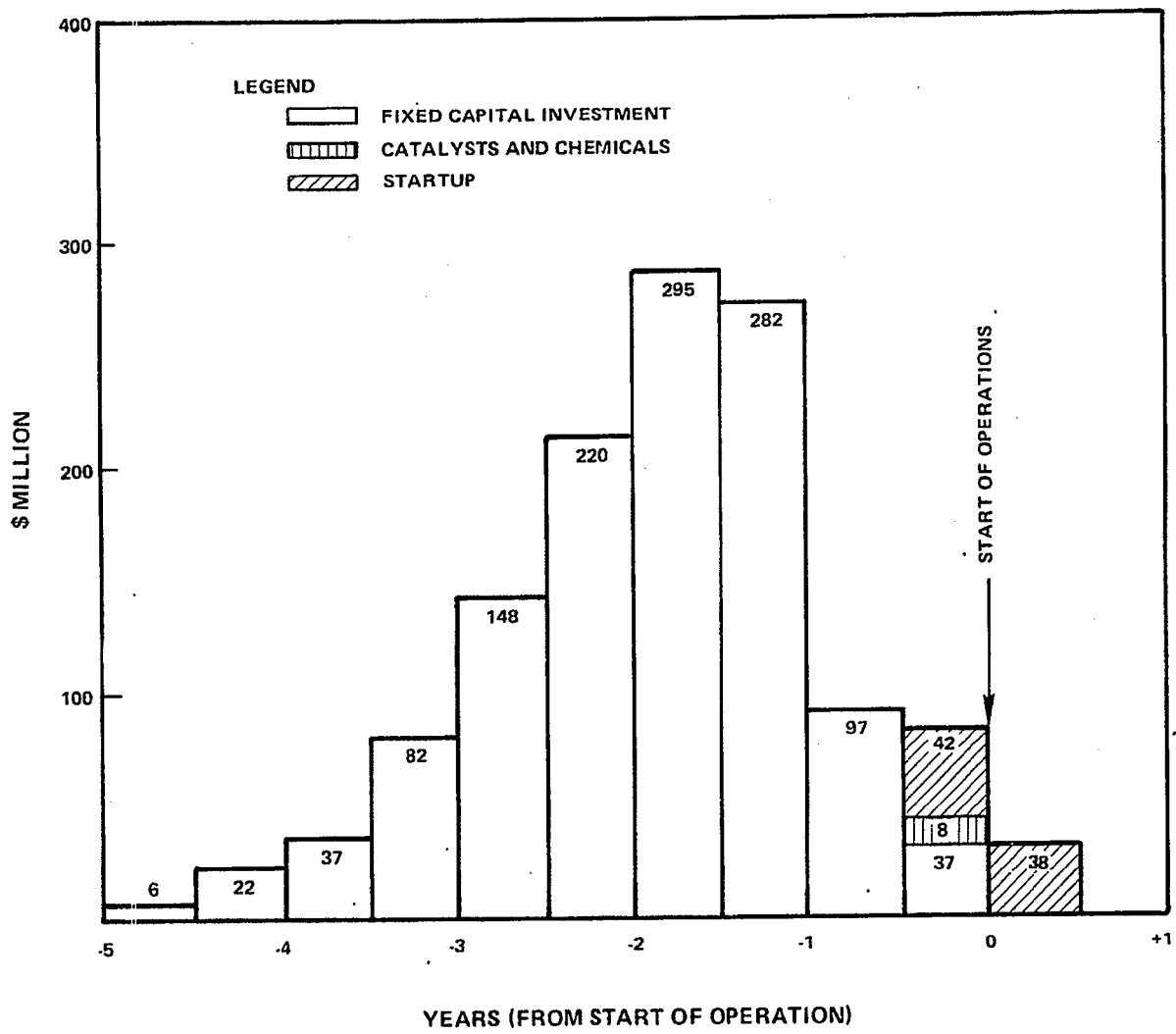


Figure 14-2 - Fund Drawdown Schedule

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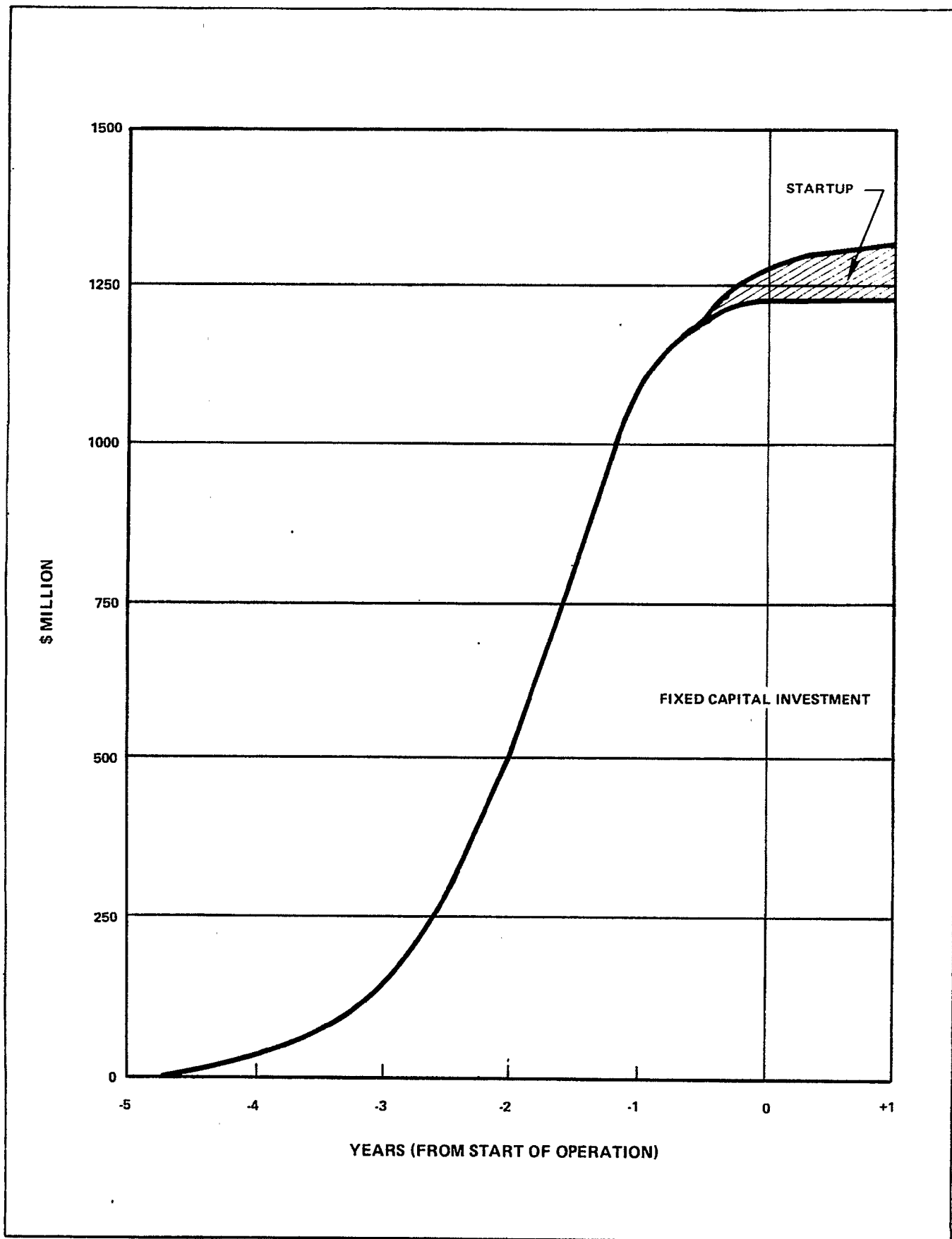


Figure 14-3 - Cumulative Fund Drawdown

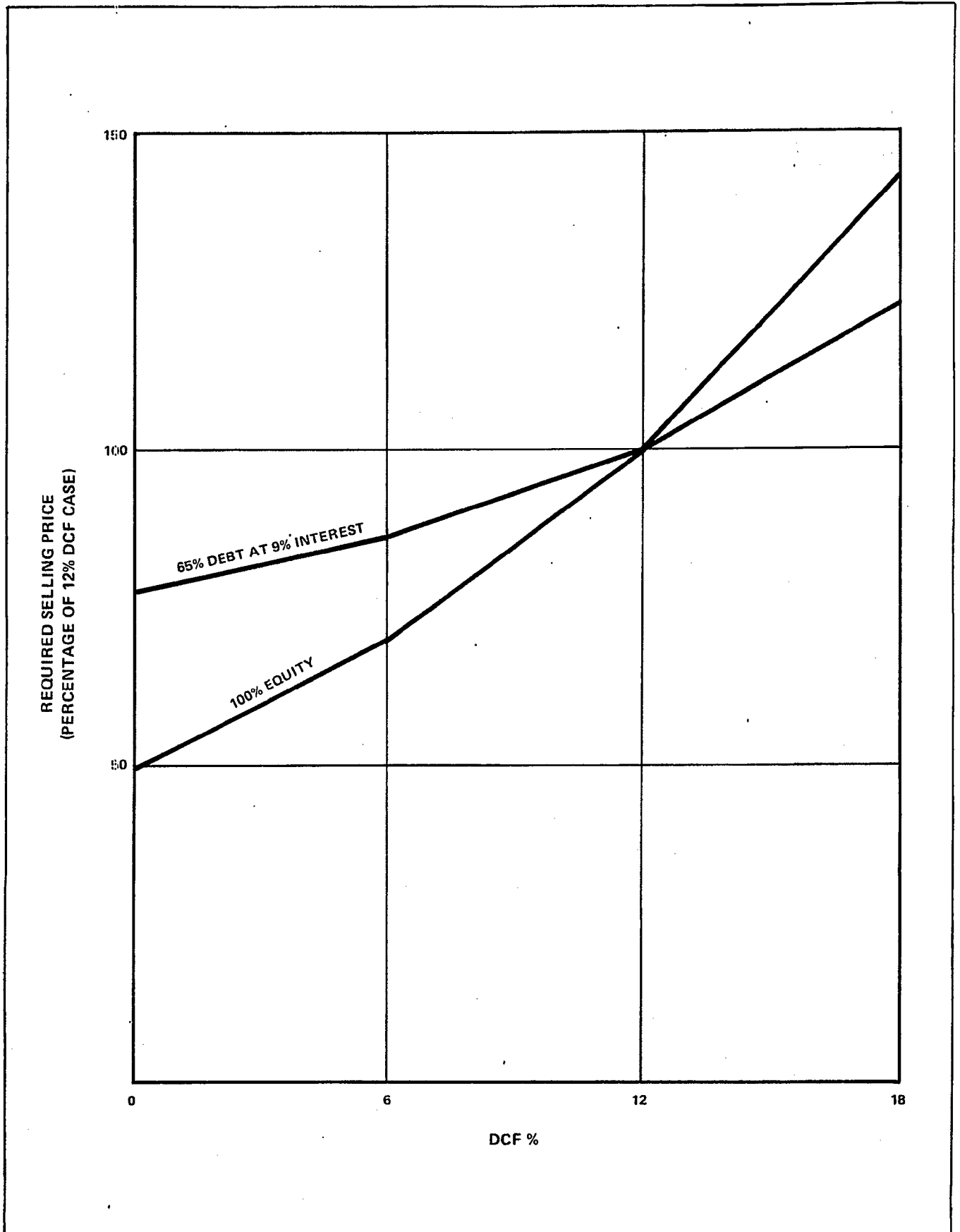


Figure 14-4 - Sensitivity of Required Selling Price to DCF

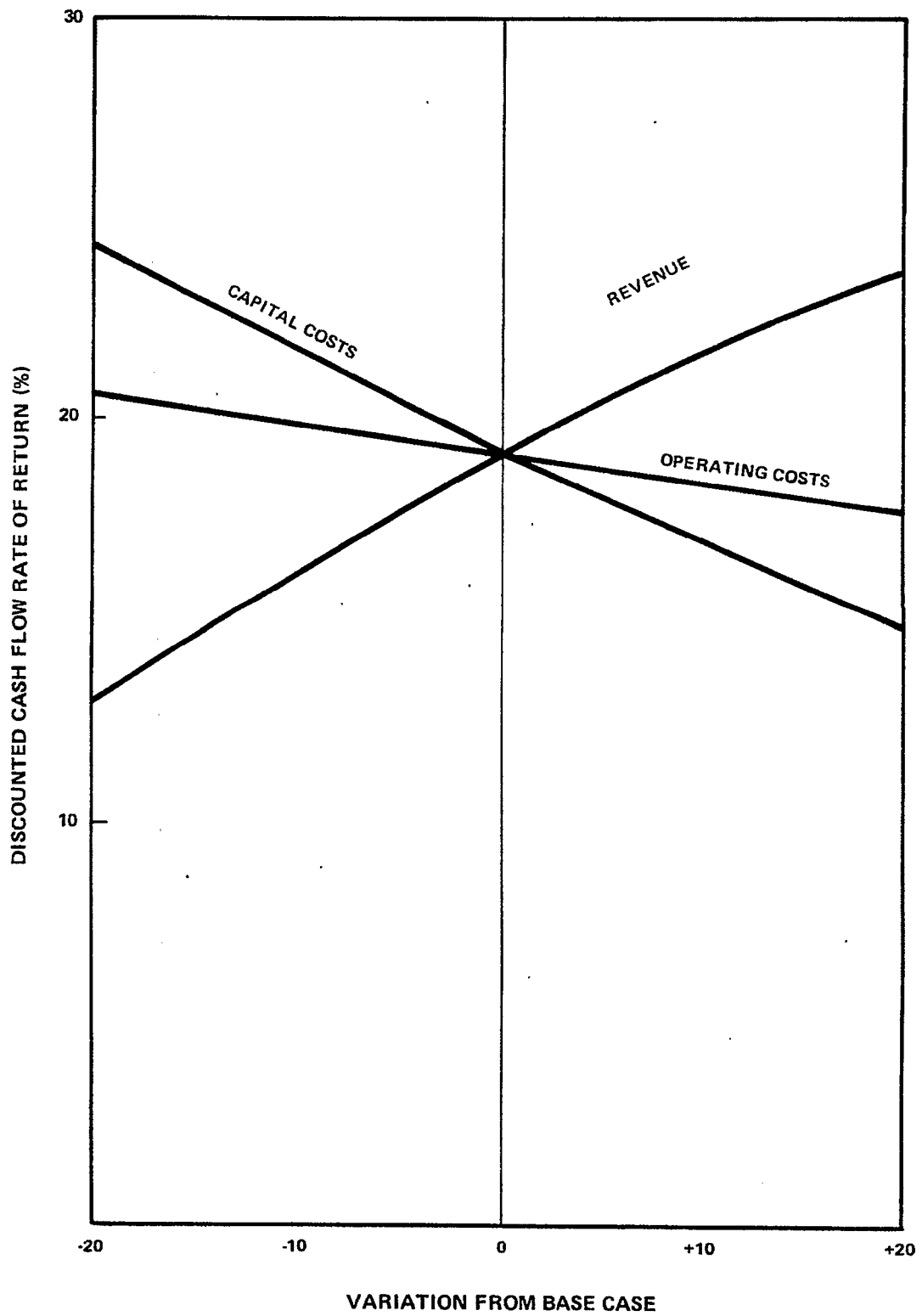


Figure 14-5 - Sensitivity Analysis of DCF  
65% Debt at 9% Interest



Table 14-1 - Estimated Fixed Capital Investment

Unit Number	Description	Cost \$ Million
9	Mine	197.952
10	Coal preparation	28.019
11	Coal crushing and drying	26.375
12	Slurrying and dissolving	202.793
13	Filtration and solvent recovery	39.249
14	Distillation	29.558
16	Naphtha hydrotreating	8.604
17	Dissolver acid gas removal	18.986
18	SNG and LPG treating	45.191
19	Methanation	0.564
20	Process gasifier	42.506
21	Shift conversion	55.618
22	Gasifier acid gas removal	44.660
23	Oxygen plant	84.355
24	Fuel gas gasifier	66.563
25	Fuel gas sulfur removal	16.760
26	Sour water treating	5.553
27	Sulfur plant	14.448
29	Product storage	30.123
30	Instrument and plant air	2.269
31	Raw water treating	15.480
32, 33	Power and steam generation	81.200
34	Effluent water treatment	5.121
35	General facilities	<u>34.803</u>
	Total constructed cost	1.096.750
	Home office, overhead and fee at 10%	109.675
	Total	1.206.425
	Sales tax	<u>22.000</u>
	Total fixed capital investment	1.228.425
	Say	<u><u>1.225.000</u></u>

Table 14-2 - Major Equipment Costs by Unit

Account Code	Equipment Description	Coal Preparation Unit 10	Coal Grinding and Drying Unit 11	Slurrying and Dissolving Unit 12	Filtration and Filter Cake Drying Unit 13	Distillation Unit 14	Naphtha Hydrogenation Unit 16	Dissolver Acid Gas Removal Unit 17	SNG and LPG Production Unit 18	Methanation Unit 19	Process Gasifier Unit 20	Shift Conversion Unit 21	Fuel Gas Gasifier Unit 24	Sour Water Gasifier Unit 26	Product Storage Unit 29	Utilities and Control Facilities Units 30, 31, 34, 35	Summary Listed Units
1100	Columns				328		131	4,488	135					477			5,605
1200	Vessels			20,500	374	83	115	113	4,681	7	2,378	4,894	149	261		233	33,788
1300	Heat Exchangers and Condensers			15,562	1,079	8,225	967	1,549	2,045	21	2,542	6,101	11,303	647			50,041
1400 & 1400	Furnaces, Heaters, and Kilns		4,044	3,780	876				301						3,000	309	9,001
1500	Pumps	823		4,985	338	336	137	517	144		75	41	44	112		11,500	10,761
1700	Cooling Towers																11,500
1800	Compressors and Drivers	13		5,718	3,232	135	627		4,783				6,300			1,045	21,853
1900	Tanks	48						52						96	9,984	858	11,038
2000	Materials Handling	4,549	4,956	145	2,376						2,775		698				15,499
2100	Reduction Equipment	840	1,092														1,932
2200	Separation	510			7,272			169			3,599	1,112	4,100			1,825	18,587
2300	Concentration																
2400	Agitation and Mixers			12	17											6	35
2500	Reactors		1,233	31,140	1,341		1,853		359	131	2,450	10,442	5,500				51,875
2600	Hoppers, Bins, and Silos	783															3,357
2700	Classification and Screens	1,365															1,365
2800	Other Major Equipment	602	6,378		1,212											199	8,597
3200	Launders and Sumps	481															481
0800	Package Units	981							10,456							994	12,431
	Total Major Equipment Costs	10,995	17,903	81,742	17,241	10,013	3,850	6,894	22,904	159	13,819	22,590	28,094	1,589	12,984	16,969	267,746

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Table 14-3 - Total Capital Requirements (\$ Million)

Item	Coal Mine	Coal Preparation	Process	Offsites	Total
Fixed capital investment (see Table 12-7)	221.000	31.000	769.000	204.000	1,225.000
Initial catalysts and chemicals (see Table 12-5)	0	0	8.000	0	8.000
Startup costs (see Table 12-6)	7.500	2.750	63.000	6.750	80.000
Construction financing <sup>a</sup>	31.750	4.500	110.500	29.250	176.000
Depreciable investment	260.250	38.250	950.000	240.000	1,489.000
Working capital (see Table 12-7)	—	—	—	—	100.000
Land, rights of way	—	—	—	—	1.000
Total capital requirement					<u>1,590.000</u>
Project life	20 yr	20 yr	20 yr	20 yr	
Useful life for depreciation	10 yr	11 yr	11 yr	20 yr	
Depreciation method	DDB <sup>c</sup>	DDB	DDB	DDB	
Recurring capital investment <sup>b</sup> (see Table 12-8)	3.300				

<sup>a</sup>Applicable to cases using 65% debt at 9% interest and 0.75% commitment fee only.

<sup>b</sup>Equivalent uniform annual cost.

<sup>c</sup>Double declining balance.

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Table 14-4 - Estimated Fixed Capital Investment by Cost Center  
(\$ Million)

Unit Number	Description	Constructed Cost	Fixed Capital Investment
	<u>Mine</u>		
09	Mine	197.951	221
	<u>Coal Preparation</u>		
10	Coal preparation	28.019	31
	<u>Process Plant</u>		
11-2	Coal crushing and drying	14.168	
12	Slurrying and dissolving	202.794	
13	Filtration and solvent recovery	39.249	
14	Distillation	29.558	
16	Naphtha hydrogen	8.604	
17	Dissolver acid gas removal	18.987	
18	SNG and LPG production	45.191	
19	Methanation	0.564	
20	Process gasifier	42.506	
21	Shift conversion	55.618	
22	Gasifier acid gas removal	44.660	
23	Oxygen plant	84.355	
24	Fuel gas gasifier	66.563	
25	Fuel gas sulfur removal	16.760	
26	Sour water treating	5.553	
27	Sulfur plant	<u>14.448</u>	
		689.577	769
	<u>Offsites</u>		
11-1	Coal storage	12.207	
29	Storage	30.123	
30	Instrument and plant air	2.269	
31	Raw water treating	15.480	
32, 33	Power generation	81.200	
34	Effluent	5.121	
35	General facilities	<u>34.803</u>	204
		<u>181.203</u>	
	Total constructed cost	1,096.750	
	Home office, overhead and fee at 10%	109.675	
	Sales tax	<u>22.000</u>	
	Total fixed capital investment	1,228.425	
	Say	<u><u>1,225</u></u>	<u><u>1,225</u></u>

Table 14-5 - Catalyst and Chemicals Cost Summary

Unit Number	Catalyst or Chemical	Initial Charge	Basis or Makeup Requirement	Cost (\$1,000)	
				Initial Charge	Annual Use
13	<u>Filtration and Solvent Recovery</u> Diatomaceous earth filter precoat		105.6 TPD		3,485
16	<u>Naphtha Hydrogen</u> Naphtha hydrogenation catalyst (Co-Mo)	4,000 ft <sup>3</sup>	3-yr life	212	71
17	<u>Dissolver Acid Gas Removal</u> Monoethanol amine (100 Wt %) Sodium hydroxide (50 Wt %) Corrosion inhibitor Antifoam Diatomaceous earth	300,000 lb 12 ton	1,400 lb/day 6 TPD 1 GPD 2.5 GPD 25 lb/day	108 2	166 277 nil 1 nil
18	<u>SNG and LPG Production</u> Molecular sieve drying agent Methanation catalyst - fluidized Methanation oil Methanation catalyst - fixed bed Zinc oxide pellets Diethylene glycol Sodium hydroxide (50 Wt %) Sweetening reagent	412,500 lb 5,870 ft <sup>3</sup> 40,000 gal 440 ft <sup>3</sup> 171 ft <sup>3</sup> 167 GPD (SNG) 64 GPD (C <sub>3</sub> ) 0.27 TPD 1/2 lb/day	3-yr life 2-yr life 0.6 gpm 3-yr life 3-yr life	520 500 40 53 12	173 250 285 18 4 14 5 15 3

Table 14-5 (Contd)

Unit Number	Catalyst or Chemical	Initial Charge	Basis or Makeup Requirement	Cost (\$1,000)	
				Initial Charge	Annual Use
19	<u>Methanation</u>				
	Zinc oxide pellets	30 ft <sup>3</sup>	3-yr life	2	1
21	Methanation catalyst	60 ft <sup>3</sup>	3-yr life	7	3
	<u>Shift Conversion</u>				
22	Shift catalyst	28,500 ft <sup>3</sup>	3-yr life	4,446	1,482
	<u>Gasifier Acid Gas Removal</u>				
25	Physical solvent	300,000 gal	2,000 GPD	120	264
	<u>Fuel Gas Sulfur Removal</u>				
26	Chemicals				
	Sodium hydroxide (50 Wt %)	326,000 lb	2,988 lb/day	1,630	4,930
27	<u>Sour Water Treating</u>	610 ton	46.5 TPD	85	2,148
	Sodium hydroxide (50 Wt %)				
26	Phosphoric acid (100 Wt %)	28,000 lb	2.0 TPD	5	12
	<u>Sulfur Plant</u>		300 lb/day		18
27	Hydrogenation catalyst (Co-Mo)	2,000 ft <sup>3</sup>	3-yr life	106	35
	Chemicals				
27	Sodium hydroxide (50 Wt %)	39,000 lb	300 lb/day	195	508
	Sodium hydroxide (50 Wt %)	74 ton	5.5 TPD	10	254
				<u>8,055</u>	<u>14,420</u>

Table 14-6 - Startup Costs (\$ Million)

Expense Item	Coal Mine	Coal Preparation	Process	Offsites	Total
<u>Pre-Startup</u>					
Construction changes	0	0.930	23.070	2.040	26.040
Advance hiring, recruiting, settling, etc.	3.375	0.235	2.350	0.710	6.670
Payroll					
Operating personnel	1.200	0.130	1.050	0.385	2.765
Administrative	2.175	0.105	1.300	0.325	3.965
Payroll burden	<u>0.750</u>	<u>0.080</u>	<u>0.800</u>	<u>0.250</u>	<u>1.880</u>
Subtotal	7.500	0.550	5.500	1.670	15.280
Total Pre-Startup	7.500	1.480	28.570	3.710	41.320
<u>Operating</u>					
Contract operative assistance	0	0.310	3.150	0.960	4.420
Support maintenance	<u>0</u>	<u>0.930</u>	<u>31.000</u>	<u>2.040</u>	<u>33.970</u>
Total operating	0	1.240	34.150	3.000	38.390
Total startup	7.500	2.720	62.720	6.710	79.650
Say	7.500	2.750	63.000	6.750	80.000



Table 14-7 - Estimate of Working Capital Requirements  
(\$ Million)

Item	Coal Mine	Coal Preparation	Process	Offsites	Total
Intermediate inventory (30 days)	4.930	0.230	0	0	4.260
Finished product inventory (30 days)	10.570	0.490	12.650	2.570	17.460
Spare parts inventory (4% of major equipment)	6.790	0.240	11.100	0.675	18.805
Accounts receivable (30 days)	10.570	0.490	12.650	2.570	17.460
Budget for current expenses (30 days)	12.935	0.805	20.500	3.665	27.725
Credit for accounts payable (30 days)	6.700	0.170	6.300	0.940	13.235
Total	39.095	2.085	50.600	8.545	100.325
Say	39.000	2.000	50.500	8.500	100.000

Table 14-8 - Coal Mine Operating Costs and Equipment Replacement Schedule

Quantity	Item	Unit Cost (\$1,000)	Total Cost (\$1,000)	Operating Cost (\$1,000/Year)	Operation (Hour/Year)	Life (Hour/each)	Replacement Schedule (Years)
5	Dragline (175 c.y.)	25,674	128,370	11,869	31,800	-	20
5	Coal shovel (15 c.y.)	1,080	5,400	742	26,000	50,000	8
10	Rotary drill	607	6,070	3,325	58,900	30,000	5
20	Coal hauler (120T)	304	6,080	2,573	109,500	25,000	20
5	Dozer w/ripper	191	955	382	24,300	15,000	3
5	Reject hauler (120T)	303	1,515	572	27,700	25,000	5
5	Scraper (35 c.y.)	278	1,390	1,082	24,300	15,000	3
5	Grader	87	435	188	26,000	15,000	3
5	R.T. dozer	127	635	395	26,000	15,000	3
10	Track dozer	172	1,720	712	48,500	15,000	3
5	Sprinkler truck	127	635	66	9,200	15,000	7.5
5	Trac-drill w/compressor	63	315	77	7,000	15,000	10
5	Front-end loader	129	645	124	7,500	15,000	9
2	Tire truck	45	90	6	3,900	20,000	10
2	Low boy w/tractor	33	66	5	1,500	15,000	10
5	Fuel lube truck	27	135	59	20,200	15,000	3.5
5	Flatbed truck	9	45	15	11,100	20,000	9
5	Anfo mix truck	38	190	68	20,200	15,000	4
5	Explosive truck	9	45	26	20,200	20,000	5
5	Mine pumping system	45	225	38	7,500	30,000	20
2	15-ton hydraulic crane	186	372	18	4,000	15,000	7.5
1	50-ton mobile crane	389	389	6	1,100	15,000	15
5	Welding truck	9	45	19	13,900	15,000	5
4	Electrical truck	9	36	15	11,100	15,000	6
4	10-ton dump truck	9	36	9	6,700	15,000	10
5	30-passenger bus	22	110	19	12,000	15,000	6
50	Pickup	4	220	172	138,600	10,000	3.5
	Total		155,149	22,582			
	Less power cost (included in power plant)			5,500			
	Equipment Operating Cost						
							17,082

Table 14-9 - Annual Operating Cost Summary (\$ Million/yr)

Item	Coal Mines	Coal Preparation	Process Plant	Offsites	Total
<u>Mine Royalty</u>	17.657				17.657
<u>Materials and Supplies</u>					
Operating supplies	10.750	0.015	0.385	0.102	11.252
Equipment operation	17.082(10)	—	—	—	17.082
Maintenance materials and contract labor	—	0.590	23.461	2.121	26.172
Catalysts and chemicals	0	0	14.420	0.834	15.254
Total Materials and Supplies	27.832	0.605	38.266	3.057	69.760
<u>Labor</u>					
Operating labor and supervision	11.537	0.524	4.221	1.533	17.815
Maintenance labor and supervision	4.546	0.252	5.479	0.910	11.187
Payroll burden	5.629	0.272	3.395	0.855	10.151
Plant overhead/administration	8.685	0.419	5.238	1.319	15.661
Union welfare	13.537	—	—	—	13.537
Total Labor Costs	43.934	1.467	18.333	4.617	68.351
<u>G and A Overhead</u>	1.463	0.045	1.184	0.196	2.888
<u>Miscellaneous Costs</u>	0.556				0.556
<u>Property Taxes and Insurance</u>	6.079	0.852	21.147	5.610	53.688
Total Operating Costs	97.521	2.969	78.930	15.480	192.900

Table 14-10 - Manpower Summary

Item	Operating	Maintenance	Administration	Total
Administration	—	—	386	386
Coal mine	779	315	—	1,094
Coal preparation	36	18	—	54
Process	292	348	—	640
Offsites	<u>112</u>	<u>58</u>	<u>—</u>	<u>170</u>
Total	1,219	739	386	2,344

Table 14-11 - Annual Maintenance Cost Summary (\$ Million)

Unit Number	Description	Labor Including Payroll Burden	Contract Labor	Materials	Total	Percent of Fixed Capital Investment
	<u>Mine</u>					
09	Mine	6.137	—	22.507 <sup>b</sup>	28.644	a
	<u>Coal Preparation</u>					
10	Coal Preparation	0.340	—	0.590	0.930	3
	<u>Process Plant</u>					
11-2	Coal crushing and drying				0.779	5
12	Slurrying and dissolving				8.923	4
13	Filtration and solvent recovery				2.159	5
14	Distillation				1.301	4
16	Naphtha hydrogen				0.379	4
17	Dissolver acid gas removal				0.835	4
18	SNG and LPG production				1.988	4
19	Methanation				0.025	4
20	Process gasifier				2.338	5
21	Shift conversion				2.447	4
22	Gasifier acid gas removal				1.965	4
23	Oxygen plant				2.784	3
24	Fuel gas gasifier				3.661	5
25	Fuel gas sulfur removal				0.553	3
26	Sour water treating				0.244	4
27	Sulfur plant				0.477	3
	Total Process Plant	7.397	12.351	11.110	30.858	4.01

Table 14-11 (Contd)

Unit Number	Description	Labor Including Payroll Burden	Contract Labor	Materials	Total	Percent of Fixed Capital Investment
	<u>Offsites</u>					
11-1	Coal storage				0.244	2
29	Storage				0.602	2
30	Instrument and plant air				0.045	2
31	Raw water treating				0.353	2
32, 33	Power generation				1.307	c
34	Effluent water treatment				0.102	2
35	General facilities				0.696	2
	Total	1.228		2.121	3.349	
		<u>15.102</u>	<u>12.351</u>	<u>36.328</u>	<u>63.781</u>	

<sup>a</sup>See Tables 12-10 and 12-12.

<sup>b</sup>Includes operating materials.

<sup>c</sup>3/4 MIL /kW-hr.

Table 14-12 - Coal Mine Operating Costs - Labor and Supervision

Category	Number of Employees		Salaries and Wages		Payroll Cost (\$1,000/Year)
	Per Shift	Total	(\$/Day)	(\$/Year)	
<u>Supervision</u>					
Pit superintendent		5		29,000	145
Chief mining engineer		1		27,000	27
Mine engineer		5		18,000	90
Shift foreman	5	21		20,000	420
Drill-blast foreman	5	21		20,000	420
Dispatcher	<u>1</u>	<u>5</u>		20,000	<u>100</u>
Total supervision	11	59			1,202
<u>Operating Labor</u>					
Dragline operator	5	22	70.35 <sup>a</sup>		402
Dragline oiler	5	22	65.07 <sup>a</sup>		372
Dragline ground man	10	48	65.07 <sup>a</sup>		812
Coal shovel operator	5	22	60.90		348
Coal shovel ground man	5	22	56.33		322
Dozer operator (coal)	5	22	56.33		322
Coal haul driver	20	86	53.80		1,203
Rotary drill operator	10	43	53.80		601
Rotary drill helper	10	43	51.76		579
Truck driver (rejects)	4	18	53.80		252
Scraper operator	5	22	53.80		308
Grader operator	5	22	53.80		308
R.T. dozer operator	5	22	53.80		308
Dozer operator (spoil)	10	43	53.80		601
F.E. load operator		6	53.80		84
Sprinkler truck driver		7	51.76		67
Trac drill operator		5	53.80		70
Trac drill helper		5	51.76		67
Fuel/lube truck driver	5	22	51.76		296
Fuel/lube helper	5	22	51.76		296
Anfo truck driver	5	22	51.76		296
Explosive truck loader/ shooter	15	63	53.80		881

<sup>a</sup>Includes daily overtime.

Table 14-12 (Contd)

Category	Number of Employees		Salaries and Wages		Payroll Cost (\$1,000/Year)
	Per Shift	Total	(\$/Day)	(\$/Year)	
Utility men (laborers)	22	91	51.47		1,218
Miscellaneous drivers	<u>5</u>	<u>20</u>	51.76		<u>269</u>
Total operating labor	161	720			<u>10,335</u>
Total operating labor and supervision	172	779			11,537
Total payroll burden					<u>4,038</u>
Total mine operating, labor, and supervision					<u><u>15,575</u></u>



Table 14-13 - Coal Mine Maintenance Costs - Labor and Supervision

Category	Number of Employees		Salaries and Wages		Payroll Cost (\$1,000/Year)
	Per Shift	Total	(\$/Day)	(\$/Year)	
<u>Supervision</u>					
Shop superintendent	1	1		26,000	26
Mechanical superintendent	1	1		26,000	26
Electrical superintendent	1	1		26,000	26
Mechanical foreman	5	20		20,000	400
Electrical foreman	5	20		20,000	400
Agronomist	<u>1</u>	<u>1</u>		18,000	<u>18</u>
Total supervision	14	44			896
<u>Maintenance Labor</u>					
Mechanic 1st	10	31	56.33		454
Mechanic 2nd	10	31	53.80		434
Electrician 1st	6	24	56.33		351
Electrician 2nd	5	20	53.80		280
Welder	10	28	56.33		377
Mechanics helper	10	31	51.76		418
Parts man	3	7	51.76		94
Tool man	2	6	51.76		81
Tire man	4	16	51.76		215
Miscellaneous equipment operator	3	11	53.80		154
Miscellaneous driver	4	11	51.76		148
Laborer	5	20	51.47		268
Rodmen	5	5	50.18		65
Clerk	10	10	38.00		99
Typist	10	10	34.00		88
Draftsman	5	5	45.00		59
Agronomist helper	<u>5</u>	<u>5</u>	50.18		<u>65</u>
Total labor	<u>107</u>	<u>271</u>			3,650
Total labor and supervision	<u>121</u>	<u>315</u>			4,546
Payroll burden					<u>1,591</u>
Total maintenance labor cost					<u>6,137</u>

Table 14-14 - Coal Preparation Labor Costs

Category	Number of Employees		Salaries and Wages		Payroll Cost (\$1,000/Year)
	Per Shift	Total	(\$/Day)	(\$/Year)	
<u>Operating Labor</u>					
Area foreman	1	4		20,000	80
Operator	6	24	53.80		336
Helper	<u>2</u>	<u>8</u>	51.76		<u>108</u>
Total	9	36			524
Payroll Burden					<u>183</u>
Total Operating Labor					707
<u>Maintenance Labor</u>					
Journeyman	—	18	53.80		252
Payroll Burden					<u>88</u>
Total Maintenance Labor					340

Table 14-15 - Process Plant Labor Costs

Category	Number of Employees		Salaries and Wages		Payroll Cost (\$1,000/Year)
	Per Shift	Total	(\$/Day)	(\$/Year)	
<u>Supervision</u>					
Operations superintendent		1		30,000	30
Section manager		4		20,000	320
Shift superintendent	1	3		18,000	60
Shift foreman	<u>7</u>	<u>28</u>		16,000	<u>448</u>
Subtotal Supervision	8	36			585
<u>Operators</u>					
Unit 11 (except storage)	9	36			
Unit 12	4	16			
Unit 13	15	60			
Unit 14, 16, 17, 19	4	16			
Unit 18	7	28			
Unit 20	5	20			
Unit 21, 22	4	16			
Unit 24	5	20			
Unit 25, 26, 27	6	24			
Laborers	<u>5</u>	<u>20</u>			
Subtotal Operators	<u>64</u>	<u>256</u>	6.00		<u>3,363</u>
Total	72	292			4,221
Payroll Burden					<u>1,477</u>
Total Operating Labor and Supervision					<u>5,698</u>
<u>Maintenance</u>					
Maintenance superintendent	1			30,000	30
Craft foreman	35			23,000	805
Labor foreman	12			19,000	228
Journeyman	206		8.00		3,428
General labor	<u>95</u>		5.00		<u>988</u>
Total	<u>348</u>				5,479
Payroll Burden					<u>1,918</u>
Total Maintenance Labor and Supervision					<u>7,397</u>

Table 14-16 - Offsites Chemical Requirements/Costs

Chemical	Annual Consumption (Ton)	Annual Cost (\$)
<u>Clarifier</u>		
Aluminum sulfate	660	79,000
Lime	1,000	30,000
Polyelectrolyte polymer	75	90,000
<u>Cooling Tower</u>		
Gaseous chlorine	330	41,000
Inhibitor	225	419,000
Dispersant	66	91,000
<u>Potable Water</u>		
Sodium hypochlorite	33	7,000
<u>Demineralizer</u>		
H <sub>2</sub> SO <sub>4</sub>	300	15,000
NaOH	200	32,000
<u>Boiler Feed Water</u>		
Chelant	15	15,000
Hydrazine	14	14,000
Trisodium phosphate	2	1,000
Total		<u>834,000</u>

Table 14-17 - Offsite Operating Labor Costs

Category	Number of Employees		Salaries and Wages		Payroll Cost (\$1,000/Year)
	Per Shift	Total	(\$/Hour)	(\$/Year)	
<u>Supervision</u>					
Section manager	1	1		20,000	20
Shift superintendent	1	4		18,000	72
Shift foreman	<u>4</u>	<u>16</u>		16,000	<u>256</u>
Subtotal Supervision	6	21			348
<u>Labor</u>					
<u>Coal Storage (Part of Unit 11)</u>					
Reclaimer and loading operator	3	12			
Oiler and groundsman	<u>3</u>	<u>12</u>			
	6	24			
<u>Product Storage (Unit 29)</u>					
Gauger	1	4			
Pump operator	3	12			
Switch engine crew		3			
Loader and car spotter		6			
Laborer	<u>—</u>	<u>3</u>			
	4	28			
<u>Utility Plants (Units 30, 31, 34)</u>					
Treatment plant operator	2	8			
Miscellaneous utilities operator	1	4			
Laborer	<u>—</u>	<u>3</u>			
	3	15			
<u>Power Generation (Unit 32, 33)</u>					
Turbine operator	1	4			
Oiler	2	8			
Control room operator	1	4			
Fireman	<u>2</u>	<u>8</u>			
	6	24			

Table 14-17 (Contd)

Category	Number of Employees		Salaries and Wages		Payroll Cost (\$1,000/Year)
	Per Shift	Total	(\$/Hour)	(\$/Year)	
Total Labor	<u>19</u>	<u>91</u>	6.00		<u>1,185</u>
Total Operating Labor and Supervision		112			1,533
Payroll Burden					<u>537</u>
Total Operating Labor and Supervision					<u><u>2,070</u></u>

Table 14-18 - Offsites Maintenance Labor Costs

Category	Number of Employees		Salaries and Wages		Payroll Cost (\$1,000/Year)
	Per Shift	Total	(\$/Hour)	(\$/Year)	
Superintendent		1		\$26,000	\$ 26
Craft foreman	2	8		20,000	160
Journeyman	8	32	\$8.00		532
Labor foreman		2		18,000	36
Laborer and painter		<u>15</u>	5.00		<u>156</u>
Total		58			910
Payroll burden					<u>318</u>
Total maintenance labor					<u><u>\$1,228</u></u>

Table 14-19 - Contribution of Cost Centers  
to Required Revenue

Category	Break-even		12% Return (DCF)			
			100\$ Equity		65% Debt	
	\$MM/Year	%	\$MM/Year	%	\$MM/Year	%
Coal mine	110.5	44	151.5	30	136.5	34
Coal preparation	4.5	2	11.0	2	8.0	2
Process plant	115.5	45	281.5	55	208.0	52
Offsites	<u>22.5</u>	<u>9</u>	<u>68.5</u>	<u>13</u>	<u>50.5</u>	<u>12</u>
Total	253.0	100	512.5	100	403.0	100
Byproducts	<u>8.0</u>	<u>3</u>	<u>8.0</u>	<u>2</u>	<u>8.0</u>	<u>2</u>
Total Energy	245.0	97	504.5	98	395.0	98
\$/MM Btu	1.125		2.315		1.810	



Table 14-20 - Cash Flow Computer Output  
100% Equity

THE RALPH H. PARSONS COMPANY												
OIL/GAS PLANT JOB NO. 5435 - 2 DATE 08/12/70												
PAGE 1												
CASH FLOW CASE EVALUATION DOLLARS - MILLIONS												
TOTAL COMPLEX 100 PERCENT EQUITY												
VARIATIONS EVALUATED IN THIS CASE ARE:												
COST	Q.0	REVENUE	C.0	INVESTMENT	O.0							
PERIOD	-5	-4	-3	-2	-1	1	2	3	4	5	6	7
[REVENUE]												
REQUIRED REVENUE	0.000	0.000	0.000	0.000	0.000	252.137	504.273	504.273	504.273	504.273	504.273	504.273
SULFUR	0.000	0.000	0.000	0.000	0.000	1.170	2.335	2.335	2.335	2.335	2.335	2.335
AMMONIA	0.000	0.000	0.000	0.000	0.000	2.760	5.565	5.565	5.565	5.565	5.565	5.565
... T O T A L ...	0.000	0.000	0.000	0.000	0.000	256.067	512.173	512.173	512.173	512.173	512.173	512.173
[COSTS]												
MINE ROYALTY	0.000	0.000	0.000	0.000	0.000	8.828	17.657	17.657	17.657	17.657	17.657	17.657
OPERATING SUPPLIES	0.000	0.000	0.000	0.000	0.000	5.626	11.252	11.252	11.252	11.252	11.252	11.252
CATALYST + CHEMICALS	0.000	0.000	0.000	0.000	0.000	7.027	15.254	15.254	15.254	15.254	15.254	15.254
OPERATING LABOR	0.000	0.000	0.000	0.000	0.000	17.815	37.615	37.615	37.615	37.615	37.615	37.615
PAYROLL BURDEN	0.000	0.000	0.000	0.000	0.000	10.151	20.151	20.151	20.151	20.151	20.151	20.151
PLANT OVERHEAD/ADMIN	0.000	0.000	0.000	0.000	0.000	15.661	31.322	31.322	31.322	31.322	31.322	31.322
UNION WELFARE	0.000	0.000	0.000	0.000	0.000	6.770	13.537	13.537	13.537	13.537	13.537	13.537
MISC COSTS	0.000	0.000	0.000	0.000	0.000	0.278	0.556	0.556	0.556	0.556	0.556	0.556
G AND A OVERHEAD	0.000	0.000	0.000	0.000	0.000	2.888	5.776	5.776	5.776	5.776	5.776	5.776
MAINTENANCE MATERIAL	0.000	0.000	0.000	0.000	0.000	21.627	43.254	43.254	43.254	43.254	43.254	43.254
MAINTENANCE LABOR	0.000	0.000	0.000	0.000	0.000	11.187	22.374	22.374	22.374	22.374	22.374	22.374
PROPERTY TAX + INSUR	0.000	0.000	0.000	0.000	0.000	33.688	67.376	67.376	67.376	67.376	67.376	67.376
... T O T A L ...	0.000	0.000	0.000	0.000	0.000	142.146	284.292	284.292	284.292	284.292	284.292	284.292
DEPRECN - MINE	0.000	0.000	0.000	0.000	0.000	45.700	91.400	91.400	91.400	91.400	91.400	91.400
DEPRECN - COAL PREP	0.000	0.000	0.000	0.000	0.000	6.136	12.272	12.272	12.272	12.272	12.272	12.272
DEPRECN - PROCESS	0.000	0.000	0.000	0.000	0.000	152.736	305.472	305.472	305.472	305.472	305.472	305.472
DEPRECN - OFF-SITES	0.000	0.000	0.000	0.000	0.000	21.675	43.350	43.350	43.350	43.350	43.350	43.350
DEPLETION ALLOWANCE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
COST + DEPR + DEPL	0.000	0.000	0.000	0.000	0.000	36.774	73.548	73.548	73.548	73.548	73.548	73.548
PROFIT BEFORE TAX	0.000	0.000	0.000	0.000	0.000	-111.706	224.989	224.989	224.989	224.989	224.989	224.989
INCOME TAXES	0.000	0.000	0.000	0.000	0.000	-28.087	56.174	56.174	56.174	56.174	56.174	56.174
TAX CREDIT	0.000	0.000	0.000	0.000	0.000	110.250	0.000	0.000	0.000	0.000	0.000	0.000
PROFIT AFTER TAX	0.000	0.000	0.000	0.000	0.000	56.631	113.271	113.271	113.271	113.271	113.271	113.271
AVERAGE ANNUAL NET PROFIT	114.142											
[INVESTMENT]												
LAND	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FIXED CAP INVESTMENT	28.000	117.000	368.000	576.000	134.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
INITIAL CAT + CHEM.	0.000	0.000	0.000	0.000	0.000	8.000	0.000	0.000	0.000	0.000	0.000	0.000
START-UP COSTS	0.000	0.000	0.000	0.000	0.000	42.000	38.000	0.000	0.000	0.000	0.000	0.000
EQUIPMENT REPLACEMNT	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TOTAL FIXED INVEST.	29.000	117.000	368.000	576.000	134.000	38.000	0.000	0.000	0.000	0.000	0.000	0.000
WORKING CAP PAID IN	0.000	0.000	0.000	0.000	0.000	72.500	0.000	0.000	0.000	0.000	0.000	0.000
ACCM GROSS CF TOTAL	-29.000	-117.000	-368.000	-576.000	-134.000	-110.422	-84.943	-61.345	-38.311	-16.730	21.152	22.153
NET CASH FLOW	-29.000	-117.000	-368.000	-576.000	-134.000	17.776	254.279	233.898	226.734	208.551	201.692	200.421
ACCM NET CASHFLOW	-29.000	-117.000	-368.000	-576.000	-134.000	-110.422	-84.943	-61.345	-38.311	-16.730	21.152	22.153

NET CASH FLOW DISCOUNTED AT 12.000 / PERIOD

PAY-OUT PERIOD FROM START OF OPERATION IS 5.536

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Table 14-20 (Contd)

		THE RALPH H. PARSONS COMPANY										PAGE 2	
CASH FLOW CASE EVALUATION		OIL/GAS PLANT										DATE 08/12/76	
DOLLARS - MILLIONS		JOB NO. 5435 - 2											
TOTAL COMPLEX													
100 PERCENT EQUITY													
VARIATIONS EVALUATED IN THIS CASE ARE:													
COST	0.0	REVENUE	0.0	INVESTMENT	0.0								
PERIOD	8	9	10	11	12	13	14	15	16	17	18	19	
<b>[REVENUE]</b>													
REQUIRED REVENUE	504.273	504.273	504.273	504.273	504.273	504.273	504.273	504.273	504.273	504.273	504.273	504.273	
SULFUR	2.335	2.335	2.335	2.335	2.335	2.335	2.335	2.335	2.335	2.335	2.335	2.335	
AMMONIA	5.565	5.565	5.565	5.565	5.565	5.565	5.565	5.565	5.565	5.565	5.565	5.565	
... T O T A L ...	512.173	512.173	512.173	512.173	512.173	512.173	512.173	512.173	512.173	512.173	512.173	512.173	
<b>[COSTS]</b>													
MINE ROYALTY	17.657	17.657	17.657	17.657	17.657	17.657	17.657	17.657	17.657	17.657	17.657	17.657	
OPERATING SUPPLIES	11.252	11.252	11.252	11.252	11.252	11.252	11.252	11.252	11.252	11.252	11.252	11.252	
CATALYST + CHEMICALS	15.254	15.254	15.254	15.254	15.254	15.254	15.254	15.254	15.254	15.254	15.254	15.254	
OPERATING LABOR	17.815	17.815	17.815	17.815	17.815	17.815	17.815	17.815	17.815	17.815	17.815	17.815	
PAYROLL BURDEN	10.151	10.151	10.151	10.151	10.151	10.151	10.151	10.151	10.151	10.151	10.151	10.151	
PLANT OVERHEAD/ADMIN	15.661	15.661	15.661	15.661	15.661	15.661	15.661	15.661	15.661	15.661	15.661	15.661	
UNION WELFARE	13.537	13.537	13.537	13.537	13.537	13.537	13.537	13.537	13.537	13.537	13.537	13.537	
MISC COSTS	.556	.556	.556	.556	.556	.556	.556	.556	.556	.556	.556	.556	
GENERAL OVERHEAD	2.888	2.888	2.888	2.888	2.888	2.888	2.888	2.888	2.888	2.888	2.888	2.888	
MAINTENANCE MATERIAL	43.254	43.254	43.254	43.254	43.254	43.254	43.254	43.254	43.254	43.254	43.254	43.254	
MAINTENANCE LABOR	11.187	11.187	11.187	11.187	11.187	11.187	11.187	11.187	11.187	11.187	11.187	11.187	
PROPERTY TAX + INSUR	33.688	33.688	33.688	33.688	33.688	33.688	33.688	33.688	33.688	33.688	33.688	33.688	
... T O T A L ...	192.900	192.900	192.900	192.900	192.900	192.900	192.900	192.900	192.900	192.900	192.900	192.900	
DEPRECN - MINE	12.753	11.367	10.801	8.641	6.007	6.406	6.603	7.997	7.516	6.084	6.061	4.849	
DEPRECN - COAL PREP	2.025	2.025	2.025	2.025	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
DEPRECN - PROCESS	50.400	50.400	50.400	50.400	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
DEPRECN - OFF-SITES	10.080	9.072	8.165	7.348	7.348	7.348	7.348	7.348	7.348	7.348	7.348	7.348	
DEPLETION ALLOWANCE	15.152	15.162	15.162	15.162	15.162	15.162	15.162	15.162	15.162	15.162	15.162	15.162	
COST + DEPR + DEPL	283.320	280.926	279.453	276.476	223.417	221.816	222.013	223.407	222.926	221.494	221.471	220.259	
PROFIT BEFORE TAX	228.853	231.247	232.720	235.697	268.756	290.357	290.160	288.766	289.247	290.679	290.702	291.914	
INCOME TAXES	119.000	120.249	121.015	122.563	150.153	150.986	150.883	150.159	150.409	151.153	151.165	151.795	
TAX CREDIT	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
PROFIT AFTER TAX	109.853	110.997	111.705	113.133	138.603	139.372	139.277	138.608	138.839	139.526	139.537	140.119	
AVERAGE ANNUAL NET PROFIT	114.142												
<b>[INVESTMENT]</b>													
LAND	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
FIXED CAP INVESTMENT	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
INITIAL CAT + CHEM.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
START-UP COSTS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
EQUIPMENT REPLACEMENT	5.590	5.825	8.537	0.000	5.471	0.000	.490	13.571	5.590	.355	5.971	0.000	
TOTAL FIXED INVEST.	5.590	5.825	8.537	0.000	5.471	0.000	.490	13.571	5.590	.355	5.971	0.000	
WORKING CAP PAID IN	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
ACCUM GROSS CF TOTAL	418.263	609.463	799.184	995.895	1159.544	1327.832	1495.232	1650.776	1814.050	1981.815	2143.953	2311.430	
NET CASH FLOW	194.660	193.200	189.722	196.711	463.649	168.283	167.400	155.544	163.275	167.765	162.137	167.478	
ACCUM NET CASHFLOW	418.263	609.463	799.184	995.895	1159.544	1327.832	1495.232	1650.776	1814.050	1981.815	2143.953	2311.430	
----- NET CASH FLOW DISCOUNTED AT 12.000 / PERIOD -----													
PAY-BACK PERIOD FROM START OF OPERATION IS 5.536													

Table 14-20 (Contd)

CASH FLOW CASE EVALUATION		THE RALPH M. PARSONS COMPANY		OIL/GAS PLANT		PAGE 3	
DOLLARS - MILLIONS				JOB NO. 5435 - 2		DATE 08/12/76	
TOTAL COMPLEX 100 PERCENT EQUITY							
VARIATIONS EVALUATED IN THIS CASE ARE:							
COST	REVENUE	INVESTMENT					
PERIOD	20						
<b>[REVENUE]</b>							
REQUIRED REVENUE	504.273						
SULFUR	2.335						
AMMONIA	5.565						
... T O T A L ...	512.173						
<b>[COSTS]</b>							
MINE ROYALTY	17.657						
OPERATING SUPPLIES	11.252						
CATALYST + CHEMICALS	15.254						
OPERATING LABOR	17.845						
PAYROLL BURDEN	10.151						
PLANT OVERHEAD/ADMIN	15.661						
UNION WELFARE	13.537						
MISC COSTS	5.556						
G AND A OVERHEAD	2.888						
MAINTENANCE MATERIAL	43.254						
MAINTENANCE LABOR	11.187						
PROPERTY TAX + INSUR	33.686						
... T O T A L ...	192.906						
DEPRECN - MINE	3.679						
DEPRECN - COAL PREP	0.000						
DEPRECN - PROCESS	0.000						
DEPRECN - OFF-SITES	7.346						
DEPLETION ALLOWANCE	19.162						
COST + DEPR + DEPL	219.269						
PROFIT BEFORE TAX	292.884						
INCOME TAXES	152.300						
TAX CREDIT	3.000						
PROFIT AFTER TAX	140.584						
AVERAGE ANNUAL NET PROFIT	114.142						
<b>[INVESTMENT]</b>							
LAND	0.000						
FIXED CAP INVESTMENT	3.000						
INITIAL CAT + CHEM.	3.006						
START-UP COSTS	0.000						
EQUIPMENT REPLACEMENT	0.000						
TOTAL FIXED INVEST.	0.000						
WORKING CAP PAID IN	-72.530						
ACCUM GROSS CF TOTAL	2550.934						
NET CASH FLOW	239.473						
ACCUM NET CASHFLOW	2250.904						
----- NET CASH FLOW DISCOUNTED AT 12.000 / PERIOD -----							
PAY-PUT PERIOD FROM START OF OPERATION IS 0.536							

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Table 14-21 - Cash Flow Computer Output  
65% Debt/35% Equity

THE RALPH M. PARSONS COMPANY

OIL/GAS PLANT  
JOB NO. 5435 - 2 DATE 08/12/76

PAGE 1

CASH FLOW CASE EVALUATION  
DOLLARS - MILLIONS

TOTAL COMPLEX FINANCED WITH 65/35 DEBT/EQUITY RATIO AT 9 PERCENT INTEREST RATE

VARIATIONS EVALUATED IN THIS CASE AREA

PERIOD	-5	-4	-3	-2	-1	1	2	3	4	5	6	7
[REVENUE]												
REQUIRED REVENUE	0.000	0.000	0.000	0.000	0.000	197.383	394.767	394.767	394.767	394.767	394.767	394.767
SULFUR	0.000	0.000	0.000	0.000	0.000	1.170	2.335	2.335	2.335	2.335	2.335	2.335
AMMONIA	0.000	0.000	0.000	0.000	0.000	2.780	5.565	5.565	5.565	5.565	5.565	5.565
... T O T A L ...	0.000	0.000	0.000	0.000	0.000	201.333	402.667	402.667	402.667	402.667	402.667	402.667
[COSTS]												
MINE ROYALTY	0.000	0.000	0.000	0.000	0.000	6.828	17.657	17.657	17.657	17.657	17.657	17.657
OPERATING SUPPLIES	0.000	0.000	0.000	0.000	0.000	5.626	11.252	11.252	11.252	11.252	11.252	11.252
CATALYST + CHEMICALS	0.000	0.000	0.000	0.000	0.000	7.527	15.254	15.254	15.254	15.254	15.254	15.254
OPERATING LABOUR	0.000	0.000	0.000	0.000	0.000	17.815	17.815	17.815	17.815	17.815	17.815	17.815
PAYROLL BURDEN	0.000	0.000	0.000	0.000	0.000	10.151	10.151	10.151	10.151	10.151	10.151	10.151
PLANT OVERHEAD/ADMIN	0.000	0.000	0.000	0.000	0.000	15.661	15.661	15.661	15.661	15.661	15.661	15.661
UNION WELFARE	0.000	0.000	0.000	0.000	0.000	6.770	13.537	13.537	13.537	13.537	13.537	13.537
MISC COSTS	0.000	0.000	0.000	0.000	0.000	2.73	5.56	5.56	5.56	5.56	5.56	5.56
G AND A OVERHEAD	0.000	0.000	0.000	0.000	0.000	2.888	2.888	2.888	2.888	2.888	2.888	2.888
MAINTENANCE MATERIAL	0.000	0.000	0.000	0.000	0.000	21.627	43.254	43.254	43.254	43.254	43.254	43.254
MAINTENANCE LABOUR	0.000	0.000	0.000	0.000	0.000	11.187	11.187	11.187	11.187	11.187	11.187	11.187
PROPERTY TAX + INSUR	0.000	0.000	0.000	0.000	0.000	33.688	33.688	33.688	33.688	33.688	33.688	33.688
INTEREST ON LOAN	0.000	0.000	0.000	0.000	0.000	83.118	78.744	74.369	69.994	65.620	61.245	56.871
INTEREST ON W/CAP.	0.000	0.000	0.000	0.000	0.000	9.000	9.000	9.000	9.000	9.000	9.000	9.000
... T O T A L ...	0.000	2.000	0.000	0.000	0.000	234.264	280.844	276.267	271.694	267.520	263.145	258.771
DEPRECN - MINE	0.000	0.000	0.000	0.000	0.000	92.047	41.637	34.398	27.546	23.572	19.914	16.204
DEPRECN - COAL PREP	0.000	0.000	0.000	0.000	0.000	6.946	5.883	4.650	3.804	3.113	2.547	2.292
DEPRECN - PROCESS	0.000	0.000	0.000	0.000	0.000	172.813	141.392	115.664	94.651	77.442	63.361	51.025
DEPRECN - OFF-SITES	0.000	0.000	0.000	0.000	0.000	24.004	21.603	19.444	17.499	15.749	14.174	12.757
DEPLETION ALLOWANCE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.338	4.558
COST + DEPR + REPL	0.000	0.000	0.000	0.000	0.000	496.074	493.959	450.445	413.394	387.481	365.449	351.607
PROFIT BEFORE TAX	0.000	0.000	0.000	0.000	0.000	-288.741	-83.292	-47.778	-12.728	15.166	37.218	51.660
INCOME TAXES	0.000	0.000	0.000	0.000	0.000	-150.145	-45.912	-24.845	-8.618	7.897	19.393	28.551
TAX CREDIT	0.000	0.000	0.000	0.000	0.000	116.250	0.000	0.000	0.000	0.000	0.000	0.000
PROFIT AFTER TAX	0.000	0.000	0.000	0.000	0.000	-288.346	-42.380	-22.934	-6.109	7.289	17.864	24.509
AVERAGE ANNUAL NET PROFIT						37.779						
[INVESTMENT]												
LAND	1.600	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FIXED CAP INVESTMENT	28.000	119.000	388.000	576.000	134.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
INITIAL CAT + MEM.	0.000	0.000	0.000	0.000	8.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
START-UP COSTS	0.000	0.000	0.000	0.000	42.000	38.000	0.000	0.000	0.000	0.000	0.000	0.000
INT. DURING CONSTR.	0.000	0.622	9.121	62.365	86.223	0.000	0.000	0.000	0.000	0.000	0.000	0.000
COMMITMENT FEE	7.246	7.192	6.485	2.049	0.261	0.000	0.000	0.000	0.000	0.000	0.000	0.000
EQUIPMENT REPLACEMENT	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TOTAL FIXED INVEST.	36.246	126.844	383.607	640.414	284.784	38.000	0.000	0.000	0.000	0.000	0.000	0.000
WORKING CAP PAID IN	0.000	0.000	0.000	0.000	0.000	100.000	0.000	0.000	0.000	0.000	0.000	0.000
BORROWED CAPITAL	7.246	7.644	101.859	540.409	214.786	0.000	0.000	0.000	0.000	0.000	0.000	0.000
WORKING CAP BORROWED	0.000	0.000	0.000	0.000	0.000	100.000	0.000	0.000	0.000	0.000	0.000	0.000
ACCUM GROSS CF TOTAL	-29.000	-148.000	-429.748	-429.753	-479.751	-290.287	-122.352	23.401	160.652	280.227	395.114	511.097
LOAN REPAYMENT	0.000	0.000	0.000	0.000	0.000	48.607	48.607	48.607	48.607	48.607	48.607	48.607
WORKING CAP REPAYMENT	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NET CASH FLOW	-29.000	-148.000	-429.748	-429.753	-479.751	-290.287	-122.352	23.401	160.652	280.227	395.114	511.097
ACCUM NET CASHFLOW	-29.000	-148.000	-429.748	-429.753	-479.751	-336.894	-219.566	-122.420	-33.776	37.192	103.472	170.848
----- NET CASH FLOW DISCOUNTED AT 12.000 / PERIOD -----												
DEBT BALANCE	7.246	15.090	146.949	757.358	472.144	923.537	874.930	826.323	777.716	729.109	680.502	631.895
BALANCE W/CAP LOAN	0.000	0.000	0.000	0.000	0.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000
PAY-OUT PERIOD FROM START OF OPERATION IS 10.992												

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Table 14-21 (Contd)

THE RALPH M. PARSONS COMPANY

GIL/GAS PLANT  
JOB NO. 5435 - 2 DATE 05/12/75 PAGE 2

CASH FLOW CASE EVALUATION  
DOLLARS - MILLIONS

TOTAL COMPLEX FINANCED WITH 65/35 DEBT/EQUITY RATIO AT 9 PERCENT INTEREST RATE

VARIATIONS EVALUATED IN THIS CASE ARE:  
COST O.O REVENUE O.O INVESTMENT O.O

PERIOD	0	1	10	11	12	13	14	15	16	17	18	19	
<b>(REVENUE)</b>													
REQUIRED REVENUE	394.767	394.767	394.767	394.767	394.767	394.767	394.767	394.767	394.767	394.767	394.767	394.767	394.767
SULFUR	2.332	2.332	2.332	2.332	2.332	2.332	2.332	2.332	2.332	2.332	2.332	2.332	2.332
AMMONIA	5.565	5.565	5.565	5.565	5.565	5.565	5.565	5.565	5.565	5.565	5.565	5.565	5.565
... T O T A L ...	402.667	402.667	402.667	402.667	402.667	402.667	402.667	402.667	402.667	402.667	402.667	402.667	402.667
<b>(COSTS)</b>													
MINE ROYALTY	17.657	17.657	17.657	17.657	17.657	17.657	17.657	17.657	17.657	17.657	17.657	17.657	17.657
OPERATING SUPPLIES	11.252	11.252	11.252	11.252	11.252	11.252	11.252	11.252	11.252	11.252	11.252	11.252	11.252
CATALYST + CHEMICALS	15.254	15.254	15.254	15.254	15.254	15.254	15.254	15.254	15.254	15.254	15.254	15.254	15.254
OPERATING LABOR	17.815	17.815	17.815	17.815	17.815	17.815	17.815	17.815	17.815	17.815	17.815	17.815	17.815
PAYROLL BURDEN	10.151	10.151	10.151	10.151	10.151	10.151	10.151	10.151	10.151	10.151	10.151	10.151	10.151
PLANT OVERHEAD/ADMIN	15.661	15.661	15.661	15.661	15.661	15.661	15.661	15.661	15.661	15.661	15.661	15.661	15.661
UNION WELFARE	13.237	13.237	13.237	13.237	13.237	13.237	13.237	13.237	13.237	13.237	13.237	13.237	13.237
MISC COSTS	2.556	2.556	2.556	2.556	2.556	2.556	2.556	2.556	2.556	2.556	2.556	2.556	2.556
G AND A OVERHEAD	2.888	2.888	2.888	2.888	2.888	2.888	2.888	2.888	2.888	2.888	2.888	2.888	2.888
MAINTENANCE MATERIAL	43.234	43.234	43.234	43.234	43.234	43.234	43.234	43.234	43.234	43.234	43.234	43.234	43.234
MAINTENANCE LABOR	11.167	11.167	11.167	11.167	11.167	11.167	11.167	11.167	11.167	11.167	11.167	11.167	11.167
PROPERTY TAX + INSUR	33.688	33.688	33.688	33.688	33.688	33.688	33.688	33.688	33.688	33.688	33.688	33.688	33.688
INTEREST ON LOAN	52.496	48.121	43.747	39.372	34.997	30.623	26.248	21.874	17.499	13.124	8.750	4.375	0.000
INTEREST ON W/CAP.	9.000	9.000	9.000	9.000	9.000	9.000	9.000	9.000	9.000	9.000	9.000	9.000	9.000
... T O T A L ...	254.396	250.021	245.647	241.272	236.897	232.523	228.148	223.774	219.400	215.025	210.650	206.275	201.900
<b>PROFIT BEFORE TAX</b>													
DEPRECN - MINE	14.981	12.430	11.651	9.320	8.592	6.841	5.671	7.251	6.719	5.606	5.674	4.543	3.412
DEPRECN - COAL PREP	2.292	2.292	2.292	2.292	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
DEPRECN - PROCESS	57.025	57.025	57.025	57.025	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
DEPRECN - OFF-SITES	11.481	11.533	9.300	0.370	8.370	6.370	6.370	6.370	6.370	6.370	6.370	6.370	6.370
DEPLETION ALLOWANCE	6.814	7.234	6.013	9.578	10.397	11.216	12.035	12.854	13.673	14.492	15.311	16.130	16.949
COST + DEPR + DEPL	349.289	337.335	333.933	327.957	294.175	254.341	254.775	251.068	247.440	243.812	240.184	236.556	232.928
<b>PROFIT AFTER TAX</b>													
INCOME TAXES	24.837	32.432	35.142	38.901	42.660	46.419	50.178	53.937	57.696	61.455	65.214	68.973	72.732
TAX CREDIT	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>AVERAGE ANNUAL NET PROFIT</b>													
NET CASH FLOW	27.541	30.399	32.992	35.909	38.826	41.743	44.660	47.577	50.494	53.411	56.328	59.245	62.162
<b>(INVESTMENT)</b>													
LAND	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FIXED CAP INVESTMENT	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
INITIAL CAT + CHEM.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
START-UP COSTS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
INT. DURING CONSTR.	3.600	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000
COMMITMENT FEE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
EQUIPMENT REPLACEMENT	2.590	5.825	8.537	0.000	2.471	0.000	0.000	13.571	5.590	3.322	5.971	0.000	0.000
TOTAL FIXED INVEST.	5.590	5.825	8.537	0.000	2.471	0.000	0.000	13.571	5.590	3.322	5.971	0.000	0.000
WORKING CAP PAID IN	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
BORROWED CAPITAL	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
WORKING CAP REPAYMENT	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ACCUM GROSS CF TOTAL	623.942	737.830	850.571	973.059	1061.346	1150.463	1253.588	1340.345	1437.308	1541.392	1641.979	1700.000	1700.000
<b>NET CASH FLOW</b>													
LAN REPAYMENT	48.007	48.007	48.007	48.007	48.007	48.007	48.007	48.007	48.007	48.007	48.007	48.007	48.007
WORKING CAP REPAYMENT	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NET CASH FLOW	64.237	67.281	64.134	73.887	39.676	47.008	48.013	38.193	48.353	59.478	71.379	59.430	59.430
ACCUM NET CASHFLOW	235.086	300.367	364.501	438.388	478.064	525.072	573.085	611.243	659.396	729.073	781.073	820.000	820.000
<b>NET CASH FLOW DISCOUNTED AT 12.000 % PERIOD</b>													
DEBT BALANCE	383.258	235.881	120.074	437.497	389.880	346.293	291.244	243.833	194.432	145.825	97.213	48.811	0.000
BALANCE W/CAP LOAN	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000
PAY-OFF PERIOD FROM START OF OPERATION IS 10.922													

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Table 14-21 (Contd)

CASH FLOW CASE EVALUATION		THE RALPH M. PARSONS COMPANY	OIL/GAS PLANT	PAGE 3	
DOLLARS - MILLIONS			JOB NO. 3435 - 2	DATE 06/12/76	
TOTAL COMPLEX FINANCED WITH 65/35 DEBT/EQUITY RATIO AT 9 PERCENT INTEREST RATE					
VARIATIONS EVALUATED IN THIS CASE ARE:					
COST	0.0	REVENUE	0.0	INVESTMENT	0.0
PERIOD		20			
<b>(REVENUE)</b>					
REQUIRED REVENUE	394.767				
SULFUR	2.335				
AMMONIA	5.565				
*** TOTAL ***	402.667				
<b>(COSTS)</b>					
MINE ROYALTY	17.657				
OPERATING SUPPLIES	41.252				
CATALYST + CHEMICALS	15.254				
OPERATING LABOR	17.815				
PAYROLL BURDEN	10.451				
PLANT OVERHEAD/ADMIN	15.061				
UNION WELFARE	13.537				
MISC COSTS	0.556				
G AND A OVERHEAD	2.038				
MAINTENANCE MATERIAL	43.254				
MAINTENANCE LABOR	11.187				
PROPERTY TAX + INSUR	33.688				
INTEREST ON LOAN	0.000				
INTEREST ON #CAP	0.000				
*** TOTAL ***	192.930				
DEPRECN - MINE	3.634				
DEPRECN - COAL PREP	0.000				
DEPRECN - PROCESS	0.000				
DEPRECN - OFF-SITES	4.370				
DEPLETION ALLOWANCE	13.661				
COST + DEPR + DEPL	218.565				
PROFIT BEFORE TAX	184.132				
INCOME TAXES	95.733				
TAX CREDIT	0.000				
PROFIT AFTER TAX	88.399				
AVERAGE ANNUAL NET PROFIT	37.779				
<b>(INVESTMENT)</b>					
LAND	0.000				
FIXED CAP INVESTMENT	0.000				
INITIAL CAT + CHEM.	0.000				
START-UP COSTS	0.000				
INT. DURING CONSTR.	0.000				
COMMITMENT FEE	0.000				
EQUIPMENT REPLACEMENT	0.000				
TOTAL FIXED INVEST.	0.000				
WORKING CAP PAID IN	-100.000				
BORROWED CAPITAL	0.000				
WORKING CAP BORROWED	0.000				
ACCUM GROSS CF TOTAL	1964.119				
LOAN REPAYMENT	43.607				
WORKING CAP REPAYMENT	100.000				
NET CASH FLOW	65.427				
ACCUM NET CASHFLOW	691.979				
----- NET CASH FLOW DISCOUNTED AT 12.000 / PERIOD -----					
DEBT BALANCE	0.004				
BALANCE #/CAP LOAN	0.000				
PAY-OUT PERIOD FROM START OF OPERATION IS 10.992					

Table 14-22 - Cash Flow Computer Output  
% DCF

THE RALPH M. PARSONS COMPANY												
CASH FLOW CASE EVALUATION												
DBLAKS - MILLIONS												
TJTL COMPLEX												
100 PERCENT EQUITY												
VARIATIONS EVALUATED IN THIS CASE ARE:												
COST	REVENUE	INVESTMENT										
PERIOD	-5	-4	-3	-2	-1	1	2	3	4	5	6	7
[REVENUE]												
REQUIRED REVENUE	0.000	0.000	0.000	0.000	0.000	122.486	244.972	244.972	244.972	244.972	244.972	244.972
SULFUR	0.000	0.000	0.000	0.000	0.000	1.170	2.335	2.335	2.335	2.335	2.335	2.335
AMMONIA	0.000	0.000	0.000	0.000	0.000	2.780	5.565	5.565	5.565	5.565	5.565	5.565
... T J T A L ...	0.000	0.000	0.000	0.000	0.000	126.436	252.872	252.872	252.872	252.872	252.872	252.872
[COSTS]												
MINE RENTAL	0.000	0.000	0.000	0.000	0.000	8.828	17.657	17.657	17.657	17.657	17.657	17.657
OPERATING SUPPLIES	0.000	0.000	0.000	0.000	0.000	5.620	11.252	11.252	11.252	11.252	11.252	11.252
CATALYST + CHEMICALS	0.000	0.000	0.000	0.000	0.000	7.027	15.254	15.254	15.254	15.254	15.254	15.254
OPERATING LABOR	0.000	0.000	0.000	0.000	0.000	17.815	37.815	37.815	37.815	37.815	37.815	37.815
PAYROLL BURDEN	0.000	0.000	0.000	0.000	0.000	10.151	20.151	20.151	20.151	20.151	20.151	20.151
PLANT OVERHEAD/ADMIN	0.000	0.000	0.000	0.000	0.000	15.661	31.322	31.322	31.322	31.322	31.322	31.322
UNION WELFARE	0.000	0.000	0.000	0.000	0.000	6.770	13.537	13.537	13.537	13.537	13.537	13.537
MISC COSTS	0.000	0.000	0.000	0.000	0.000	0.276	0.550	0.550	0.550	0.550	0.550	0.550
G AND A OVERHEAD	0.000	0.000	0.000	0.000	0.000	2.888	5.776	5.776	5.776	5.776	5.776	5.776
MAINTENANCE MATERIAL	0.000	0.000	0.000	0.000	0.000	21.627	43.254	43.254	43.254	43.254	43.254	43.254
MAINTENANCE LABOR	0.000	0.000	0.000	0.000	0.000	11.187	22.374	22.374	22.374	22.374	22.374	22.374
PROPERTY TAX + INSUR	0.000	0.000	0.000	0.000	0.000	33.688	67.376	67.376	67.376	67.376	67.376	67.376
... T O F A L ...	0.000	0.000	0.000	0.000	0.000	142.490	284.980	284.980	284.980	284.980	284.980	284.980
DEPRECN - MINE	0.000	0.000	0.000	0.000	0.000	45.700	91.400	91.400	91.400	91.400	91.400	91.400
DEPRECN - COAL PREP	0.000	0.000	0.000	0.000	0.000	6.130	12.260	12.260	12.260	12.260	12.260	12.260
DEPRECN - PROCESS	0.000	0.000	0.000	0.000	0.000	152.736	305.472	305.472	305.472	305.472	305.472	305.472
DEPRECN - OFF-SITES	0.000	0.000	0.000	0.000	0.000	21.075	42.150	42.150	42.150	42.150	42.150	42.150
DEPLETION ALLOWANCE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
COST + DEPR + DEPL	0.000	0.000	0.000	0.000	0.000	367.793	735.586	735.586	735.586	735.586	735.586	735.586
PROFIT BEFORE TAX	0.000	0.000	0.000	0.000	0.000	-241.357	-482.714	-482.714	-482.714	-482.714	-482.714	-482.714
INCOME TAXES	0.000	0.000	0.000	0.000	0.000	-125.506	-251.012	-251.012	-251.012	-251.012	-251.012	-251.012
TAX CREDIT	0.000	0.000	0.000	0.000	0.000	110.250	220.500	220.500	220.500	220.500	220.500	220.500
PROFIT AFTER TAX	0.000	0.000	0.000	0.000	0.000	-56.613	-112.224	-112.224	-112.224	-112.224	-112.224	-112.224
AVERAGE ANNUAL NET PROFIT						-1.490						
[INVESTMENT]												
LAND	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FIXED CAP INVESTMENT	28.000	119.000	358.000	576.000	134.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
INITIAL CAT + CHEM.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
START-UP COSTS	0.000	0.000	0.000	0.000	0.000	38.000	0.000	0.000	0.000	0.000	0.000	0.000
EQUIPMENT REPLACEMENT	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.490	-1.40	7.675	5.231	1.362
TOTAL FIXED INVEST.	29.000	119.000	358.000	576.000	134.000	38.000	0.000	5.490	-1.40	7.675	5.231	1.362
WORKING CAP PAID IN	0.000	0.000	0.000	0.000	0.000	72.500	0.000	0.000	0.000	0.000	0.000	0.000
ACCUM GROSS CF TOTAL	-29.000	-148.000	-516.000	-1092.000	-1276.000	-1166.454	-1041.200	-937.943	-843.421	-767.188	-697.645	-629.573
NET CASH FLOW	-29.000	-119.000	-368.000	-576.000	-184.000	169.546	125.254	103.257	94.523	76.234	64.543	68.072
ACCUM NET CASHFLOW	-29.000	-148.000	-516.000	-1092.000	-1276.000	-1166.454	-1041.200	-937.943	-843.421	-767.188	-697.645	-629.573
----- NET CASH FLOW DISCOUNTED AT 0.000 / PERIOD -----												
PAY-OFF PERIOD FROM START OF OPERATION IS -5.000												

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Table 14-22 (Contd)

THE RALPH M. PARSONS COMPANY

OIL/GAS PLANT

JOB NO. 5435 - 2 DATE 06/12/76

CASH FLOW CASE EVALUATION  
DOLLARS - MILLIONS

TOTAL COMPLEX  
100 PERCENT EQUITY

VARIATIONS EVALUATED IN THIS CASE ARE:  
COST 0.0 REVENUE 0.0 INVESTMENT 0.0

PERIOD	8	9	10	11	12	13	14	15	16	17	18	19
(REVENUE)												
REQUIRED REVENUE	244.972	244.972	244.972	244.972	244.972	244.972	244.972	244.972	244.972	244.972	244.972	244.972
SULFUR	2.335	2.335	2.335	2.335	2.335	2.335	2.335	2.335	2.335	2.335	2.335	2.335
AMMONIA	5.565	5.565	5.565	5.565	5.565	5.565	5.565	5.565	5.565	5.565	5.565	5.565
... T O T A L ...	252.872	252.872	252.872	252.872	252.872	252.872	252.872	252.872	252.872	252.872	252.872	252.872
(COSTS)												
MINE ROYALTY	17.657	17.657	17.657	17.657	17.657	17.657	17.657	17.657	17.657	17.657	17.657	17.657
OPERATING SUPPLIES	11.252	11.252	11.252	11.252	11.252	11.252	11.252	11.252	11.252	11.252	11.252	11.252
CATALYST + CHEMICALS	15.254	15.254	15.254	15.254	15.254	15.254	15.254	15.254	15.254	15.254	15.254	15.254
OPERATING LABOR	17.815	17.815	17.815	17.815	17.815	17.815	17.815	17.815	17.815	17.815	17.815	17.815
PAYROLL BURDEN	10.151	10.151	10.151	10.151	10.151	10.151	10.151	10.151	10.151	10.151	10.151	10.151
PLANT OVERHEAD/ADMIN	15.661	15.661	15.661	15.661	15.661	15.661	15.661	15.661	15.661	15.661	15.661	15.661
UNION WELFARE	13.537	13.537	13.537	13.537	13.537	13.537	13.537	13.537	13.537	13.537	13.537	13.537
MISC COSTS	.556	.556	.556	.556	.556	.556	.556	.556	.556	.556	.556	.556
G ANJ A OVERHEAD	2.888	2.888	2.888	2.888	2.888	2.888	2.888	2.888	2.888	2.888	2.888	2.888
MAINTENANCE MATERIAL	43.254	43.254	43.254	43.254	43.254	43.254	43.254	43.254	43.254	43.254	43.254	43.254
MAINTENANCE LABOR	11.187	11.187	11.187	11.187	11.187	11.187	11.187	11.187	11.187	11.187	11.187	11.187
PROPERTY TAX + INSLR	33.688	33.688	33.688	33.688	33.688	33.688	33.688	33.688	33.688	33.688	33.688	33.688
... T O T A L ...	192.900	192.900	192.900	192.900	192.900	192.900	192.900	192.900	192.900	192.900	192.900	192.900
DEPRECN - MINE	12.753	11.307	10.801	8.641	8.007	6.406	6.805	7.937	7.210	8.084	5.061	4.649
DEPRECN - COAL PREP	2.025	2.025	2.025	2.025	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
DEPRECN - PROCESS	50.400	50.400	50.400	50.400	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
DEPRECN - OFF-SITE	10.080	9.072	8.165	7.348	7.348	7.348	7.348	7.348	7.348	7.348	7.348	7.348
DEPLETION ALLOWANCE	.197	.890	1.173	2.253	7.570	3.371	3.272	2.375	2.315	3.532	3.543	4.149
COST + DEPR + DEPL	268.395	266.054	265.464	263.567	215.825	210.025	210.123	210.020	210.500	209.804	209.652	209.246
PROFIT BEFORE TAX	-15.463	-13.782	-12.592	-10.695	37.047	42.847	42.749	42.052	42.292	43.008	43.020	43.626
INCOME TAXES	-8.051	-7.167	-6.548	-5.561	19.264	22.230	22.230	21.867	21.992	22.364	22.370	22.686
TAX CREDIT	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
PROFIT AFTER TAX	-7.442	-6.615	-6.044	-5.134	17.783	20.617	20.519	20.185	20.300	20.644	20.650	20.941
AVERAGE ANNUAL NET PROFIT			-1.495									
(INVESTMENT)												
LAND	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FIXED CAP INVESTMENT	0.000	3.600	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
INITIAL CAT + CHEM	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
START-UP COSTS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
EQUIPMENT REPLACEMENT	5.590	5.825	8.537	0.000	5.471	0.000	.990	13.571	5.590	.355	5.971	0.000
TOTAL FIXED INVEST.	5.590	5.825	8.537	0.000	5.471	0.000	.990	13.571	5.590	.355	5.971	0.000
WORKING CAP PAID IN	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ACCUM GROSS CF TOTAL	-567.139	-505.826	-447.843	-382.309	-347.073	-309.381	-272.629	-240.095	-215.704	-178.452	-146.821	-109.534
NET CASH FLOW	62.433	61.314	57.483	65.533	35.237	37.692	35.753	24.524	32.340	37.253	31.031	37.287
ACCUM NET CASH FLOW	-504.706	-444.512	-387.060	-321.536	-286.299	-248.597	-212.844	-178.320	-145.980	-108.727	-77.696	-40.409

----- NET CASH FLOW DISCOUNTED AT 0.000 / PERIOD -----

PAY-JUT PERIOD FROM START OF OPERATION IS -5.000

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Table 14-22 (Contd)

CASH FLOW CASE EVALUATION		THE RALPH M. PARSONS COMPANY		OIL/GAS PLANT		PAGE 3	
DOLLARS - MILLIONS				JOB NO. 5435 - 2		DATE 08/12/76	
TOTAL COMPLEX							
100 PERCENT EQUITY							
VARIATIONS EVALUATED IN THIS CASE ARE:							
COST	Q.0	REVENUE	Q.0	INVESTMENT	Q.0		
PERIOD	20						
[REVENUE]							
REQUIRED REVENUE	244.972						
SULFUR	2.335						
AMMONIA	2.505						
... T O T A L ...	249.812						
[COSTS]							
MINE ROYALTY	17.657						
OPERATING SUPPLIES	11.292						
CATALYST + CHEMICALS	12.254						
OPERATING LABOR	17.340						
PAYROLL BURDEN	13.151						
PLANT OVERHEAD/ADMIN	19.651						
UNION WELFARE	13.937						
MISC COSTS	.226						
G AND A OVERHEAD	2.658						
MAINTENANCE MATERIAL	43.254						
MAINTENANCE LABOR	11.107						
PROPERTY TAX + INSUR	35.686						
... T O T A L ...	192.730						
DEPRECN - MINE	3.074						
DEPRECN - GJAL PRSP	0.000						
DEPRECN - PROCESS	0.000						
DEPRECN - OFF-SITES	7.349						
DEPLETION ALLOWANCE	4.634						
COST + DEPR + DEPL	204.751						
PROFIT BEFORE TAX	44.111						
INCOME TAXES	22.938						
TAX CREDIT	0.000						
PROFIT AFTER TAX	21.173						
AVERAGE ANNUAL NET PROFIT	-1.492						
[INVESTMENT]							
LAND	0.000						
FIXED CAP INVESTMENT	0.000						
INITIAL CAP + CHEM.	0.000						
START-UP COSTS	0.000						
EQUIPMENT REPLACEMENT	0.000						
TOTAL FIXED INVEST.	0.000						
WORKING CAP PAID IN	-72.536						
ACCUM GRGSS CF TOTAL	-72.536						
NET CASH FLOW	107.534						
ACCUM NET CASH FLOW	-72.536						
----- NET CASH FLOW DISCOUNTED AT 0.000 / PERIOD -----							
PAY-JUT PERIOD FROM START OF OPERATION IS -5.0000							
VARIATIONS EVALUATED IN THIS CASE ARE:							
C O S T	I N V E S T M E N T S	R E V E N U E					
0.0	0.0	0.0	0.0	0.0	0.0		

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Table 14-23 - Evaluation of Effect of Possible Product Market Values on Profitability

Products	Daily Output	Possible Unit Sales Price (\$)	Possible Annual Sales (\$ Million)	Required Selling Price		
				0% DCF	12% DCF	
					100% Equity	65% Debt
SNG	170 MM SCFD	4.25/MCF	238.425	2.05	4.25	3.30
Propane	6,030 BPD	11.00/bb1	21.890	5.35	11.00	8.60
Butane	4,100 BPD	12.00/bb1	16.235	5.80	12.00	9.35
Naphthas	9,400 BPD	15.50/bb1	48.080	7.50	15.50	12.10
Fuel Oil	56,400 BPD	9.75/bb1	<u>181.470</u>	4.70	9.75	7.60
Total Energy			506.100			
Sulfur	118 LT/D	60/ton	2.335	\$60/ton	\$60/ton	\$60/ton
Ammonia	90 ST/D	120/ton	5.565			
			514.000			

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