Section 7

CRITICAL AREAS OF THE DESIGN

The most critical technical area involved in the design described in this report concerns the Texaco Coal Gasification Process. Although this process has been extensively pilot planted both at Montebello, California and at Oberhausen, Germany, the process has not yet been applied on a commercial scale. The objective of programs already underway is to provide a reliable basis for the design of a plant such as the one described herein. Among the important design parameters which can be firmly established by these programs are:

- Coal slurry concentration
- Gasifier temperature
- Preferred waste heat boiler-type and performance
- Refractory life
- Gasifier capacity
- Treatment of aqueous effluent
- Control characteristics

It is also important that the operation of centrifugal compressors in oxygen service at pressures to 1050 psig, or even higher, be demonstrated over extended periods of time.

Another critical design item is the development of a sulfur removal scheme to produce a methanol synthesis gas containing only trace amounts of sulfur to assure the longevity of the methanol synthesis catalyst. It appears that the design included herein should accomplish this objective.

A methanol specification is desired that accurately describes the needs of a turbine fuel, especially with respect to its water content. It appears that the 0.75 weight percent water included in the EPRI specification may be overly restrictive at least for those cases where the methanol is not shipped for long distances.

Section 8

CONCLUSIONS AND RECOMMENDATIONS

The design prepared during this study appears to be a promising route to produce methanol from coal. The Texaco coal gasification process is well suited to gasifying Eastern bituminous coal and generating a high-pressure gas with low inerts for use as methanol synthesis gas.

Most of the steps employed in the design including shift conversion, acid gas removal, and methanol synthesis represent proven technology whose costs are well known. There are some technological uncertainties concerning the Texaco process, however, which have not yet been fully resolved. These critical questions relate to refractory life and to the design and cost of the waste heat boilers. Although the radiant section of the waste heat boiler at the 150 tpd Texaco pilot plant in Oberhausen, West Germany, has reportedly operated in a satisfactory manner, no complete waste heat boiler has yet seen service at any location, and no waste heat boiler of any kind has been operated in the United States. Before the overall scheme described in this report could be applied on a commercial scale, it is necessary that satisfactory demonstration of all the critical elements of the Texaco process be carried out. Programs already underway may provide this demonstration at an early date.

Although the Texaco process appears to be an excellent candidate for gasifying Eastern bituminous coal in the configuration described herein, it is important to keep in mind that it is less well suited to gasifying high-equilibrium moisture content coals such as lignites and some subbituminous coals. High slurry concentrations cannot be achieved with these coals but are essential in order to achieve good thermal efficiencies. Other gasification systems may be preferred for high-equilibrium moisture content coals whose slurrying characteristics make it impossible to reach high slurry concentrations.

REQUIRED METHANOL SELLING PRICES

Introduction

This section presents a calculation of the required selling prices of the methanol product. A required selling price is that required for a minimum acceptable return on common equity. The required prices are calculated using discounted cash flow methodology. In the base case, the methanol plant is assumed to be owned by a non-regulated producer and to be funded with 100% common equity capital. As a sensitivity case, the plant is assumed to be owned and operated by a regulated utility producer. Discounted cash flow rates of return to non-regulated producers when the methanol is sold at the market price of competitive fuels were also calculated. Changes in required prices with changes in plant and coal costs and other parameters were also determined.

The "base case" calculations are based in part on the following;

- Plant Location:
  - Southern Illinois Mine Mouth.
- Coal type and feed rates:
  - 16,418 short tons per day of Illinois Number 6 at design capacity; 5,393,300 short tons per year at a 90% plant capacity factor.

- Coal purchase price and heating value:

  - $24.25 per short ton as received, mid-1980 dollars, which is equivalent to $1.14 per million Btu higher heating value. The coal purchase price is assumed to increase at a rate of 1.0% per year over the inflation rate to account for the effect of resource depletion.

  - The higher heating value of coal as received is 21.73 million Btu per short ton, or 10,637 Btu per pound.

- The methanol production rate, expressed in several ways, is:

  - 10,927 short tons per day, at design capacity.

  - 78,450 barrels per day, at design capacity.

  - 3.295 million gallons per day, at design capacity.

  - 8.8125 billion Btu per hour (higher heating value), at design capacity.

  - 38,300 barrels per day distillate fuel oil higher heating value equivalent, at design capacity.

- The thermal efficiency of methanol production (higher heating value basis) is 57.86 per cent, not including the heating value of by-products.

- A monetary inflation rate of 10 per cent per year was used in the analysis. This rate was applied to all components of cost, e.g., capital, coal, and operating costs.

- Required returns on common equity were set at 20%/year for a non-regulated producer.

- Plants were financed with 100% common equity by the non-regulated producer.

- Plant design and construction was assumed to commence at the beginning of 1985, and commercial operation to start at the beginning of 1990.

For the regulated utility sensitivity case, the plant was financed with 35% common equity, 15% preferred stock, and 50% debt. Required return on common equity was set at 16% per year, preferred stock dividends at 12.75% per year, and interest on debt at 12.25%/year.

SUMMARY OF RESULTS

The required selling price for a non-regulated producer was found to be:

Table A-1

Required Methanol Selling Prices

Non-Regulated Producer

	In Current Dollars at the Beginning of 1990	In Mid-1980 Dollars
Per Million Btu Higher Heating Value	$ 18.57	$ 7.51
Per Million Btu Lower Heating Value	21.05	8.51
Per Barrel Distillate Fuel Oil Equivalent Higher Heating Value	108.63	43.93
Per Gallon Methanol Fuel	122.4¢	49.5¢

The required selling price in current dollars is defined as the price which if inflated 10% per year together with coal and operating costs will yield the producer a minimum acceptable rate of return on common equity of 20%/yr. This rate of return, is derived from the assumption that the minimum acceptable rate of return is 9.1% per year in the absence of inflation. At 10% per year inflation, the minimum acceptable return becomes (1.091)(1.10) - 1.0 = 0.20 per year (20.0%/yr) to preserve the 9.1% per year constant dollar return.

The most significant price in the above table is the $7.51 per million Btu in mid-1980 dollars. This is simply the price required at the beginning of 1990 de-escalated at 10% per year to mid-1980. The mid-1980 required price can then be compared with the costs of competitive fuels at that same time. For example, using a mid-1980 landed Algerian or Libyan crude oil cost of $38 per barrel*, an approximate refining cost of $5 per barrel of crude oil, a higher heating value of 5.85 million Btu per barrel for both crude oil and products, and a ratio of product to crude oil volume of 0.9, the cost of refined products from these crude oils would be $8.17 per million Btu (mid-1980$). For comparison, the weighted average wholesale price of three major refined products (gasoline, distillate fuel oil and 0.3% sulfur fuel oil) was calculated to be over $8 per million Btu from data in the April 27, 1981 Oil and Gas Journal, pp. 239 and 240. Since the mid-1980 required methanol price would be less than the cost of competitive fuels, the producer would realize rates of return higher than 20% per year if the methanol were sold at the competitive cost, as shown in Table A-2.

*This price was chosen to reflect a totally decontrolled petroleum price situation.

Table A-2

Rates of Return on Common Equity

Methanol Sold at Competitive Fuel Cost*

Competitive Fuel Cost Escalation Rate	Rate of Return
10% per year[†]	22.3% per year
12.2% per year[δ]	31.2% per year

*$8.17/Million Btu (mid-1980).

[†]10%/year general inflation, no "real" cost increase.

[δ]10%/year general inflation, 2% per year "real" increase.

Based on the above, it appears that methanol from coal has an excellent chance of becoming competitive in the liquid fuels market. However, it is prudent to test the sensitivity of the required methanol price to factors that could potentially increase costs. These sensitivities are reported in Table A-3.

Table A-3

Effect of Factors That Could Increase Required Methanol Price

	Required Price Mid-1980$/MMBtu HHV	% Increase Over Base Case
• Base Case	$7.51	—
• "Real" cost of coal increase at 3%/year	$8.41	12.0
• Plant facilities cost 35% more than in base case	$9.19	22.4
• Thermal efficiency of methanol production decreases 10%	$8.26	10.0
• Construction period lengthens by 2 years*	$7.56, $8.49	0.7, 13.0

*The required price is sensitive to the fractions of expenditure for plant in each year of the extended construction period. The prices shown are respectively for: (1) no expenditures in the first two years followed by the same fractional expenditures in the last five years as in the five year base case, and (2) the same fractional expenditures in the first five years as in the five year base case followed by no expenditures in the last two years. The first case might be the result of intervenor objections when the project is announced and the second the result of a delay by intervenors of plant start-up.

Except for the plant cost overrun, none of the negative factors, taken alone would cause the required price to exceed the $8.17 per million Btu cost of competitive petroleum fuels by a wide enough margin to rule methanol out of the clean liquid fuel market. However, even with the plant cost overrun, if the methanol is sold at the cost of competitive fuels with the competitive fuel cost increasing at 2%/year in real dollars, the rate of return would be in excess of the 20%/yr. required return.

Effects of factors that could decrease the required price were also calculated. They are listed in Table A-4.

Table A-4

Effect of Factors That Would Decrease The Required Methanol Price

	Required Price Mid-1980$/MMBtu HHV	% Decrease From Base Case
• Base case	$7.51	—
• Thermal efficiency of methanol production increases 10%	$6.83	9.0
• Investment tax credit rate increases to 25% (over 10% used in base case)	$6.76	10.0
• Construction period shortens by one year*	$7.29	3.0
• Inflation rate decreased to 5%/yr.	$7.47	0.5
• 75 per cent of plant facilities investment financed with loan guarantee	$5.41	28.0
• Plant owned by regulated utility:		
First year (1990)	$6.10	
Fifth year (1994)	$5.42	
Tenth year (1999)	$4.83	
Twentieth year (2009)	$4.07	
Levelized	$4.87	35.0

*The required price is sensitive to the fractions of expenditures for plant in the shortened construction period. Fractions used were:

Year	Shortened Period	Base Case
1	0.15	0.1
2	0.25	0.2
3	0.40	0.3
4	0.20	0.2
5		0.2

As might be expected, the loan guarantee has a dramatic effect, indicating that any appreciable level of loan guarantee up to 75% will provide significant price protection. The interest rate on the loan is 12.25% per year. As also might be expected, the required prices would also decrease substantially if the plant were owned by a regulated utility.

The balance of this section presents plant costs as estimated by Fluor, an estimate of operating costs, and methodology used in calculating required selling prices and other financial information presented above.

Estimated Cost of Plant

The plant facilities investment expressed in mid-1979 dollars is presented in Table A-5 and A-6 by plant section. The figures in Table A-5 are based on a U.S. Gulf Coast location. Factors are applied to these figures to estimate the cost of the facilities at an Illinois location, as presented in Table A-6. As noted, costs in Table A-6 were increased by 13 percent to convert them to mid-1980$, to enable calculation of required prices expressed in mid-1980$. Process and project contingencies have been added. Process contingencies are added only to those sections of the plant not considered to be commercially proven at this time. Process and project contingency rates used in this estimate are shown in Table A-7.

The estimate of plant cost is a "factored" estimate. In this type of estimate, vendor quotations are obtained for the major equipment items, and sales taxes and costs of transportation to the site are added. Then factors are applied to cover all costs necessary to construct the

Table A-5

ESTIMATED PLANT FACILITIES INVESTMENT
THOUSAND MID-1979
U.S. GULF COAST LOCATION

Plant Section	Cost Without Contingencies: Direct Field Material	Labor	Engineering and Support	By Others	Sales Tax	Total Cost	Contingencies: Process	Project	Total Plant Investment
Coal Preparation	8,676	2,687	5,105		441	16,909	-	2,536	19,445
Air Separation	57,967	10,605	28,928	107,929	2,748	208,177	-	41,635	249,812
Coal Gasification	114,257	27,536	56,733		5,713	204,239	20,424	61,272	285,935
Gas Processing and Cooling	14,839	6,493	10,691		693	32,716	-	6,543	39,259
Acid Gas Removal	12,636	4,089	11,413	74,867	645	103,650	-	20,730	124,380
Methanol	68,398	8,660	19,749		2,469	99,276	-	19,855	119,131
Emissions Control	5,643	853	2,565	7,369	287	16,717	232	3,344	20,293
Steam and Power Generation	25,840	5,498	11,822		1,279	44,439	-	11,110	55,549
Product Storage	12,035	7,943	10,132		286	30,396	-	6,079	36,475
Utilities	16,728	7,255	11,434		703	36,120	-	9,030	45,150
Offsites	27,326	11,277	16,090		877	55,570	-	16,671	72,241
Total	364,345	92,896	184,662	190,165	16,141	848,209	20,656	198,805	1,067,670

Table A-6

ESTIMATED PLANT FACILITIES INVESTMENT
THOUSAND MID-1979 DOLLARS
ILLINOIS LOCATION

Plant Section	Cost Without Contingencies: Direct Field Material	Direct Field Labor	Engineering and Support	By Others	Sales Tax	Total Cost	Contingencies: Process	Project	Total Plant Investment
Coal Preparation	8,682	3,494	6,535		448	19,159	-	2,874	22,033
Air Separation	58,174	13,497	33,955	107,929	2,771	216,326	-	43,265	259,591
Coal Gasification	114,396	35,677	71,118		5,780	226,971	22,697	68, 91	317,759
Gas Processing and Cooling	14,922	8,333	13,915		708	37,878		7,576	45,454
Acid Gas Removal	12,644	5,318	13,593	74,867	655	107,077	-	21,415	128,492
Methanol	68,684	10,836	23,461		2,486	105,467	-	21,093	126,560
Emissions Control	5,643	1,112	3,026	7,369	289	17,439	232	3,488	21,159
Steam and Power Generation	25,881	7,100	14,646		1,292	48,919	-	12,230	61,149
Product Storage	12,396	9,780	13,204		300	35,680	-	7,136	42,816
Utilities	16,901	9,181	14,766		718	41,566	-	10,392	51,958
Offsites	27,882	13,817	20,311		896	62,906	-	18,872	81,778
SUBTOTAL	366,205	118,145	228,530	190,165	16,343	919,388	22,929	216,432	1,158,749
Initial Fill of Chemicals & Catalysts									8,776
Total Plant Facilities Investment									$1,161,525

Note: For required price calculations, plant facilities investment was increased by 13% to escalate the estimate to mid 1980$ ($1,161,525 x 1.13 = $1,312,500).

Table A-7

CONTINGENCY RATES

Section	Process Contingency, Percent	Project Contingency, Percent
Coal Preparation	0	15
Air Separation	0	20
Coal Gasification	10	30
Gas Processing and Cooling		
COS Hydrolysis	0	20
Shift Conversion	0	20
Acid Gas Removal (Rectisol)	0	20
Methanol		
Methanol Synthesis	0	20
Methanol Refining	0	20
Emissions Control		
Claus Sulfur	0	20
Tail Gas Treating	3	20
Steam and Power Generation		
Boiler Plant	0	25
Turbogenerators	0	25
Product Storage and Shipping	0	20
Utilities	0	25
Off-sites	0	30

plant, such as engineering, field labor, piling, foundations, structural steel, piping, instrumentation, electrical, painting, contractor fee, etc. The factors used are based on the Contractor's experience in constructing similar facilities.

A factored estimate is usually expected to be accurate within the range of plus or minus 30 per cent.

Plant Operating Costs

Estimates of these costs are summarized in Table A-8.

The number of operating jobs necessary to operate the plant was estimated by Fluor. The annual cost of operating labor was then calculated using an hourly rate of $20.00 per person hour including 35% payroll burden (mid-1980$).

Annual maintenance costs (labor and material) were based on the following rates:

Plant Section	Maintenance Costs Percent of Mid-1980 Installed Cost
Coal Preparation	3.0
Air Separation	2.0
Coal Gasification	4.5
Gas Processing and Cooling	2.5
Acid Gas Removal	2.5
Methanol Synthesis and Refining	3.0
Emission Control	2.5
Steam and Power Generation	1.5
Product Storage	2.0
Utilities	1.5
Offsites	1.0

Table A-8

Estimated Plant Operating Costs

Thousand Mid-1980 Dollars Annually

Fixed Costs	
Operating Labor	$10,862
Maintenance Labor	14,514
Maintenance Material	21,772
Administrative and Support Labor	7,613
General and Administrative Expense	12,051
Total	$66,812
Variable Costs*	
Water	$ 2,453
Catalysts and Chemicals	7,074
Ash Disposal	3,093
Total	$12,566

*At 100% annual capacity factor.

The annual cost calculated using these rates was then divided into 40% labor and 60% material. Administrative and support labor was estimated to be 30% of operating and maintenance labor.

General and administrative expense to cover all other plant expense and additional corporate expense was estimated at 0.7% of plant facilities investment.

Variable operating costs are dependent on plant capacity factor. The bases for these costs are:

- Raw water - 50¢ per thousand gallons (mid-1980$).
- Catalysts and Chemicals - Market prices (See Table A-9). The annual makeup cost in Table A-9 was increased by 13% to reflect mid-1980$, then converted to a cost at 100% capacity factor for reporting in Table A-8.
- Ash disposal - $5 per short ton (mid-1980$).

Required Selling Prices of Methanol Product - Base Case

The total capital requirement for the base case is presented in Table 6-10. A five year design and construction period is assumed with plant expenditures assumed to occur in the following fractions:

Year	Fraction
1	0.1
2	0.2
3	0.3
4	0.2
5	0.2

The amount of escalation in plant facilities investment as a result of 10%/year inflation assumed throughout the calculations is added to arrive at the escalated investment in plant facilities. For this calculation, expenditures are assumed to be made in the middle of each year.

An <u>allowance for funds during construction</u> is calculated. Its meaning and the method of its calculation is presented later.

Table A-9

CATALYSTS AND CHEMICALS COSTS
MID-1979 DOLLARS

Unit	Catalyst or Chemical	Initial Charge Amount	Initial Charge Cost, $	Annual Makeup (90% cap. fac.) Amount	Annual Makeup (90% cap. fac.) Costs, $
21	Waste Water Treating Chemicals				210,000
31	COS Hydrolysis Catalyst	103,000 lb	186,000	34,500 lb	62,000
	Sour Shift Catalyst	480,000 lb	1,872,000	96,000 lb	375,000
32	Methanol Solvent	210,000 gal	105,000	*	
41	Zinc Oxide Sulfur Adsorbent	167,000 lb	184,000	167,000 lb	184,000
	Methanol Synthesis Catalyst	**			4,086,000
51	Activated Alumina	268,000 lb	134,000	50,000 lb	25,000
	Cobalt Moly Catalyst		104,000		30,000
	Stretford Process Chemicals		154,000		100,000
81	Lime	35 ton	1,600	1,600 ton	74,000
	Soda Ash	30 ton	2,400	1,400 ton	112,000
	Sulfuric Acid (93 percent)	100 ton	5,200	2,160 ton	112,000
	Caustic Soda (100 percent)	13 ton	2,200	150 ton	25,000
	Cooling Water Chemicals		15,000		198,000
	Boiler Feedwater Chemicals		11,000		41,000
	Total		2,776,400		5,634,000

*Methanol solvent makeup supplied by methanol product and reflected in overall material balance

**Included in installed cost of Unit 41

Table A-10

CAPITAL OUTLAY SCHEDULE
FOR A
NON-UTILITY COMPANY

(THOUSAND DOLLARS)

DESIGN/ CONSTR-UCTION PERIOD (YEAR)	CALEN-DAR YEAR	PLANT FACILITIES INVESTMENT: IN MID-1980 DOLLARS	PLANT FACILITIES INVESTMENT: AMOUNT OF ESCALA-TION	PLANT FACILITIES INVESTMENT: ESCALA-TED INVEST-MENT	ALLOWANCE FOR FUNDS DURING CONSTRUCTION: EQUITY	ALLOWANCE FOR FUNDS DURING CONSTRUCTION: INTEREST	OTHER OUTLAYS*	TOTAL OUTLAY	GRANTS IN AID OF CONSTR-UCTION	INVEST-MENT TAX CREDITS	OTHER INCOME TAX CREDITS	NET OUTLAY FOR PLANT
1.	1985.	131250.	80129.	211379.	--	0.	3071.	214450.	0.	20840.	1462.	192148.
2.	1986.	262500.	202535.	465035.	--	0.	0.	465035.	0.	44148.	3229.	417658.
3.	1987.	393750.	373557.	767307.	--	0.	0.	767307.	0.	76649.	4327.	686331.
4.	1988.	262500.	300192.	562692.	--	0.	0.	562692.	0.	56267.	3117.	503310.
5.	1989.	262500.	356461.	618961.	--	0.	182306.	801267.	0.	61875.	58814.	690530.
	TOTALS	1312500.	1312875.	2625375.	1228364.	0.	185377.	2811152.	0.	258836.	63944.	2488312.

GROSS DEPRECIABLE INVESTMENT	=	2604566.
NET NON-DEPRECIABLE PLANT OUTLAY	=	-116214.**
EQUITY PORTION OF AFDC	=	1228364.
TOTAL NON-DEPRECIABLE INVESTMENT	=	1112150.
TOTAL INVESTMENT	=	3716736.

* PREPAID ROYALTIES, LAND, ORGANIZATION AND STARTUP EXPENSES, AND WORKING CAPITAL

GROSS DEPRECIABLE INVESTMENT = ESCALATED PLANT FACILITIES INVESTMENT LESS GRANTS-IN-AID OF CONSTRUCTION LESS EXPENSABLE PORTION OF ESCALATED PLANT FACILITIES INVESTMENT PLUS PREPAID ROYALTIES

PLANT FINANCING:	
COMMON EQUITY	3716736.

	3716736.

**CONSISTS OF:			
LAND	=		3071.
WORKING CAPITAL	=		13632.
AFDC INTEREST	=		0.
EXPENSABLE PORTION OF ESCALATED PLANT FACILITIES INVESTMENT	=		37019.
ORGANIZATION AND START-UP EXPENSES	=		92844.
INVESTMENT TAX CREDITS	=	-	258836.
OTHER INCOME TAX OFFSETS	=	-	63944.
TOTAL	=		-116214.

Other outlays consist of:

- Land costs at $5,000/acre mid-1980$, escalated at 10%/year to the beginning of 1985.

- Pre-paid royalties of 0.5% of plant facilities investment (mid-1980$) escalated at 10%/year to the end of 1989.

- Organization and start-up expenses at 3% of plant facilities investment (mid-1980$) escalated at 10%/year to mid-1989.

- Working capital consisting of:

  - One month cost of coal at full capacity (mid-1980$).

  - Three months cost of total labor (mid-1980$).

  - One month cost of all other operating costs (mid-1980$).

  - A contingency of 25% of the total of the above costs.

  Working capital is then escalated at 10% per year and is assumed to be provided at the end of 1989.

Investment tax credits are calculated at 10 percent of the non-expensable portion of escalated plant facilities investment. In this case, the expensable portion of plant facilities investment is the sales tax, which amounts to 1.4075 per cent of plant facilities investment.

Other income tax offsets result from expensing the sales tax portion of plant facilities investment and organization and startup expenses.

The net outlay for plant is then the net out-of-pocket cash investment in the plant.

The equity portion of allowance for funds during construction is not an actual cash outlay. It is the earnings lost as a result of investing equity money in this project rather than others. It was calculated at 20% of each net outlay for plant with each amount so calculated compounded to the end of 1989 at the rate of 20.0%/year. Since the working capital quantity is provided at the end of 1989, and prepaid royalties are assumed paid at the end of 1989, no allowance for funds during construction is necessary for those quantities.

The significance of the 20.0%/year is as follows:

- It is assumed that the minimum acceptable after tax discounted cash flow (DCF) rate of return on common equity in the absence of inflation is 9.1 per cent per year.

- This being the case, then in view of 10% per year inflation the rate of return needs to be increased to:

  $$(1.091)(1.10) - 1.0 = 0.20 \text{ per year (rounded)}$$

  to preserve a rate of return of 9.1% per year in constant dollars.

Using discounted cash flow terminology, the present value of the common equity investment at the beginning of commercial operation is $3,716,736,000.

A so-called "year-by-year" revenue requirement schedule is presented in Table A-11. The revenue requirements shown are those necessary to yield a 20% return each year on common equity outstanding at the beginning of that year. As noted on the table, the methanol would not be sold at the year-by-year prices, but at market prices. However, the year-by-year revenue requirements are used to rigorously develop the required starting

Table A-11

YEAR-BY-YEAR
REVENUE REQUIREMENTS SCHEDULE
FOR A
NON-UTILITY COMPANY
(SEE NOTE)
(THOUSAND DOLLARS)

YR	CALEN-DAR YEAR	RETURN ON COMMON EQUITY	PRE-FERRED STOCK DIVI-DENDS	INTER-EST ON DEBT	INCOME TAXES	OTHER TAXES AND INSUR-ANCE	RECOVERY OF CAPITAL: BOOK DEPREC-IATION	RECOVERY OF CAPITAL: OTHER *	COAL COST	OPER-ATING AND MAINTE-NANCE COSTS	TOTAL REVENUE REQUIRED	REVENUE FROM BY-PRODUCTS	REVENUE FROM PRINCIPAL PRODUCT: TOTAL	REVENUE FROM PRINCIPAL PRODUCT: $ PER MMBTU	REVENUE FROM PRINCIPAL PRODUCT: $ PER MMBTU-HCOH EXPRESSED IN MID-1980 DOLLARS
1	1990.	743347.	0.	0.	560159.	78761.	117206.	51772.	392265.	195281.	2138652.	0.	2138652.	30.78	11.32
2	1991.	709551.	0.	0.	552365.	78761.	117206.	51772.	435739.	214721.	2168115.	0.	2168115.	31.19	10.39
3	1992.	675766.	0.	0.	544948.	78761.	117206.	51772.	484186.	236195.	2188365.	0.	2188365.	31.08	9.57
4	1993.	641960.	0.	0.	536773.	78761.	117206.	51772.	537842.	259612.	2224127.	0.	2224127.	32.01	8.84
5	1994.	608164.	0.	0.	528977.	78761.	117206.	51772.	597543.	285794.	2268218.	0.	2268218.	32.65	8.20
6	1995.	574369.	0.	0.	521102.	78761.	117206.	51772.	663870.	314373.	2321533.	0.	2321533.	33.41	7.63
7	1996.	540573.	0.	0.	513306.	78761.	117206.	51772.	737560.	345810.	2385069.	0.	2385069.	34.33	7.12
8	1997.	506777.	0.	0.	505591.	78761.	117206.	51772.	819429.	380391.	2459928.	0.	2459928.	35.41	6.68
9	1998.	472981.	0.	0.	497795.	78761.	117206.	51772.	910385.	418430.	2547332.	0.	2547332.	36.66	6.29
10	1999.	439186.	0.	0.	490080.	78761.	117206.	51772.	1011436.	460274.	2648637.	0.	2648637.	38.12	5.94
11	2000.	405390.	0.	0.	482284.	78761.	117206.	51772.	1123708.	506301.	2765343.	0.	2765343.	39.80	5.64
12	2001.	371594.	0.	0.	474489.	78761.	117206.	51772.	1248439.	556931.	2899113.	0.	2899113.	41.73	5.38
13	2002.	337798.	0.	0.	466613.	78761.	117206.	51772.	1387016.	612624.	3051792.	0.	3051792.	43.92	5.14
14	2003.	304003.	0.	0.	458818.	78761.	117206.	51772.	1540978.	673886.	3225422.	0.	3225422.	46.42	4.94
15	2004.	270207.	0.	0.	426034.	78761.	117206.	51772.	1712023.	741275.	3397279.	0.	3397279.	48.90	4.73
16	2005.	236411.	0.	0.	393290.	78761.	117206.	51772.	1902167.	815483.	3594062.	0.	3594062.	51.74	4.56
17	2006.	202615.	0.	0.	360467.	78761.	117206.	51772.	2113186.	896945.	3820951.	0.	3820951.	55.00	4.40
18	2007.	168820.	0.	0.	327683.	78761.	117206.	51772.	2347760.	986637.	4078629.	0.	4078629.	58.71	4.27
19	2008.	135024.	0.	0.	294899.	78761.	117206.	51772.	2608350.	1085301.	4371314.	0.	4371314.	62.92	4.16
20	2009.	101228.	0.	0.	262116.	78761.	117206.	51772.	2897877.	1193031.	4702791.	0.	4702791.	67.69	4.07
												LEVELIZED		** 34.59	*** 7.51

LEVELIZED FIXED CHARGE RATE IN CURRENT DOLLARS = .366345 **

NOTE: PRODUCTS ARE NOT SOLD AT YEAR-BY-YEAR REVENUE REQUIREMENTS. THEY ARE SOLD AT MARKET PRICES. HOWEVER, THESE REVENUES ARE USED TO DEVELOP THE STARTING PRICES SHOWN BELOW. (SEE USER'S MANUAL)

* NON-DEPRECIABLE INVESTMENT LESS WORKING CAPITAL LESS LAND
** LEVELIZED USING RETURN ON EQUITY OF 20.000 PCT./YEAR
*** LEVELIZED USING RETURN ON EQUITY OF 9.091 PCT./YEAR

Table A-11 (Continued)

REVENUE REQUIREMENTS SCHEDULE
FOR A
NON-UTILITY COMPANY

STARTING PRICE ** OF PRIMARY PRODUCT AT THE BEGINNING OF 1990,THE FIRST YEAR OF COMMERCIAL OPERATION

AT GENERAL INFLATION RATE OF 10.00 PCT./YEAR *$ 18.57 PER MMBTU-MECH

INFLATION-INDEPENDENT PRICES ** OF PRIMARY PRODUCT IN MID - 1980,THE BASE YEAR FOR COST DATA INPUT

AT GENERAL INFLATION RATE OF 10.00 PCT./YEAR *$ 7.51 PER MMBTU-MECH

** THE PRICE OF THE PRINCIPAL PRODUCT WHICH IF ALLOWED TO INCREASE AT
* THE SPECIFIED RATE OF GENERAL INFLATION,

WOULD PROVIDE THE SAME DCF RATE OF RETURN AS EITHER THE CALCULATED YEAR-BY-YEAR PRICES OR THE CALCULATED LEVELIZED PRICES

prices shown on the continuation of Table A-11. As shown, the required initial selling price at the start of commercial operation (beginning of 1990) was calculated to be $18.57 per million Btu (higher heating value). This is the price at the beginning of commercial operation which if indexed to the 10% per year inflation rate would result in a 20.0%/year DCF rate of return to the producer. Expressed in mid-1980 dollars, this price is equivalent to $7.51 per million Btu.

It is not necessary to present the development of the required starting price, for it is justified in Table A-12. The calculations in this table show that if the required starting price of $18.57 per million Btu is escalated at 10%/year, the producer does, in fact, realize a 20%/year return on common equity investment.

In calculating required prices, the following additional criteria not previously described were used.

- Property tax and insurance—3% of escalated plant facilities investment, this quantity held constant throughout the 20 year period of commercial operation, in accord with common practice.

- Income taxes—A 46% federal and 6% state rate were used, for a combined rate of 49.24%.

- Depreciation for calculation of income taxes—Sum-of-years-digits over a 13 year tax life, gross depreciable investment less 10% salvage value.

Required Selling Prices - Regulated Utility Case

The capital outlay schedule for the regulated utility owned plant (Table A-13) is somewhat similar to that for the non-regulated producer. In this regulated ownership case, the allowance for funds during construction

Table A-12

CASH FLOW SCHEDULE FOR A NON-UTILITY COMPANY
WITH PRINCIPAL PRODUCT SOLD AT ESCALATED REQUIRED STARTING PRICE

(THOUSAND DOLLARS)

YEAR	CALEN-DAR YEAR	REQUIRED PRICE, $ PER MMBTU-HLOH	REVENUE FROM PRINCIPAL PRODUCT	REVENUE FROM BY-PRODUCTS	TOTAL REVENUE	TAXES ON INCOME	OTHER CASH DISBURSE-MENTS *	COMMON EQUITY PORTION OF RE-CURRING INVEST-MENT	PLANT SALVAGE VALUE, WORKING CAPITAL, AND LAND	CASH FLOW TO COMMON EQUITY
1	1990.	20.43	1419390.	0.	1419390.	285994.	668167.	0.	0.	592231.
2	1991.	22.47	1561329.	0.	1561329.	257521.	729272.	0.	0.	574560.
3	1992.	24.72	1717467.	0.	1717467.	312696.	779841.	0.	0.	695705.
4	1993.	27.19	1889208.	0.	1889208.	371858.	876616.	0.	0.	640434.
5	1994.	29.91	2078129.	0.	2078129.	435377.	962098.	0.	0.	680654.
6	1995.	32.90	2285942.	0.	2285942.	503656.	1057004.	0.	0.	725281.
7	1996.	36.19	2514536.	0.	2514536.	577136.	1162151.	0.	0.	775769.
8	1997.	39.81	2765990.	0.	2765990.	658296.	1278581.	0.	0.	811113.
9	1998.	43.79	3042589.	0.	3042589.	741659.	1407577.	0.	0.	893352.
10	1999.	48.17	3346847.	0.	3346847.	833799.	1550475.	0.	0.	962576.
11	2000.	52.99	3681532.	0.	3681532.	933336.	1708778.	0.	0.	1039426.
12	2001.	58.29	4049685.	0.	4049685.	1048951.	1885138.	0.	0.	1176503.
13	2002.	64.12	4454654.	0.	4454654.	1157383.	2078601.	0.	0.	1218876.
14	2003.	70.53	4900119.	0.	4900119.	1203439.	2293622.	0.	0.	1323058.
15	2004.	77.58	5390131.	0.	5390131.	1467315.	2532659.	0.	0.	1390157.
16	2005.	85.34	5929144.	0.	5929144.	1567691.	2796221.	0.	0.	1590212.
17	2006.	93.87	6522059.	0.	6522059.	1650492.	3080878.	0.	0.	1792671.
18	2007.	103.26	7174265.	0.	7174265.	1851976.	3413148.	0.	0.	1909143.
19	2008.	113.59	7891691.	0.	7891691.	2028333.	3772417.	0.	0.	2090941.
20	2009.	124.94	8680860.	0.	8680860.	2228917.	4118669.	0.	557162.	2626637.

PRESENT VALUE AT BEGINNING OF 1990 OF CASH FLOWS TO COMMON EQUITY DISCOUNTED AT 20.00 PCT./YEAR = $ 2716735119.

COMMON EQUITY OUTSTANDING AT BEGINNING OF 1990 = $ 2716735119.

* OTHER TAXES AND INSURANCE, PREFERRED STOCK COST, DEBT PRINCIPAL AND INTEREST, COAL COST, AND OPERATING AND MAINTENANCE COSTS

Table A-13

CAPITAL OUTLAY SCHEDULE
FOR AN
INVESTOR-OWNED UTILITY

(THOUSAND DOLLARS)

DESIGN/ CONSTR-UCTION PERIOD (YEAR)	CALEN-DAR YEAR	PLANT FACILITIES INVESTMENT: IN MID-1980 DOLLARS	PLANT FACILITIES INVESTMENT: AMOUNT OF ESCALA-TION	PLANT FACILITIES INVESTMENT: ESCALA-TED INVEST-MENT	ALLOWANCE FOR FUNDS DURING CONSTRUCTION: EQUITY	ALLOWANCE FOR FUNDS DURING CONSTRUCTION: INTEREST	OTHER OUTLAYS*	TOTAL OUTLAY	GRANTS IN AID OF CONSTR-UCTION	INVEST-MENT TAX CREDITS	OTHER INCOME TAX OFFSETS	NET OUTLAY FOR PLANT
1.	1985.	131250.	80129.	211379.	--	--	3071.	214451.	0.	0.	0.	214451.
2.	1986.	262500.	202535.	465035.	--	--	0.	465035.	0.	0.	0.	465035.
3.	1987.	393750.	373557.	767307.	--	--	0.	767307.	0.	0.	0.	767307.
4.	1988.	262500.	300192.	562692.	--	--	0.	562692.	0.	0.	0.	562692.
5.	1989.	262500.	356461.	618961.	--	--	182706.	801667.	0.	0. **	0.	801667.
	TOTALS	1312500.	1312875.	2625375.	0.	694960.	185777.	2811152.	0.	258836.	0.	2811152.

GROSS DEPRECIABLE INVESTMENT	=	3392390.
NET NON-DEPRECIABLE PLANT OUTLAY	=	76703.
TOTAL NON-DEPRECIABLE INVESTMENT	=	76703.
TOTAL INVESTMENT	=	3469094.

* PREPAID ROYALTIES, LAND, ORGANIZATION AND STARTUP EXPENSES, AND WORKING CAPITAL

** TO BE NORMALIZED OVER PERIOD OF COMMERCIAL OPERATION

GROSS DEPRECIABLE INVESTMENT = ESCALATED PLANT FACILITIES INVESTMENT LESS GRANTS-IN-AID OF CONSTRUCTION PLUS ALLOWANCE FOR FUNDS DURING CONSTRUCTION PLUS PRE-PAID ROYALTIES PLUS ORGANIZATION AND STARTUP EXPENSES

PLANT FINANCING:

COMMON EQUITY	= (.350)X(3469094.)	=	1214183.
PREFERRED STOCK	= (.150)X(3469094.)	=	520364.
DEBT	= (.500)X(3469094.)	=	1734547.
			3469094.

is calculated assuming the net outlay for the plant is funded by debt capital. For this purpose interest on debt is 12.25% per year. As indicated on Table A-13, when constructed the plant is financed with 50% debt, 35% common equity and 15% preferred stock. In this case, no expenditure is expensed during the design-construction period, since in most cases, such expenses are capitalized for purposes of calculating future revenue requirements. Investment tax credits are calculated at 10% of escalated plant facilities investment, less sales tax. They are then normalized over the book life of the plant.

Table A-14 indicates the annual revenue that would be required for recovery of capital, and the outstanding annual balances of the various forms of capital.

All revenue requirements for the regulated utility operation are shown in Table A-15, Since, in theory, a regulated utility must sell each year at its actual costs, including a fixed return on equity, it is appropriate to show "year-by-year" revenue requirements. In this exhibit, the return on common equity for any year is calculated by multiplying the amount of common equity outstanding at the beginning of that year by the required return on common equity (16.0%/year). Recovery of preferred stock, debt and common equity are each on a straight line basis through book depreciation over the 30 year project life. Preferred stock dividends are at the rate of 12.75%/year and interest on debt is 12.25%/year. Sum-of-the-year's digits depreciation was used for tax purposes over a tax life of 13 years and using a 10% plant salvage value. Income taxes were reduced through normalization of investment tax credits over the project life.

Table A-14

CAPITAL RECOVERY SCHEDULE
FOR AN
INVESTOR-OWNED UTILITY

(THOUSAND DOLLARS)

PERIOD OF COMMERCIAL OPERATION (YEAR)	CALENDAR YEAR	DEBT BALANCE (BEGINNING OF YR.)	DEBT PRINCIPAL PAYMENT	PREFERRED STOCK BALANCE (BEGINNING OF YEAR)	RECOVERY OF PREFERRED	COMMON EQUITY OUTSTANDING (BEGINNING OF YEAR)	ANNUAL RECOVERY OF COMMON EQUITY	
							TYPICAL BOOK DEPRECIATION	OTHER
1.	1990.	1734547.	57818.	520364.	17345.	1214183.	26608.	0.
2.	1991.	1676729.	57818.	503019.	17345.	1187575.	26608.	0.
3.	1992.	1618910.	57818.	485673.	17345.	1160967.	26608.	0.
4.	1993.	1561092.	57818.	468328.	17345.	1134359.	26608.	0.
5.	1994.	1503274.	57818.	450982.	17345.	1107751.	26608.	0.
6.	1995.	1445456.	57818.	433637.	17345.	1081143.	26608.	0.
7.	1996.	1387637.	57818.	416291.	17345.	1054535.	26608.	0.
8.	1997.	1329819.	57818.	398946.	17345.	1027927.	26608.	0.
9.	1998.	1272001.	57818.	381600.	17345.	1001319.	26608.	0.
10.	1999.	1214183.	57818.	364255.	17345.	974711.	26608.	0.
11.	2000.	1156365.	57818.	346909.	17345.	948103.	26608.	0.
12.	2001.	1098546.	57818.	329564.	17345.	921495.	26608.	0.
13.	2002.	1040728.	57818.	312218.	17345.	894887.	26608.	0.
14.	2003.	982910.	57818.	294873.	17345.	868279.	26608.	0.
15.	2004.	925092.	57818.	277527.	17345.	841671.	26608.	0.
16.	2005.	867273.	57818.	260182.	17345.	815063.	26608.	0.
17.	2006.	809455.	57818.	242837.	17345.	788455.	26608.	0.
18.	2007.	751637.	57818.	225491.	17345.	761847.	26608.	0.
19.	2008.	693819.	57818.	208146.	17345.	735239.	26608.	0.
20.	2009.	636001.	57818.	190800.	17345.	708631.	26608.	0.
21.	2010.	578182.	57818.	173455.	17345.	682022.	26608.	0.
22.	2011.	520364.	57818.	156109.	17345.	655414.	26608.	0.
23.	2012.	462546.	57818.	138764.	17345.	628806.	26608.	0.
24.	2013.	404728.	57818.	121418.	17345.	602198.	26608.	0.
25.	2014.	346909.	57818.	104073.	17345.	575590.	26608.	0.
26.	2015.	289091.	57818.	86727.	17345.	548982.	26608.	0.
27.	2016.	231273.	57818.	69382.	17345.	522374.	26608.	0.
28.	2017.	173455.	57818.	52036.	17345.	495766.	26608.	0.
29.	2018.	115636.	57818.	34691.	17345.	469158.	26608.	0.
30.	2019.	57818.	57818.	17345.	17345.	442550.	26608.	0.
31.	2020.	0.	0.	0.	0.	415942.	0.	0.

Table A-15

REVENUE REQUIREMENTS SCHEDULE
FOR AN
INVESTOR-OWNED UTILITY

(THOUSAND DOLLARS)

YR	CALENDAR YEAR	RETURN ON COMMON EQUITY	PREFERRED STOCK DIVIDENDS	INTEREST ON DEBT	INCOME TAXES	OTHER TAXES AND INSURANCE	RECOVERY OF CAPITAL: BOOK DEPRECIATION	RECOVERY OF CAPITAL: OTHER	COAL COST	OPERATING AND MAINTENANCE COSTS	TOTAL REVENUE REQUIRED	REVENUE FROM BY-PRODUCTS	REVENUE FROM PRINCIPAL PRODUCT: TOTAL	REVENUE FROM PRINCIPAL PRODUCT: $ PER MMBTU	REVENUE FROM PRINCIPAL PRODUCT: $ PER MMBTU-RCOM EXPRESSED IN MID-1980 DOLLARS
1	1990.	194269.	66346.	212482.	-88865.	78761.	101772.	0.	392205.	195281.	1152471.	0.	1152471.	16.59	6.18
2	1991.	190013.	64135.	205399.	-62294.	78761.	101772.	0.	435739.	214721.	1228246.	0.	1228246.	17.68	5.91
3	1992.	185759.	61923.	198317.	-36023.	78761.	101772.	0.	484106.	236193.	1318804.	0.	1318804.	18.87	5.73
4	1993.	181497.	59712.	191234.	-9751.	78761.	101772.	0.	537842.	259812.	1400879.	0.	1400879.	20.16	5.57
5	1994.	177248.	57500.	184151.	16828.	78761.	101772.	0.	597543.	285794.	1499281.	0.	1499281.	21.58	5.42
6	1995.	172983.	55349.	177068.	42791.	78761.	101772.	0.	663670.	314373.	1606987.	0.	1606987.	23.13	5.28
7	1996.	168726.	53077.	169986.	69063.	78761.	101772.	0.	737560.	345810.	1724794.	0.	1724794.	24.82	5.16
8	1997.	164468.	50866.	162903.	95354.	78761.	101772.	0.	819427.	380391.	1853924.	0.	1853924.	26.68	5.03
9	1998.	160211.	48684.	155821.	121695.	78761.	101772.	0.	910309.	418430.	1995639.	0.	1995639.	28.72	4.93
10	1999.	155954.	46442.	148737.	147877.	78761.	101772.	0.	1011130.	460274.	2151255.	0.	2151255.	30.96	4.83
11	2000.	151696.	44231.	141655.	174146.	78761.	101772.	0.	1123708.	506301.	2322271.	0.	2322271.	33.42	4.74
12	2001.	147439.	42019.	134572.	200419.	78761.	101772.	0.	1248499.	556931.	2510353.	0.	2510353.	36.13	4.66
13	2002.	143182.	39808.	127489.	226690.	78761.	101772.	0.	1387916.	612624.	2717342.	0.	2717342.	39.11	4.58
14	2003.	138925.	37596.	120406.	252962.	78761.	101772.	0.	1540978.	673886.	2945283.	0.	2945283.	42.39	4.51
15	2004.	134667.	35385.	113324.	246687.	78761.	101772.	0.	1712023.	741279.	3163693.	0.	3163693.	45.54	4.41
16	2005.	130410.	33173.	106241.	240412.	78761.	101772.	0.	1902057.	815403.	3400229.	0.	3400229.	49.05	4.32
17	2006.	126153.	30962.	99158.	234136.	78761.	101772.	0.	2113186.	896943.	3681071.	0.	3681071.	52.98	4.24
18	2007.	121895.	28750.	92076.	227861.	78761.	101772.	0.	2347750.	986637.	3985502.	0.	3985502.	57.36	4.17
19	2008.	117638.	26539.	84993.	221586.	78761.	101772.	0.	2680350.	1085301.	4324939.	0.	4324939.	62.25	4.12
20	2009.	113381.	24327.	77910.	215311.	78761.	101772.	0.	2897877.	1193831.	4703170.	0.	4703170.	67.69	4.07
21	2010.	109124.	22116.	70827.	209036.	78761.	101772.	0.	3219541.	1313214.	5124390.	0.	5124390.	73.76	4.03
22	2011.	104866.	19904.	63745.	202761.	78761.	101772.	0.	3576910.	1444536.	5593254.	0.	5593254.	80.50	4.00
23	2012.	100609.	17692.	56662.	196486.	78761.	101772.	0.	3973947.	1588989.	6114910.	0.	6114910.	88.01	3.97
24	2013.	96352.	15481.	49579.	190211.	78761.	101772.	0.	4415095.	1747888.	6695898.	0.	6695898.	96.36	3.96
25	2014.	92094.	13269.	42496.	183935.	78761.	101772.	0.	4905126.	1922677.	7340131.	0.	7340131.	105.65	3.94
26	2015.	87837.	11058.	35414.	177660.	78761.	101772.	0.	5449596.	2114944.	8057041.	0.	8057041.	115.97	3.93
27	2016.	83580.	8846.	28331.	171385.	78761.	101772.	0.	6054580.	2326439.	8853614.	0.	8853614.	127.43	3.93
28	2017.	79323.	6635.	21248.	165110.	78761.	101772.	0.	6726590.	2559083.	9730461.	0.	9730461.	140.37	3.93
29	2018.	75065.	4423.	14166.	158835.	78761.	101772.	0.	7473197.	2814991.	10721209.	0.	10721209.	154.31	3.93
30	2019.	70808.	2212.	7083.	152560.	78761.	101772.	0.	8302721.	3096490.	11812407.	0.	11812407.	170.02	3.94
												LEVELIZED		20.49 *	4.87 **

LEVELIZED FIXED CHARGE RATE IN CURRENT DOLLARS = .170460
* LEVELIZED USING RETURN ON EQUITY OF 16.000 PCT./YEAR
** LEVELIZED USING RETURN ON EQUITY OF 5.455 PCT./YEAR

The required prices are shown in both current dollars and in mid-1980 dollars. By showing them in mid-1980 dollars, perspective is gained with respect to the methanol's competitive position in today's fuel market.

As previously stated, the cost of fuels rafined from foreign crude oil is now (mid-1980) about $8.17 per million Btu. Thus, the methanol produced in this case would be expected to be cost effective.

Table A-16 is provided for several purposes. First, it shows net cash flow to common equity on a year-by-year basis. It also shows that the year-by-year prices calculated in Table A-15 (called "prices not levelized" in Table A-16) do, in fact, provide a 16% per year DCF return on common equity. And, it shows that the current dollar levelized price reported on Table A-15, would also provide a 16%/year return on common equity.

Table A-16

PROJECT CASH FLOW SCHEDULE
FOR AN
INVESTOR-OWNED UTILITY

(THOUSAND DOLLARS)

		TOTAL REVENUE AT:		TAXES ON INCOME WITH REVENUE AT:									CASH FLOW TO COMMON EQUITY WITH REVENUE AT:	
YR	CALENDAR YEAR	PRICES NOT LEVELIZED	LEVELIZED PRICE *	PRICES NOT LEVELIZED	LEVELIZED PRICE *	OTHER TAXES AND INSURANCE	PREFERRED STOCK COST +	DEBT PRINCIPAL AND INTEREST	COAL COST	OPERATING AND MAINTENANCE COSTS	COMMON EQUITY PORTION OF RECURRING INVESTMENT	PLANT SALVAGE VALUE, WORKING CAPITAL, AND LAND	PRICES NOT LEVELIZED	LEVELIZED PRICE *
1	1990.	1152471.	1979496.	-88565.	318662.	78761.	83692.	278100.	192205.	195205.	0.	0.	220811.	646675.
2	1991.	1228246.	1979496.	-62294.	307672.	78761.	81480.	263217.	435739.	214721.	0.	0.	210620.	557055.
3	1992.	1318604.	1979496.	-36823.	293241.	78761.	79269.	256135.	484186.	236153.	0.	0.	211363.	551751.
4	1993.	1400879.	1979496.	-9751.	275160.	78761.	77057.	249052.	557892.	255812.	0.	0.	208165.	503911.
5	1994.	1499281.	1979496.	16520.	252978.	78761.	74846.	241969.	597543.	285196.	0.	0.	203841.	447606.
6	1995.	1606907.	1979496.	42791.	226284.	78761.	72634.	234887.	663070.	314573.	0.	0.	195591.	384717.
7	1996.	1724754.	1979496.	69065.	194498.	78761.	70423.	227804.	757563.	345810.	0.	0.	191334.	324641.
8	1997.	1853924.	1979496.	95334.	157166.	78761.	68211.	220722.	819429.	380391.	0.	0.	191076.	254617.
9	1998.	1995639.	1979496.	121605.	113657.	78761.	66000.	213638.	910385.	418430.	0.	0.	188019.	178625.
10	1999.	2151285.	1979496.	147877.	63383.	78761.	63788.	206556.	1011438.	460274.	0.	0.	185062.	95177.
11	2000.	2322271.	1979496.	174148.	5565.	78761.	61576.	199473.	1123708.	506301.	0.	0.	177384.	4312.
12	2001.	2510353.	1979496.	200419.	-60975.	78761.	59365.	192390.	1248439.	556931.	0.	0.	174047.	-95916.
13	2002.	2717542.	1979496.	226690.	-136625.	78761.	57153.	185307.	1387816.	612624.	0.	0.	165790.	-204191.
14	2003.	2945283.	1979496.	252962.	-222592.	78761.	54942.	178225.	1540975.	673886.	0.	0.	162533.	-324101.
15	2004.	3163893.	1979496.	246687.	-336510.	78761.	52730.	171142.	1712823.	741275.	0.	0.	171215.	-439925.
16	2005.	3408229.	1979496.	240412.	-463096.	78761.	50519.	164059.	1902057.	815403.	0.	0.	151018.	-568207.
17	2006.	3661071.	1979496.	234136.	-603719.	78761.	48307.	156976.	2113186.	896945.	0.	0.	152761.	-710958.
18	2007.	3985502.	1979496.	227862.	-759896.	78761.	46096.	149894.	2347150.	986637.	0.	0.	141503.	-869145.
19	2008.	4324939.	1979496.	221586.	-933318.	78761.	43884.	142811.	2608350.	1085301.	0.	0.	144296.	-1041301.
20	2009.	4703170.	1979496.	215311.	-1125826.	78761.	41672.	135728.	2897877.	1199831.	0.	0.	135989.	-1242540.
21	2010.	5124390.	1979496.	209031.	-1339510.	78761.	39461.	128646.	3219541.	1313219.	0.	0.	137732.	-1460617.
22	2011.	5593254.	1979496.	202761.	-1576653.	78761.	37249.	121563.	3576910.	1444536.	0.	0.	131419.	-1702869.
23	2012.	6114910.	1979496.	196486.	-1839196.	78761.	35038.	114480.	3973947.	1589989.	0.	0.	127217.	-1971923.
24	2013.	6695098.	1979496.	190211.	-2131752.	78761.	32826.	107397.	4415055.	1747808.	0.	0.	125960.	-2270680.
25	2014.	7340331.	1979496.	183935.	-2455441.	78761.	30615.	100315.	4905126.	1922677.	0.	0.	118102.	-2602356.
26	2015.	8057091.	1979496.	177660.	-2814923.	78761.	28403.	93232.	5449595.	2114944.	0.	0.	114441.	-2970517.
27	2016.	8853614.	1979496.	171385.	-3213430.	78761.	26192.	86149.	6054580.	2326439.	0.	0.	110168.	-3370119.
28	2017.	9738461.	1979496.	165110.	-3655414.	78761.	23980.	79066.	6726550.	2559083.	0.	0.	102913.	-3832530.
29	2018.	10721209.	1979496.	158835.	-4145585.	78761.	21769.	71984.	7473197.	2814991.	0.	0.	101873.	-4335120.
30	2019.	11812407.	1979496.	152560.	-4689165.	78761.	19557.	64901.	8302721.	3096490.	0.	4159942.	581358.	-4477127.

PRESENT VALUE OF CASH FLOWS TO COMMON EQUITY AT BEGINNING OF 1990 DISCOUNTED AT 14.00 PCT./YEAR:

WITH REVENUE AT LEVELIZED PRICE = $ 1214182777.
WITH REVENUE AT PRICES NOT LEVELIZED = $ 1214182777.

COMMON EQUITY OUTSTANDING AT BEGINNING OF 1990 = $ 1214182777.

* ONLY PRINCIPAL PRODUCT PRICE IS LEVELIZED, USING RETURN ON EQUITY OF 14.00 PCT./YEAR
\+ RECOVERY AND DIVIDENDS