APPENDIX A INSIDE BATTERY LIMIT COSTS

The inside battery limit (ISBL) costs presented in this report reflect a current U.S. Gulf Coast battery limits price. The costs consist of a materials and labor (M & L) estimate, a design allowance, engineering and contractor's fees, and overheads and expenses allowance.

The M & L estimates have been derived by scaling detailed estimates prepared for similar units on the basis of U.S. Gulf Coast erection to UOP standards and specifications. The M & L estimates are intended to include all direct material and labor, indirect field costs, and labor benefits that are associated with the erection of the battery limits process equipment, including the following specific equipment, categories, and services as and when required:

Heaters

Vessels and internals

Heat exchange equipment

Pumps

Drivers

Compressors

Piping

Instruments

Electrical

Insulation

Structural steelwork

Fireproofing

Paving and concrete work

Compressor shelter

Control house

Catalyst-handling equipment

Sundry construction equipment

Temporary field office,

warehouse, change house, etc.

Field testing

Expendable tools

Clerical costs associated with

construction

Final cleaning

Miscellaneous field costs

Fringe benefits

An allowance for design, engineering and contractor's fees, and overheads and expenses, primarily based on prior UOP experience, has been added to the total material and labor estimate to reach an overall erected cost estimate for the battery limits plant. These allowances are intended to cover the following charges:

UOP:

Basic process and engineering design specifications and drawings (Schedule A package), including review of contractor's detailed design of specified equipment items.

Contractor:

Detailed engineering

Purchasing, expediting, and inspection Construction tools and equipment rental Contractor's field and home office expenses

Erection supervision Contractor's fees

Items not included in the estimated UOP ISBL costs are as follows, unless otherwise specified as included:

- Cost of land, site preparation, and soil investigation
- Piling or any unusual foundation requirements
- Docks, marine terminals, or jetties
- Access roads to site
- Home office administration building
- Employees housing, worker's barracks, canteens, recreation facilities, etc.
- Overtime pay during construction
- Owner's expenses in developing the project
- Know-how fees and royalties on licensed processes
- Local permits, taxes, and fees or other specific costs of doing business in the area
- Items concerned with export shipment, such as ocean freight, marine
 insurance, import taxes, customs, etc.
- Operating capital and investment in goods in progress
- Escalation on materials and labor as a result of price fluctuation or economic conditions
- Contingencies
- Cost of start-up, including testing, manpower, utilities, operating manuals, and training programs
- Spare parts, special tools, or maintenance equipment

- Catalysts, chemicals, and raw materials including initial fill
- Customer or national standards or codes
- Special pollution or noise control facilities
- Electrical main substations
- Power generation
- Water or hydrocarbon pipelines
- Additions or extensions to utilities systems or offsites
- Laboratory supplies
- Special communications or computer systems

The following assumptions are normally made regarding economic conditions at the time the job is bid:

- An adequate supply of skilled labor will be available for construction.
- Contractors will engage in competitive bidding.
- The plant will be constructed in the U.S. Gulf Coast area.
- No time will be lost as a result of climatic conditions.
- The M & L estimates prices are valid as of the date of the estimate.

APPENDIX B INTERNAL RATE OF RETURN (IRR) CALCULATION METHOD

Appendix B

CALCULATION METHOD FOR FIGURING INTERNAL RATE OF RETURN (IRR)

- 1. Determine the total fixed investment (INV) for the complex. The INV is composed of three factors:
 - The inside-battery-limits (ISBL) costs (the costs for the process units).
 - An allowance of 50% of the ISBL is added for offsites. The value of 50% is rather arbitrary and depends on many factors, such as the site, existing utility structure, etc.
 - The interest on the capital already spent is added in. Capital expenditures occur over a three-year construction period: 20% of ISBL in the first year, 50% in the second year, and 30% in the third year. The interest on the capital is assumed to be 10% per year.
- 2. The cash-flow calculations are calculated over a 20-year period. The calculations use three simplifying assumptions: 100% equity basis (no interest charges in the pretax income calculation), constant dollar basis (no inflation), and no taxes. These assumptions will not affect the conclusions because conclusions are drawn by comparing rather than by looking at absolute dollar values.

CF(t) = P - F - VE - FE

Where:

P = Product Revenue

F = Feedstock cost

VE = Variable expenses (catalyst, utilities, etc.)

FE = Fixed expenses (labor, maintenance, overheads, etc.)

CF(t) = Cash flow for year t

3. The discounted cash flow equation to be solved for the discounted internal rate of return (IRR) is:

$$\sum_{t=1}^{20} \frac{CF(t)}{(1+IRR)^{t}} = INV + CAT + WC$$

where:

CAT = Cost of initial catalyst loading and royalties

WC = Working capital

APPENDIX C ECONOMIC ANALYSIS TABULATIONS

Arge: Base Case

Synthol: Base Case

Arge: Sensitivity to Product Prices (Base x1.5)

Synthol: Sensitivity to Product Prices (Base x1.5)

Arge: Sensitivity to Feed Costs (Base x1.2)

Arge: Sensitivity to Feed Costs (Base x1.1)

Synthol: Sensitivity to Feed Costs (Base x1.1) Arge: Sensitivity to Plant Capital (Base x1.5)

Synthol: Sensitivity to Plant Capital (Base x1.5)

C.1 ARGE: Base Case

333.33 days/year; 8,000 hours/year; operating factor: 1.000

VARIABLE COSTS/REVENUES		CAPITAL ITEMS	\$ 101			
		Plant Investment	28.55			
Units per	****	Cyclar Splitter + Alkymax	6.89			
	171.0	NHT plus splitter	8.80			
Gasoline MT 2,119.9 242 Diese) MT 2,802.4 193	180.3	CCR Platformer	13.02			
	351.3	Penex/Holex	10.20			
Total products 4.922.3 214		HC Unibon	<u> 29.15</u>			
By-products		Total ISBL	96.61			
H. Rich Gas MT 75.3 694	17.4	OSBL • 50% of ISBL				
Fuel gas WT 262.4 121	10.6	Interest 0 10% 3 yrs.	<u> 29.16</u>			
LPG MT 48.6 140	2.3	Total fixed investment	174.07			
Total by-prds. MT 386.3 235	30.3	Catalyst,Adsorbant & Roys	1+inn 21 15			
		Catalyst, Adsorbant a soy				
Total Products 5,308.6	381.6	Total plant investment	195.22			
		lots, bigg mices				
Feedstocks C./C. 1P6 NT 533.5 140	24.9					
C4/01	54.2					
C5/C1 maphtha MT 1,015.9 160 C5/C1 kerosp MT 788.9 193	50.8	Working capital				
C12/C18 kerosn. MT 788.9 193 C12+ MT 2.934.2 125	122.3	22 (1111)				
01D'	8.4	Total working capital	a) 44.75			
ng Fich yes	260.5					
Total Feedstocks 5,308.7 14/	200.0					
				4 007		
Consumables: catalysts and chamicals	.79	ECONOMIC ANALYSIS	4.0. /	\$/MT	•	
		<u>_</u>	_\$181/yr.			
		Gasoline sales	171.01	104.22 109.88		
Units per		Diesel sales	180.29	140.30	80.61%	
It il it ies hour		Feedstocks - byproducts	230.19 121.10	73.81	00:01-	
Power kWh 9,023 .06	4.33	Gross margin	121.10	75.01		
Steam, HP M1b 12.3 4.50	.44					
Steam, MP M1b 16.7 4.00	.53	Variable costs	•			
Steam, LP M1b 22.7 3.00	.54		.79	.48	.28%	
BFV M16 21.3 .40	. 07	Cats. & chemicals	_14.12_	8.61	4.94%	
Condensate Mlb -67.6 .40	22	Utilities	14.91	9.09		
CW circul. mGal 493.0 .10	.39	Total variable costs	24.51	4.		
Fuel fired mmBtu 334.2 3.00	<u>B.02</u>	Final anale				
Total Utilities	14.12	Fixed costs				
		Labor	3.79	2.31		
		Maintenance	3.48	2.12		
		Overheads	6.25	3.81		
		Other expenses	4.47	2.73		
		Total fixed costs	17.99	10.97	6.30%	
FINER COCTC						
FIXED COSTS		Cash cost of production	263.09	160.35		
Ops. per shift 13 8 \$36,000 per year	2.25					
Supervision 25% of operating labor	.56	Cash Flow	88.20	53.76		
Direct ownd. 35% of labor & superv.	98					
Direct only:	3.79	Capital costs				
<u>Na intenance</u>			17.41	10.61		
Mtrls. & labor 2% of fixed investment	3.48	Plant depreciation	17.41	10.01		
		Royalty amortization plu	5.06	3.09		
Overhead expenses		Inventory depletion	22.47	13.69	7.87%	
Plant ovhd. 50% of labor & mainten.		Total capital costs	66.77			
Tax & insrnce. 2% of fixed investment	2.61	Het cost of production	285.56	174.04	100.00%	
	6.25	MET COST OF PLOCOST IN				
Other expenses	.00	Pre-tax income	65.73	40.06		
Intrst. on captl. debt 0% per year intrst. wkng. capital 10% per year		*				
intrst. wkng. capital 10% per year	4.47	Simple pre-tax RO1, %	27.39			
Depreciation & emortization		•				
	11.60	Simple payback, years	2.72			
	5.80	• • •			20 60 A 20 MART	
OSBL 10% per year		DCF IRR, %	34.91	W 10 years	: 36.68 @ 20 years	
Catalysts, adsorbents and royalties	5.06		4	• 15x	: 3,33 0 107	Ľ
Catalysis, advocation and representation		DCF payback, yrs.	3.75	A 127	, 5.05 + 20.	-
			20V 100 €100	# 10 years	: \$190 # 20 years	
Total	22.47	Prod. sale price, \$/MT		# 10 years		
 -				# 10 years	AAAA A AA	

C.2 SYNTHOL: Base Case

333.33 days/year; 8,000 hours/year; operating factor: 1.000

VARIABLE COSTS/E	EVENU	ES .			CAPITAL LITERS					
		15 14 1 1 1			Plant Investment					
Products	Units	Units per	_\$/unit_	dami /	Huels/Cyclar	52.48				
6asol ine	MI	3,027.5	242	244.2	_ Splitter + Alkymax - NHT plus splitter	11.01				
Diesel	MT	397.3	193	25.6	CCR Platformer	9.85 12.67				
Total products		3,424.8	236	269.8	Penex/Holex	13.53				
•					Distillate Finishing	6.94				
By-products					Total ISBL	106.48				
Ho Rich Gas	MT	121.5	694	28.1	OSBL 9 50% of 1					
Füel gas	MT	548.7	121	22.1	Interest # 10% 3 y					
LPG	MT	80.0	140	3.7	Total fixed investment					
C19+ Fuel	MT	227.0	125	9.5						
Total by-prds.	MT	977.2	19 5	63_4_	Catalyst, Adeorbent & R	loyalties_31_17_				
Total Products		4,402.0		33 3.2						
Paradaka at a					Total plant investme	int 223.0 3				
Feedstocks	447									
C ₃ /C ₄ LPG C ₅ /C ₁₁ naphtha	MT	1.418.9	140	66.2						
CS/C11 Naphtha	MT	2,270.2	160	121.1		_				
C ₁₂ /C ₁₈ kerosn.	MT	397.3	193	25.6	Morking capital					
H19T	MT MT	227.0	125	9.5	*-4-34 1		•			
Horich gas Total Feedstoo		88.6	694	20.5	Total working cap	ital 38.14				
TOTAL PRODUCTOR	K.3	4,402.0	165	242.8						
Consumables: ca	talvet	ts and chan	icale	1.38	ECONOMIC ANALYSIS		\$/NT			
			19916	4.50	LIAMONIE BRALISIS	\$191/yr.	**.	~		
					Gasol ine sales	244.22	<u>products</u> 213.93			
		Units per			Diesel sales	25.56	22.39			
Utilities		hour			Feedstocks - byproducts		157.13	73.04%		
Power	kVh	11,710	. 06	5.62	Gross margin	90.40	79.19	75.042		
Steam, HP	МЪ	-34.6	4.50	-1.25		50.40	,,,,			
Steam, MP	Mib	14.8	4.00	.47	Variable costs					
Steam, LP	Mib	41.0	3.00	.98						
BFW	MIP	66.7	.40	.21	Cats. & chemicals	1.38	1.21	.56%		
Condensate	HIP	-76.0	.40	24	Utilities	<u> 18.45</u>	16.17	7.51%		
CW circul.	mGa1	1081.0	.10	.86	Total variable costs	19.84	17.38			
	an Btυ	491.1	3. 0 0	_11.79						
Total Utilitie	\$			18.45	Fixed costs					
					1-1					
					Labor	3.50	3.07			
					Na intenance Overheads	3.84 6.55	3.36			
					Other expenses	3.81	5.73 3.34_			
					Total fixed costs	17.70	15.50	7.21%		
FIXED COSTS					,	27.70	10.50	7.214		
Labor					Cash cost of product to	n 216.9 1	190.01			
Ops. per shift	12	\$36.000 p	er vear	2.07						
Supervision		of operatin		.52	Cash flow	52.87	46.31			
Direct ovhd.		of labor &		91_						
			•	3.50	Capital costs					
Ma intenance										
Mtrls. & labor	2%	of fixed in	ives tment	3.84	Plant depreciation	19.19	16.81			
		•			Royalty amortization p					
Overhead expense					_ Inventory depletion	<u>9.48</u>	8.31_			
Plant ovhd.		of labor &		3.67	Total capital costs	28.67	25.11	<u>11.67%</u>		
Tax & insrnce.	2%	of fixed in	evestment,	2.88						
				6.5 5	Het cost of production	245.58	215.12	100.00%		
Other expenses										
intrst. on capt			per year	.00	Pre-tax income	24.20	21.20			
intrst. u kng. c	pita	102	per year		Simila A 201 - #					
D	4.	-41		3.81	Simple pre-tax RO1, X	9.26				
Depreciation & a				12 70	\$4-7a and at	4.44				
ISBL		per year		12.79	Simple payback, years	4.94				
OSBL	10%	per year		6.40	PCC 100 T	15 40 4	. 10			
Catalunts adam	chase -	and nousla	inc	9.48	DCF IRR, X	15.42	10 years	; 19.59	20 y	BATS
Catalysts, adsor	DENTS	and royalt	162	J.40	MC newbook was	0 67 6	150	. 7 15 4		200
					DCF payback, yrs.	9.67 (15%	; 7.15 •		10%
Total				28.67	Prod. sale price, \$/MT	20% IRR \$245 (10 years	; \$237 e	20 w	2275
							10 years.			
							10 years			

Note: Products reflect the total tomage of gasoline and diesel

C.3 ARGE: Sensitivity to Product Prices (Base x1.5)

333.33 days/year; 8,000 hours/year; operating factor: 1.000

WAR A RIVE COSTS A	nevenie				CAPITAL ITEMS				
YARIABLE COSTS/	REVENUE	2			Plant Investment	\$ 101			
		Units per			Cyclar	28.55 6.89			
Products	Inits	day	\$/unit_	\$MM/VT.	Splitter + Alkymax NHT plus splitter	8.80			
Gasol ine	MT	2,119.9	363 290	256.5 270.4	CCR Platformer	13.02			
Diesel Total product	MT .	4.922.3	321	526.9	Penex/Molex	10.20			
iotal product	. •	7,320.0			HC Unibon	<u> 29.15</u>			
By-products					Total ISBL	96.61 11 48.31			
H, Rich Gas	HT	75.3	694	17.4	OSBL 0 50% of ISB Interest 0 10% 3 yrs				
füel gas	MT	262.4	121	10.6 2.3	Interest # 10% 3 yrs Total fixed investment	174.07			
LPG	MT . MT	<u>48.6</u> 386.3	140 235	30.3					
Total by-prds	. 7 11	300.5	200		Catalyst, Adsorbent & Roy	/alties <u>21.15</u>			
Total Products		5,308.6		557.2		105 99			
		•			Total plant investment	195.22			
Feedstocks				24.0					
C3/C4 LPG	MT	533.5	140 160	24.9 54.2					
CE/C11 Naprici	na Mi	1,015.9 788.9	193	50.8	Morking capital	_\$_191_			
C12/C18 kerosi	MT	2.934.2	125	122.3					
C ₁₉ + H ₂ rich gas	MT	36.2	694	8.4	Total working capit	ial 71.77			•
Total Feedst	ociks	5,308.7	147	260.5					
	4-7		icale	.79	ECONOMIC ANALYSIS		\$/HT		
Consumables:	E LAUYS	12 airi Cias	16413			SIMI/YT.	products .		
					Gasoline sales	256.51	156.33		
		Units per			Diesel sales	270.43 230.19	154.82 140.30	79.85%	
Utilities		hour			Feedstocks - byproducts	296.75	180.86	, 0.00	
Power	kWh		.06	4.33	Gross margin				
Steam, HP	MIP		4.50	.53	Variable costs				
Steam, MP Steam, LP	Mib		3.00	. 54			40	.27%	•
BFW	Mib		.40	. 07	Cats. & chemicals	.79 14.12	.48 8.61_	4.90%	
Condensate	. Mib		.40	- ,22	Utilities	14.91	9.09	4.502	
CW circul.	mGa 1		.10	.39	Total variable costs	24.52	0.00		
Fuel fired	- mmBtu	334.2	3.00	8.02 14.12	Fixed costs				
Total Utilit	162								
					Labor	3.79	2.31 2.12		
					Maintenance	3.48 6.25	3.81		
					Overheads	7.18	4.37		
					Other expenses Total fixed costs	20.70	12.61	7.18%	
F1VER 60070					•				
FIXED COSTS Labor					Cash cost of production	265.80	162.00		
Ops. per shif	t 13	\$36,000	per year	2.25		261.14	159.16		
Supervision	257	of operat	ing labor	.56	Cash flow	201.17	133.10		
Direct ovhd.	357	of labor (superv.	<u>.98</u> 3.79	Capital costs				
				3.75	Caprill Court				
Maintenance Mtrls. & labo	nr 23	of fixed	investmen	t 3.48	Plant depreciation	17.41	10.61		
M(113. # IED		• • • • • • • • • • • • • • • • • • • •			Royalty amortization pl	5.06_	3.09		
Overhead exper	1165				Inventory depletion	22.47	13.69	7.79%	
Plant ovhd.	507	of labor			Total capital costs	20.47			
Tax & instruct	e. 27	L of fixed	JUAGREMEN	t <u>2.61</u> 6.25	Het cost of production	288.27	175.69	100.00%	
	_			0.25					
Other expense:	enti.de	ebt 0	Y per yea	r .00	Pre-tax income	238.6 7	145.46		
intrat. wkng	. capita	1 10	x per yea	r <u>7.18</u>		8 9.39			
				7.18	Simple pre-tax ROI, X				
Depreciation	asort :	<u>ization</u>		11 60	Simple payback, years	1.02			
ISBL	107	% per year		11.60 5.80	Seature tentament lange				••
OSBL	107	% per year		3.00	DCF IRR, %	97.70	# 10 years	; 97.B1 •	zu years
Catalysts, a	dsorbeni	ts and rova	lties	5.06			. 150	: 1.13 •	10%
tererysis, e	J20. DC11				DCF payback, yrs.	1.19	• 15%	, 1.13 ¥	104
				- 02 43	Prod. sale price, \$/MI	20% IRR \$201	0 10 years	; \$195 0	20 years
Total				22.47	Prod. sale price, 4/m	30% IRR \$215	# 10 years	\$211 0	20 years
							# 10 years	; \$227 0	20 years

C.4 SYNTHOL: Sensitivity to Product Prices (Base x1.5)

333.33 days/year; 8,000 hours/year; operating factor: 1.000

YARIABLE COSTS/RE	VENUES			CAPITAL ITEMS Plant Investment				•
	U nits p	er		Huels/Cyclar	52.48			
Products U	nitsday		\$101/yr.	_ Splitter + Alkymax	11.01			
Gasol ine	MT 3,027		365.3	NHT plus splitter	9.85			
Diesel	MT397		38.3	CCR Platformer	12.67			•
Total products	3.424		404.7	Penex/Notex	13.53			
, , , , , , , , , , , , , , , , , , ,	-,			Distillate Finishing	6.94			
By-products				Total ISBL	106.48			
H. Rich Gas	MT 121	.5 694	28.1	OSBL # 50% of IS				
Füel gas	MT 548		22.1	Interest # 10% 3 yr				
LPG	MT 80		3.7	Total fixed investment	191.86			
C19+ Fuel	MT 227		9.5	10127 7 1,1123 1,11723 1,117				
Total by-prds.	HT977		63.4	Catalyst, Adeorbent & Ro	valties 31.17			
Total Products	4,402		468.1					
	1, 102	••	٠	Total plant investmen	nt 223.0 3			
Feedstocks				TOTAL PICIL MILES				
C3/C4 LPG	NT 1,418	.9 140	66.2					
C5/C11 naphtha	MT 2.270		121.1					
Car/Cas keroso	MT 397		25.6	Working capital	> <u>\$ 101</u>			
C ₁₂ /C ₁₈ kerosn. C ₁₉ +	MT 227		9.5	POLETING CARDINET				
H ₂ rich gas	MT 88		20.5	Total working capt	tal 58.90			
Total Feedstock			242.8	local solking cap				
TOTAL PRODUCT	3 7,702	.0 103	242.0					
Consumables: cat	aluete and e	hamicale.	1.38	ECONOMIC ANALYSIS		\$/KT		
MISCHEDICS. LAL	ALTONO DIN L	1991/4/19	1.30	ELEMENTE PROCESSES	\$101/yr.	products	~	
				Gasoline sales	366.33	320.89		
	Alm 4 a			Diesel sales	38.34	33.58		
Ut i) it ies	Units p			Feedstocks - byproducts	_179.38	157.13	72.43%	
. Power	<u>hour</u> kWh 11.7		5.62	Gross margin	225.29	197.35	,	
Steam, HP	M1b -34		-1.25	Gross mory in				
	M1b 14		.47	Variable costs				
Steam, LP	M1b 41		.98	va: lable costs				
BFW	M16 66		.21	Cats. & chemicals	1.38	1.21	.56%	
Condensate	M16 -76		24	Utilities	18.45_	16.17_	7.45%	
	mGal 1081		.86	Total variable costs	19.84	17.38	,.402	
	m8tu 491		11.79	TOTAL VALUEDIE COSES		27.00		
Total Utilities		.1 5.00	18.45	Fixed costs				
1042. 01.1111.143			20.45					
				Labor	3.50	3.07		
				Maintenance	3.84	3.36		
				Overheads	6.55	5.73		
				Other expenses	5.89	5.16		
				Total fixed costs	19.77	17.32	7.98%	
FIXED COSTS					••••			
Labor				Cash cost of production	218.99	191.83		
Ops. per shift	12 # \$36.0	Of ner wear	2.07					
Supervision	25% of oper		.52	Cash flow	185.68	162.65		
Direct ovhd.	35% of labo		91	33.11.0				
onect one. ,	332 01 1250	. • sepc. v.	3.50	Capital costs				
Majetenance			0.50					
<u>Maintenance</u> Mtrls. & labor	27 of five	d investment	3.84	Plant depreciation	19.19	16.81		
Attits. a labor		0 111100011101110		Royalty amortization pl				
Overhead expenses				Inventory depletion	9.48	8.31		
Plant ovhd.		r & mainten.	3.67	Total capital costs	28.67	25.11	11.58%	
Tax & instruce.		d investment		10111 Cap 1001 Con 12				
iax a marnee.	ZA UI I IAE	O MACREMENT	6.55	Het cost of production	247.66	216.94	100.00%	
Other evenence			0.55	mit door or production	4		••••	
Other expenses	debt	MY ner weer	.00	Pre-tax income	157.01	137.54		
intrst. on captl	. 0000	0% per year 10% per year		114 000 1110000	201.112			
Intrst. wkng. ca	pital	Toy be: 3441	5.89	Simple pre-tax ROI, %	5 5. 69			
Depreciation & am	net ivat ion		2.03	Duple his are not, a	٠			
	10% per yes	•	12.79	Simple payback, years	1.52			
15BL			5.40	ample payment, years				
OSBL	10% per yea	•	0.70	DCF IRR, %	65.43	0 10 wears	; 65.86 G	20 wears
Catalysts, adsor	hents and w	valties	9.48		55.45	,		
Catalysts, euson		J= 1 0 100	2.70	DCF mayback, yrs.	1.85	• 15x	: 1.73 0	10%
					2.00			
Total			28.67	Prod. sale price, \$/MT	20% IRR \$251	0 10 years	; \$243 0	20 years
1000							\$265 •	
						# 10 years	; \$291 0	20 years
						-		

Note: Products reflect the total tomage of gasoline and diesel

C.5 ARGE: Sensitivity to Feed Costs (Base x1.2)

333.33 days/year; 8,000 hours/year; operating factor: 1.000

WARTABLE COSTS/REVENUES		CAPITAL ITEMS Plant Investment	_ \$.104			
Units per		Cyclar	28.55			
	SMH/yr.	Splitter + Alkymax	6.89			
Gasol ine MT 2.119.9 242	171.0	NHT plus splitter	8.80		-	
Diesel MT 2.802.4 193	180.3	CCR Platformer	13.02			
Total products 4,922.3 214	351.3	Penex/Molex	10.20			
·		HC Unibon	<u> 29.15</u>			
By-products		Total ISBL	96.61 48.31			
H ₂ Rich Gas HT 75.3 833	20.9	OSBL 9 50% of ISB				
Fûel gas MT 262.4 145	12.7	Interest 0 10% 3 yrs	174.07			
LPG MT 48.6 168 _	2.7	Total fixed investment	1/4.0/			
Total by-prds. MT · 386.3 282	36.3	Catalyst, Adsorbent & Roy	miltims 21.15			
Total Products 5.308.6	387.6	(2021) SE, MESON SENS E MO)				
Total Products 5,308.6	307.0	Total plant investment	195.22			
Enadetaska		10021 P12 12				
Feedstocks C_/C_ LPG MT 533.5 168	29.9					
C ₃ /C ₄ LPG MT 533.5 168 C ₅ /C ₁₁ naphtha MT 1,015.9 192	65.0					
C. /C. kerosn. MT 788.9 232	60.9	Working capital	2.994			
C12/C18 kerosn. MT 788.9 232 C19+ MT 2.934.2 150	146.7					
H ₂ rich gas MT <u>36.2</u> <u>833</u>	10.0	Total working capit	al 42.02			
fotal Feedstocks 5,308.7 177	312.6					
19981 1988555555						
Consumables: catalysts and chemicals	.79	ECONOMIC ANALYSIS		\$/)(T	~	
			_\$101/ <u>YT.</u>			
		Gasoline sales	171.01	104.22		
Units per		Diesel sales	180.29	109.88	02 27*	
Utilities hour		Feedstocks - byproducts	276.23	168.35	83.37%	
Power kWh 9,023 .06	4.33	Gross margin	75.0 6	45.75		
Steam, HP M1b 12.3 4.50	.44					
Steam, MP M1b 16.7 4.00	. 53	Variable costs				
Steam, LP M1b 22.7 3.00	. 54		70	.48	.24%	
BFW M1b 21.3 .40	. 07	Cats & chemicals	.79		4.26%	
Condensate #1b -67.6 .40	2 2	Utilities	_14.12	<u> 8.61</u>	4.202	
CW circul. mGal 493.0 .10	. 39	Total variable costs	14.91	9.09		
Fuel fired mmBtu 334.2 3.00	<u>B.02</u>					
Total Utilities	14.12	Fixed costs				
			3.79	2.31		
		Labor	3.48	2.12		
		Na intenance	5.25	3.81		
		Overheads	4.20	2.56		
		Other expenses	17.72	10.80	5.35%	
		Total fixed costs	*****	20.00		
FIXED COSTS		Cash cost of production	308.86	188.24		
Labor	2 25	Cash Cost of production	555.55	••••		
Ops. per shift 13 @ \$36,000 per year	2.25	Cook Class	42.43	25.86		
Supervision 25% of operating labor	.56	Cash flow	70.75	20.00		
Direct ownd. 35% of labor & superv.	<u>.98</u> 3.79	Capital costs				
•	3.79	Capital Costs				
Maintenance	3.48	Plant depreciation	17.41	10.61		
Mtrls. & labor 2% of fixed investment	3.40	Royalty amortization pl				
		Inventory depletion	5.06	3.09		
Overhead expenses	3.64	Total capital costs	22.47	13.69	6.78%	
Plant ovhd. 50% of labor & mainten. Tax & instruce. 2% of fixed investment.	2.61					
Tax & instruce. 2% of fixed investment	6.25	Net cost of production	331.33	201.93	100.00%	
Athen superson	0.25					
Other expenses Intrst. on capti, debt 0% per year	.00	Pre-tax income	19. 9 6	12.17		
Intrst. on captl. debt UX per year Intrst. wkng. capital 10% per year.						
Intrat. ming. capital 100 pc/ jour.	4.20	Simple pre-tax ROI. %	8.42			
Depreciation & amortization						
	11.60	Simple paybook, years	5.59			
1000	5.80					
OSBL 10% per year		DCF IRR, %	12.26	# 10 years	; 17.13 €	ZU years
Catalysts, adsorbents and royalties	5.06	-	_			بمراد و
Catalysts, ausorbents and reporter		BCF payback, yrs.	13.05	• 15x	; 8.59 ●	10%
		• •			***	20
Total	22.47	Prod. sale price, \$/MT		# 10 years		20 years 20 years
****			30% IRR \$235 40% IRR \$248	0 10 years		20 years
			ALTO	- To lesig		

Note: Products reflect the total tonnage of gasoline and diesel

C.6 ARGE: Sensitivity to Feed Costs (Base x1.1)

333.33 days/year; 8,000 hours/year; operating factor: 1.000

VARIABLE COSTS/REVENUES		CAPITAL TIENS				
15-14		Plant Investment	28.55			
Units per		Cycler				
	mir _ 316 1/AI	Splitter + Alkymax	6.89 8.80			
Gasoline MT 2,119.9	242 171.0	NHT plus splitter	13.02			
Diese] MT <u>2.802.4</u>	193 180.3	CCR Platformer				
Total products 4,922.3	214 351.3	Penex/Molex	10.20			
		HC Unibon	<u> 29.15</u>			
By-products		Total ISBL	96.61			
H ₂ Rich Gas MT 75.3	763 19.2	OSBL 9 50% of ISBL	48.31			
FDel gas NT 262.4	133 11.6	Interest # 10% 3 yrs.	<u> 29.16</u>			
LPS NT <u>48.6</u>	154 2.5	Total fixed investment	174.07			
Total by-prds. MT 386.3	259 33.3					
•		Catalyst, Adeorbent & Roysi	1t ies <u>21.15</u>			
. Total Products 5,308.6	384.6					
		Total plant investment	19 5. 2 2			
Feedstocks		•				
C ₃ /C ₄ LP6 MT 533.5 C ₅ /C ₁₁ naphtha MT 1.015.9	154 27.4					
C ₅ /C ₁₁ naphtha MT 1,015.9	176 59.6					
C12/C18 kerosn. MT 788.9 C19* MT 2,934.2 H2 rich gas MT 36.2	212 55.8	Morking capital				
C12+18 MT 2.934.2	138 134.5	THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NAM				•
Harich eas MT 36.2	763 9.2	Total working capital	1 43.38			
Total Feedstocks 5,308.7	162 286.5	Total total and tap in				
Total Feedstocks 5,308.7	102 200.5					
					•	
**************************************	. 70	F00W0W1C AUAI VCTC		\$/WT		
Consumables: catalysts and chamical	<u>s</u> .79	ECONOMIC ANALYSIS	6181 /	•	-	
			\$9#/ <u>y</u> T	products		
		Gasoline sales	171.01	104.22		
Units per		Diesel sales	180.29	109.88		
Utilities hour		Feedstocks - byproducts	<u> 253.21</u>	154.33	82.09%	
Power kWh 9,023	.06 4.33	Gross margin	98.06	59.78		
Steam, HP M1b 12.3	4.50 .44	•				
	4.00 .53	Variable costs			•	
	3.00 .54					
BFV M16 21.3	.40 .07	Cats. & chemicals	.79	.48	.26%	
Condensate M1b -67.6	.4022	Utilities	14.12	8.61	4.58%	
CV circul. mGal 493.0	.10 .39	Total variable costs	14.91	8.09		
	3.008.02	IOLE: VE. IEDIE COSTS				
	14.12	Fixed costs				
Total Utilities	14.12	rixed costs				
		Labor	3.79	2.31		
		Labor	3.48	2.12 ·		
		Ma intenance				
	*	Overheads	6.25	3.61		
		Other expenses	4.34	2.64		
		Total fixed costs	17. 8 6	10.88	5.79%	
FIXED COSTS						
Labor		Cash cost of production	285.98	174.29		
Ops. per shift 13 0 \$36,000 per	year 2.25					
Supervision 25% of operating 1		Cash flow	6 5. 3 2	39.81		
Direct ovhd. 35% of labor & sup						
	3.79	Capital costs				
Na intenance	• • • • • • • • • • • • • • • • • • • •					
Miris. & labor 2% of fixed inves	tment 3.48	Plant depreciation	17.41	10.61		
MITIS. & IMPOR ZA DI LINEO INVES	CHEIL 3.40	Royalty amortization plus				
		Inventory depletion	5.06	3.09		
Overhead expenses		Total capital costs	22.47	13.69	7.28%	
Plant cyhd. 50% of labor & mai		iotal capital costs	66.47	13.03	7.108	
Tax & instruce. ZX of fixed inves		Mak and of production	306.45	187.99	100.00%	
	6.25	Het cost of production	300.43	107.33	100.002	
Other expenses			40.00	95.11		
intrst. on captl. debt UX per		Pre-tax income	42.85	26.11		
Intrst. ukng. capital 10% per			47.00			
-	4.34	Simple pre-tax RO1, X	17.96			
Depreciation & amortization						
ISBL 10% per year	11.60	Simple payback, years	3.65			
OSBL 10% per year	5.80					
0300		DCF IRR, %	24.25	10 years	; 27.15 # 20 years	
Catalysts, adsorbents and royalties	5.06	-		-		
	2.30	BCF payback, yrs.	5.68	D 15%	; 4.77 € 10	7%
Total	22.47	Prod. sale price, \$/MT 20	% IRR \$209	0 10 years	; \$204 @ 20 years	
10141	, 66.47	30		10 years		
				9 10 years		
				,		
		•				

Note: Products reflect the total tomage of gasoline and diesel

C.7 SYNTHOL: Sensitivity to Feed Costs (Base x1.1)

333.33 days/year; 8,000 hours/year; operating factor: 1.000

VARIABLE COSTS/REV	ENUES			CAPITAL ITEMS Plant Investment	\$.HH.			
	11-14			Huels/Cyclar	52.48			
5	Units per	\$/unit_1	MM/vr.	Splitter + Alkymax	11.01			
	MT 3,027.5	242	244.2	NHT plus splitter	9.85			
	MT397.3	193	25.6	CCR Platformer	12.67			
Total products	3,424.8	236	269.8	Penex/Molex	13.53			
•••••				Distillate Finishing	6.94 106.48			
By-products				Total ISBL 50% of ISBL				
Ho Rich Gas	MT 121.5	763	30.9	OSBL # 50% of 15bl Interest # 10% 3 yrs.				
	MT 548.7	133	24.3	Total fixed investment	191.86			
• • •	MT 80.0	154	4.1 10.4					
	MT 227.0	138 –	69.8	Catalyst, Adsorbent & Roye	lties_31.17_			
	MT 977.2 4,402.0	21-	339.6	-				
Total Products	4,402.0			Total plant investment	223.03			
Feedstocks				•				
C./C. LPG	MT 1.418.9	154	72.8					
	MT 2,270.2	176	133.2	· _				
C5/C11 kerosn	MT 397.3	212	28.1	Morking capital	\$_191			
C ₁₂ /C ₁₈ kerosn.	MT 227.0	138	10.4					
H ₂ rich gas	MT	763	22.5	Total working capita	a) 37.24			
Total Feedstocks		182	267.1					
1000	• ••••							
				CONTRACTO ANALYCIC		\$/MT		
Consumables: cat	alvata and cham	<u>icals</u>	1.38	ECONOMIC ANALYSIS	\$101/yr.	products .		
					244.22	213.93		
				Gasoline sales	25.56	22.39		
	Units per			Diesel sales	197.31	172.84	74.90%	
Utilities	hour			Feedstocks - byproducts	72.46	63.47		
Power	kWh 11,710	. 06	5.62	Gross margin				
Steam, HP	M16 -34.6	4.50	-1.25	Variable costs				
Steam, MP	M16 14.8	4.00	.47	ABLIEDIE COSTS				
Steam, LP	M16 41.0	3.00	.98 .21	Cats. & chemicals	1.38	1.21	.53%	
8F¥	N1b 66.7	1.40	24	Utilities	18.45	16.17	7.01%	
Condensate	M1b -76.0		.86	Total variable costs	19.84	17.38		
	mGal 1081.0	.10	11.79	IOLET VETTEBLE SECTO				
,	mBtu 491.1	3.00 .	18.45	Fixed costs				
Total Utilities	3		10.43	TIMES COSTS				
				Labor	3.50	3.07		
				Maintenance	3.84	3.36		
				Overheads	6.55	5.73		
		•		Other expenses	3.72	3.26_		
				Total fixed costs	17.61	15.42	6.68%	
FIXED COSTS				Cash cost of production	234 .76	205.64		
Labor			2.07					
Ops. per shift	12 • \$36,000	per year	.52	Cash flow	35.02	30.67		
Supervision	25% of operat 35% of labor	ing tabut	91					
Direct ovhd.	33% 01 16001	s superv.	3.50	Capital costs				
Ma intenance	7% of fixed	investment	3.84	Plant depreciation	19.19	16.81		
Mirls. & labor	CA DI LINEU	1111432	•	Royalty amortization pl	US			
	_			Inventory depletion	9.46	8.31	10.88%	
Overhead expense	50% of labor	1 minten.	3.67	Total capital costs	28.67	25.11		
Plant oyhd.	2% of fixed	investment	2.88			230.75	100.00%	
Tax & instrnce.	28 01 1 1X40		6.55	Het cost of production	263.43	230.75	100.00	
					6.35	5.56		
Other expenses Intrst. on capt	1 debt 0	% per year	.00	Pre-tax income	6.33	3.30		
Intrst. wkng. G	apital 10	% per year	$\frac{3.72}{3.72}$		2.44			
Intrat. weny: 0			3.72	Simple pre-tax ROI, X	2.44			
Depreciation & a	mort izat ion				7.43			
ISBL	10% per year		12.79	Simple payback, years	7.45			
OSBL	10% per year		6.40	=	5 79	# 10 years	: 12.08 •	20 years
				SCF IRR, %	3.73	,		-
Catalysts, adso	rbents and roya	ilties	9.48	mor analysis and	#VALUE!	• 15¥	; 14.26 €	10%
				DCF payback, yrs.	a surar.			
			20 57	Prod. sale price, \$/NT		# 10 years		20 years
Total			20.0/	Lines main history day.	30% IRR \$279	# 10 years	; \$274 0	20 years
					40% IRR \$300	# 10 years	; \$297 •	20 years
						-		

C.8 ARGE: Sensitivity to Plant Capital (Base x1.5)

333.33 days/year; 8,000 hours/year; operating factor: 1.000

YARIABLE COSTS/REVENUES		CAPITAL ITEMS Plant Investment				
Units per		Cyclar	42.83			
Products Units day \$/unit	SIN/YT.	Splitter + Alkymax	10.34			
Gasol ine MT 2,119.9 242	171.0	NHT plus splitter	13.20			
Diese1 NT 2.802.4 193	180.3	CCR Platformer	19.53			
Total products 4,922.3 214	351.3	Penex/Holex	15.30			
		HC Unibon	43.73			
By-products		Total ISBL OSBL 9 50% of ISBL	144. 9 2 72.46	t .		
H ₂ Rich Gas MT 75.3 694	17.4					
Fuel gas MT 262.4 121	10.6	Interest # 10% 3 yrs. Total fixed investment	261.11			
LP6 MT 48.6 140 Total by-prds, MT 386.3 235	30.3	1965) LIVER INVESTMENT				
Total by-prds. MT 386.3 235	30.3	Catalyst, Adeorbent & Roya	lties 21.15			
Total Products 5,308.6	381.6					
10121 1100012		Total plant investment	28 2.26			
Feedstocks		•				
C ₃ /C ₄ LPG MT 533.5 140	24.9					
C5/C11 naphtha MT 1.015.9 160	54.2					
	50.8	<u>Working capital</u>				
C12 18 MT 2.934.2 125	122.3					
C12/C18 kerosn MT 788.9 193 C19 HT 2.934.2 125 H2 rich gas MT 36.2 594	8.4	Total working capita	1 45.64			
Total Feedstocks 5,308.7 147	260.5					
		•				
				0.007		
Consumables: catalysts and chamicals	.79	ECONOMIC ANALYSIS	Ann. 1	\$/MT	•	
			_ \$191 / <u>x</u> T-	products		
		Gasoline sales	171.01	104.22		
Units per		Diesel sales	180.29	109.88	77.18%	
Utilities hour		Feedstocks - byproducts	<u> 230.19</u>	<u> 140.30</u>	//.10A	
Power kWh 9,023 .06	4.33	Gross margin	121.10	73.81		
Steam, HP M1b 12.3 4.50	.44					
Steam, MP M1b 16.7 4.00	. 53	Variable costs				
Steam, LP M1b 22.7 3.00	.54	C.A. A shaminals	.79	.48	.25X	
BFV M1b 21.3 .40	.07	Cats. & chemicals	14.12	8.61	4.73%	
Condensate Hib -67.6 .40	22	Utilities	14.91	9.09	7	
EW circul. mGal 493.0 .10	.39	Total variable costs	14.91	3.03	-	
Fuel fired mmBtu 334.2 3.00	<u> 8.02</u>	Fired make		•		
Total Utilities	14.12	Fixed costs				
		Labor	3.79	2.31		
		Na intenance	5.22	3.18		
		Overheads	8.42	5.13		
		Other expenses	4.56	2.78		
		lotal fixed costs	22.00	13.41	7.38%	
P1478 88777		IDEAL LIXED COSES				
FIXED COSTS		Cash cost of production	267.10	162.79		
Labor	2.25	Cash Cost of production	20. 12.	•••		
Ops. per shift 13 0 \$36,000 per year	.56	Cash flow	84.19	51.31		
Supervision 25% of operating labor	98	Casii 110m				
Direct owhd. 35% of labor & superv.	3.79	Capital costs				
** * * * * * * * * * * * * * * * * * * *	3.73	35				
Maintenance Mtrls & labor 2% of fixed investment	5.22	Plant depreciation	26.11	15.91		
Mtrls. & labor 2% of fixed investment	J. 2.	Royalty amortization plus				•
•		inventory depletion	5.06	3.09		
Overhead expenses Plant owhd. 50% of labor & mainten.	4.51	Total capital costs	31.17	19.00	10.45%	
Tax & instruce. 2% of fixed investment	8.42	Net cost of production	298.27	181.79	100.00%	
Other expenses		·				
intrst. on captl. debt 0% per year	.00	Pre-tax income	53.02	32.31		
Intrst. ukng. capital 10% per year		_				
Illetat: mail opposit	4.56	Simple pre-tax ROI, %	16.17			
Depreciation & smortization						
ISBL 10% per year	17.41	Simple payback, years	3.89			
OSBL 10% per year	8.70				95 46 4	20
		DCF IRR, %	Z2. Z 3	# 10 years	; 25.40 e	co years
Catalysts, adsorbents and royalties	5.06					10%
The same of the sa		DCF peyback, yrs.	6.28	• 15x	; 5.18	107
			MY TOD \$210	0 10 years	\$204 8	20 years
Total	31.17	Prod. sale price, \$/MT 2		0 10 years		20 years
			10% 100 \$246			

Note: Products reflect the total tonnage of gasoline and dissel

C.9 SYNTHOL: Sensitivity to Plant Capital (Base x1.5)

333.33 days/year; 8,000 hours/year; operating factor: 1.000

Principate Units per Sant San														
Description	WADTABLE COCTS/DE	VENUES			ļ	CAPITAL ITEMS								
Description Section	ANTINDEE CASISANE	V PINA				Plant Investment								
		U	nits per			Huels/Lyciat								
Total products	Products 1	nits_				Spiller + Alkyman		14.78						
Total products	6asol ine					rcp Platformer								
Distribution Dist														
No. Rich Gas NT 121.5 594 22.1 121.5 122.1 1	Total products		3,424.8	230										
R. Sich Gas MT 121.5 694 22.1 1 1 1 1 1 1 1 1 1	- 1 -4-					Total ISBL								
Total by=rds	By-products	MT	121 5	694	28.1	0000								
Total proprise MT 80.0 140 3.7 127.0 122 8.5 127.0 127.0 127.0 128 137.2 128 137.2 128 137.2 128 138.2	Ho Kich bas					Interest # 10% 3	yrs.							
Total by-prds. H					3.7	Total fixed investment	nt.	267.70						
Total Pyprosition						A.A.J. Advantant &	Royaltic	s 31.17						
Total Products Fendituries C37/4 LPG C37/1, naphtha NT C327.02 160 121.1 C37/2 LPG C37/2, 1		MT		195		Catalyst, Admiratio	,							
Consumables: catalysts and chemicals 1.38 1.3			4,402.0		333.Z	Total plant invest	ment.	318.96						
CyC						10th blant moss								
Consumables: catalysis and chemicals 1.38 Consumables: catalysis 1.38	Feedstocks			140	66.2									
Consumables: catalysts and chemicals 1.38 594 70.5	C3/C4 LPG	MI												
Consumables: catalysts and chemicals 1.38 594 70.5	C5/C11 naphtha	Mi				Working capital								
Total Feedback Tota	C12/ C18 NC. CO	• • • •						** 13						
Consumables: catalysis and chamicals 1.38	C19 ⁺	m :				Total working o	capital	39.13						
Consembles: Catalysis and chemicals 1.38 ECOMONIC ANALYSIS Sandy San	Marion gas				242.8									
Consessables: Catalysts and chemicals 1.38 Clammil Modulate 1.	10181 Pendston		4,402											
Unities						TOWNS ANALYSIS			\$/	/NT				
Direct Direct Direct Direct Steam HP Direct Direct Steam HP HI Direct Direct Steam HP HI Direct Steam HP Direct Steam HI Direc	Consumables: Ci	stalyst	s and ches	icals	1.38	ECIMONIC WAY 1212		\$30I/VT.			_ <u>*</u> _			
Diese sales Prover Prov	Transfer of the last of the la					Consline eales								
Power Name								25.56	2	2.39				
Printing Prover Number 11,710 .06 5.62						Feedstocks - byprodu	cts		_15	7.13	69.102			
Note Power Steam HP HIb -34.5 4.50 -1.25	Utilities			- 05	5 62			90.40	7	9.19				
Steam, NP NID 14.0 4.00 47 Steam, NP NID 14.0 3.00 98 Steam, LP NID 66.7 40 21 Utilities 15.45 15.17 7.11%														
Steam, IP Nib 41.0 3.00 .98						Variable costs								
Steam								1 26		1 21	. 53%			
Condensate Mib -76.0 .40 .40 .24 .11 .					.21									
Column				.40										
Fixed costs						Total variable cos	113	23.0	_					
Labor S. 76 S. 04			491.1	3.00		Fired seets								
Labor Single Si		es			18.45	Lixed coars								
Maintenance						Labor								
Description										_				
Cash cost of production 22.11 19.37 8.52%														
Total fixed costs E.1.11 Eabor Cash cost of production Cash						Other expenses			_		8 52%			
Labor Ops. per shift 12 © \$36,000 per year Supervision 25% of operating labor Direct ovhd. 35% of labor & superv. Maintenance Htrls. & labor 2% of fixed investment Mtrls. & labor & superv. Maintenance Htrls. & labor 2% of fixed investment S.76 Plant ovhd. 50% of labor & mainten. 4.63 Tax & instruce. 2% of fixed investment Inventory depletion Total capital costs Other expenses Intrst. on capit. debt O% per year Intrst. wkng. capital 10% per year Intrst. wkng. capital 10% per year OSBL 10% p						Total fixed costs		22.11		19.3/	0.522			
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Direct ownd. 35% of labor & superv. 3.50 Capital costs		254	of operat	ing labor		Cash flow		40.40						
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15BL 10% per year 9.59 DCF IRR, % 5.91 @ 10 years ; 12.17 @ 20 years	Depreciation &	amort.	ization			Samla madack wa	ars	7.39)		•			
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Total 38.26 Prod. sale price, 3/81 205 IRR \$295 0 10 years ; \$288 0 20 years	-					• •				A	- \$25R I	9 20 v	rears	
Total 30% IRR \$230 0 10 years					38.26	Prod. sale price,	\$/101 201		5 0 1	n years	•			
ANY THE STORY OF T	Total						307			O years				
-							40	P 144 \$35	·	,		•		

Note: Products reflect the total tonnege of gasoline and diesel