Schedule VII

OPERATING ASSUMPTIONS

Construction begins 2nd quarter, 1984

Mechanical completion: December, 1987

Launch curve: 10% (1987) 87% (1988) 100% (1989 and beyond)

Annual production loss to maintenance: 25 days

Staffing level:	900 people (operations and maintenance)
Inventory levels:	45 days coal
	45 days chemicals and catalysts
	30 days products and maintenance supplies
	0 days SNG
Accounts Receivable:	30 days sales
Accounts Payable:	30 days purchases
	15 days salaries

OPERATING ASSUMPTIONS

A work force of 900 people will be required to operate and maintain the plant. As the plant will be built in "trains", initial production will occur prior to mechanical completion in December, 1987. The first barrel of gasoline is expected to flow in August, 1987; full production levels will not be reached for another year-and-a-half. Even then, the equivalent of 25 days worth of production will be lost each year due to maintenance.

45 days supply of coal will be stockpiled for plant use. There will also be a one month inventory of liquid products and chemicals in the tank farm; there is to be no on-site storage of synthetic natural gas (SNG). Chemicals and catalysts inventory level will average 45 days.

Accounts receivable will equal 30 days sales. Accounts payable will equal 30 days worth of purchases. Salaries payable will be half a month's payroll expense.

CASH FLOW ASSUMPTIONS

Federal tax rate: 46%

Kentucky State tax rate: 5.8%

Ad valorem tax rate: 0.7%

Tax payment lag: 20% paid in subsequent year

Tax loss carry back: 3 years

Tax loss carry forward: 15 years

Tax credits to be taken during construction

Tax depreciation: ACRS 5 year life for 93% of plant

ACRS 15 year life for 7% of plant

All excess cash to be distributed to partners

CASH FLOW ASSUMPTIONS

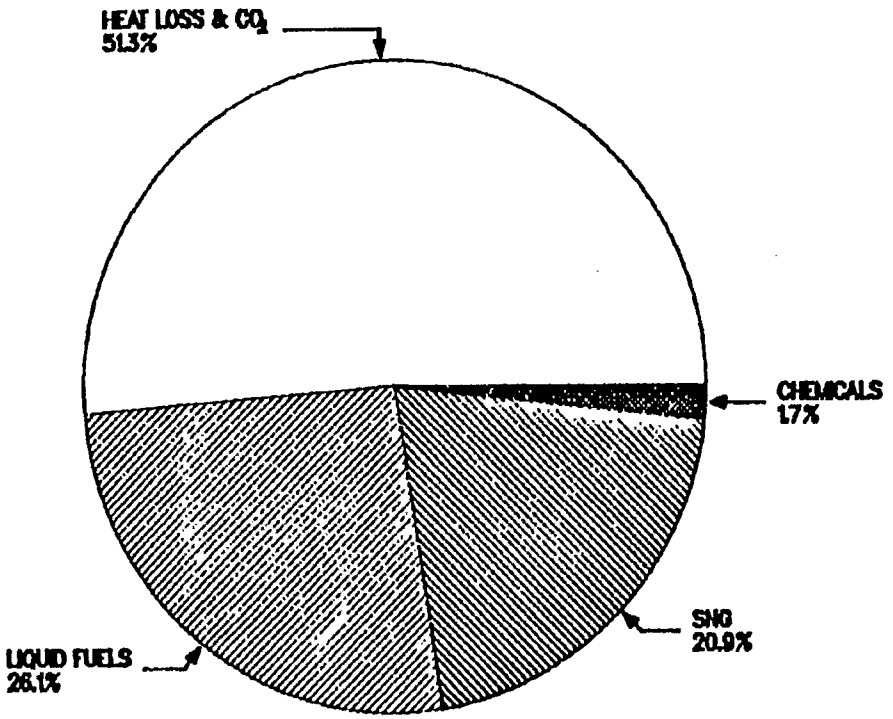
The federal income tax rate has been assumed to be 46%, the Kentucky State income tax rate is assumed to be 5.8%. In addition, an ad valorem tax of 0.7% has been assumed. It will be based on the net book value of all plant, property, and equipment.

During construction, federal tax benefits will be passed through to the partners; state tax benefits will have to be carried forward until after operations begin. 80% of any year's current tax liability will be paid in that year; the balance will be paid the following year.

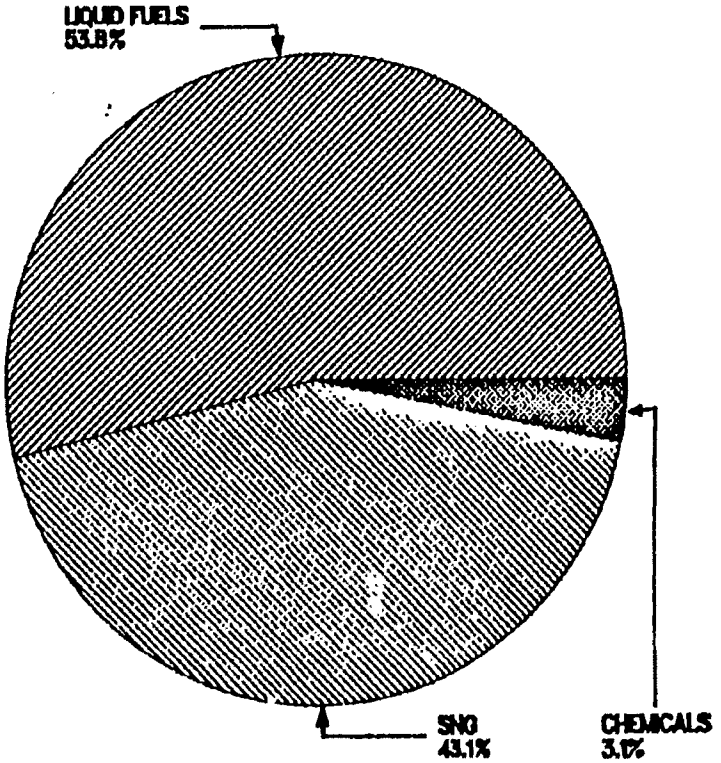
Under the Economic Recovery Act of 1981, approximately 93% of the plant will have a tax life of 5 years, the rest will have a 15 year tax life. Tax depreciation will be calculated using the Accelerated Cost Recovery System (ACRS). Book depreciation is to be straight-line over a 25 year life.

PLANT OUTPUT

ENERGY CONTENT OF PRODUCTS AS % OF BTU INPUT



ENERGY CONTENT OF PRODUCTS AS % OF BTU OUTPUT



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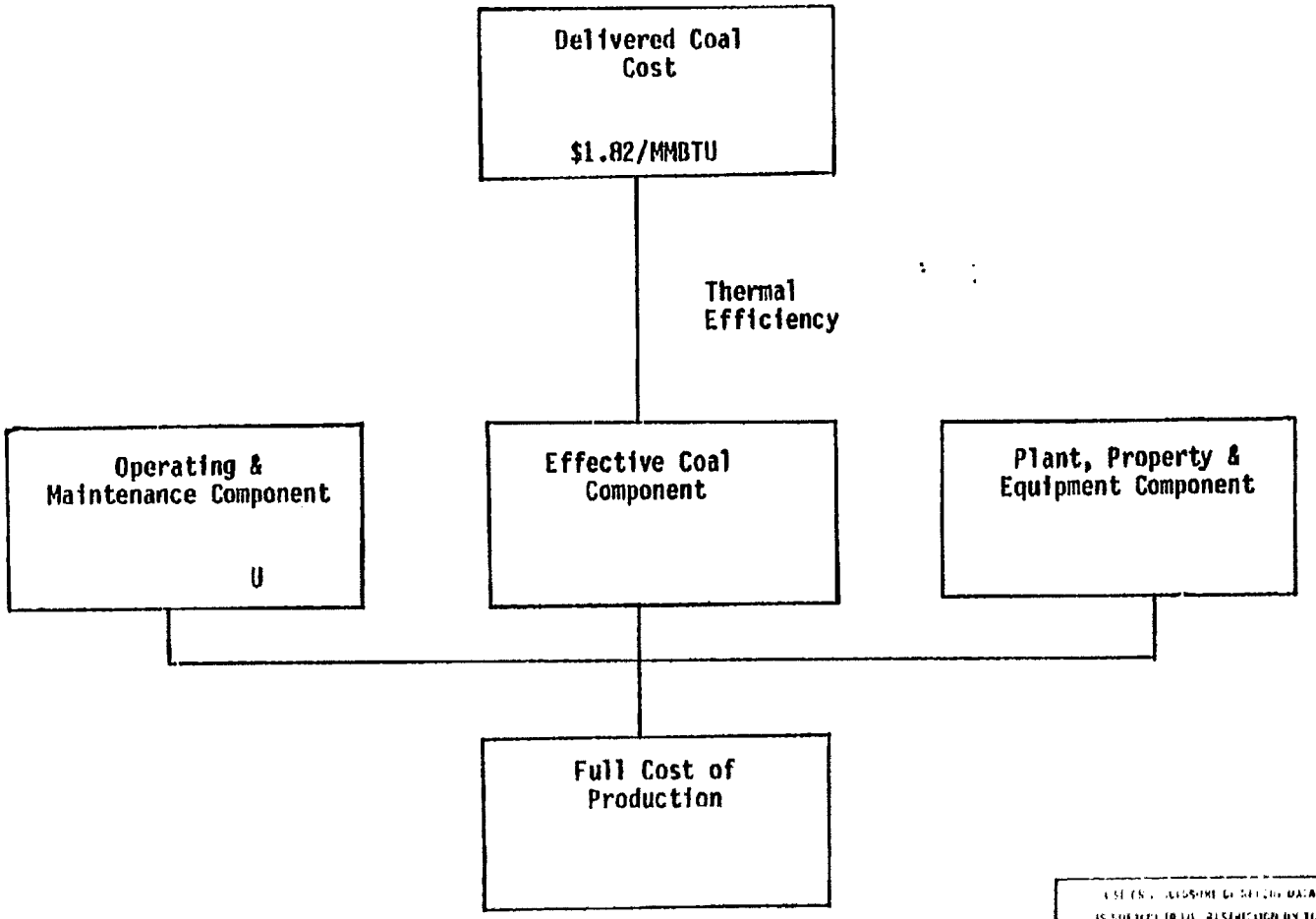
PRODUCTS

A synthetic fuels plant transforms a relatively cheap energy commodity, coal, into high value-added energy products such as gasoline and SNG. In the Tri-State plant, approximately half the energy going into the plant will be lost in the form of heat and CO_2.

The resulting products, though, will contain enough energy to reduce our nation's dependence on foreign oil by 15,000 barrels a day. 43% of the energy output will be in the form of SNG, 54% will be in the form of liquid fuels (primarily gasoline), and the remaining 3% will be chemical byproducts (primarily ammonia and sulfur).

Schedule X

PRODUCT COST COMPONENTS
JANUARY, 1982



PRODUCTION COSTS

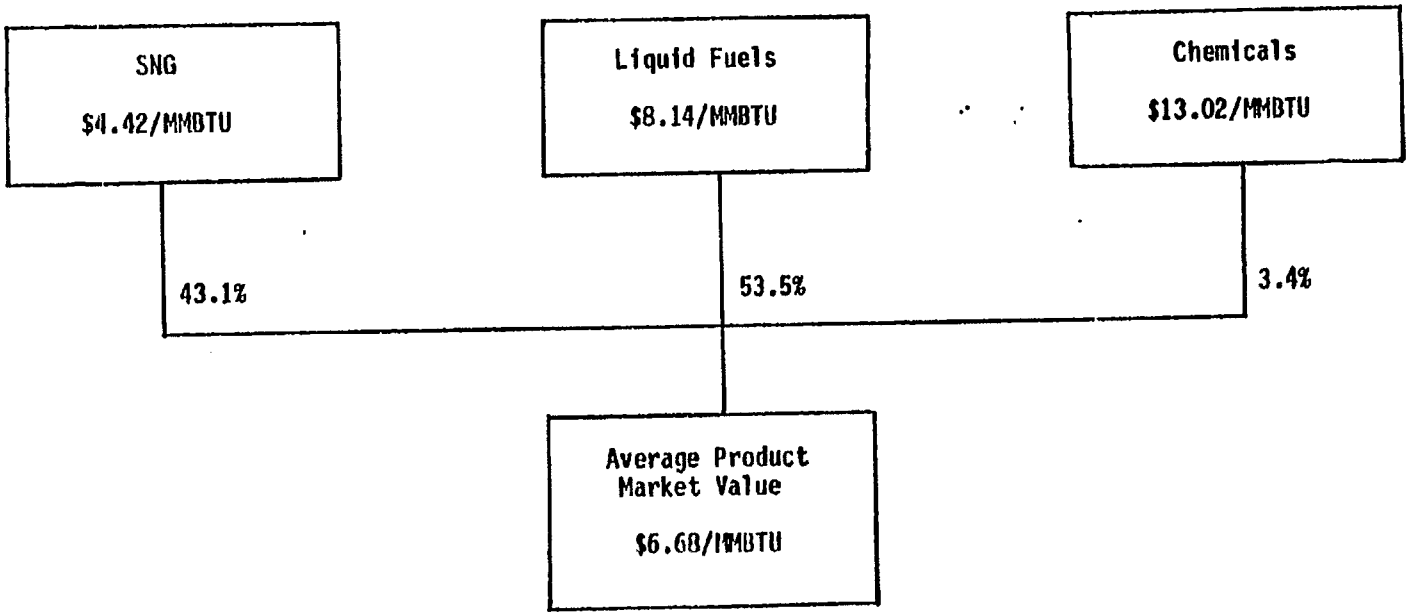
Tri-State Synfuels estimates that the cost of delivered Illinois Basin coal was $37.75 per average ton in January, 1982. This figure was derived from a series of quotes received from potential suppliers. Some of the coal must be sized for the gasifiers; a charge for this sizing is included in the above figure.

$37.75/ton is equivalent to $1.82/MMBTU of delivered coal, which, in turn, is equivalent to of output. Operating costs and maintenance add another to the cost of producing a million BTU's of output.

The present value of the costs associated with the capital investment includes not only full "capital recovery", but also interest charges, tax savings on the investment, and a 17% opportunity cost for the partners' equity investment in the project. This component adds MMBTU to the costs of production. The sum of the three components yields the full cost of or upgrading Illinois Basin coal into high value-added energy products.

Schedule XI

VALUE OF PRODUCTS AT JANUARY, 1982 MARKET PRICES



PRODUCT VALUE

Tri-State's proximity to major transportation systems and large population centers makes its location outstanding. A large market exists for all of the plant's output. Liquid fuels and SNG can be transported through existing major pipelines which pass within a dozen miles of the plant's gate; chemicals can be barged up the Ohio River.

By the time the plant opens, natural gas is expected to reach price-parity with #6 fuel oil based on BTU content; Schedule XI reflects this assumption. Tri-State's gasoline will meet existing specifications for premium-grade, unleaded gasoline.

Schedule X shows the January, 1982 netback value of the plant's output. These values are weighted according to each product's share of energy output. The result is $6.60/MMBTU of output.

Schedule XII

CHEM SYSTEMS'
PRICE FORECAST
(1982 constant dollar)

	1982	1988	Real Increase
SNG	$ 4.42	$ 6.86	55%
Liquid Fuels	$ 8.14	$11.47	41%
Chemicals	$13.02	$20.14	55%
Weighted Averge	$ 6.68	$ 9.74	46%
Less: Full Cost of Production	$10.25	$10.25	
Profit (Loss) Per MMBTU	$(3.57)	$ (.51)	

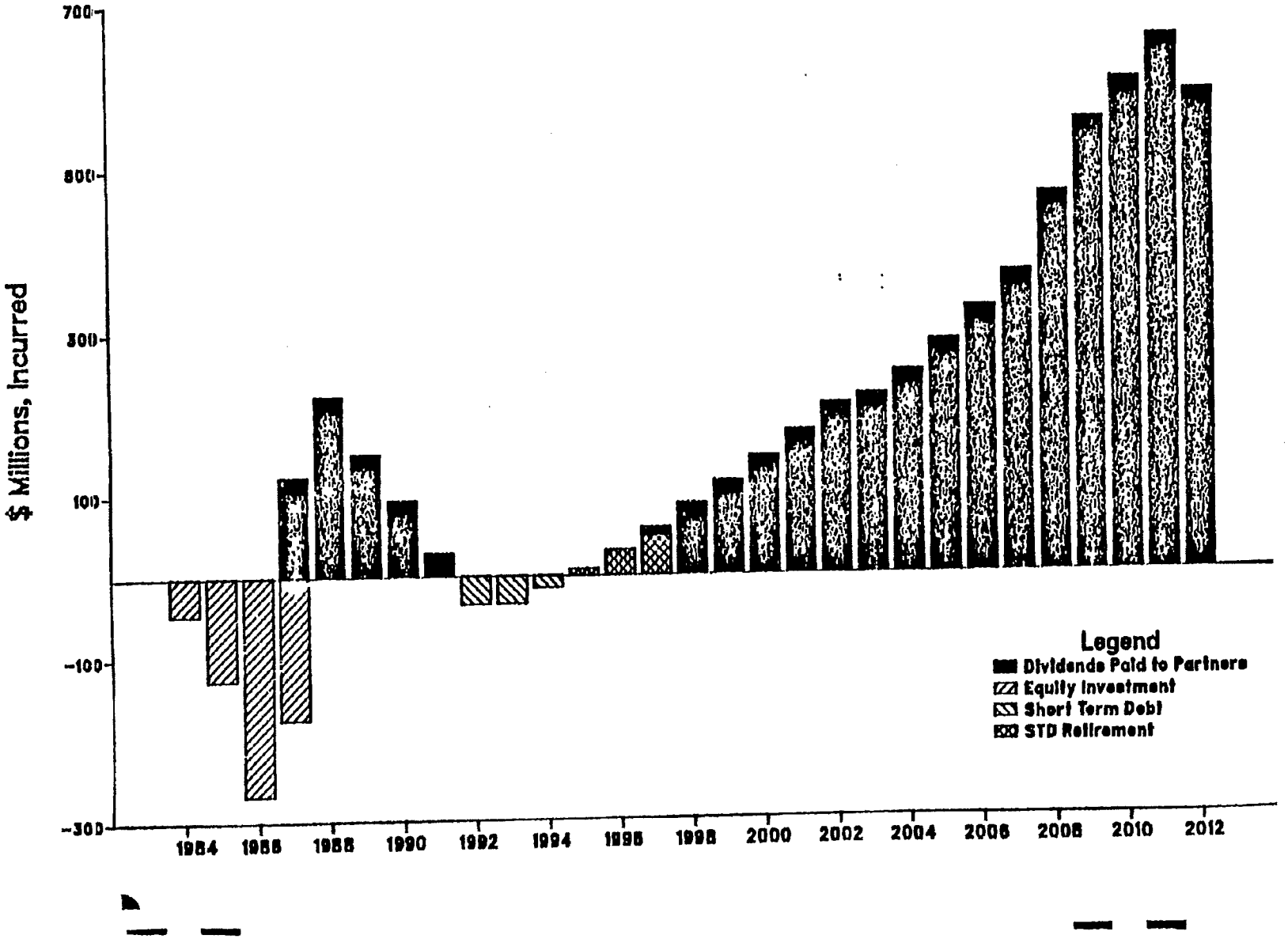
PRICING FORECAST

The past decade saw a highly volatile energy market. The real cost of a barrel of oil rose 800% between 1970 and 1980. Tri-State assumes that by the time the plant doors open for business, real energy prices will be at least 50% higher than they were in January, 1982. This assumption is based on a marketing study conducted expressly for Tri-State Synfuels by Chem Systems, Inc.

Schedule XII shows that at today's prices this plant would fail to generate a 17% rate of return. However, Chem Systems' forecasted 1988 prices nearly result in a of 17% rate of return. If the oil markets continue to be as unstable during the 1980's as they were during the 1970's, the Chem Systems' forecast could prove to be conservative.

Schedule XIII

TRI-STATE'S PARTNERSHIP CASH FLOWS



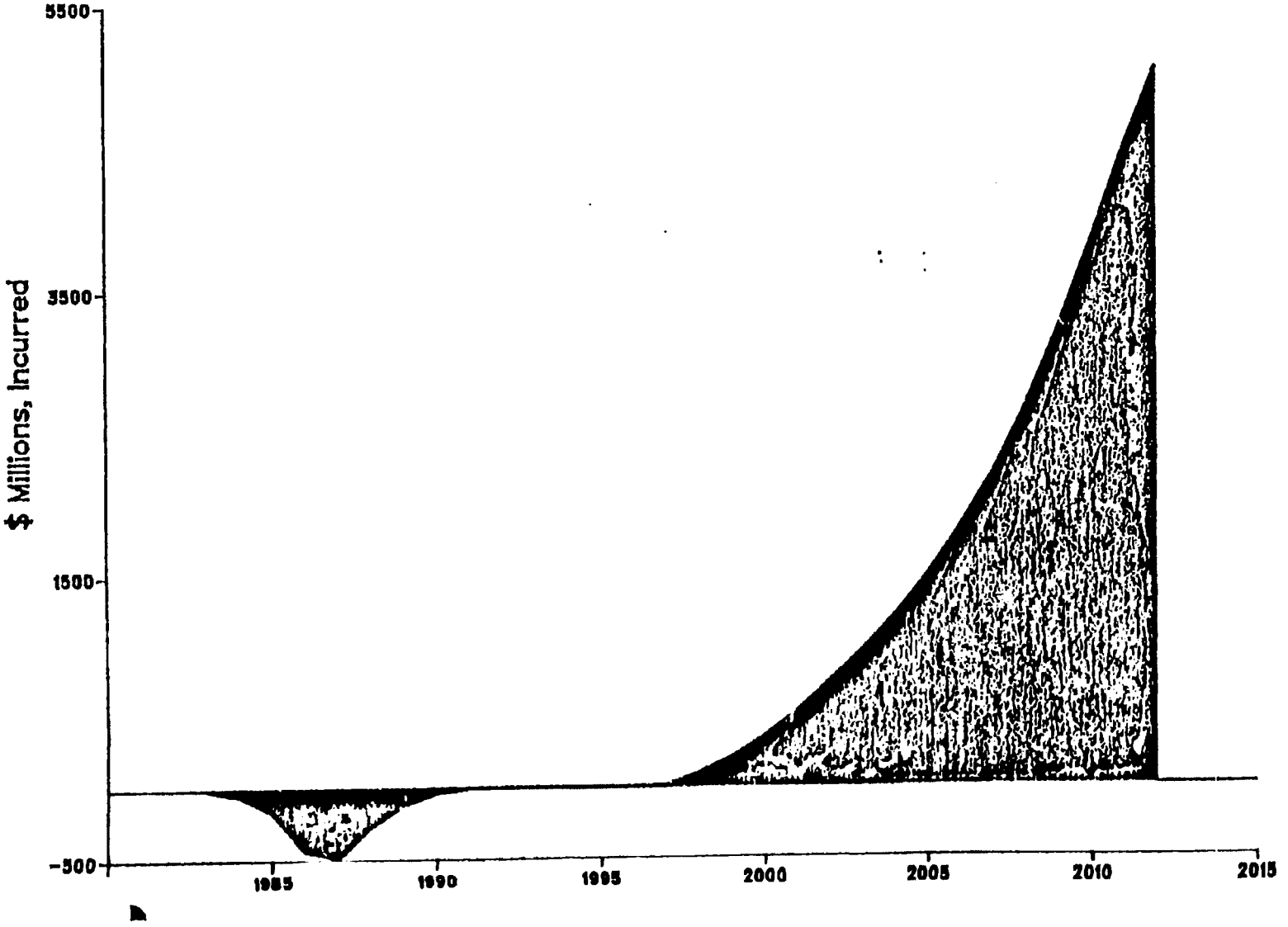
ECONOMIC FEASIBILITY ANALYSIS

The incurred partnership cash flow for the project is expected to be shaped like Schedule XIII. During the first four years, the partners will be required to invest over a half a billion dollars. By year 5, the first year of operation, the partners should begin seeing a net cash return from the plant.

During the first 5 years of production, the project will throw off a massive amount of cash, resulting in virtual payback to the partners. This is caused primarily by the short tax life allowed by the Economic Recovery Act. Between 1992 and 1994, the project is expected to experience a short term debt requirement of some $85 million. This will be a temporary setback which will be erased as energy prices continue to grow. In the final years of the project's life, the plant should be generating over a half a billion dollars per year for distribution to the partnership.

Schedule XIV

CUMULATIVE CASH FLOW FOR PARTNERSHIP



PAYBACK

The partners will incur a total cash investment of $600 million before one barrel of gasoline is made. However, the moment full-scale production begins in 1987, the partners will realize over $100 million in cash from the plant due to tax savings from the accelerated depreciation.

By 1991, 5 years after plant start-up, the partners' investment will have been entirely paid back by the plant's operations. The potential for cash generation by this plant is very favorable.

PROFITABILITY MEASURES

Internal Rate of Return on:

- 25% Equity

-100% Equity

First Year of Net Cash Flow to Partner 1988

Payback Period of Partners' Investment 5 years from startup

First Year of Positive Net Income

PROFITABILITY

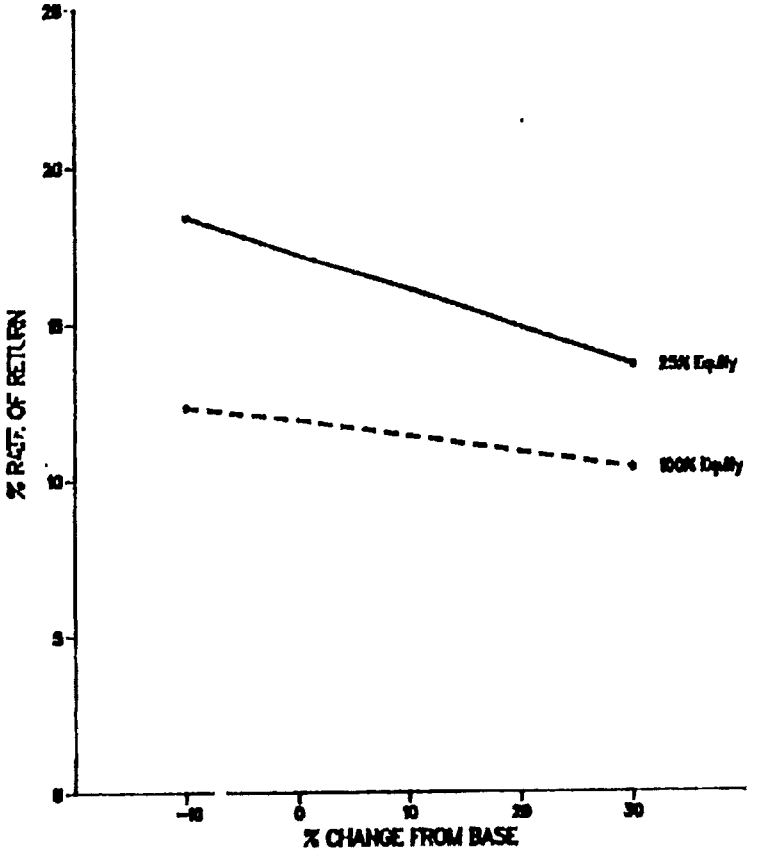
The project will reach a positive cash flow during the first full year of production. The partners will realize payback of equity investment within five years of start-up. By the seventh year of operations the project should be contributing to the partners' earnings per share.

The partners of Tri-State Synfuels Project expect to realize an after-tax rate of return of on their investment. The rate of return on an all-equity basis is expected to reach 11.9%

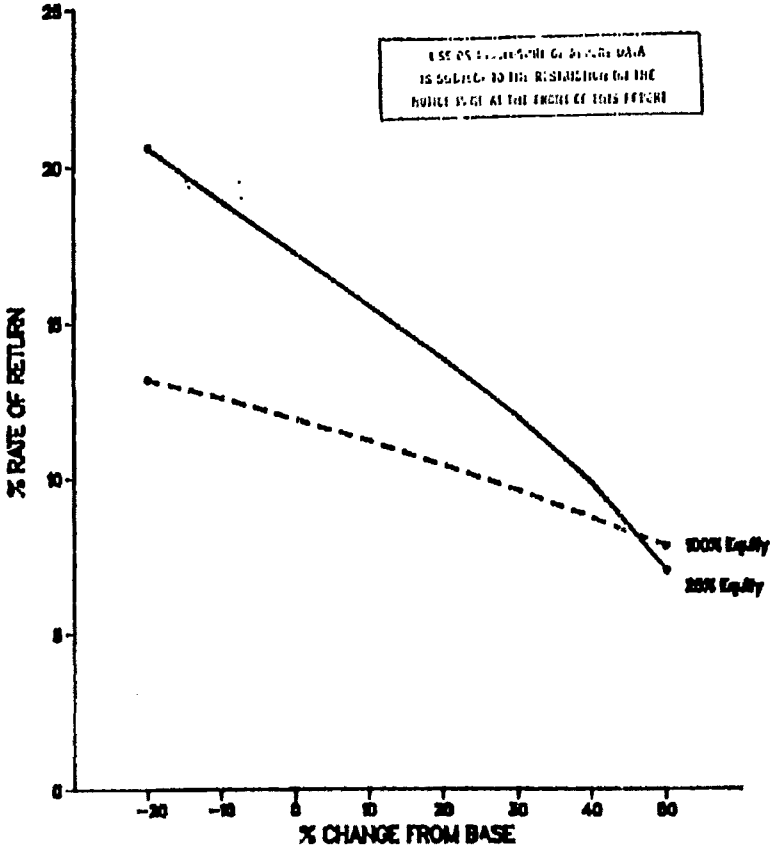
Schedule XVI

SENSITIVITY STUDIES

OPERATING EXPENSE



COAL COST



SENSITIVITY ANALYSIS

The Tri-State project is most sensitive to the operating rate and product price increases. The project is surprisingly insensitive to increases in capital expenditure cost overruns and delays in start of construction.

OPERATING EXPENSES

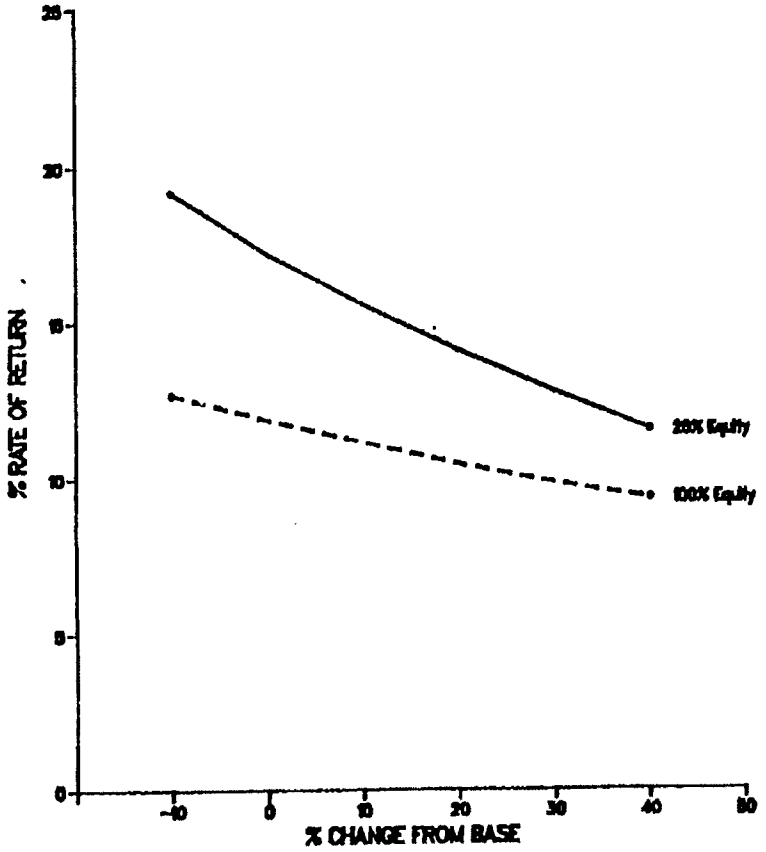
The project is fairly insensitive to changes in operating expense. If operating expenses are 10% higher than expected, the project's rate of return falls from 17.2% to 16.1%. In the all-equity case, a 10% increase in cost results in a 0.5 percentage point drop in the project's rate of return.

COAL COST

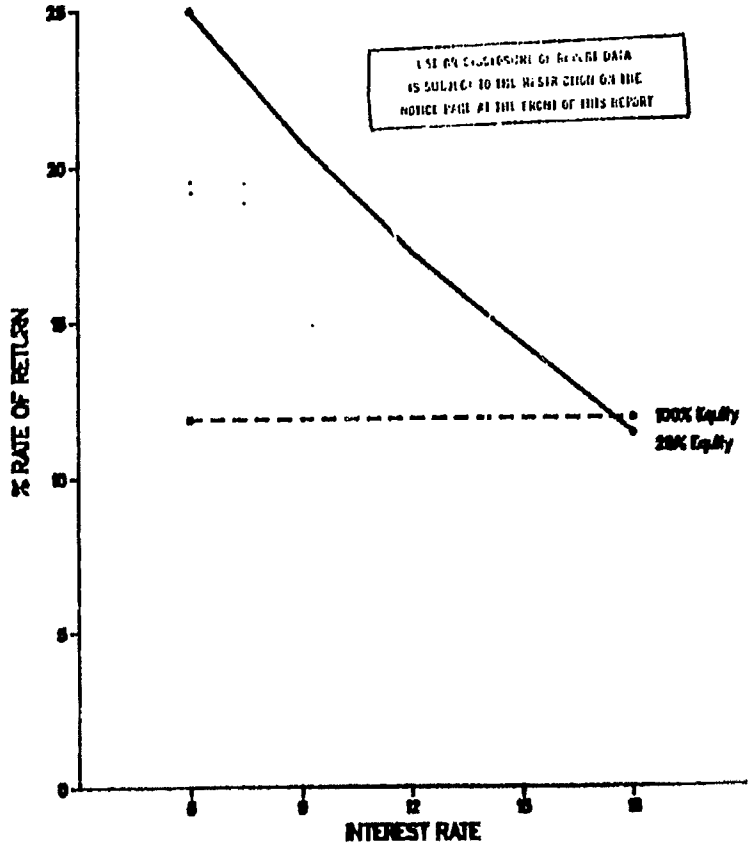
Tri-State is somewhat more sensitive to coal costs. The same 10% increase in costs causes the leveraged rate of retun to fall from 17.2% to 15.5%. A comparable change reduces the all-equity rate of return from 11.9% to 11.2%

SENSITIVITY STUDIES

CAPITAL EXPENDITURES



INTEREST RATE



CAPITAL EXPENDITURES

Cost overruns are a major concern in any project. A 10% increase in capital expenditures would cause the average rate of return to fall 1.6 percentage points. A 40% overrun in the Tri-State project would reduce the project's leveraged rate of return to 11.6% from a base rate of return of 17.2%. The all-equity return would drop to 9.4% from 11.9%.

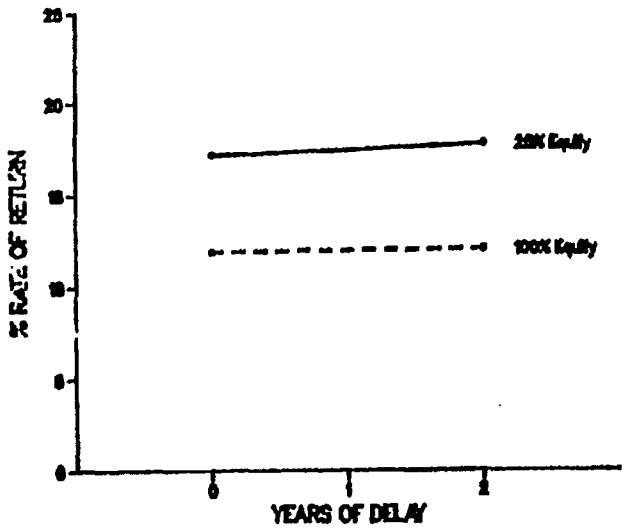
INTEREST RATE

The leveraged rate of return is highly sensitive to long term interest rates, assuming no change in inflation. A 3 percentage point increase in interest rates results in a 3 percentage point decline in the project's rate of return; a 3 percentage point decline in interest rates yields a 3.6 percentage point improvement in the rate of return.

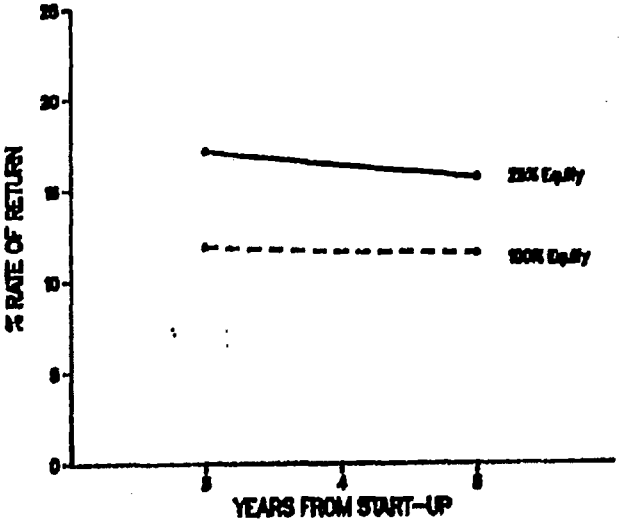
The Tri-State study assumes a real interest rate of 5%, reflecting current financial markets. If real interest rates decline to historical rates of 3% over inflation, and, if the U.S. enters an era of moderate levels of inflation, this area may provide an opportunity.

SENSITIVITY STUDIES

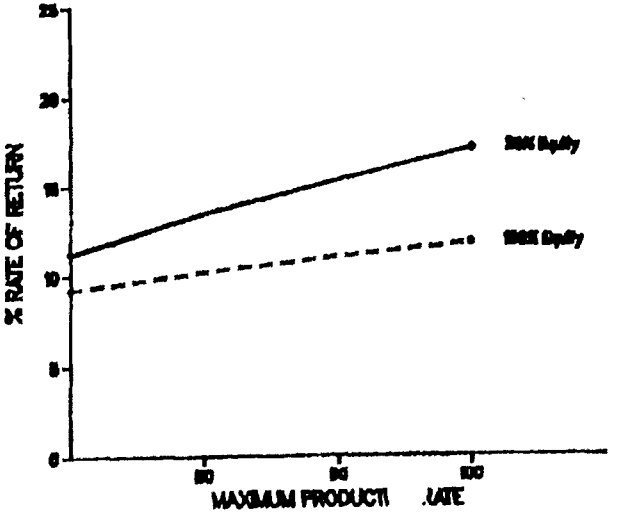
CONSTRUCTION DELAY



LAUNCH SCHEDULE

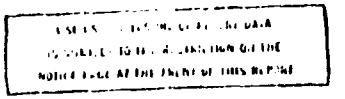


PRODUCTION RATE



CONSTRUCTION DELAY

Delays in the start of construction result in minor increases in the project's rate of return. This is due to the relationship of construction cost increases to product price increases. Here, the assumptions result in the gross margin percentage increasing over time while price inflation in construction costs moderate after 1985.



LAUNCH SCHEDULE

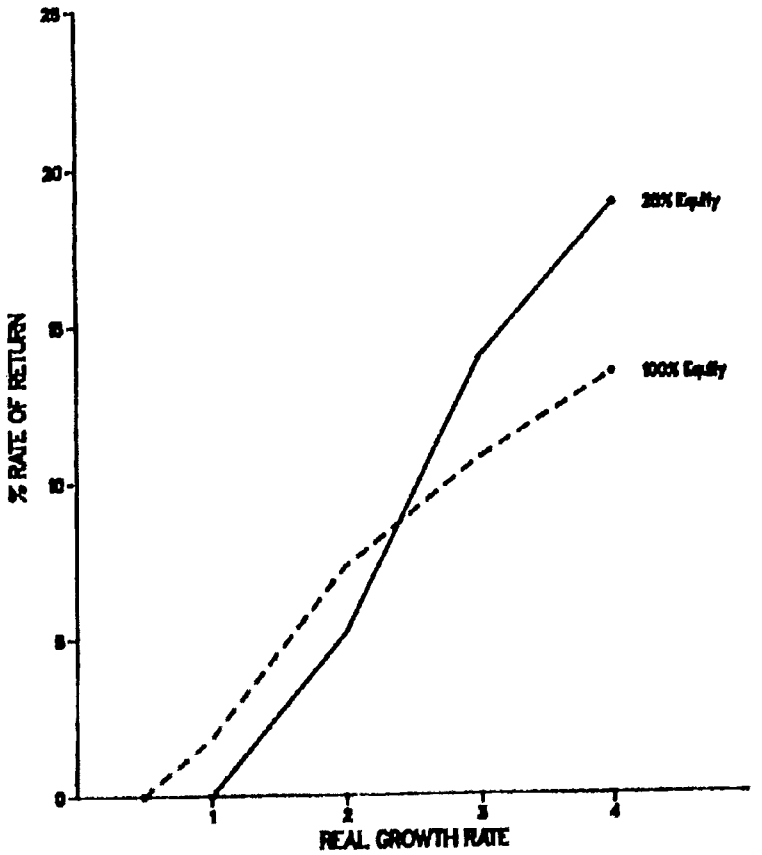
The longer it takes to reach full production, the lower the rate of return. Full production should be reached after three years of operations, based on actual experience at SASOL. If it takes five years to reach full production, the leveraged rate of return drops 1.5 percentage points; the all-equity rate of return declines 0.4 percentage points. This is not a terribly sensitive area.

MAXIMUM PRODUCTION RATE

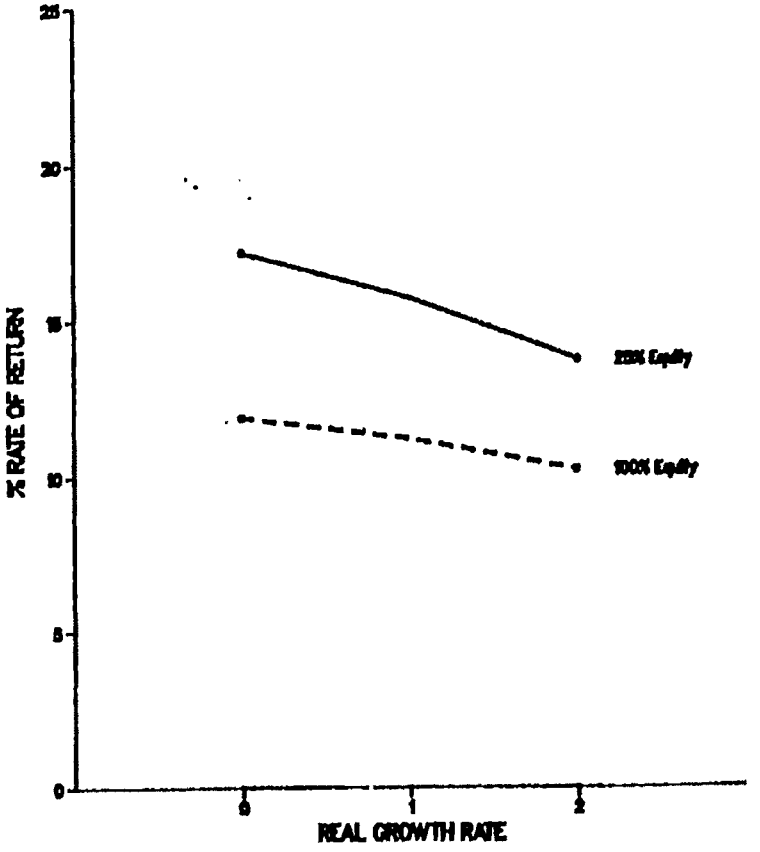
The project is very sensitive to the level of production actually achieved. If the plant only reaches 90% of planned capacity, the leveraged rate of return will drop nearly 2 percentage points; the all equity rate of return will fall just under one percentage point. Operating at 70% of capacity will reduce the project's leveraged rate of return to 11.2%.

SENSITIVITY STUDIES

REAL GROWTH IN PRODUCT PRICES

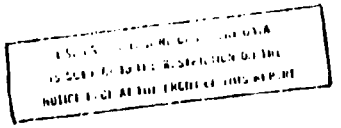


REAL GROWTH IN OPERATING EXPENSE



PRICE GROWTH RATES

The most sensitive element in this project is the future real growth rate of product prices. Tri-State's marketing study forecast an average real growth rate in prices of 2.6% over mid-1980 prices. This assumption yields a 17% leveraged rate of return. This assumption is comparable to an annual average growth rate of 3.5% over January, 1982 prices.



If prices only increase at a rate of 3% over January, 1982 levels, the leveraged rate of return falls by over 3 percentage points, while the all-equity rate of return falls 1.1 percentage points.

OPERATING EXPENSE GROWTH RATES

An increase in the growth rate of 1% per year in O&M expenses will cause a 1.5 percentage points decline in the leveraged rate of return. The all-equity rate of return will decline .7 percentage points.

CONCLUSION

There are major risks involved in building a plant of this nature. Aside from the risks associated with new technology, there are operating risks and marketing risks. The purpose of the sensitivity studies is to help quantify the severity of those risks.

The engineering estimates for the Tri-State Project were not based on the most favorable situation imaginable, and the estimate contains a contingency of 14% of total capital expenditures. A serious attempt was made to reflect honest expectations for all the costs to be incurred. The most appropriate contingency percentage remains an open issue which deserves further consideration. The sensitivities, however, need not only indicate downside risks, but may highlight possible opportunities.

The most sensitive areas in this analysis are prices, operating rate, and interest rates. Coincidentally, prices and interest rates are currently highly volatile. The other areas present risks which do not seem extraordinary.

The sensitivity analysis points to potential problem areas as well. as possible opportunities. It is reasonable to conclude, then, that this project can be expected to provide a rate of return somewhere in the range of 17.2%, based on a debt:equity ratio of 3:1. The all-equity rate of return can be expected to reach 11.9%. The acceptable rate of return for a project with these risks has not been determined and current capital costs may warrant a higher rate of return.

APPENDIX

Sensitivity Studies
25% Equity

	Change From Base								
	-30%	-20%	-10%	Base	10%	20%	30%	40%	50%
Operating Expense	-	-	18.4	17.2%	16.1%	14.9%	13.7%	-	-
Coal Cost	-	20.6%	18.9%	17.2%	15.5%	13.8%	11.9%	9.8%	7.0%
Capital Expenditures	-	-	19.2%	17.2%	15.6%	14.1%	12.7%	11.6%	-
Production Rate	11.2%	13.5%	15.4%	17.2%	-	-	-	-	-

	Interest Rate				
	6%	9%	12%	15%	18%
Interest Rate	25.0%	20.8%	17.2%	14.2%	11.4%

Years of Delay			
	Base	1 Yr	2 Yrs
Construction Delay	17.2%	17.5%	17.9%

Years to Reach Full Production			
	Base 3 Yrs	4 Yrs	5 Yrs
Launch Schedule	17.2%	16.4%	15.7%

	Real Growth Rate				
	0%	1%	2%	3%	4%
Real Growth Over January 1982	Neg	Neg	5.2%	14.0%	18.9%
Real Growth in Expense	17.2%	15.7%	13.2%	-	-

Exhibit XIII F-1

SYNFUELS ALTERNATIVES STUDY

Lurgi, Texaco, Westinghouse - Cost and Revenue Comparison
(1982 $/MMBTU)

$/BBL of Crude Oil Equivalent

Production Costs
O & M
Coal
Capital
Total Costs
Product Revenues*
Net Difference (Revenues - Cost)
Profit Margins as % of Revenue

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Lurgi - Texaco - Westinghouse Comparison

	2A-1 Lurgi	2B-1 Texaco	2C-1 Westinghouse
Net Coal Consumption			
- Short Tons Per Day	26,300	26,600	26,300
- Million Tons Per Year	9.3	9.4	9.3
- Price Per Ton (1982)	$ 38	$ 34	$ 34
Thermal Efficiency	50.4 %	55.6 %	58.5 %
Product Slate			
- SNG (MMSCFD) @ 983 BTU/CF	107	------	30
- Methanol (TPD)	7,500	14,500	13,600
- Chemicals (TPD)	775	1,000	900
- Memo: BOED	45,000	51,000	58,000
Capital Expenditures (Billion)			
- 1981 Dollars	$ 2.9	$ 3.4	$ 3.1
- Mid 1982 Dollars	$ 3.3	$ 3.9	$ 3.5
- Incurred Dollars	5.0	5.8	5.4
- Net Capital to be Financed	4.3	5.0	4.6
- Memo: Contingency	13 %	18 %	26 %
Revenue (Billion, 1993)	$ 1.7	$ 1.8	$ 1.9
Operating & Maintenance (Billion, 1993)	.2	.2	.2
Coal Cost	.8	.7	.7
IRR:			
- 25% Equity	19.8 %	21.8 %	26.6 %
- All Equity	13.1 %	13.7 %	15.7 %

Exhibit XIII F-2

Chem Systems Prices

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Exhibit XIII F-3

Lurgi - Texaco - Westinghouse Study

IRR vs Real Product Price Growth over January, 1982

Return on 100% Equity

	Real Product Price Growth			
	0%	1%	2%	3%
Lurgi	Neg.	Neg.	3.2 %	8.4 %
Texaco	Neg.	.5 %	6.3 %	10.0 %
Westinghouse	Neg.	3.5 %	8.2 %	11.6 %

Return on 25% Equity

	Real Product Price Growth			
	0%	1%	2%	3%
Lurgi	Neg.	Neg.	Neg.	9.2 %
Texaco	Neg.	Neg.	0 %	12.7 %
Westinghouse	Neg.	Neg.	8.8 %	15.6 %

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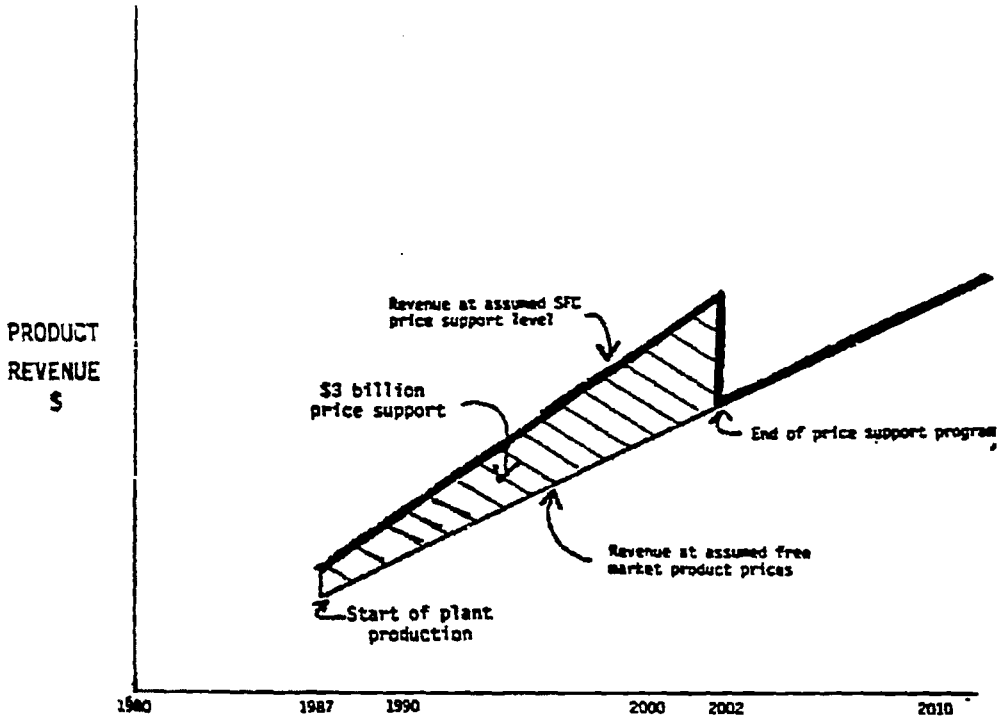
Exhibit XIII - G

Assumptions Relative to SFC Price/Revenue Supports



Explanatory Notes:

1. Bottom line represents what happens to total plant revenue assuming no real growth in product prices through 1990 and 2% real growth thereafter. For analytical purposes, this line represents what the marketplace might actually pay for Tri-State's output.

2. The top line represents what happens to total plant revenue assuming 3% real growth in product prices every year after 1982. This line represents a possible SFC price guarantee.

3. The heavy line represents Tri-State's expected total revenue in every year assuming:
   a. SFC price support of 3% real annual price growth;
   b. An actual market price growth equal to no real growth through 1990 and 2% real growth thereafter;
   c. a limit of $3 billion in price supports; and
   d. that after the $3 billion is used up, Tri-State's revenues will be limited to what the market place has to offer, which is represented by the bottom line.

4. The area between the lines (shaded area) represents the $3 billion SFC price support.

which specifically allow for all the needed information. For example, Exhibit XIII-H shows the level of detail needed for product pricing.

2.1.4 Challenges to Conventional Wisdom

In most instances, vigorous engineering work and financial analysis tended to support conventional wisdom. However, it was discovered that delaying the start of construction does not always decrease the IRR. If construction cost increases are sufficiently low while product prices are increasing, delay can improve the rate of return.

2.1.5 Key Contacts

Exhibit XIII-I contains a list of key contacts.

2.2 CURRENT STATUS

2.2.1 Current Work Activities/Decisions Pending/Open Issues

Current work efforts would have included five major activities:

- Opportunities associated with diverting some methanol from gasoline into acetic acid still had to be evaluated.
- Further work had to be done analyzing chemical-grade methanol and fuel-grade methanol alternatives. The key potential partners were more interested in a methanol plant. The SFC response to a methanol project remains an open issue.
- may wish to further study Texaco or Westinghouse gasification in place of Lurgi in a reconstituted Tri-State Project.
- Work still had to be done structuring an SFC support package, including some combination of price supports and loan guarantees.
- Continuing efforts needed to be made to keep up to date with the latest economic forecasts, product prices, coal costs, etc.

2.2.2 Major Strengths/Weaknesses

The major strength is the large volume of input data - capital cost estimates, product volumes, operating costs, etc. Key weaknesses include the uncertaintly surrounding important but uncontrollable variables such as interest

Exhibit XIII H

Chem Systems Price Assumptions

(1980 Dollars)

	Units	BTUS Per Unit	Source	Mid 1980 Prices: Gulf Coast Price/Unit	Mid 1980 Prices: Kentucky Netback Per Unit	Mid 1980 Prices: Kentucky Netback Per MMBTU	Kentucky Netbacks: Annual Average Growth Rate In Real Prices 80-85	85-90	90-95	95+	Forecast Prices (Real) 1985	1990	1995	2000	
SNG	MCF	.9825 mm		$ 2.50	$ 2.85	$ 2.90	%13.1	6.8	1.4	1.3	5.37 5.28	7.48 7.34	8.00 7.86	8.51 8.38	$/MMBtu $/MCF
Liquid Fuels															
Average Crude Oil	bbl	5.8 mm	4	28.22	NF	4.85	7.7	2.3	1.2	1.5	40.85	45.70	48.48	52.52	
Fuel Oil (#6 Sulfur)	bbl	6.436 mm	1	25.37	25.37	3.94	6.1	3.5	1.4	1.2	39.52	47.08	50.48	53.59	
Fuel Oil (#2)	bbl	5.8 mm	5	33.52	NF	5.75	7.2	1.5	1.2	1.1	47.58	51.28	54.52	57.58	
Gasoline (Prem-unleaded)	gal	125,000	5	.941	.950	7.60	5.6	1.5	1.2	1.1	1.24	1.34	1.41	1.49	
Diesel Fuel	gal	133,000	3	.800	.809	6.08	7.3	1.9	1.5	1.2	1.15	1.27	1.36	1.45	
Jet Fuel	gal	133,000	5	.808	.813	6.02	7.5	1.7	1.5	1.2	1.17	1.27	1.37	1.46	
Methanol (Fuel grade)	ton	18.309mm	1	72.17**	72.17**	3.94	6.1	3.5	1.4	1.2	97.04	115.25	123.50	131.14	
Propane (LPG)	gal	91,500	5	.423	.443	4.59	9.4	2.9	0.6	2.3	.69	.80	.83	.93	
Naphtha	gal	128,519	4	.835	.849	6.60	7.1	1.2	1.1	1.1	1.20	1.27	1.34	1.42	
Isobutane	gal	94,619	4	.813*	.823*	8.70	.5	3.1	1.0	1.0	.84	.98	1.03	1.09	
Butane	gal	103,000	4	.570	.580*	5.63	4.0	1.1	1.1	1.2	.71	.75	.79	.84	
Chemicals															
Acetone	lb	13,300	3	.230	.230	17.29	7.6	1.5	1.3	1.8	.33	.36	.39	.41	
Ammonia	ton	19.4mm	3	170.00	180.00	9.28	4.2	9.6	0.9	1.0	221.60	350.30	365.80	385.00	
Benzene	gal	132,655	1	1.650	1.600	12.06	4.0	1.1	1.2	1.1	1.95	2.06	2.18	2.30	
CO_2	MCF			1.600	1.600		(.7)	2.0	1.4	2.0	1.54	1.70	1.82	2.01	
Creosotes	gal			.770	.770		3.0	5.7	1.2	.8	.89	1.18	1.25	1.30	
Cresols	lb	13,190	3	.530	.530	40.18	.4	(1.4)	2.0	1.4	.54	.44	.48	.52	
Ethylene	lb	20,276	1	.223	.223	11.00	6.9	3.4	3.4	1.3	.31	.37	.43	.46	
MEK	lb	14,300	3	.300	.317	22.17	6.0	5.7	1.8	1.6	.41	.53	.58	.63	
Methanol (Chemical grade)	gal	64,800	1	.600	NF	9.26	3.9	3.1	1.9	2.3	.73	.85	.93	1.04	
Mixed Alcohols	gal			NF	1.105		5.5	.9	1.0	.9	1.44	1.51	1.59	1.66	
Phenols	lb	13,100	3	.300	.328	25.04	4.9	2.9	1.9	1.7	.42	.48	.53	.58	
Styrene	lb	18,150	1	NF	.380*	20.94	4.0	1.1	1.1	1.2	.46	.49	.52	.55	
Sulfur	ton	7.6mm	3	83.00	93.00	12.24	2.9	3.2	2.5	2.4	107.20	125.40	142.20	160.00	

*Furnished by Chem Systems by phone; not in their formal report

**Calculated as Btu equivalent of low sulfur #6 fuel oil

NF-Not furnished by Chem Systems

Sources: Prices, Netbacks, and forecast growth rates are per Chem Systems.

Others:
(1) "Relative Energy Data" Stone & Webster (Btu conversion chart)
(2) Chem Systems
(3) Fluor estimates for Tri-State
(4) DOE "1980 Annual Report to Congress" Volume II, page 227
(5) T.E. Corporate Planning

EXHIBIT XIII-I

KEY CONTACTS

COMPANY & ADDRESS	INDIVIDUALS*	TITLE/POSITION	TELEPHONE
Temple, Barker & Sloan, Inc. 33 Hayden Avenue Lexington, Mass. 02173 (Markets model with acceptable risk simulation)	John Boyles	Market Representative	(617) 861-7500
Fluor Engineers and Constructuors, Inc. Advanced Technology Division P.O. Box C11944 Santa Ana, CA 92711	Mike Norman	Cost Estimator	(714) 966-5179

* Key Contact

rates, product prices, inflation, etc. While the SEEM program was not ideal, it was very flexible and was a major contributor to the project economic analysis.

2.3 FUTURE

2.3.1 Future Milestones

Future milestones are contained in section 2.2.1, "Current Work Activities/Decisions Pending/Open Issues." Major effort would include matching the project to the requirements of additional partners and identification of SFC support.

2.3.2 Minimal Work Effort

Future project activity in partnership discussions may require a work effort from the economic analysis group. Changes in the SFC environment might possibly result in additional work.

2.3.2 Priority Activities upon Reactivation

If SEEM is to be used, computer services must be notified so that the model can be reactivated. If an outside model is to be used, the model must be purchased and installed quickly.

Other priority activities will be to identify external inputs and any project-specific inputs. External inputs include inflation rates, interest rates, tax rates and relevant tax law changes. Project-specific inputs include capital cost estimates, operating cost estimates, product slate, etc.

2.3.4 Organizational Recommendations

The Tri-State staffing was adequate for economic analysis. The key elements for success are to maintain a small, highly capable staff and to ensure good communication between all members of the project team.

3.0 DETAILED REVIEW OF WORK PLAN

3.1 REFERENCE AND WORK PRODUCTS

The following sections will summarize the work contained in the three volumes of binders titled "Economic Analysis Reference and Work Products, Volumes I, II & III.

3.1.1 Volume I - SNG-MTG Economics

This section contains a copy of the final analytical work performed on Case 13, the quarter-sized MTG plant. Following the analysis are copies of computer runs. The first computer run corresponds directly to the analysis. The second computer run is based on a set of pricing assumptions submitted to the SFC.

3.1.2 Volume 1 - Process Alternatives

This section contains a document which was delivered to the D.O.E. on April 7, 1982. The document contains relative rankings of all the alternative studies by the project. As well, the document includes Fluor's published studies, Tri-State's January 8, 1982 presentation to D.O.E., and a copy of Case 14's computer output.

3.1.3 Volume II - SEEM

The Synfuels Economic Evaluation Model (SEEM) was developed jointly by Tri-State and Texas Eastern's Computer Services. It was used extensively in analyzing the economic value of different proposals.

The first part of this section lists the crucial differences between SEEM and GEM, the only other available in-house economic model. The second part of this section is a copy of the SEEM user's manual.

3.1.4 Volume II - Federal Tax Analyses

Several different papers appear in this section. They provide the rationale for tax interpretations made by the economic analysis group.

The first section discusses the sale of tax credits through a sale/leaseback contract. The analysis which was undertaken indicated a potential opportunity. However, further work would be necessary to demonstrate the benefits of selling tax credits.

The next section analyzes Production Tax Credits. Given expected future price levels, these tax credits should not be expected to yield any benefit to the projects, especially if SFC price supports are used.

The final section addresses the 1981 tax law changes titled "Economic Recovery Act of 1981". There are several different analyses contained in this section. The major effect of the new tax laws is a shortening of asset life, resulting in a quicker write-off of capital expenditures.

3.1.5 Volume II - Other Supporting Analyses

There are two major analyses contained in this section. The first concerns capitalized interest. The specific analysis is followed by a series of papers published by FASB concerning capitalized interest.

The second analysis addressed ad valorem taxes and potential impact assistance which might be faced by the project in Kentucky. This section concludes with a study produced by the Kentucky Department of Energy entitled "The Synthetic Fuels Industry in Kentucky: An Assessment of Socioeconomic Issues".

3.1.6 Volume III - Early Analyses

During middle and late 1980, a series of economic analyses were produced comparing Tri-State to Wesco (an earlier Texas Eastern project). Later versions included the beginning stages of the process alternatives analysis, comparing F-T with SNG and SNG/MTG. Roughly, these analyses compared market values to costs of production.

3.1.7 Sohio Meetings

This section contains a series of reports based on a rate of return analysis. The reports are in a format which was eventually used in partnership discussions

3.1.8 December 14, 1981 Management Committee Meetings

This report followed a somewhat different format. The report argued for changing the process from Fischer-Tropsch to SNG/MTG. The argument was based on financial and economic issues. The arguments compared costs with relative market value.

XIV

FINANCING

Prepared by: Judy F. Kochel - Project Planning Coordinator
James M. Hossack - Manager, Project Planning and Control

1.0 INTRODUCTION

The financing function is responsible for identifying activities necessary to obtain financing, for selecting and interfacing with financial advisors, for negotiations with the SFC, for preparation of necessary documents, and for arranging financing. Financing activities cannot begin in earnest until project size and process are firmly established and additional partners identified.

1.1 SCOPE OF WORK

A financing plan was developed which specifies the type of information and the kinds of activities which will be required in order to finance the project. The key stages of this plan are:

- The optimum financial structure has to be determined. The advantages of leveraging must be weighed against the risks of high debt loads and heavy debt-servicing.
- Submissions to the SFC must be prepared. The type and level of assistance to be requested must be determined. This decision will likely have a major impact on the capital-structure decision.
- Project bankers need to be selected. These include the lead bankers, the investment banker, and the trustee banker. At the same time the bond underwriter should be chosen. An IRS ruling should be obtained concerning tax-exempt bonds.
- A "Blue Book" has to be prepared. This will provide an overview of the project for serious potential investors. It will also facilitate the process of obtaining a bond rating.

1.2 OBJECTIVES AND GOALS

The objective here is to finance a multi-billion dollar project. A detailed plan which will successfully meet this

goal must be developed and implemented. Plant scale and plant process must be adopted and partnership participants must be identified before significant progress can be made in this area. A firm plan must be implemented before the decision can be made to commit to construction.

EXHIBIT XIV-A

PROJECT PERSONNEL

Tri-State

Name	Title	Dates of Service	Area of Responsibility
J. M. Conaway[3]	Manager	08/80 - 07/81	Interface with investment banker, identify issues preliminary SFC filing, Financing Task Force
P. M. Anderson[2]	Project Director	05/80 - 06/82	Issues investment banker interface, SFC interface
L. S. Rathbun[2]	Manager	07/81 - 05/82	Response to SFC questionnaire
J. M. Hossack[3]	Manager	10/81 - 06/82	Development of financing plan and partnership brochure, SFC filing
J. F. Kochel[3]	Coordinator	10/80 - 06/82	Development of financing plan and partnership brochure, SFC filing

Texas Eastern Support

Name	Title	Area/Type Assistance	Role
J. F. Callahan[1]	Tax Attorney	Synfuels Financing Task Force	Defining issues in Synfuels financing
P. C. Forbes[1]	Treasurer	Synfuels Financing Task Force	Defining issues in Synfuels financing
E. H. Mowery[1]	Regulatory Affairs	Synfuels Financing Task Force	Defining issues in Synfuels financing

EXHIBIT XIV-A

PROJECT PERSONNEL

Texas Eastern Support (Continued)

Name	Title	Area/Type Assistance	Role
E. M. Waggoner(1)	Regulatory Affairs	Synfuels Financing Task Force	Defining issues in Synfuels financing
R. Leal(1)	Assistant Treasurer	Synfuels Financing Task Force	Defining issues in Synfuels financing

Texas Gas Support

Name	Title	Area/Type Assistance	Role
R. Greenwell(1)	Assistant Treasurer	Identification of Issues	Synfuels Task Force
M. N. Kelley(1)	Project Director (Texas Gas)	Identification of Issues	Synfuels Task Force

(3) - Key

(2) - Impact but on "as required basis"

(1) - Occasional use

2.0 SUMMARY AND HIGHLIGHTS

2.1 HISTORY

2.1.1 Work Plan

Submit SFC Round 2 Solicitation	5/31/82
Complete Project Synopsis (Blue Book)	5/31/82
Receive Commitment from Additional Partners	6/01/82
File for IRS Partnership Ruling	6/01/82
Receive SFC Approval	8/31/82
File for IRS Ruling on Tax-Exempt Bonds	8/31/82
Contact Export Country	9/01/82
Sign Partnership Agreements	10/31/82
Receive IRS Partnership Ruling	10/31/82
Select Trustee Banker	10/31/82
Select, Negotiate and Commit Lead Bank	12/01/82
Receive IRS Ruling on Tax-Exempt Bonds	3/01/83
Complete Contract Negotiations with SFC	5/31/83
Receive Preliminary Commitment from Lender Banks for Export Credit	6/30/83
Final Project Synopsis	7/31/83
Issue Tax-Exempt Bond Indenture	8/31/83
Receive Tax-Exempt Bond Rating	9/30/83
Obtain Valid Bank Commitments and Sign Loan Agreements	12/31/83
Review and Prepare Security Package	1/31/84
Financing Arranged	2/28/84

2.1.2 Description of Work Completed

Meetings were held with representatives from both Pace Consultants and Dillon, Read & Company. These meetings were

helpful in establishing the issues associated with financing a synfuels project. Pace Consultants prepared a CPM network. This was used extensively in developing the financing workplan in Section 2.1.1.

The project's financial structure will be constrained by the amount of leveraging that the market or the SFC will support. Various financial structures were analyzed through studies using an internal rate of return approach.

Three submissions were made to the Synthetic Fuels Corporation. A preliminary filing was made in March, 1981. This resulted in a questionnaire being sent to the project. A response was filed in January, 1982. Finally, a project description package was reviewed in May, 1982. Each filing outlined the project's financing plans, but no plan had been implemented when the project was terminated.

EXHIBIT XIV-B

KEY DECISIONS REACHED

Decision/Recommendation	Rank*	Date	Alternatives	Rationale for Decision
Additional partners should be sought to reduce risk to Texas Eastern and Texas Gas	3	12/80	Betting the company on one project	Texas Eastern, Texas Gas unwilling to risk amount of investment required
Project size should be reduced to make project financable with all debt guaranteed	3	01/81	Equity sponsors back-stopping debt	Discussions with Dillon, Read and other investment bankers
Project size reduced and product slate changed	3	12/81	Remain full size	Inability to finance full size project. F-T did not downsize well
Request SFC support in form of loan guarantees which would be converted to price guarantee after construction is completed	3	03/82	- Request no support - Risk only loan guarantee - Request only price support	Minimize risk completion, and minimize market risk

*3 - Absolute studied
2 - Preliminary (pending additional input/information)
1 - Operational (little to no support)

EXHIBIT XIV-C

MAJOR ACCOMPLISHMENTS/MILESTONES COMPLETED

Description	Date Initiated	Date Completed
Preliminary SFC filing		03/27/81
Response to SFC questionnaire		01/05/82
Review project with SFC		05/18/82

EXHIBIT XIV-D

CONSULTANT/CONTRACTOR REVIEW

Firm	Dillon, Read and Company
Individuals/Positions	James Brandy, Vice President-Energy
Statement of Scope	Provide input on: - tasks required to secure financing; - composition of project synopsis; - financial structure; - SFC submission; and - identification of potential partners.
Dates of Service	January, 1981 - March, 1982
Reports Prepared (dates)	One 2-page checklist of financing requirements included in Section 3.
Decision Impacted	Reduction in plant size.
Budgeted $ to date	
Actual $ to date	
Future Budget/Estimate	
Performance Appraisal	
Future Recommendations	

EXHIBIT XIV-D

CONSULTANT/CONTRACTOR REVIEW

Firm	Pace Consultants
Individuals/Positions	Doug Burton
Statement of Scope	Develop list of activities necessary to secure project financing.
Dates of Service	August, 1981 - September, 1981
Reports Prepared (dates)	CPM network of financing activities.
Decisions Implicated	Decision to begin search for potential partners' immediately.
Budgeted $ to date	
Actual $ to date	
Future Budget/Estimate	
Performance Appraisal	
Future Recommendations	

EXHIBIT XIV-E

FUTURE MILESTONES/MASTER SCHEDULE

Phase I

Description	Date Initiate	Date Deadline
Project Legal Entity Study	-	10/01/82
Issue Final Financing Plan	-	02/01/83

2.1.3 Major Problems

2.1.4 Challenges to Conventional Wisdom

The SFC has the ability to support any one project in excess of the $3 billion limit as long as the total current amount of commitment does not exceed $3 billion at any one time. For example, the SFC could make available $2 billion in loan guarantees and $3 billion in price supports. However, the price supports could not exceed $1 billion prior to converting the guaranteed debt into standard debentures.

Contrary to earlier indications, the SFC and Dillon, Read & Co. have stated the project may be financed with 75% debt. Previously the minimum equity contribution was assumed to be 40%.

The 75% debt financing has been interpreted by Tri-State and Dillon, Read & Co. to mean a 25% equity investment after tax benefits have been considered. Certain other projects have interpreted the 25% equity to mean before tax benefits resulting in an actual equity investment of approximately 13%.

2.1.5 Expenditures and Budgets

No external costs were incurred for financing activities and little has been spent internally. The money which has been spent went towards salaries, travel, and general and administrative expenses. The expenditures were not segregated from the budget for economic analysis. Had Phase 1 continued to completion, several hundred thousand dollars would have been spent on financing.

2.2 CURRENT STATUS

2.2.1 Current Financing Work Activities

Financing activity can not begin until process decision and project size is finalized and partners are identified.

2.2.2 Key Financing Decisions Pending

Three major decisions are currently pending. First, major equity participants must be found. The current partnership does not have the strength to undertake a project of this size, given the project's risk profile.

Second, an active financial advisor must be selected. Third, the size and form of SFC support has to be resolved.

2.2.3 Major Strengths/Weaknesses

The major weakness is the lack of a detailed financing plan demonstrating a clear understanding of tasks and responsibilities and the interrelationship of those tasks.

2.2.4 Demobilization

No special measures are necessary to wrap-up the financing effort.

2.3 FUTURE

2.3.2 Work Program

No extended effort has been applied to completion of the work plan in Section 2.1.1. Financing efforts can not commence until process selection and equity participants have been finalized.

A CPM network of financing activities was prepared by Pace and appears in Exhibit XIV-F.

2.3.3 State of Readiness

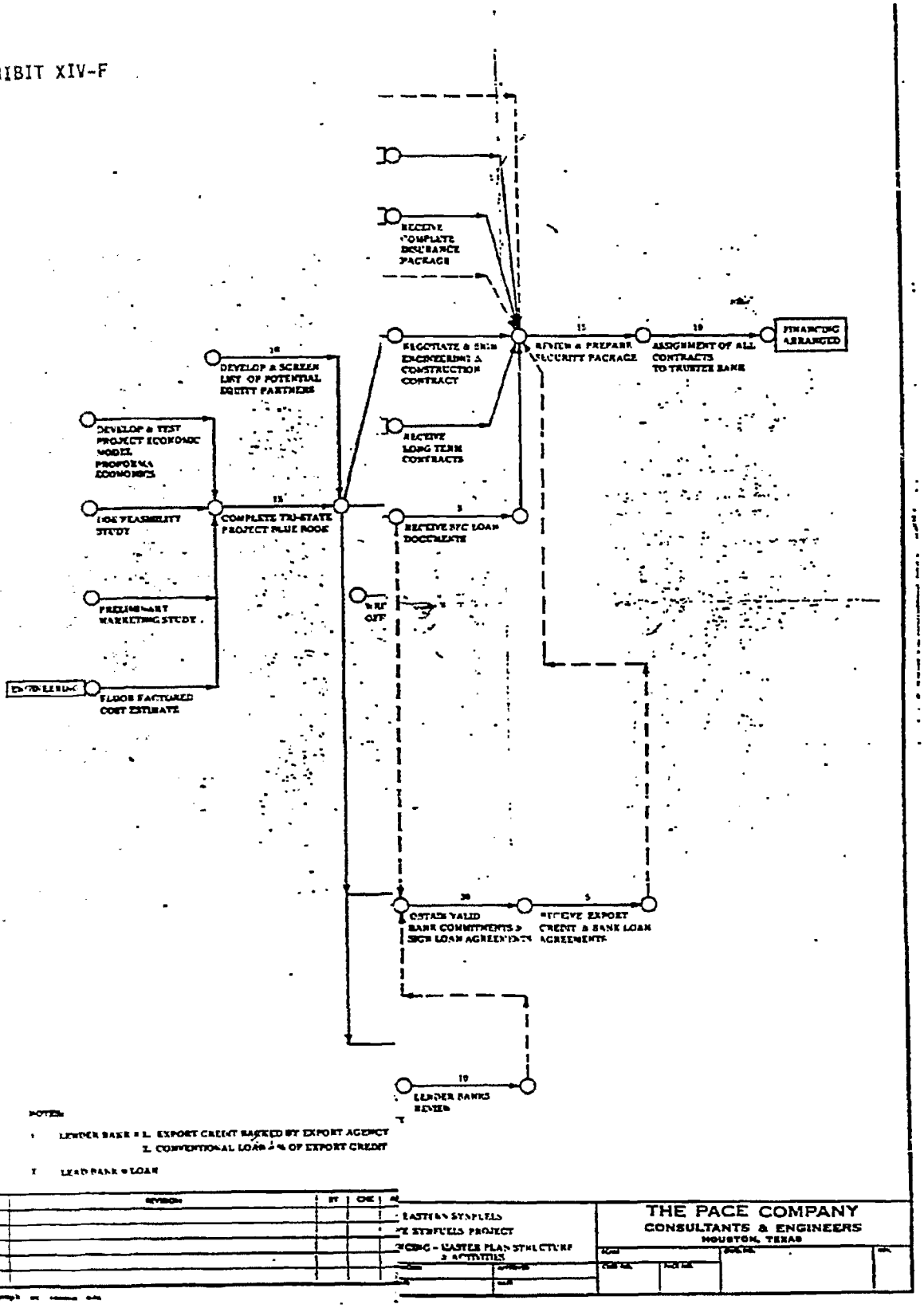
The only financing activity necessary to maintain a state of readiness is the continuation of the partnership search.

2.3.4 Key Tasks

The most important task facing the project is finding a major equity partner. The two best prospects to date (Conoco and Sohio) have been unwilling to commit themselves to Tri-State.

A final decision on the process configuration and the size of the plant must be reached with the partners. After these tasks have been accomplished, the financial advisors must be selected in order to procure professional financing support.

EXHIBIT XIV-F



2.3.5 Long Lead Activities

Attracting additional partners is a very long lead activity. Committing another partner requires six (6) to twelve (12) months from the initial contact. Because of the high failure rate and long lead time, discussions should take place with multiple candidates concurrently.

2.3.6 Staffing

If Tri-State is reactivated, an effort should be made to recruit an experienced outside advisor for this facet of the project. This advisor should work closely with the Treasury personnel and project team personnel.

3.0 DETAILED REVIEW OF WORK PLAN

3.1 WORK PRODUCTS/REFERENCES

The seven sections briefly summarized below are detailed in the binder titled "Financing Work Products and References".

3.1.1 Issues in Synthetic Financing

The major financing issues in a project of this nature lie in the areas of corporate risk, dependence on the SFC, and determination of requirements of other regulatory agencies. These issues were outlined in late 1980 - early 1981. A financing task force was established. The goal was to have a financing plan ready for submission to SFC under Phase I Solicitation. The deadline for this submission was March 15, 1981.

3.1.2 Synfuels Financing Task Force

The first task force meeting took place on December 17, 1980. The responsibilities were broken down along divisional lines. Representatives from synfuels were to coordinate the financing task force activities and interface with the investment bankers. They were to coordinate the analyses of major issues and of feasible alternatives.

Treasury's representative was to identify financing issues, assist in dealing with the investment bankers, and analyze the incremental effect of alternatives on the corporation. The tax department was assigned the task of examining tax effects and tax incentives on project financing. The Gas Group was to identify issues concerning the sale of SNG vis-a-vis FERC. Also, they were to study the impact of different alternatives on the company's natural gas supply.

Subsequent meetings resulted in a consensus concerning the major financing issues.

- Completion risk and operating risk were identified as the major project risks.
- Equity participation and SFC support were identified as the only realistic types of support available.
- The initial estimated cost for the full-sized project far exceeded SFC's $3 billion support limit. Thus, alternative plant configurations were identified. These alternatives were a modular approach, a stripped-down version, a phased approach, and a "fenced" approach.

3.1.3 Financing Work Plan

The work plan was developed during the middle of 1981. Little has been completed beyond an outlining of principal actions necessary to obtain financing. Pace Consultants did provide a CPM network but few of the tasks in the network have been finished.

3.1.4 Project Brochure

A project brochure titled "A Coal Conversion Project in Kentucky", was published in early 1982. It was based on a preliminary version of Case 13--the quarter sized MTG plant. This brochure could be the model for the project's "Blue Book".

3.1.5 SFC Inquiry - May 18, 1982

It was recognized in early 1982 that Tri-State was unlikely to find a suitable new partner. The preliminary submission that was made to the SFC outlined Tri-State's financing plans.

SFC was presented with the opportunity of indicating its degree of interest in the project based on the synopsis dated May 18, 1982. The SFC did not act on this overture and no Phase II submission was prepared.

3.1.6 Request for IRS Ruling

In early 1981, a decision was made to request a ruling by the IRS on whether or not Tri-State would be considered a partnership. The request has been delayed and won't be made until just prior to construction. Texas Eastern's tax department has indicated that the request will be a mere formality.

3.1.7 Notes on Financial Structure

There are three primary methods of dealing with a project's capital structure during construction. In this project all construction financing was expected to include tax savings and tax credits in the calculation of the debt-equity ratio. A corollary of this method excludes tax savings and tax credits from the financing calculation. The effect of this exclusion would be to increase the amount of leveraging in the project.

The second method of financing is a turnkey approach in which a contractor would build the plant and sell it to the partners at a fixed price. The third method involves leasing and the sale of tax credits.

The problems with a turnkey approach lay with the difficulty of finding a contractor willing to take on the risk of successfully building and completing a project of this size at any reasonable fee. The problem with lease-backs is that it is unlikely that an investor would allow a vital part of the plant to lie outside its reach should the project default on its debt. Security to the lenders is a major issue.

EXHIBIT XIV-G

MAJOR CONTACTS

Company & Address	Individual*	Title/Position	Telephone
Dillon, Read & Company 46 William Street New York, NY 10005	James Brandy	Vice President	(212) 285-4496
Pace Consultants P. O. Box 53473 Houston, TX 77052	Doug Barton	Vice President	(713) 965-0311

*Key Contact

EXHIBIT XIV-H

T.E. SYNFUELS CENTRAL FILES

Critical/Important Items

File	Item/Description	Date	Proprietary/Confidential If yes, by whom*
SFC #1	Supplement to Initial Solicitation	10/23/81	No
SFC #2	Second Solicitation	12/11/81	No
	SFC Board Briefing 12/11/81 - Maturity		

XV

PARTNERSHIP DEVELOPMENT

Prepared by : Michael D. Burke - Project Director
Linda S. Rathbun - Manager, Project Development

1.0 INTRODUCTION

A critical element to the success of the Tri-State Synfuels Project was the development of an adequate equity base. It was recognized from the beginning of the project that Texas Eastern and Texas Gas would have to secure additional sponsors early in the development of the project. Ideally, the new partner would be of sufficient size and profiability to limit the addition to only one or two companies. Considerable emphasis was also placed on securing a partner(s) that not only would be compatible with the interest of Texas Eastern and Texas Gas but who had resources, product demands and/or expertise and experience that would be valuable contributions to the project development, plant construction and operation. A more detailed discussion of partnership issues and the partner's position is presented in Exhibit XV-A, Partnership Development Issues, and Exhibit XV-B, Partnership Development Position Paper.

Note: Almost all information presented in this Section is considered sensitive and/or proprietary to Texas Eastern, Texas Gas, Tri-State Synfuels, and potential partners to the project and has been deleted from the DOE Deliverable version. The U.S. Department of Energy may however, review this section in its entirety in the Tri-State Houston, Texas offices.

EXHIBIT XV-A

PARTNERSHIP DEVELOPMENT ISSUES

EXHIBIT XV-B

PARTNERSHIP DEVELOPMENT POSITION PAPER

2.0 PARTNERSHIP DEVELOPMENT PLAN AND PROGRAM

3.0 POTENTIAL PARTNERS

4.0 POTENTIAL CONDITIONS FOR ADDING A NEW PARTNER

XVI

MARKETING

Prepared by: Linda S. Rathbun - Manager, Project Development
William N. Shoff - Project Analyst

1.0 INTRODUCTION

1.1 SCOPE OF WORK

The Marketing Program was one of the responsibilities of the Project Development Group in the Tri-State Synfuels Project. The focus of the Marketing Program was to arrange for the sale of the products to be produced by the Tri-State Synfuels Project ("the Project"). However, marketing efforts during the portion of Phase I completed prior to termination of the DOE Cooperative Agreement were limited mainly to the completion of a major market analysis report. Only minimal efforts had been made toward developing marketing plans for the sale of the products, evaluating competitors, and contacting potential customers. Marketing was also involved in evaluating and recommending (from a marketability point of view) alternative product slates for the Project which could be produced by making various minor or major process design modifications.

1.2 OBJECTIVES AND GOALS

During Phase I of the Project, the Marketing Program had three main objectives:

- Obtain signed contracts for the sale of the primary products to be produced by the Project.
- Obtain at least letters of interest for the sale of the secondary products to be produced by the Project.
- Advise the Engineering and Economics Groups of the market considerations of various process/product design modifications to insure that the final product slate would result in the maximum profitability to the Project.

1.3 WORK EFFORT

The Marketing Program was conducted primarily by a Business Development Coordinator, a Project Analyst and the Manager of Project Development. The Deputy Project Director was also fairly heavily involved, especially at the beginning of the Project. Advisory roles were played by other Texas Eastern personnel and are reflected in Exhibit XVI-A. A major consulting contract had been completed with Chem Systems, Inc. for a market analysis report ("The Tri-State Synfuels Project, Product/By-Product Marketability") for the original Lurgi/Fischer-Tropsch product slate. Because the decision had been made to change from the Lurgi/Fischer-Tropsch process configuration to one which would produce methanol and/or Mobil M gasoline, additional consulting for market analysis studies were planned for the remainder of Phase I of the Project. Also planned was consulting assistance for determining the optimal modes of transportation for the various products.

1.4 ESTIMATED COSTS

Other than staff time and the affiliated overhead and travel costs, the major direct expenditures were for consulting services. dollars were estimated to be spent during Phase I of the Project on Marketing consulting contracts. (See Exhibit XVI-B.) Almost one hundred thousand dollars was spent on the Chem Systems market study, an additional eighty thousand had been planned to be spent by June 15, 1982, and the remainder by the end of Phase I. The additional market and sales analysis consulting was to focus on specific sales prospects for methanol and/or gasoline, CO_2, and other potential high-value, smaller volume by-products of the plant. The transportation consulting was to help the Project evaluate the economics of various product transportation and storage options available.

EXHIBIT XVI-A
MARKETING
PROJECT PERSONNEL

Tri-State

Name	Title	Dates of Service	Area of Responsibility
M. D. Burke	Deputy Project Director	12/80 - 6/82	Coordinated early marketing efforts; negotiated Chem Systems contract.
L. S. Rathbun	Mgr., Project Development	7/81 - 4/82	Responsible for managing & directing marketing program.
J. P. McIlvoy	Business Development Coordinator	2/81 - 10/81	Oversaw the completion of the Chems System study; responsible for implementation of marketing effort. Conducted analysis of product slate modifications.
W. N. Shoff	Project Analyst	1/82 - 4/82	Conducted market analysis for various product slate modifications; helped finalize Chem Systems report.

Texas Eastern Support

Name	Title	Area/Type Assistance	Role*
Les Deman	Mgr., Strategic Planning & Economics (Petroleum)		2
Buck Gatewood	Vice President, La Gloria Marketing and Supply	Market analysis, prices & marketability review & advice	2
Doug Nettle	Mgr., Rates and Tariffs (Products Pipeline)		2
Vern Ludwig	Gen. Mgr., Gas Supply Projects		2
Dick Wornson	General Attorney	Sale contract drafting	1
Larry Haar	Mgr., Corporate Economics	Product price forecasts and inflation forecasts	2

*3 = Key
2 = Impact but on "as required basis"
1 = Occassional use

EXHIBIT XVI-B

ESTIMATED EXPENDITURES FOR WORK AREA

MARKETING

Major Areas	Expenditures 2/6/81-6/15/82 Budget	Actual	To Complete Phase I Estimate
Consulting Agreements			
1. Chem Systems Marketability Study			
2. Product Transportation Analysis			
3. Market & Sales Analysis			

2.0 SUMMARY

2.1 HISTOPY

2.1.1 Work Plan

During Phase I of the Project, the Marketing Program's work effort was to focus on:

- Conducting market analysis studies which could be used to support decisions regarding possible product slate modifications, would identify potential cutomers and competitors, and would forecast prices for the Project's products; and,

- Obtaining sales commitments for the major products (SNG and methanol/Mobil-M gasoline) and commitments or expressions of interest for most of the other, minor products.

The plan was to complete a detailed market study within the first 6-9 months of Phase I. This study would then be used to assist in the evaluation of process design modifications proposed by the engineering effort as they conducted their plant optimization studies. This study was also to be used to identify customers and competitors for the various products planned to be produced; thus enabling the Marketing staff to evaluate the competitiveness of its products, develop sales plans, etc. Such a market study was conducted (as will be discussed later), however only on the products to be produced from the original process configuration planned for the Project (i.e., the Lurgi/Fischer-Tropsch process). Since the Project made a major modification in its process configuration in early 1982, additional market studies needed to be done to include the additional products to be produced in the new SNG/Mobil-M configuration ("Case 13") and the possible SNG/Methanol/Acedic Acid configuration.

Sales efforts during Phase I of the Project were to concentrate on obtaining executed "conditional" sales contracts (i.e., conditioned upon the decision by Tri-State to construct the plant) for the major products: the SNG and transportation fuels (gasoline, diesel, and jet fuel in the Lurgi/Fischer-Tropsch configuration; gasoline and/or methanol in the Case 13 configuration). At least letters of interest were to be obtained from customers for the sale of the minor products to be produced. (If possible, conditional contracts would be signed for the sale of these products; however, this was not felt to be critical to the decision for the Project to proceed beyond Phase I.)

Also, the Marketing Program was responsible for the commercial evaluation of the various transportation and distribution methods available to the Project's products.

2.1.2 Description of Work Completed

Major work tasks completed thus far during Phase I of the Project are summarized as follows:

- Chem Systems market analysis report, "The Tri-State Synfuels Project, Product/By-Product Marketability", was completed. The scope of this report is described more fully in Section 3.3.1 but it essentially contained national and regional product-specific supply and demand forecasts, customer and competitor identification, price forecasts, netback forecasts, and minor product slate modification recommendations. The report consisted of two volumes: an Executive Summary and a Detailed Report. Also, there were "public" and "confidential" versions of the Executive Summary. The public version was made available to DOE for their files and was to be included as part of the DOE "deliverable" Marketing report to be prepared at the end of Phase I (see Section 3.1 for discussion of this). The confidential version and the Detailed Report were for Project team use only, as they contained limited information covered by confidentiality agreements with Sasol.

- Preliminary discussions had been held with both Texas Eastern and Texas Gas regarding the structure of the purchase agreements for the SNG. Also, preliminary estimates were made of the pipeline system necessary to connect to both Texas Eastern's and Texas Gas's main pipelines.

- Preliminary discussions had been held with potential customers and/or brokers regarding the sale of sulfur, CO_2, crude phenol, Mobil-M gasoline, and methanol. (These contacts are enumerated in Section 3.5; but only the most initial discussions were held and the bulk of the sales effort for these products remains to be done.)

- For the Lurgi/Fischer-Tropsch configuration, minor process modifications were recommended to enhance the marketability of the products produced.

- For the Lurgi/Fischer-Tropsch configuration, preliminary product storage and transportation requirements were identified.

- Price forecasts were made for products not included in the Chem Systems report. Also, additional forecasts were prepared for various project evaluation purposes.

2.1.3 Key Decisions

Following are the key decisions reached in the Marketing Program thus far during Phase I of the Project (see Exhibit XVI-C for ranking, rationale and alternatives considered):

- Use Chem Systems for market analysis study.

- For the full size, Lurgi/Fischer-Tropsch plant: don't sell cresols and creosotes but blend them in the motor fuels; blend alcohols into the motor fuel; and extract benzene and blend the gas naphtha into motor fuel.

- For the Case 13 plant: burn cresols and creosotes in the boiler; produce Mobil-M gasoline not methanol.

- For the Case 13 plant: products to be produced are of too small a volume to justify the investment necessary for a barge terminal and they can be trucked or shipped by rail; therefore, eliminate terminal if not needed for other purposes.

2.1.4 Major Accomplishments

The major accomplishments of the Marketing Program were the completion of the market analysis report for the Lurgi/Fischer-Tropsch products, and the refinement of the Lurgi/Fischer-Tropsch product slate. Because of the major decision made by the Project to change the plant to a SNG/Mobil-M gasoline configuration and the subsequent decision to demobilize the Project, no other notable accomplishments occurred. (See Exhibit XVI-D.)

2.1.5 Major Problems

There were three major problems which impeded the work effort of the Marketing Program. First, the changing of the process configuration from a Lurgi/Fischer-Tropsch plant to a SNG/Mobil-M gasoline plant not only negated the need for much of the work completed to date, but also necessitated a

EXHIBIT XVI-C
MARKETING
KEY DECISIONS REACHED

Decision	Rank*	Alternatives	Rationale for Decision
1. Chem Systems chosen for study	3	(1) SRI (2) Pace	. Chem Systems expertise in chemicals.
2. Product slate modifications (Fischer-Tropsch plant)			
(a) Eliminate cresols & creosote as a product; blend in motor fuels	3	(1) Sell as products	. Too low value products to market, volume too large for market to easily absorb.
(b) Blend alcohols into motor fuels	3	(1) Upgrade to specification product and sell	. Too expensive to make specification product; too small a volume to justify.
(c) Extract benzene and blend gas naphtha into gasoline	3	(1) Sell naphtha	. Higher value to remove benzene and sell.
3. Product slate modifications			
(Case 13; quarter size SNG/Mobil M plant)			
(a) Send cresols & cresotes to partial oxidation	3	(1) Sell as products (2) Burn as fuel	. Higher value to remove benzene and sell.
(b) Convert methanol to Mobil M gasoline	1	(1) Produce & sell all or part as chemical or fuel grade methanol	. Gasoline is a specification product which can be sold in an established market.
4. For Case 13, eliminate barge terminal for products--use rail and truck transportation.	2	(1) Leave barge terminal in plan.	. Products to be produced which could be barged are of too small a volume to justify investment.

EXHIBIT XVI-D

MARKETING
MAJOR ACCOMPLISHMENTS/MILESTONES COMPLETED

Description	DATE	
	Initiate	Deadline
1. Chem Systems Marketability Report	02/81	08/81
2. Product Slate Refined*	09/81	02/82

* Because of the major decision made by the Project during this process to change the plant configuration from Fischer-Tropsch to SNG/Mobil-M gasoline, additional modifications in the final product slate can be expected to occur.

temporary halt in much of what was planned. Second, the lack of an experienced marketing coordinator or analyst during this time prevented the continuation of those marketing tasks which were not affected by the change in configuration. Neither of these problems were avoidable given the fact that the Project had to resolve the question of its ultimate process configuration and given that replacing or expanding staff in light of such unresolved questions could not be justified.

2.1.6 Challenges to Major Assumptions/Conventional Wisdoms

Not really applicable.

2.1.7 Consultant/Contractor Review

2.2 CURRENT STATUS

As of the time of the decision to demobilize the Tri-State Project, the Marketing Program had the following activities ongoing:

- Discussions had been held with Texas Eastern regarding the need to sign a "letter of interest" or "letter of intent" so that they could begin the process of obtaining FERC's approval of the pricing

EXHIBIT XVI-E

MARKETING
CONSULTANT/CONTRACTOR REVIEW

Firm: Chem Systems, Inc.

Individuals/Positions: Raymond E. Ory, Jr. - Manager-Houston Operations

Statement of Scope: To evaluate the marketability of and to provide price forecasts for products of the Fischer-Tropsch process with particular emphasis on the chemicals.

Dates of Service: 02/81 - 08/81

Reports Prepared (dates): "The Tri-State Synfuels Project Product/By-Product Marketability"
Detailed Report 07/81
Executive Summary 07/81
DOE Version 08/81

Decisions Impacted: Recommendation to revise original product slate was accepted.

Budgeted $ to date:

Actual $ to date:

Future Budget/Estimate:

Performance appraisal:

Future Recommendations:

provisions of a purchase contract for Tri-State's gas (SNG). This letter needed to be drafted and agreed to. Similar action was to be taken with Texas Gas.

- A scope of work was being developed for an additional market analysis study (ies). A study addressing the specific market opportunities for fuel-grade and chemical-grade methanol, methanol derivatives, and/or Mobil-M gasoline was probably going to be commissioned. Also, a CO_2 regional marketability study may have been undertaken (in-house or with consultants).

- Work plans and schedules were being developed for the completion of "marketing plans" for SNG, gasoline, sulfur and ammonia. (Other products would be done later in Phase I.) "Marketing plans" were to contain: forecasts of regional market trends for the product, specific target market/customer identification, competitive analysis, market value analysis, and tactical, action plans for sales. (A "marketing plan" was to be developed for SNG to enable the Project team to better negotiate a sales agreement with the two partner companies.)

2.2.2 Key Decisions Pending

The major decisions that had not been made prior to the termination of Phase I of the Project are:

- Ultimate "final" product slate.
- Whether to broker or sell directly minor products.
- Final modes of transportation to be used for products.
- Whether to sell or vent CO_2.

2.2.3 Major Strengths and Weaknessess of the Marketing Program

It is difficult to address the strengths and weaknesses of a Program which never substantially progressed beyond the first major task in its work program (i.e., the market analysis report). The evaluation process leading to and following the decision to change the Project's process configuration effectively froze the progression of the Marketing Program work effort. With this as a general caveat, the major weakness in that portion of the program conducted was the

lack of staff and management attention paid to the direction and completion of Chem Systems' analysis and report. The major strength was the excellent detailed information developed in the Chem Systems report on the specific market opportunities for many of Tri-State's proposed products.

2.2.4 Demobilization Program

Demobilization efforts were minimal in the Marketing area. They consisted of notifying consultants and potential customers with whom recent conversations had been held.

2.3 FUTURE

2.3.1 Milestones/Master Schedule

Attached as Exhibit XVI-F are the future milestones for the Marketing Program. No activity scheduled for March 1st start-up had begun. Thus, upon resumption of the Project, these milestones and the timing required to complete them should still be valid.

2.3.2 Minimum Work Program

As a minimum, Tri-State staff should monitor market conditions for all the proposed products within the Tri-State market region. The staff should also note and file information pertaining to specific plans of competitors and potential customers.

2.3.3 Maintaining a State of Readiness

In order to maintain a state of readiness to be prepared for the resumption of a full-scale effort on the Project, the following market activities should be conducted in addition to the minimal effort described above:

- Negotiate a letter of interest with Texas Eastern and Texas Gas so that they can apply to FERC as soon as the Project resumes full-scale activity.
- Investigate enhanced oil recovery applications for CO_2 in regions surrounding Tri-State plant. (Conduct this with in-house geologic staff.)
- Entertain discussions with potential customers but do not initiate to contract with them.
- Evaluate market possibilities within the region for chemical-grade and fuel-grade methanol and for methanol derivatives (e.g., acetic acid).

EXHIBIT XVI-F
MARKETING
FUTURE MILESTONES/MASTER SCHEDULE
PHASE I

Description	DATE Initiate	Deadline
1. Update product price forecasts	-	6/31/82
	-	12/31/82
	-	12/31/83
2. Conduct Methanol market study	3/01/82	07/01/82
3. Sell SNG output		
a) Negotiate letter of interest with TG & TE	3/01/82	6/31/82
b) TE & TG to obtain FERC approval	7/01/82	8/31/83
c) Negotiate sales contract with TE & TG	7/01/82	8/31/83
d) Execute sales contract	7/01/83	9/30/83
4. Sell gasoline (and/or methonol) output		
a) Develop marketing plans for both potential gasoline & methanol sales	3/01/82	6/31/82
b) Initiate contacts with customers and transporters	3/01/82	6/31/82
c) Project determination of final product slate (i.e., gasoline or methanol)	7/01/82	8/31/82
d) Narrow down potential customers	7/01/82	8/31/82
e) Negotiate contracts for sale and transportation of gasoline and/or methanol	9/01/82	9/30/83
f) Execute sales contract	10/01/83	10/30/83
5. Sell "other products"		
a) Develop marketing plans for potential "other products"	3/01/82	8/31/82
b) Initiate contacts with customers and transporters	3/01/82	8/31/82
c) Project determination of final product slate	9/01/82	12/31/82
d) Narrow down potential customers	9/01/82	12/31/82
e) Negotiate contracts or letters of interest for sales and transportation of "other products"	1/01/83	12/31/83
f) Execute sales contracts	1/01/84	1/31/84

2.3.4 High Priority Tasks After Start-Up

If and when the decision is made to resume full-scale efforts on the Tri-State Project, and assuming the tasks above necessary to maintain a state of readiness were completed, following are the high priority tasks to be quickly focused upon:

- Execute the letter of interest with Texas Eastern and Texas Gas and insure that they apply to FERC.
- Reassess marketability of planned products.
- Finalize product slate.
- Establish contact with potential customers.
- Develop marketing plans for SNG, gasoline (or methanol, etc.), sulfur and ammonia.

2.3.5 Long Lead Time Activities

The FERC approval process is estimated to take a minimum of one year. In order to assure receipt of this approval prior to the Project obtaining its financing commitments, application must be made prior to the negotiation of the final sales contract. Thus, the completion of a letter of interest preceding a contract negotiations becomes a critical activity since it can be used to initiate the FERC process.

2.3.6 Staffing and Organizational Requirements

Upon resumption of full-scale activity on the Tri-State Project, an expanded staff should be considered for the Marketing Program. Marketing must monitor general and specific market trends, conduct market studies, revise price forecasts on a timely basis, develop marketing plans, contact customers, assess competition, make sales presentations, negotiate contracts, assess options and arrange for transportation, and evaluate marketability of various minor process/product slate changes. These activities are important enough to the success of the Project that an experienced, professional staff with adequate time and budget is mandatory. A full time Marketing Manager, a Sr. Sales Representative and a Sr. Market Analyst are recommended as the appropriate staffing level. The staff should all have significant marketing experience with at least two of the three having experience in gas, refined products or chemicals.

3.0 DISCUSSION OF WORK EFFORT

The following sections document the major work effort completed and/or initiated thus far in Tri-State's Marketing Program:

- Section 3.1: Work Plan
- Section 3.2: Product Slate
- Section 3.3: Market Analysis and Recommendations
- Section 3.4: Price Forecasts
- Section 3.5: Sales Efforts
- Section 3.6: Product Transportation

3.1 WORK PLAN

As discussed in Sections 1.0 and 2.0 only limited tasks in the Phase I Marketing work plan were completed prior to the demobilization of the Project. Exhibit XVI-F in Section 2.0 clearly enumerates the major tasks, timing and sequencing for the remainder of the Marketing work plan.

The Marketing Program was to produce one DOE "deliverable" under the Cooperative Agreement work program. Initially, when the Tri-State Project was envisioned as the Lurgi/Fischer-Tropsch process configuration, the Chem Systems market analysis study was intended to be the "deliverable". Subsequent to the change in the process configuration of the Project as well as because of a number of problems expressed by both the Project team and DOE regarding the limited nature of the Chem Systems report, the marketing "deliverable" was redefined. The deliverable was to be a broader Marketing Recommendations and Plans report and was to include:

- Chem Systems' analysis and recommendations;
- Other marketing studies (e.g., the methanol/Mobil-M gasoline market analysis);
- The results of profitability analyses of various product slate modifications;
- The final, specific product slate recommendations;
- Summaries of detailed Marketing Plans (content of which is described in Section 2.2, point #3) for the final product slate; and,
- A status report on the sales efforts.

The deliverable was to have been completed and submitted to DOE at the end of Phase I.

3.2 PRODUCT SLATE

3.2.1 Fischer-Tropsch Case

The original full-size Lurgi/Fischer-Tropsch plant was to produce the following products with the following daily volumes:

Based upon the Chem Systems' marketability recommendations and Fluor's special process modification studies, the following products were not to be produced and sold but instead were to be modified as described in Section 3.3.1:

- Naphtha
- Cresols
- Creosotes
- Ethane
- Alcohols

3.2.2 Case 13

After the decision was made to change the process to SNG/Mobil-M gasoline and significantly reduce the size of the plant, the following marketable products were to be produced in the following daily volumes:

- SNG (55 mmscf)
- Unleaded premium gasoline (10,000 barrels)
- LPG (800 barrels)
- Ammonia (85 tons)
- Sulfur (200 tons)
- Isobutane (800 barrels)

3.3 MARKET ANALYSIS & RECOMMENDATIONS

3.3.1 Chem Systems Consulting Study

Proposals were solicited and received from three consulting firms for the marketability study for the products and by-products of the Tri-State Project as originally configured (i.e., the Lurgi/Fischer-Tropsch process). was budgeted for this study. SRI International, who had done marketing work for the KDOE feasibility study, and Pace Consultants were considered but eliminated. Chem Systems, Inc., of Houston, Texas, was chosen primarily on the basis of their chemical and petrochemical expertise. (A copy of the "Confidential" version of the Executive Summary volume is in the Appendix.)

Chem Systems was asked to evaluate the marketability of and to provide price forecasts for the following products:

- Propane
- Unleaded Gasoline
- Jet Fuel
- Diesel Fuel (1-D & 2-D)
- Fuel Oil
- SNG
- Carbon Dioxide
- Gas Naphtha
- Phenol
- Cresols
- Creosotes
- Sulfur
- Ammonia
- Acetone
- Ethylene
- MEK
- Ketones
- Mixed Alcohols

The objectives of the Chem Systems study were:

- To recommend to Tri-State a preliminary product slate that offered the most attractive marketing options consistent with Chem Systems' view of economics and technology.

- To provide a general discussion and projection of worldwide, U. S., and regional supply and demand for the Tri-State products.

- To provide a detailed forecast of market prices and netbacks for Tri-State products. These forecasts were to be consistent with raw materials prices, supply/demand patterns, conventional and anticipated technology and costs of production, and relative transportation costs.

The Chem Systems study focused on the marketability of the proposed products of the Tri-State Project. Its focus was regional in nature, assessing the markets and identifying the customers. The analysis addressed primarily the chemical products, as it had always been the intent of the Tri-State partners to purchase the SNG and fuel products themselves. It was Tri-State's intention to use the Chem Systems analysis as a "first cut" marketability guide for all the Fischer-Tropsch products. Products and by-products with no potential market were to be eliminated from the product slate. Economic and profitability analyses were to be performed by the Project Team for all other products before determination of the final product slate. Secondarily, the information obtained by Chem Systems on the potential customers and competitors in the region was to be used as the basis for developing marketing plans for each product.

Based on their marketability analysis, Chem Systems made the following recommendations for changes in the product slate:

- Gasification products
  - Cresols - Cresols should be converted to aromatics for blending into the gasoline pool. Benzene should be recovered from cresols and sold as a specification product.
  - Creosote - Creosotes should be converted to a material suitable for blending into the plant's saleable transportation fuels.
- Chemical products
  - Ethylene/Ethane - The ethane should be separated from the ethylene and subsequently converted to additional ethylene. Ethylene could then be converted to polyethylene, at the site, by a second party, and sold in the region.
  - Alcohols - Since the quality of the alcohols is not up to competitive specifications, alcohols should be blended into the plant's gasoline pool.
- Transportation & Heating Fuels
  - Syncrude - Facilities should be constructed at the site to upgrade syncrude into specification transportation fuels.
  - Gas naphtha - Benzene should be extracted from the naphtha and sold. The remaining raffinate stream should be blended into the gasoline pool.

The remaining products and the recommended product slate in general were determined to be very marketable in the Tri-State marketing region. This was due to the fact that some portion of almost all of the transportation fuels, chemicals and petrochemical consumed presently in the Tri-State region had to be imported from other regions. Thus a transportation advantage would be available to a regional producer such as Tri-State. In addition, proximity to TE/TG gas and TE product pipelines, and access to the Ohio River further helped enhance the marketability of Tri-State products.

Chem Systems prepared price forecasts for the products of Tri-State for the years 1980-2000. A number of economic and energy assumptions formed the basis for their price forecasts. These assumptions were:

- Worldwide economic growth and energy consumption will increase at a slower rate in the future than it has in the past. This is caused by limited supplies of, and higher prices for petroleum, and the effect of sustained energy conservation practices.

- Long-term (1980-2000) growth in the U.S. gross national product (GNP) will increase an average of 2.5 percent per year in real terms. This is a direct result of higher energy costs, declining rates of increase in the labor force and low labor productivity growth rates.

- Long-term energy consumption in the U.S. will increase approximately 1.5 percent per year. This growth rate is substantially lower than the pre-1973 OPEC embargo historical rates.

- Coal will re-emerge as a key energy source, increasing its contribution to total U.S. energy supply from 21 percent in 1980 to almost 35 percent by 2000.

- The contribution of synfuels (i.e., liquid and gas products from coal, oil shale and tar sands) to the U.S. energy supply will be limited through 2000 due to financing, technical, and environmental barriers to development.

- Despite a lower growth rate of energy consumption and improved efficiency in energy use, the United States will continue to import a significant share of its total energy. Approximately 37 percent of the total petroleum supply will be imported in 2000

compared to 39 percent in 1980. Imports of natural gas will increase from 5 percent of supply in 1980 to over 15 percent by the end of the century.

- Total U.S. demand for refined petroleum products will remain stable. Long-term declines in gasoline demand will be offset by increased demand for jet fuel and automotive diesel fuels.

- As a result of continued social and political uncertainty in the Middle East and other areas, the long-term price of foreign crude oil is forecast to rise, in real terms, at about 3.0 percent per year.

- Natural gas prices, after deregulation under the Natural Gas Policy Act, will tend to equalize with the price of low sulfur residual fuel oil. The availability of gas in the future will result in greater industrial and utility use as a thermal fuel than is presently envisioned under the Fuel Use Act.

- Coal use will be demand limited with future prices reflecting the incremental costs of opening new mines, but will not rise with increases in petroleum price.

- Future petrochemical prices will increase at a rate somewhat greater than energy values, reflecting the real capital cost of constructing new plants.

The Chem Systems price forecast in constant 1980 dollars is presented in Exhibit XVI-G. These prices represent the net-back values to Tri-State. Chem Systems used Gulf Coast forecast prices as a base (Exhibit XVI-H) and adjusted them for transportation costs to estimate the netback value to Tri-State. The following methodology was used:

- Gulf Coast FOB values were adjusted for freight, via predominant means of transport, to Tri-State consuming region (i.e., to a given customer).

- Prices at these customers were adjusted for expected freight, via appropriate means, back to Henderson, Kentucky.

The netback values were not adjusted to reflect distribution or brokerage costs should Tri-State decide not to market products directly.

TABLE IV-F-1

TRI-STATE NET-BACK VALUES - HENDERSON, KENTUCKY

(Constant 1980 Dollars)

		1980	1985	1990	1995	2000
SNG						
New Gas Wellhead	¢/MMBTU	255.0	500.0	700.0	750.0	800.0
Gasoline						
Regular Unleaded	¢/gal	92.2	121.2	130.5	138.4	146.0
Premium Unleaded	¢/gal	95.0	124.2	133.5	141.4	149.0
Jet A	¢/gal	81.3	116.7	127.0	136.9	145.5
Diesel	¢/gal	80.9	115.0	126.5	136.4	145.0
Fuel Oil (Low Sulfur)	¢/gal	70.1	94.2	112.1	120.2	127.6
Natural Gas						
Average Gas	¢/MMBTU	184.0	287.5	717.5	785.0	847.5
"New" Gas	¢/MMBTU	290.0	537.5	747.5	800.0	852.5
Propane	¢/gal	44.3	69.4	80.0	82.6	92.7
Chemicals						
Benzene	¢/gal	160.0	195.0	206.1	218.3	230.0
Ethylene	¢/lb	22.3	31.1	36.7	43.3	46.1
Phenol	¢/lb	32.8	41.7	48.2	53.0	57.7
Mixed Alcohols	¢/gal	110.5	144.3	151.2	159.1	166.7
Acetone	¢/lb	23.0	33.1	35.7	38.1	40.7
Methyl Ethyl Ketone	¢/lb	31.7	40.5	53.4	58.4	63.2
Sulfur	$/st	93.0	107.2	125.4	142.2	160.0
Ammonia	$/st	180.0	221.6	350.3	365.8	385.0
* Cresols	¢/lb	53.0	54.0	43.7	48.3	51.9
** Creosote	¢/gal	77.0	89.3	117.6	125.1	130.2
Carbon Dioxide	¢/MSCF	160.0	154.1	170.0	182.0	201.0

* Value for 1990-2000 reflects aromatics conversion.

** Suggested market value as fuel as blendstock for No. 2 fuel oil.

REFINED PETROLEUM AND PETROCHEMICAL PRODUCTS

U.S. GULF COAST - CONSTANT 1990 DOLLARS

		1979	1980	1985	1986	1987	1988	1989	1990	1995	2000	2005	2010	2020
Average Crude	$/Bbl	17.73	28.22	40.95	41.90	42.85	43.80	44.75	45.70	48.48	52.20	55.92	59.64	67.08
Full Range Naphtha	¢/Gal	52.4	83.5	117.5	118.9	120.1	121.7	123.0	124.5	131.5	138.8	145.9	153.1	167.5
Gasoline														
Premium Leaded		59.7	92.0	121.0	-	-	-	-	-	-	-	-	-	-
Regular Leaded		55.7	87.9	116.9	118.5	120.2	122.0	123.9	125.5	133.4	-	-	-	-
Regular Unleaded		58.9	91.3	120.3	122.4	124.1	126.0	127.9	129.6	137.5	145.1	155.7	166.3	187.5
Premium Unleaded		62.1	94.1	123.3	125.4	127.1	129.0	130.9	132.6	140.5	148.1	158.7	169.3	190.5
Kero/Jet	¢/Gal	57.7	80.4	115.8	117.8	119.8	122.0	124.0	126.1	136.0	144.6	152.7	160.8	177.0
Diesel	¢/Gal	55.6	80.0	114.1	115.5	118.8	121.0	123.2	125.6	135.5	144.1	152.9	161.0	177.3
No. 2 Fuel Oil	¢/Gal	55.0	79.8	113.3	115.0	116.9	118.6	120.3	122.1	129.8	137.1	145.1	153.1	169.1
No. 6 Fuel (0.7%S)	¢/Gal	43.0	60.4	75.0	80.3	85.8	91.2	96.8	102.1	110.5	118.1	125.8	133.5	148.9
No. 6 Fuel (3.0%S)	¢/Gal	31.3	44.8	68.3	74.1	79.9	85.8	91.5	97.1	104.8	112.4	120.5	128.1	143.3
Natural Gas	¢/MM Btu													
Average Wellhead	¢/MM Btu	119.0	149.0	250.0	355.0	500.0	588.0	645.0	670.0	735.0	795.0	860.0	925.0	1055.0
"New Gas Wellhead	¢/MM Btu	221.0	255.0	500.0	670.0	677.0	680.0	690.0	700.0	750.0	800.0	860.0	925.0	1055.0
Av. Trans/Distrib - U.S.		65.0	70.0	75.0	80.0	84.0	88.0	91.0	95.0	100.0	105.0	110.0	112.0	119.0
Av. Trans/Distrib - G. C.		25.0	27.0	35.0	36.0	37.0	38.0	39.0	40.0	48.0	50.0	52.0	55.0	57.0
Natural Gas Liquids	¢/Gal													
Ethane	¢/Gal	17.7	28.7	43.1	46.4	49.5	52.5	55.8	58.8	64.6	67.6	70.7	73.8	80.0
Propane	¢/Gal	28.3	42.3	67.4	70.3	73.0	75.5	78.0	80.6	85.7	90.7	96.0	100.6	111.0
Isobutane	¢/Gal	72.5	81.3	83.2	86.5	89.0	91.6	94.2	97.1	102.1	107.5	111.8	116.2	125.0
Butane	¢/Gal	56.3	57.0	76.2	79.7	82.5	85.2	88.1	91.1	97.1	102.5	106.6	110.9	120.3
Natural Gasoline	¢/Gal	72.5	69.7	100.1	102.5	104.5	106.6	108.6	110.8	117.8	124.5	131.0	137.8	152.0
Aromatics														
Benzene	¢/Gal	136.0	165.0	200.5	202.8	204.7	207.0	208.9	211.4	223.6	235.4	247.6	259.5	284.2
Toluene	¢/Gal	105.3	127.5	160.3	162.1	164.0	165.8	167.3	169.2	180.8	190.5	200.8	210.0	229.8
Xylene	¢/Gal	111.0	130.5	162.3	164.3	166.4	168.4	170.1	172.2	183.8	193.6	203.8	213.0	232.9
Olefins														
Ethylene	¢/lb	15.6	22.3	31.1	32.4	33.4	34.5	35.4	36.7	43.3	46.1	48.9	51.7	57.3
Propylene (PG)	¢/lb	12.2	19.4	26.5	27.1	27.8	28.3	29.0	29.5	35.0	37.0	39.1	41.4	45.8
Propylene (CG)	¢/lb	11.3	17.8	25.0	25.5	26.2	26.6	27.2	27.8	33.2	35.1	37.1	39.2	42.8
Butadiene	¢/lb	23.5	30.4	45.3	45.0	44.7	44.2	43.9	43.4	18.2	19.5	20.7	21.9	24.5
Butylenes	¢/Gal	41.6	59.7	126.3	124.9	123.5	122.1	120.7	119.3	125.8	132.4	139.0	145.6	158.8
Alcohols														
Methanol	¢/Gal	48.3	60.0	72.8	75.2	77.6	79.9	82.3	84.7	93.0	104.4	115.8	127.2	150.0
Ethanol	¢/Gal	125.0	175.0	201.9	202.2	202.4	202.7	202.9	203.2	171.6	179.7	187.8	195.9	212.1
n-Propanol	¢/lb	26.0	32.0	46.3	47.9	49.5	51.2	52.8	54.4	61.4	68.4	75.4	82.4	96.4
n-Butanol	¢/lb	21.0	29.0	37.0	37.6	38.2	38.9	39.5	40.1	46.4	52.6	58.8	65.0	77.4
i-Butanol	¢/lb	16.0	24.0	31.0	31.8	32.6	33.4	34.2	35.0	41.0	47.0	53.0	60.0	67.0
Pentanol Plus	¢/Gal													
Ketones														
Acetone	¢/lb	17.0	23.0	33.1	33.6	34.1	34.7	35.1	35.7	38.1	40.7	43.3	45.9	51.1
Methyl Ethyl Ketone	¢/lb	22.0	30.0	47.1	48.0	48.9	49.9	50.8	51.7	56.6	61.6	66.2	71.0	80.6
Gasification Products														
Sulfur (Recovered)	$/ST	48.0	83.0	87.2	90.5	93.6	96.9	100.0	103.4	122.2	140.0	156.7	173.7	206.4
Ammonia	$/ST	107.9	170.0	211.3	230.0	261.0	284.0	312.0	339.0	355.0	373.0	390.0	407.0	443.0
Cresols (Mix)	¢/lb	44.0	53.0	54.0	54.0	52.0	49.0	46.5	43.7	48.3	51.9	55.6	58.3	63.6
Creosotes	¢/Gal	69.0	77.0	89.3	95.2	101.1	107.0	112.9	117.6	125.1	130.2	138.2	146.2	161.6
Carbon Dioxide	¢/MSCF	-	160.0	154.1	157.3	160.5	163.6	166.8	170.0	182.0	201.0		250.0	265.1
Phenol	¢/lb	29.1	30.0	38.8	40.1	41.4	42.7	44.0	45.3	50.0	54.6	59.2	63.8	73.0
"Synthetic" Crude	$/Bbl													
1) Hydrogen @ Fuel		-	21.70	33.00	33.47	33.95	34.42	34.90	35.37	37.84	40.30	43.37	46.44	52.58
2) Hydrogen @ Mfg.		-	21.12	27.55	28.32	29.09	29.86	30.63	31.40	33.65	35.90	38.47	41.01	46.12
3) As No. 2 Btu Value		-	27.62	39.21	39.80	40.46	41.04	41.64	42.25	44.92	47.46	50.21	52.98	58.52

3.3.2 Other Marketing Studies

In addition to the Chem Systems market study, Tri-State had access to a number of other marketing studies. The Kentucky Department of Energy provided Tri-State with two preliminary market analyses. The first one, dated April 1980, addressed the regional marketability of the chemical by-products of the Fischer-Tropsch process. The second study was prepared by SRI International for an industrial park that has been proposed by the KDOE. It also analyzed the regional markets for chemical by-products. The KDOE also supplied Tri-State with updated listings of product slates of other proposed synfuels plants in the area.

Internally, the marketability of Fischer-Tropsch chemicals was analyzed by Texas Eastern's Petroleum Group. The marketability and transportation of SNG was evaluated by Gas Supply. The feasibility of a CO_2 pipeline to West Texas for enhanced oil recovery was evaluated by Engineering Services.

The consensus recommendations of all these preliminary marketability studies was that most products appeared to be very marketable in the region. The CO_2 pipeline to West Texas, however, was determined to be non-economical. (See Tri-State files for these reports and memo studies.)

3.4 PRICE FORECASTS

3.4.1 Chem Systems Forecasts

The basic Chem Systems price forecasts were used for the economic evaluation of various versions of the Tri-State Project. These forecasts, as they appeared in the Chem Systems report, were presented in Section 3.3.1 as Exhibit XVI-G. Some prices were clarified or corrected by Chem Systems and the list of products for which prices were forecast was expanded slightly. The attached Exhibit XVI-I contains these forecasts as well as the Btu specifications of the products for which Chem Systems made their forecasts.

3.4.2 Price Forecasts Used for Various Evaluations

Besides the evaluation of the Tri-State Project as originally and finally configured, many other evaluations were conducted by the Project Planning and Control staff. To facilitate these analyses, additional price forecasts were provided by Marketing. Usually these forecasts were based on the basic Chem Systems forecasts. These forecasts are attached as the following exhibits:

- Exhibit XVI-J: Prices used for "straw-to-gold" analysis.

EXHIBIT XVI-I

TEXAS EASTERN

INTEROFFICE CORRESPONDENCE

TO: Distribution* WNS

CO/DIV: Synfuels

FROM: W. N. Shoff

DATE: March 22, 1982

SUBJECT: Tri-State Product Price Assumptions

Attached is a worksheet of Chem Systems' product price assumptions. Prices, netbacks and forecast growth rates are from the Chem Systems market study. Btu values are the "standard" for each product and were obtained from different sources. The btu values are not necessarily the exact values for Tri-State products; the exact values will have to be supplied by Fluor.

If there are any questions, please contact me.

WNS/cb
Attachment

*M. D. Burke
R. E. Honeyman
J. M. Hossack
J. F. Kochel
L. S. Rathbun
W. M. Scriber

Tri-State P[illegible] Price Assumptions

(19[illegible] Dollars)

	Units	BTUS Per Unit	Source	Mid 1999 Prices: Gulf Coast Price/Unit	Mid 1999 Prices: Kentucky Netback Per Unit	Mid 1999 Prices: Kentucky Netback Per MMBTU	Kentucky Netbacks: Annual Average Growth Rate In Real Prices 80-85	85-90	90-95	95+	Forecast Prices (Real) 1985	1990	1995	2000	
SNG	MCF	.9825 mm		$ 2.50	$ 2.85	$ 2.90	13.1	6.8	1.4	1.3	5.37	7.48	8.00	8.53	$/MMBtu
											5.28	7.34	7.86	8.38	$/MCF
Liquid Fuels															
Average Crude Oil	bbl	5.8 mm	4	28.22	NF	4.05	7.7	2.3	1.2	1.5	40.85	45.70	48.48	52.52	
Fuel Oil (#6 Sulfur)	bbl	6.436 mm	1	25.37	25.37	3.94	6.1	3.5	1.4	1.2	39.52	47.08	50.48	53.59	
Fuel Oil (#2)	bbl	5.8 mm	5	33.62	NF	5.75	7.2	1.5	1.2	1.1	47.58	51.28	54.52	57.59	
Gasoline (Prem-unleaded)	gal	125,000	5	.941	.950	7.60	5.5	1.5	1.2	1.1	1.24	1.34	1.41	1.49	
Diesel Fuel	gal	133,000	3	.800	.809	6.08	7.3	1.9	1.5	1.2	1.15	1.27	1.36	1.45	
Jet Fuel	gal	135,000	5	.804	.813	6.02	7.5	1.7	1.5	1.2	1.17	1.27	1.37	1.46	
Methanol (Fuel grade)	ton	18.309mm	1	72.17**	72.17**	3.94	6.1	3.5	1.4	1.2	97.04	115.25	123.50	131.14	
Propane (LPG)	gal	91,600	5	.423	.443	4.59	9.4	2.9	0.6	2.3	.69	.80	.83	.93	
Naphtha	gal	128,519	4	.835	.849	6.60	7.1	1.2	1.1	1.1	1.20	1.27	1.34	1.42	
Isobutane	gal	94,619	4	.813*	.823*	8.70	.5	3.1	1.0	1.0	.84	.96	1.03	1.09	
Butane	gal	103,000	4	.570	.580*	5.63	4.0	1.1	1.1	1.2	.71	.75	.79	.84	
Chemicals															
Acetone	lb	13,300	3	.230	.230	17.29	7.6	1.5	1.3	1.8	.33	.36	.30	.41	
Ammonia	ton	19.4mm	3	170.00	180.00	9.28	4.2	9.6	0.9	1.0	221.60	350.30	365.80	385.00	
Benzene	gal	132,655	1	1.650	1.600	12.06	4.0	1.1	1.2	1.1	1.95	2.06	2.18	2.30	
CO_2	MCF			1.600	1.600		(.7)	2.0	1.4	2.0	1.54	1.70	1.82	2.01	
Creosotes	gal			.770	.770		3.0	5.7	1.2	.8	.89	1.18	1.25	1.30	
Cresols	lb	13,190	3	.530	.530	40.18	.4	(1.4)	2.0	1.4	.74	.44	.48	.52	
Ethylene	lb	20,276	1	.223	.223	11.00	6.9	3.4	3.4	1.3	.31	.37	.43	.46	
MEK	lb	14,300	3	.300	.317	22.17	5.0	5.7	1.8	1.6	.41	.53	.58	.63	
Methanol (Chemical grade)	gal	64,800	1	.600	NF	9.26	3.9	3.1	1.9	2.3	.73	.85	.93	1.04	
Mixed Alcohols	gal			NF	1.105		6.5	.9	1.0	.9	1.44	1.51	1.59	1.66	
Phenols	lb	13,100	3	.300	.328	25.04	4.9	2.9	1.9	1.7	.42	.48	.53	.58	
Styrene	lb	18,150	1	NF	.380*	20.94	4.0	1.1	1.1	1.2	.46	.49	.52	.55	
Sulfur	ton	7.6mm	3	83.00	93.00	12.24	2.0	3.2	2.5	2.4	107.20	125.40	142.20	160.00	

*Furnished by Chem Systems by phone; not in their formal report

**Calculated as Btu equivalent of low sulfur #6 fuel oil

NF-Not furnished by Chem Systems

Sources: Prices, Netbacks, and forecast growth rates are per Chem Systems.

Others:
(1) "Relative Energy Data" Stone & Webster (Btu conversion chart)
(2) Chem Systems
(3) Fluor estimates for Tri-State
(4) DOE "1980 Annual Report to Congress" Volume II, page 227
(5) T.E. Corporate Planning

EXHIBIT XVI-J(a)

TEXAS EASTERN

INTEROFFICE CORRESPONDENCE

TO: P. M. Anderson

CO/DIV: Synfuels

FROM: L. S. Rathbun

DATE: December 10, 1981

SUBJECT: "Straw-to-gold" Calculations

Attached are copies of the "straw-to-gold" calculations. The product volumes and Btu's per unit were furnished by Bob Honeyman and the 1981 prices are basically from Chem Systems except for SNG and methanol which are the Btu equivalent of the current low sulfur #6 fuel oil Kentucky netback. See my memo and attachments on price assumptions for detailed documentation.

LSR/ca
attachments

xc: M. D. Burke
J. C. Heffner
R. E. Honeyman
J. M. Hossack
J. F. Kochel
Central Files

Case 5: Optimized Fischer-Tropsch
Kentucky Coal in Kentucky Location

	Units produced	Price Mid-1981 Netback	Revenue $x10^6	Revenue % of Total	Btu Produced $x10^9	Btu Produced % of Total	Revenue per mm Btu
SNG		$ 5.15/mcf		25%		44%	$ 5.24
Lurgi Chemicals							
.ammonia		$204.73/ton					
.phenol		$750.00/ton					
.sulfur		$104.22/ton		5%		4%	$14.16
Liquid Fuels							
.gasoline		$ 45.74/bbl					
.diesel		$ 39.69/bbl					
.fuel oil		$ 34.02/bbl					
.LPG		$ 22.18/bbl		35%		38%	$ 8.41
Other							
.styrene		$876.00/ton					
.mixed alcohols		$361.55/ton					
.mixed ketones		$409.03/ton		35%		14%	$23.13
TOTAL							$ 9.25

LSR
12/09/81

Case 6: SNG/Methanol
Kentucky Coal in Kentucky Location

	Units produced	Price Mid-1981 Netback	Revenue $x10^6	Revenue % of Total	Btu Produced $x10^9	Btu Produced % of Total	Revenue per mm Btu
SNG	56,210mmscf	$ 5.15/mcf	$289.482	37%	55,283	43%	$ 5.24
Lurgi Chemicals							
.ammonia	76,600 tons	$204.73/ton	$ 15.682		1,487		
.phenol	16,300 tons	$750.00/ton	12.225		430		
.sulfur	312,700 tons	$104.22/ton	32.590		2,363		
.naphtha	2,037mbbl	$ 41.58/bbl	84.698		8,796		
.butanes	25,500 tons	$275.16/ton	7.017		1,063		
			$152.212	20%	14,139	11%	$10.77
Liquid Fuels							
.methanol	3,274,000 tons	$102.48/ton	$335.520	43%	63,843	46%	$ 5.24
TOTAL			$ 777.214		133,265		$ 5.83

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Case 7: SNG/Mobil-M Gasoline
Kentucky Coal in Kentucky Location

	Units produced	Price Mid-1981 Netback	Revenue $x10^6	Revenue % of Total	Btu Produced $x10^9	Btu Produced % of Total	Revenue per mm Btu
NG	55,115mmscf	$ 5.15 mscf	$283.842	31%	54,206	43%	$ 5.24
urgi Products							
.ammonia	76,700 tons	$204.73/ton	15.703		1,487		
.phenol	16,300 tons	$750.00/ton	12.225		430		
.sulfur	312,700 tons	$104.22/ton	32.590		2,363		
.naphtha	2,037 mbbl	$ 41.58/bbl	84.698		8,796		
.butane	15,400 tons	$275.16/ton	4.237		1,063		
			$149.453	17%	14,139	11%	$10.57
iquid fuels							
.gasoline(Mobil M)*	10,111mbbl	$ 43.47 / bbl	439.525		51,614		
.propane	723mbbl	$ 22.18 /bbl	16.036		2,723		
			$455.561	50%	54,337	44%	$ 8.38
t butane	529mbbl	$ 37.84/bbl	20.017	2%	2,196	2%	$ 9.12
TOTAL			$908.873		124,378		$ 7.28

95% of "regular" premium unleaded gasoline

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Case 8: All SNG
Kentucky Coal in Kentucky Location

	Units produced	Price Mid-1981 Netback	Revenue $x10^6$	Revenue % of Total	Btu Produced $x10^9$	Btu Produced % of Total	Revenue per mm Btu
SNG	124,465mmscf	$ 5.15mscf	$640.995	81%	122,411	90%	$ 5.24
Lurgi Products							
.ammonia	72,300 tons	$204.73/ton	14.802		1,402		
.phenol	15,400 tons	$750.00/ton	11.550		406		
.sulfur	297,400 tons	$104.22/ton	30.995		2,247		
.naphtha	1,927mbbl	$ 41.58/bbl	80.125		8,321		
.butanes	23,800 tons	$275.16/ton	6.549		992		
			$144.021	19%	13,368	10%	$10.77
TOTAL			$785.016		135,779		$ 5.78

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12/09/81

Case 11: SNG/Mobil-M Gasoline
Western Coal in Kentucky Location

	Units produced	Price Mid-1981 Netback	Revenue $x10^6$	Revenue % of Total	Btu Produced $x10^9$	Btu Produced % of Total	Revenue per mm Btu
SNG	59,130mmscf	$ 5.15mmscf	304.520	33%	58,154	46%	$ 5.24
Surgi Products							
.ammonia	51,800 tons	204.73/ton	10.605				
.phenol	28,800 tons	750.00/ton	21.600				
.sulfur	26,500 tons	104.22/ton	2.762				
.naphtha	2,891 mbbl	44.58/bbl	128.881				
.butane	28,900 tons	275.16/ton	7.952				
			171.800	19%	15,665	12%	$10.97
Liquid fuels							
.gasoline (Mobil M)	9,600 mbbl	43.47/bbl*	417.312				
.propane	679 mbbl	22.18/bbl	15.060				
			432.372	47%	51,566	41%	$ 8.38
Other							
isobutane	434 mbbl	37.84/bbl	16.423	2%	1,801	1%	$ 9.12
TOTAL			925.115		127,186		$ 7.27

*95% of "regular premium unleaded gasoline.

LSR
12/09/81

Case 12: SNG/Mobil-M Gasoline
Western Coal in Western Location

	Units produced	Price Mid-1981 Netback	Revenue $x10^6	Revenue % of Total	Btu Produced $x10^9	Btu Produced % of Total	Revenue per mm Btu
	59,130mmscf	$ 5.15mscf	$304.520	33%	58,154	46%	$5.24
...ai Products							
...monia	51,800 tons	$177.73/ton	9.206				
phenol	28,800 tons	$686.00/ton	19.757				
sulfur	26,500 tons	$ 47.00/ton	1.246				
naphtha	2,891 mbbl	$ 36.83/bbl	106.476				
butane	28,900 tons	$270.77/ton	7.825				
			$144.510	16%	15,665	12%	$9.23
...quid fuels							
...gasoline (Mobil M)*	9,600mbbl	$ 43.47/bbl*	417.312				
...propane	679mbbl	$ 17.09/bbl	11.604				
			$428.916	49%	51,566	41%	$8.32
...her							
...utane	434mbbl	$ 37.38/bbl	16.223	2%	1,801		$9.01
			$894.169		127,186	1%	$7.03

...% of "regular" premium unleaded price gasoline.

LSR
12/09/81

EXHIBIT XVI-J(b)

TEXAS EASTERN

INTEROFFICE CORRESPONDENCE

TO P. M. Anderson

CO/DIV Synfuels

FROM L. S. Rathbun

DATE December 10, 1981

SUBJECT Notes on Prices Assumptions

LSR/ca
attachments (3)

xc: M. D. Burke
J. C. Heffner
R. E. Honeyman
J. M. Hossack
J. F. Kochel
Central Files

Wyoming Product - Netbacks - Mid 1981 Prices in 1981 $

Mid 1981 I .t Netbacks
Henderson Kentucky

Additional Backup to Wyoming Netbacks

Pricing Assumptions (4)
Kentucky Netback

Wyoming Product - Netbacks · ..d 1981 Prices in 1981 $

EXHIBIT XVI-K