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DE83 000173

The BRECKINRIDGE PROJECT

Initial Effort

REPORT VIII

CAPITAL COST ESTIMATE

MASTER

ASHLAND SYNTHETIC FUELS, INC.
AIRCO ENERGY COMPANY, INC.

PREPARED FOR
UNITED STATES DEPARTMENT OF ENERGY
UNDER COOPERATIVE AGREEMENT
NO. DE-FC05-800R20717

DISCLAIMER

The information and data contained in this report are the result of an economic evaluation and a preliminary design effort and because of the nature of this work no guarantees or warranties of performance, workmanship, or otherwise are made, either expressed or by implication.

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REPORT VIII

CAPITAL COST ESTIMATE

1.0 INTRODUCTION AND SUMMARY

1.1 INTRODUCTION

The major objective of the Initial Effort for the Breckinridge Project is to develop engineering to the point where realistic economics for the construction and operation of the plant can be made.

The plant is designed to process 23,000 tons per day of run-of-mine coal to produce a nominal 50,000 barrels per day of liquid products using the H-Coal® and standard industry technology. The plant will be located in Breckinridge County, Kentucky.

Cost estimating for previous synfuels projects has proved to be difficult. This is usually because no preliminary engineering was performed and historical data is not available for such plants. Estimates for coal conversion plants have been made with little or no significant basis and have invariably been found to be of poor quality.

The Initial Effort was undertaken to rectify this situation. Considerable preliminary engineering has been performed for this estimate. This work uses a single-point design based on the Process Demonstration Unit (PDU) data from run 5, period 29 of the pilot plant. The design basis is discussed in Volume II of this report. Many aspects of plant construction and cost have been considered that were not taken into account in the past studies.

Substantial experience from the H-Coal® pilot plant at Catlettsburg, Kentucky, will be available at initiation of the detailed engineering phase. Thus, the data obtained from pilot plant experience will be incorporated into the design of the commercial plant.

Ashland and Bechtel believe the accuracy of the capital estimate to be +19%, -17%. This accuracy is postulated on January 1981 dollars, the as-spent dollar amount naturally depending upon the inflation rate through the construction period.

Considerable attention has been devoted to reliability of operation, and redundant equipment has been used where it was deemed necessary to assure reasonable onstream time. This equipment is included in the capital estimate.

1.2 COST SUMMARY

The capital cost is summarized by total plant cost on Table 1. The subtotal plant cost, excluding contingency, fee, and adjustment is $2,710,940,000. The contingency shown on this Table and derived from analysis of risk Figure 1 is defined as the cost which will result in a 50:50 probability of overrun on the project. This was determined by using the RAC 8 program, a risk analysis program used by Bechtel to determine overrun probability and based on a Monte Carlo random number simulation. The adjustment shown on Table 1 represents the deletion of one 600 TPH coal washing unit plus associated contingency and fee. Adding the contingency, fee and adjustment, the total depreciable cost of the plant is $3,167,430,000.

Working capital, the non-depreciable cash required for plant operations, is assumed to be recovered without loss at the end of the project. Working capital is usually divided into three categories - cash, accounts receivable and inventory. The latter two are self-explanatory and the first includes the cash necessary to meet payroll, accounts payable and other expenses as they are incurred during the plant operations. Adding the working capital to the total plant cost results in total capital requirements of $3,258,430,000 as shown on the individual plant cost summary Table 2.

The downside economics for the project will be based on a contingency reflecting a 20 percent probability of overrun. This contingency shown on Table 2 is derived from Figure 1 and results in the total capital requirement of $3,695,861,000.

1.3 COMMON COST FACTORS

The capital estimate is a factored estimate based on the "bare equipment" cost. The bare equipment cost is determined by in-house and vendor estimates. The costs for foundations, piping, insulation, process buildings, painting, instrumentation and electrical are determined by taking a percentage of the bare equipment cost. Subsequently, these accounts are broken down into materials and labor, allowing estimates of the field construction labor requirement. The number of manhours required to erect the equipment is taken from Bechtel's standard manhour manual. The bare equipment costs for this study have been based on data sheets prepared by Bechtel that are believed to be the most complete to date for the determination of these costs for a commercial coal liquefaction plant. Therefore, the bare equipment costs have been estimated as accurately as possible at this stage of project development.

Additional factors are used for field indirects, engineering, home office allowances, and fee. This results in an installed cost for each plant and is a line item on Table 2. Additional line items are interconnecting piping (taken from an overlay of the plant plot plan), offsites, steam plant, administration building, shops, etc. These line items total the plant construction cost mentioned previously.

The factors used are determined from historical data compiled by Bechtel for similar plants. Obviously, direct parallels are not always possible for a new technology, and some judgement by the estimators is thus required. However, because of the experience of both the Ashland and Bechtel personnel, it is believed that these judgements are sound.

The equipment list and equipment data sheets are available as backup to this estimate and are contained in Reports IV and V.

Construction labor productivity affects the determination of the field labor requirement mentioned above. For this project the Bechtel system of relating productivity to a standard is used. That is, the productivity is determined from historical data from recent construction jobs in the geographical area under consideration and an appropriate adjustment factor is used. The resulting productivity is then incorporated into the estimate after the factors are broken down for material and labor.

1.4 ESTIMATING METHOD

Each of the numbered plants are treated separately for estimating so that the installed cost for each plant is determined independently of all other plants. This allows the application of different factors to the bare equipment cost depending upon the type of plant being estimated, as well as the consideration of the relative complexity of the different plants. Well-defined factors can be used for the conventional sections of the plant, and the probable error in the total estimate is thus reduced.

The summary for each individual plant follows the total capital summary, Table 1. An estimate of the manhours required for construction of each plant is made which allows leveling of craft requirements as the detailed schedule is developed. For each plant, the labor is distributed over all accounts with a distributable manual labor allowance based on material cost and an allowance for non-manual field labor. Then, for each plant the estimated bare equipment cost is determined and the total installed cost estimated.

2.0 ESTIMATE BASIS

2.1 GENERAL

This is an estimate of the capital costs for a major coal liquifaction facility to be located in Breckinridge County, Kentucky. The plant capacity is a nominal 50,000 barrels per day of petroleum liquids, utilizing H-Coal® technology.

The estimate is based on a scope definition produced by Bechtel as a product of the initial cooperative agreement effort between DOE, ASFI, and AECI. It incorporates additional data and information supplied by various equipment vendors and third-party engineering firms. A complete definition of the scope basis can be found in Reports III, IV, and V.

The reference material utilized in preparing the estimate consists of the following documents:

- Major equipment item lists
- General design specifications
- Equipment data sheets
- Equipment design sketches
- Piping and Instrument Diagrams
- Plot plans
- Routing diagrams

A scope cutoff date was established for consolidating information to be used in the estimate. However, certain additional data available after that time was also incorporated when a significant impact on facility costs was evident. Pricing for the estimate is based on January 1981 levels with no additional allowance for escalation.

This is a preliminary-type estimate with an associated accuracy of +19%, -17%. Costs for major equipment have been developed for each individual item. From this information, the total installed cost was derived utilizing various curves, ratios and factors based on Bechtel's historical data for similar or related facilities.

The paragraphs that follow describe the methods and techniques used in completing each portion of the estimate.

2.2 METHODOLOGY

2.2.1 Major Equipment

The equipment was priced using curves and unit cost comparison for similar items from other recent Bechtel projects. The remaining equipment, especially unique or special items, was priced using vendor estimates.

The major equipment was considered on an item-by-item basis within each plant, unit or facility. General design parameters were extracted from data sheets, recognizing such features as size, capacity, metallurgy, wall thickness, etc. Typical design characteristics and units of measurement that were used to estimate costs for various classifications of equipment can be summarized as follows:

- Columns & Vessels
  - Based on tons of steel, metallurgy and plate thickness. Internals priced separately
- Tanks
  - Classified as to type and priced at barrels of capacity
- Heat Exchangers
  - Identified as air coolers or shell and tube type, priced on the basis of metallurgy and tube surface area

- Fired Heaters
  - Specified as to absorbed heat duty (MM Btu/hr) and priced utilizing vendor data and cost curves
- Pumps and Drivers
  - Case material, driver-type, and brake horsepower were used
- Vacuum Equipment
  - Utilized vendor estimates
- Compressors and Drivers
  - Classified as reciprocal or centrifugal and priced on the basis of driver brake horsepower, using vendor estimates
- Special Equipment
  - Used vendor estimates for packaged or special equipment

2.2.2 Subcontract Costs

The estimate is based on a number of items being purchased and erected by subcontractors. Items such as tank construction, site preparation, boiler erection, etc., are typically supplied by someone other than the prime contractor, and these items have been shown as separate subcontract costs. These subcontracts include all material, labor, overhead and fees related to the work.

2.2.3 Bulk Materials

The costs of bulk materials were developed in two ways. First, in the process units all bulk materials and labor costs were derived from ratios and factors related to the major equipment costs. These factors were tailored to each process unit, based on Bechtel's in-house historical data for similar types of facilities. In certain cases, adjustments have been

made to allow for special or unique characteristics of the unit. Such adjustments or special conditions are noted in the plant summary description sheets that follow.

The second method used for estimating bulk materials involved the offplot and interconnecting units. For these areas, it was necessary to develop quantity data based on preliminary plot plans and site plan arrangements, with assumptions made for routings, line sizes, pipeway configurations, etc. These preliminary quantities were priced on an itemized basis and compared to other large, complex projects as a cross check.

2.2.4 Bulk Subcontract Costs

Certain activities such as insulation, buildings, and painting have, in all cases, been based on subcontracts. For insulation and painting, the estimates are based on a percentage of major equipment costs. Buildings are estimated separately in Plant 41.

2.2.5 Direct Labor Manhours

For erection of major equipment, the direct labor manhours were calculated on the basis of unit rates and manhour standards for each individual item. These manhours were summarized by category within the individual plants or units.

Because this preliminary level estimate does not contain detailed quantity data for bulk materials, the manhours required for these items have been applied as a percentage, or factor, of the bulk material cost which in turn was derived from factors related to the major equipment cost. These ratios have been tailored and adjusted at the plant level to conform to historical Bechtel experience for similar types of units, corrected to be site specific for the Breckinridge County job location.

2.2.6 Direct Labor Costs

The manhours derived above were priced using an overall, net average job wage rate. This rate was developed from an analysis of union wage agreements in effect in the Breckinridge local area as of January 1, 1981.

These agreements set the base rates and fringes applicable to each craft involved in the construction phase of the project. Adjustments were applied for crew mixes and spot overtime. An overall average rate was then calculated on a weighted basis, utilizing Bechtel's experience for typical craft distributions on similar large projects. This average rate takes into consideration the following variables:

- Base wages by craft, as specified by current local agreements
- Fringe benefits by craft including travel time
- Crew mix for journeyman, foreman and apprentice
- Normal "spot" overtime
- Overall weighted craft participation during the construction period
- Insurances and taxes as required by state and federal law

The overall rate is based on a standard 40 hour work week and does not allow for future escalation.

2.2.7 Spare Parts

An allowance of 5% of the major equipment has been included for spare parts to be purchased with initial placement of orders for equipment.

2.2.8 Sales Tax

Sales tax has been estimated at 5% of the direct material cost, except for the process plant facilities which are based on being exempt from sales tax.

2.2.9 Field Indirect Costs

Field indirect costs have been included as a percentage of direct labor cost taking into consideration the site location, job master schedule, project construction plan, subcontracting plan, etc. The indirect percentage is based on Bechtel's experience from other large, grass-roots, refinery-type construction projects.

As a cross-check, the costs developed by this overall factoring method were allocated to specific indirect functions and compared to costs for the same functions on other large projects.

The construction phase of the project is scheduled for approximately six years. As a result of construction duration the normally temporary-type construction offices and warehouses will be of a permanent nature. The sewage treatment facilities are handled similarly.

Items that are included in the indirect cost can be grouped into four functional areas, which are summarized below:

- Temporary Construction Services
  - Includes office buildings, warehouses, working areas and bays, temporary roads, walks, parking area and fences; railroad and barge unloading facilities; power, light and telephone facilities; minor temporary construction; general purpose scaffolding, cribbing and drainage; sanitary facilities
- Miscellaneous Construction Services
  - General and final cleanup, maintenance of tools and equipment; material handling, welder's supplies and testing, watchmen and guards and surveying
- Construction Equipment and Tools
  - Supplies and purchased utilities, fuels and lubricants. All types of construction equipment whether rented or purchased, and tools

- Field Office Cost
  - Nonmanual supervision, administration, warehousing and purchasing, first aid, safety and medical, nonmanual payroll adds and benefits, field office overhead, nonmanual travel and subsistence

2.2.10 Home Office Manhours

An evaluation of home office manhours has been included in the estimate for those portions of the facility to be designed by the prime engineering contractor. The estimate was produced first by an analysis of the engineering scope developed in the Phase Zero design and consisting of process descriptions, lists of equipment, estimated numbers of drawings, material requisitions, specifications, etc. The engineering manhours associated with this scope were estimated on a plant-by-plant basis utilizing experience from similar types of facilities.

Manhours for home office support services have also been included. These were added as a percentage of the engineering requirements for each individual plant. The percentage is based on historical data from other large, refinery-type projects and includes the following typical functions:

- Project Management
- Technical Services (Project Controls)
- Construction Management
- Procurement
- Commercial Services

2.2.11 Home Office Costs

The home office manhours, derived above, were priced using an overall average rate, based on Bechtel's current Houston office experience. The rate was developed by an analysis of salaries for various employment classifications and was distributed on a weighted basis for an organization of the size and complexity of this project.

In addition to the base salaries, the following items are included in the overall average rate:

- Bechtel standard payroll additives for taxes and insurance
- Engineering supplies
- General office supplies
- Communication costs
- Indirect cost allowances for facility and overhead items
- Fringe benefits
- Reproduction and printing
- Computer charges
- Travel expense (home office personnel)

2.2.12 Engineering by Others

A number of the plants in this estimate involve licensed units or designs of a special and unique nature to be engineered by other third-party firms. The costs of home office services for these plants have been shown separately, utilizing information which those companies supplied with their estimates.

2.2.13 Estimating Allowances

The estimates for the capital costs of these facilities conform to the Phase Zero design scope available at the time the estimate was produced. No additional provisions for changes or modifications are included unless specifically identified in the estimate.

However, because of the preliminary nature of this estimate, an allowance of 15% of the capital cost has been included in the plant summary. This

allowance provides for costs which are not identified by specific item at this stage of engineering.

2.2.14 Risk Analysis

A risk analysis was made using Bechtel's Risk Analysis - Contingency (RAC) program. This program helps to define the accuracy of the estimate, presents the most probable cost, assesses the risks and shows the probability of an overrun at various levels of contingency. The results of this program were used to aid in establishing the estimating allowance for the project.

2.2.15 Fee

For estimating purposes, a contractor's fee of 2% of the capital cost has been included with each plant summary.

2.2.16 RAC - Calculations

Calculations provided in the risk analysis resulted in the output data contained on the following page. These data were utilized as indicated above.

2.2.17 Estimate Exclusions

The capital cost estimate does not include cost for the items listed below.

- Land cost for site
- Socioeconomic considerations; community facilities, camp, or other infrastructure
- Permits and bonds
- Cost of importing borrow fill material from offsite for site fill and compaction

- Gas pipeline
- Electric transmission line
- Cost of setting up remote preassembly yards and facilities
- Credit or debit for worldwide procurement
- Potable water wells
- Allowance for incentive to attract labor

FIGURE 1

RCE - 35 A
10/70

JOB NO 14222 /Client ASFI

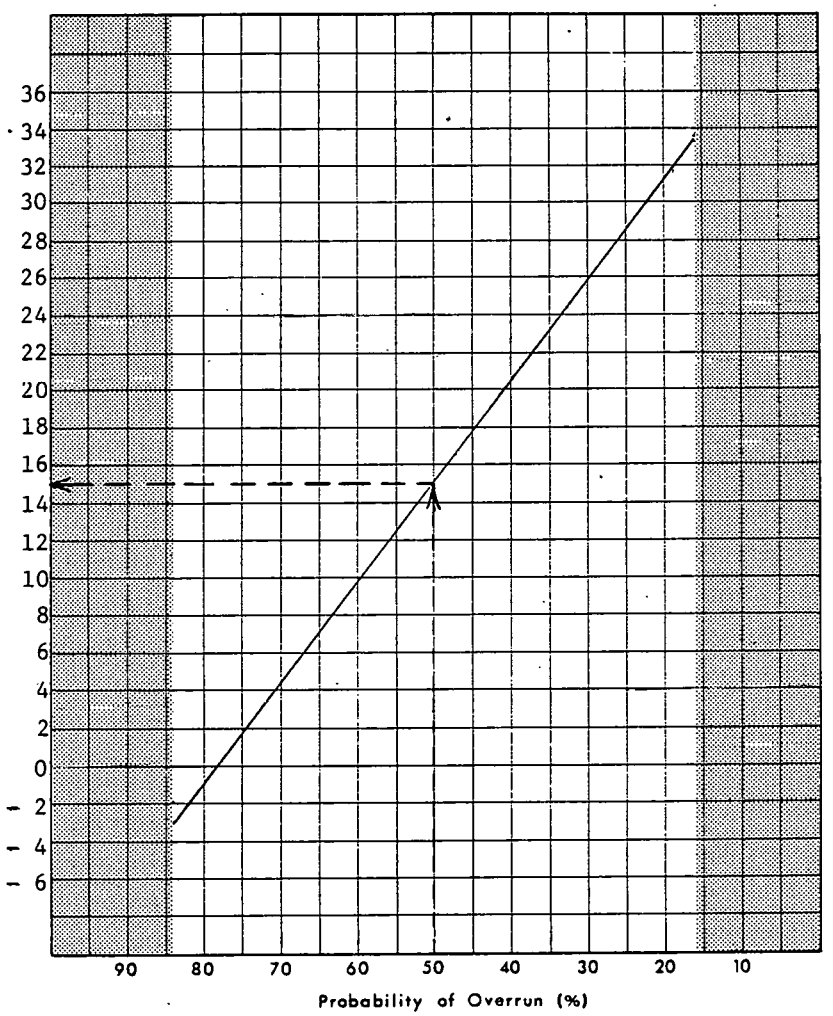
Type of Plant Coal Liquif.

Location Addison, Ky.

Date 4/29/81

ANALYSIS OF RISK

CONTINGENCY ($M)	CONTINGENCY (%)
	36
	34
975,938	32
921,720	30
867,501	28
813,282	26
759,063	24
704,844	22
650,626	20
596,407	18
542,188	16
487,969	14
433,750	12
379,532	10
325,313	8
271,094	6
216,875	4
162,656	2
108,438	0
54,219	- 2
0	- 4
(54,219)	- 6
(108,438)	
(162,656)	



ESTIMATE

Est. Cost Excl. Contingency $ 2,710,940

Accuracy Excl. Contingency* + 34 % - 2 %

Most Probable Cost $ 3,117,580

MANAGEMENT DECISION

Probability of Overrun 50 %

Contingency 15 %

$ 406,640

Estimate Accuracy Incl. Contingency* + 19 % - 17 %

* Based on Standard Deviation

Table 1

FACTORED CAPITAL COST ESTIMATE
ALL PLANTS SUMMARY

NOTE: All costs are in thousands of dollars.

MAJOR EQUIPMENT, MATERIAL AND SUBCONTRACT COSTS

Price developed from vendor quotes or in-house data	=	$787,550

BULK MATERIAL AND SUBCONTRACT COSTS

The bulk material and subcontract costs are taken as percentages (or cost "factors") of the major equipment costs. The cost factors are based on Bechtel's historical, proprietary data for similar types of plants and vary with type and size of plant.

Bulk Material Costs		Cost Factor, %			
Instruments	=	NA	X	=	66,410
Piping	=	NA	X	=	227,280
Structural Steel	=	NA	X	=	63,760
Electrical	=	NA	X	=	96,330
Concrete	=	NA	X	=	42,230
Site Improvements	=	NA	X	=	24,760
Siding	=	NA	X	=	650
Buildings	=	NA	X	=	3,790
Total Bulk Material Cost				=	$525,210

Table 1 (Cont)

Subcontract Costs		Cost Factor, %			
Piping	=	NA	X	=	10
Insulation	=	NA	X	=	48,370
Electrical	=	NA	X	=	4,250
Buildings	=	NA	X	=	24,110
Site Improvements	=	NA	X	=	68,440
Painting	=	NA	X	=	10,230
HVAC	=	NA	X	=	1,210
Total Subcontract Cost				=	$156,620
TOTAL BULK MATERIAL AND SUBCONTRACT COSTS				=	$681,830

DIRECT LABOR MANHOURS

Direct labor manhours are taken as multipliers (or manhour "factors") of the bulk material costs. The manhour factors are based on Bechtel's historical, proprietary data for similar types of plants, varying with type and size of plant and adjusted as required for labor productivity based on jobsite data.

		Manhour Factor Hrs/$1000 of Cost			
Instrument Manhours	=	NA	X	=	1,391
Piping Manhours	=	NA	X	=	8,753
Structural Steel Manhours	=	NA	X	=	2,749
Electrical Manhours	=	NA	X	=	3,912
Buildings	=	NA	X	=	5
Concrete Manhours	=	NA	X	=	3,920

	Manhour Factor Hrs/$1000 of Cost (Cont)			Hours
Siding	=	NA	X	= 52
Site Improvement Manhours	=	NA	X	= 2,244
Painting	=	NA	X	= 7
Major Equipment Manhours*				= 2,708
TOTAL DIRECT LABOR MANHOURS				25,741

*Major equipment manhours obtained from Bechtel's proprietary "Manhour Standard" document.

Table 1 (Cont)

DIRECT LABOR COST		
25,741,000 @ $20.70/hr.	=	532,840
COMMERCIAL EQUIPMENT	=	8,910
SPARE PARTS	=	30,170
SALES TAX	=	11,130
CATALYST	=	29,140
FIELD INDIRECT COSTS		
75% of Labor Cost	=	399,630
SUBTOTAL FIELD COSTS		
787,550 + 681,830 + 532,840 + 8,910 + 30,170 + 11,130 + 29,140 + 399,630	=	2,481,200
HOME OFFICE MANHOURS	=	6,000,000
HOME OFFICE COSTS		
6,000,000 @ $36.79	=	220,740
THIRD PARTY ENGINEERING	=	9,000
SUBTOTAL PLANT COSTS		
2,481,200 + 220,740 + 9,000	=	2,710,940
ESTIMATING ALLOWANCE FOR UNCHARACTERIZED ITEMS		
15% of 2,710,940 3,117,580	=	406,640
FEE @ 2% OF 3,117,580 3,179,930		62,350
ADJUSTMENT - Plant 27 Delete 600 TPD Washing Unit		(12,500)
TOTAL COSTS FOR ALL PLANTS	=	$3,167,430

Table 2

CAPITAL COST SUMMARY

Plant No.	Unit Name	Major Equipment	Bulk Materials	Labor	Subcontracts	Total	50:50 Probability of Overrun	20:80 Probability of Overrun
1	Coal Drying and Pulverizing	7,100,000	3,900,000	7,330,000	23,300,000	41,630,000		
2	Cost Slurry Preparation	9,508,100	6,758,000	8,210,000	1,105,000	25,581,100		
3	Preheating and Reaction	155,486,400	129,670,000	73,660,000	7,770,000	366,586,400		
4	H-Coal® Primary Separation	49,708,000	47,960,000	30,080,000	4,280,000	132,028,000		
5	H-Coal® Recycle Slurry Preparation	15,964,900	13,300,000	18,050,000	2,128,000	49,442,900		
6	Recycle Hydrogen Compression	8,340,800	4,750,000	6,790,000	800,000	20,680,800		
7	Gas Plant	26,067,400	17,800,800	20,630,000	3,121,000	67,619,200		
8	Cryogenic Hydrogen Purification	8,772,400	1,285,000	1,450,000	493,000	12,000,400		
9	Sour Water Treating	13,412,500	9,330,000	10,170,000	1,407,000	34,319,500		
10	Sulfur Plant	3,828,500	2,641,700	3,770,000	440,000	10,680,200		
12	Gasification and Purification	97,853,900	54,950,000	67,830,000	11,571,000	232,204,900		
15	Oxygen Plant	61,753,600	6,804,700	14,730,000	7,205,000	90,493,300		
17	H-Coal® Distillate Separation	13,312,400	9,900,000	11,630,000	1,609,000	36,451,400		
18	Naphtha Hydro-Treating and Reforming	10,269,000	6,287,000	8,790,000	1,686,000	27,032,000		
19	Flare System	3,371,800	1,824,700	2,580,000	186,000	7,962,500		
20	Tankage	2,373,300	6,250,000	8,970,000	45,515,000	63,108,300		
21	Interconnecting Piping	20,100	15,606,800	19,070,000	2,696,000	37,392,900		
22	River Facilities		4,904,200	5,960,000	-0-	10,864,200		
23	Rail and Truck Facilities	680,000	1,383,700	1,530,000	2,987,000	6,580,700		
26	Coal Receiving and Storage	21,300,000	16,700,000	33,470,000	19,830,000	91,300,000		
27	Coal Washing and Secondary Crushing	16,065,000	20,242,000	20,060,000	5,295,000	61,662,000		
30	Electrical Distribution	-0-	43,482,000	24,530,000	-0-	68,012,000		
31	Steam Generation and BFW Heating	16,048,000	45,400,000	56,820,000	70,000,000	188,268,000		
32	Water Systems: Raw, Potable, Cooling	7,027,800	8,480,000	11,010,000	7,764,000	34,281,800		
33	Fire System	419,700	5,013,000	10,810,000	281,600	16,524,300		
34	Sewers and Wastewater Treatment	18,611,100	18,940,000	32,040,000	32,526,000	102,117,100		

Table 2

CAPITAL COST SUMMARY
(Continued)

Plant No.	Unit Name	Major Equipment	Bulk Materials	Labor	Subcontracts	Total	50:50 Probability of Overrun	20:80 Probability of Overrun
35	Stack Gas Scrubbing	10,022,400	9,330,000	13,650,000	6,690,000	39,692,400		
36	Instrument and Plant Air Systems	721,600	360,800	480,000	69,000	1,631,400		
37	Telecommunications Systems	-0-	1,092,000	-0-	155,700	1,247,700		
38	Inert Gas Systems	829,200	597,000	870,000	54,000	2,350,200		
39	Purge and Flush Oil Systems	3,275,700	1,867,000	2,170,000	280,000	7,592,700		
40	Site Development and Roads	-0-	-0-	-0-	58,560,000	58,560,000		
41	Buildings	-0-	3,728,000	-0-	23,519,000	27,247,000		
42	Solid Waste Management	6,324,400	4,640,000	5,690,000	780,000	17,434,400		
44	Landfill	5,886,000	3,000	30,000	5,681,000	11,600,000		
45	Transportation (Included in commercial equipment)	0	0	0	0	0		
	Subtotal	594,354,000	525,181,400	532,860,000	349,784,300	2,002,179,700		
					Initial catalyst and chemicals	29,140,000		
					Commercial equipment	8,910,000		
					Field indirects	399,650,000		
					Sales tax	11,130,000		
					Home office cost and third party engineering	229,740,000		
					Spare parts	30,170,000		
					Round off adjustment	20,300		
					Subtotal Plant Costs	2,710,940,000	2,710,940,000	2,710,940,000
					Contingency		406,640,000	840,391,000
					Subtotal		3,117,580,000	3,551,331,000
					Fee @ 2%		62,350,000	71,030,000
					Adjustment, Plant 27 - remove one 600 TPH washing unit		(12,500,000)	(12,500,000)
					Total Plant Costs		3,167,430,000	3,604,861,000
					Working Capital		91,000,000	91,000,000
					Total Capital Requirements		$3,258,430,000	$3,695,861,000

3.0 PLANT 1 COAL DRYING AND PULVERIZING

3.1 GENERAL

Coal Drying and Pulverizing (Plant 1) dries and pulverizes washed coal from Coal Washing and Secondary Crushing (Plant 27) prior to the coal being slurried in Coal Slurry Preparation (Plant 2).

The estimate for Coal Drying and Pulverizing (Plant 1) was prepared by Bechtel's Research and Engineering Division, reviewed by the project estimating team, and incorporated into the overall summary totals.

The direct cost estimates for this plant are based on the conceptual design and engineering information prepared in Phase Zero and consisted of drawings, specifications, and a list of major equipment. Estimating methods consistent with the conceptual nature of the design were employed using vendor information as well as extrapolation from current Bechtel historical information.

Approximately 80% of the major equipment was priced from vendor estimates. The remainder was evaluated using curves and unit prices for similar items from other projects.

Quantities for bulk materials, such as concrete, steel, piping, wire and conduit were not available at the time of the estimate, resulting in a factor method being employed to determine approximate costs for these materials.

3.0 PLANT 1 COAL DRYING AND PULVERIZING

3.2 FACTORED CAPITAL COST ESTIMATE

NOTE: All costs are in thousands of dollars.

MAJOR EQUIPMENT, MATERIAL AND SUBCONTRACT COSTS

Price developed from vendor quotes or in-house data = $ 30,400

BULK MATERIAL AND SUBCONTRACT COSTS

The bulk material and subcontract costs are taken as percentages (or cost "factors") of the major equipment costs. The cost factors are based on Bechtel's historical, proprietary data for similar types of plants and vary with type and size of plant.

Bulk Material Costs		Cost Factor, %				
Instruments	=	0.0066	X	30,400	=	200
Piping	=	0.0164	X	30,400	=	500
Structural Steel	=	0.0526	X	30,400	=	1,600
Electrical	=	0.0526	X	30,400	=	1,600
Concrete	=	-	X	-	=	-
Site Improvements	=	-	X	-	=	-
Total Bulk Material Cost					=	$3,900

Subcontract Costs		Cost Factor, %				
Insulation	=		X	=	NA	
Buildings	=		X	=	NA	
Painting	=		X	=	NA	
Total Subcontract Cost				=		
TOTAL BULK MATERIAL AND SUBCONTRACT COSTS				=	$3,900	

DIRECT LABOR MANHOURS

Direct labor manhours are taken as multipliers (or manhour "factors") of the bulk material costs. The manhour factors are based on Bechtel's historical, proprietary data for similar types of plants, varying with type and size of plant and adjusted as required for labor productivity based on jobsite data.

		Manhour Factor Hrs/$1000 of Cost				Hours
Instrument Manhours	=	50.000	X	200	=	10,000
Piping Manhours	=	68.000	X	500	=	34,000
Structural Steel Manhours	=	85.000	X	1,600	=	136,000
Electrical Manhours	=	34.375	X	1,600	=	55,000
Concrete Manhours	=	-	X	-	=	-
Site Improvement Manhours	=	-	X	-	=	-
Major Equipment Manhours*					=	119,000
TOTAL DIRECT LABOR MANHOURS						354,000

*Major equipment manhours obtained from Bechtel's proprietary "Manhour Standard" document.

DIRECT LABOR COST		
354,000 @ $20.70/hr.	=	7,330
SPARE PARTS	=	360
SALES TAX	=	550
FIELD INDIRECT COSTS		
75% of Labor Cost	=	5,500
SUBTOTAL FIELD COSTS		
30,400 + 3,900 + 7,330 + 360 + 550 + 5,500	=	48,040
HOME OFFICE MANHOURS	=	101,000
HOME OFFICE COSTS		
101,000 @ $36.79	=	3,720
ENGINEERING BY OTHERS	=	-
SUBTOTAL PLANT AREA COSTS		
48,040 + 3,720	=	51,760

PLANT #1

JOB NO. 14222

JOB NO. & TITLE BRECKINRIDGE PROJECT

CLIENT ASHLAND SYNTHETIC FUELS, INC.

JOB LOCATION BRECKINRIDGE CO., KENTUCKY

TAKEOFF _____ APPROVED _____

PRICED _____ DATE _____

CHECKED _____ SHEET ___ OF _____

RCE - 10 C 10/70

DIRECT FIELD COST SUMMARY COAL DRYING & PULVERIZING

	QUANTITY / UNIT	$M QUOTED	MANHOURS TOTAL	MANHOURS $/MH	TOTAL COST MATERIAL	TOTAL COST LABOR	TOTAL COST SUBCONTRACT	TOTAL COST TOTAL
.11 "C" - Columns & Vessels								
.12 "D" - Tanks	8 ea		15,000					
.13 "E" - Exchangers								
.14 "F" - Fired Heaters								
.15 "G" - Pumps & Drivers								
.16 "H" - Vacuum Equipment								
.17 "K" - Compressors & Drs.								
.18 "T" - Special Equipment	48 ea		104,000					
TOTAL MAJOR EQUIPMENT	76 ea.	Rev. 2	119,000		7100000		23300000	30400000
.21 "J" - Instruments								
.22 "L" - Piping								
.23 "M" - Structural Steel								
.24 "N" - Insulation								
.25 "P" - Electrical								
.26 "Q" - Concrete Work								
.27 "R" - Buildings								
.28 "S" - Site Improvements								
.29 "X" - Painting								
TOTAL OTHER MATERIALS								
TOTAL DIRECT COST								

SHEET NO _____ PLANT 1

4.0 PLANT 2 COAL SLURRY PREPARATION

4.1 GENERAL

Coal Slurry Preparation (Plant 2) prewets and slurries dried and pulverized coal from Coal Drying and Pulverizing (Plant 1), with the recycle heavy distillate and hydroclone overflow routed to H-Coal® Preheating and Reaction (Plant 3).

Estimated costs for this plant were developed by Bechtel's Refinery and Chemical Division using information supplied by Hydrocarbon Research, Inc. (HRI). The data consisted of the HRI process design and equipment list, with accompanying plot plans, specifications, drawings, and data sheets.

Major equipment was priced by item, using vendor estimates and historical data for similar equipment from other Bechtel projects. The bulk material costs were based on ratios and percentages of the major equipment costs. These factors were developed from comparisons of similar types of slurry processing facilities.

4.2 FACTORED CAPITAL COST ESTIMATE

NOTE: All costs are in thousands of dollars.

MAJOR EQUIPMENT, MATERIAL AND SUBCONTRACT COSTS

Price developed from vendor quotes or in-house data	=	$ 9,520

BULK MATERIAL AND SUBCONTRACT COSTS

The bulk material and subcontract costs are taken as percentages (or cost "factors") of the major equipment costs. The cost factors are based on Bechtel's historical, proprietary data for similar types of plants and vary with type and size of plant.

Bulk Material Costs		Cost Factor, %				
Instruments	=	0.0998	X	9,520	=	950
Piping	=	0.2899	X	9,520	=	2,760
Structural Steel	=	0.0998	X	9,520	=	950
Electrical	=	0.0998	X	9,520	=	950
Concrete	=	0.0704	X	9,520	=	670
Site Improvements	=	0.0504	X	9,520	=	480
TOTAL BULK MATERIAL COST					=	$6,760

Subcontract Costs		Cost Factor, %				
Insulation	=	0.0998	X	9,520	=	950
Buildings	=	-	X	-	=	-
Painting	=	0.0147	X	9,520	=	140
Total Subcontract Cost					=	1,090
TOTAL BULK MATERIAL AND SUBCONTRACT COSTS					=	$7,850

DIRECT LABOR MANHOURS

Direct labor manhours are taken as multipliers (or manhour "factors") of the bulk material costs. The manhour factors are based on Bechtel's historical, proprietary data for similar types of plants, varying with type and size of plant and adjusted as required for labor productivity based on jobsite data.

		Manhour Factor Hrs/$1000 of Cost				Hours
Instrument Manhours	=	25.579	X	950	=	24,300
Piping Manhours	=	51.014	X	2,760	=	140,800
Structural Steel Manhours	=	38.316	X	950	=	36,400
Electrical Manhours	=	67.158	X	950	=	63,800
Concrete Manhours	=	101.49	X	670	=	68,000
Site Improvement Manhours	=	81.250	X	480	=	39,000
Major Equipment Manhours*					=	24,500
Total Direct Labor Manhours						396,800

*Major equipment manhours obtained from Bechtel's proprietary "Manhour Standard" document.

DIRECT LABOR COST		
396,800 @ $20.70/hr.	=	8,210
SPARE PARTS	=	480
SALES TAX	=	-
FIELD INDIRECT COSTS		
75% of Labor Cost	=	6,160
SUBTOTAL FIELD COSTS		
9,520 + 7,850 + 8,210 + 480 + 6,160	=	32,220
HOME OFFICE MANHOURS	=	198,000
HOME OFFICE COSTS		
198,000 @ $36.79	=	7,280
ENGINEERING BY OTHERS	=	-
SUBTOTAL PLANT AREA COSTS		
32,220 + 7,280	=	39,500

PLANT #2

JOB NO. & TITLE JOB NO. 14222 BRECKINRIDGE PROJECT — TAKEOFF — APPROVED

CLIENT ASHLAND SYNTHETIC FUELS, INC. — PRICED — DATE

JOB LOCATION BRECKINRIDGE CO., KENTUCKY — CHECKED — SHEET ___ OF ___

RCE - 10 C 10/70

DIRECT FIELD COST SUMMARY

COAL SLURRY PREP.

	QUANTITY / UNIT	$ M QUOTED	MANHOURS TOTAL	MANHOURS $/MH	TOTAL COST MATERIAL	TOTAL COST LABOR	TOTAL COST SUBCONTRACT	TOTAL COST TOTAL
.11 "C" - Columns & Vessels	40 EA		6050		23352000		1040000	
.12 "D" - Tanks			-					
.13 "E" - Exchangers	24 EA		7710		33784000			
.14 "F" - Fired Heaters			-					
.15 "G" - Pumps & Drivers	40 EA		6630		21312000			
.16 "H" - Vacuum Equipment			-					
.17 "K" - Compressors & Drs.								
.18 "T" - Special Equipment	24 EA		4080		12976000			
					3657000			
TOTAL MAJOR EQUIPMENT	128 EA		24470		95081000		1040000	95185000
								Adj. 1500
.21 "J" - Instruments								95200000
.22 "L" - Piping								
.23 "M" - Structural Steel								
.24 "N" - Insulation								
.25 "P" - Electrical								
.26 "Q" - Concrete Work								
.27 "R" - Buildings								
.28 "S" - Site Improvements								
.29 "X" - Painting								
TOTAL OTHER MATERIALS								
TOTAL DIRECT COST								

SHEET NO ___ PLANT 2

5.0 PLANT 3 H-COAL® PREHEATING AND REACTION

5.1 GENERAL

H-Coal® Preheating and Reaction (Plant 3) preheats, mixes, and reacts both coal slurry from Coal Slurry Preparation (Plant 2) and hydrogen gas to form liquid and gaseous hydrocarbons.

Costs for this unit were estimated by Bechtel's Refinery and Chemical Division with assistance from HRI. The process design, as well as a list of major equipment, data sheets, plot plans, material specifications, design sketches and drawings for specialized items were supplied by HRI.

This plant is a highly specialized design employing numerous large equipment items and highly expensive materials of construction. Major equipment was priced by individual piece and based on vendor estimates in most cases.

Bulk materials, except for piping and instrumentation which were separately estimated by HRI, were factored from the major equipment costs. In developing the piping costs, HRI made use of a complete set of preliminary isometric sketches.

Some special considerations for the estimate of this unit are:

Major Equipment

1. High-pressure, 3000 psig design
2. High-temperature process, 750 F
3. Numerous stainless steel-clad vessels
4. Reactors designed at 760 tons each, 13-inch wall thickness
5. Extensive use of alloy materials in heat exchange equipment
6. Special pumps required for high-pressure slurry

Bulk Materials

1. Factors discounted to adjust for the unusually high cost of major equipment
2. Instrument account includes expensive special "letdown" valves
3. Piping costs increased by the extensive use of allow material, cast fittings, and specialized flanged connector

5.0 PLANT 3 H-COAL® PREHEATING AND REACTION

5.2 FACTORED CAPITAL COST ESTIMATE

NOTE: All costs are in thousands of dollars.

MAJOR EQUIPMENT, MATERIAL AND SUBCONTRACT COSTS

Price developed from vendor quotes or in-house data = $155,490
in-house data

BULK MATERIAL AND SUBCONTRACT COSTS

The bulk material and subcontract costs are taken as percentages (or cost "factors") of the major equipment costs. The cost factors are based on Bechtel's historical, proprietary data for similar types of plants and vary with type and size of plant.

Bulk Material Costs		Cost Factor, %				
Instruments	=	0.0965	X	155,490	=	15,000
Piping	=	0.5775	X	155,490	=	89,800
Structural Steel	=	0.0400	X	155,490	=	6,220
Electrical	=	0.0600	X	155,490	=	9,330
Concrete	=	0.0500	X	155,490	=	7,770
Site Improvements	=	0.0100	X	155,490	=	1,550
Total Bulk Material Cost					=	$129,670

Subcontract Costs		Cost Factor, %				
Insulation	=	0.0400	X	155,490	=	6,220
Buildings	=	-	X	-	=	-
Painting	=	0.0100	X	155,490	=	1,550
Total Subcontract Cost					=	7,770
TOTAL BULK MATERIAL AND SUBCONTRACT COSTS					=	$137,440

DIRECT LABOR MANHOURS

Direct labor manhours are taken as multipliers (or manhour "factors") of the bulk material costs. The manhour factors are based on Bechtel's historical, proprietary data for similar types of plants, varying with type and size of plant and adjusted as required for labor productivity based on jobsite data.

		Manhour Factor Hrs/$1000 of Cost				Hours
Instrument Manhours	=	14.453	X	15,000	=	216,800
Piping Manhours	=	18.172	X	89,800	=	1,631,800
Structural Steel Manhours	=	38.264	X	6,220	=	238,000
Electrical Manhours	=	57.471	X	9,330	=	536,200
Concrete Manhours	=	70.206	X	7,770	=	545,500
Site Improvement Manhours	=	86.000	X	1,550	=	133,300
Major Equipment Manhours*					=	256,700
TOTAL DIRECT LABOR MANHOURS						3,558,300

*Major equipment manhours obtained from Bechtel's proprietary "Manhour Standard" document.

DIRECT LABOR COST		
3,558,300 @ $20.70/hr.	=	73,660
SPARE PARTS	=	7,770
SALES TAX	=	-
FIELD INDIRECT COSTS		
75% of Labor Cost	=	55,250
CHEMICALS	=	5,600
SUBTOTAL FIELD COSTS		
155,490 + 137,440 + 73,660 + 7,770 + 55,250 + 5,600	=	435,210
HOME OFFICE MANHOURS	=	691,000
HOME OFFICE COSTS		
691,000 @ $36.79	=	25,420
ENGINEERING BY OTHERS	=	-
SUBTOTAL PLANT AREA COSTS		
435,210 + 25,420	=	460,630

PLANT #3

ACE - 10 C 10/70

JOB NO. & TITLE JOB NO. 14222
CLIENT BRECKINRIDGE PROJECT
JOB LOCATION ASHLAND SYNTHETIC FUELS, INC BRECKINRIDGE CO., KENTUCKY

TAKEOFF _____ APPROVED _____
PRICED _____ DATE _____
CHECKED _____ SHEET ___ OF _____

DIRECT FIELD COST SUMMARY

H-COAL® PREHEATING & REACTION

	QUANTITY / UNIT	$ M QUOTED	MANHOURS TOTAL	MANHOURS $/MH	TOTAL COST MATERIAL	LABOR	SUBCONTRACT	TOTAL
.11 "C" - Columns & Vessels	104 EA		86,800		6,557,600			
.12 "D" - Tanks								
.13 "E" - Exchangers	64 EA		4680		246,960			
.14 "F" - Fired Heaters	16 EA		130,560		3,600,000			
.15 "G" - Pumps & Drivers	96 EA		32980		2,302,800			
.16 "H" - Vacuum Equipment	8 EA		1360		48,000			
.17 "K" - Compressors & Drs.								
.18 "T" - Special Equipment	8 EA		340		158,400			
FREIGHT 4%					598,000			
CHEMICALS								
TOTAL MAJOR EQUIPMENT	296		256,720		15,548,640			15,548,640
								ADJ 3600
.21 "J" - Instruments								15,549,000
.22 "L" - Piping								
.23 "M" - Structural Steel								
.24 "N" - Insulation								
.25 "P" - Electrical								
.26 "Q" - Concrete Work								
.27 "R" - Buildings								
.28 "S" - Site Improvements								
.29 "X" - Painting								
TOTAL OTHER MATERIALS								
TOTAL DIRECT COST								

SHEET NO _____ PLANT 3

6.0 PLANT 4 H-COAL® PRIMARY SEPARATION

6.1 GENERAL

H-Coal® Primary Separation separates by flashing at lower pressures the liquid and gaseous hydrocarbons from H-Coal® Preheating and Reaction (Plant 3); hydrocarbon condensate is fed to Distillate Separation (Plant 17), recycle hydrogen to H-Coal® Recycle Hydrogen Compression (Plant 6), hydroclone feed to H-Coal® Recycle Slurry Preparation (Plant 5), and purge hydrogen to Gas Plant (Plant 7).

The estimate for this plant was developed on the basis of a HRI process design. Major equipment items were priced utilizing vendor estimates and Bechtel historical data. Bulk materials were estimated as percentages of the equipment costs. Piping and instrumentation estimates were, however, developed separately by HRI and used in place of factors.

This plant is also a special facility, using high alloy materials and costly equipment items.

6.2 FACTORED CAPITAL COST ESTIMATE

NOTE: All costs are in thousands of dollars.

MAJOR EQUIPMENT, MATERIAL AND SUBCONTRACT COSTS

Price developed from vendor quotes or in-house data = $49,760

BULK MATERIAL AND SUBCONTRACT COSTS

The bulk material and subcontract costs are taken as percentages (or cost "factors") of the major equipment costs. The cost factors are based on Bechtel's historical, proprietary data for similar types of plants and vary with type and size of plant.

Bulk Material Costs		Cost Factor, %				
Instruments	=	0.1509	X	49,760	=	7,510
Piping	=	0.6029	X	49,760	=	30,000
Structural Steel	=	0.0699	X	49,760	=	3,480
Electrical	=	0.0699	X	49,760	=	3,480
Concrete	=	0.0500	X	49,760	=	2,490
Site Improvements	=	0.0201	X	49,760	=	1,000
TOTAL BULK MATERIAL COST					=	$47,960

Subcontract Costs		Cost Factor, %				
Insulation	=	0.0699	X	49,760	=	3,480
Buildings	=	-	X	-	=	-
Painting	=	0.0151	X	49,760	=	750
Total Subcontract Cost					=	4,230
TOTAL BULK MATERIAL AND SUBCONTRACT COSTS					=	$52,190

DIRECT LABOR MANHOURS

Direct labor manhours are taken as multipliers (or manhour "factors") of the bulk material costs. The manhour factors are based on Bechtel's historical, proprietary data for similar types of plants, varying with type and size of plant and adjusted as required for labor productivity based on jobsite data.

		Manhour Factor Hrs/$1000 of Cost				Hours
Instrument Manhours	=	14.29	X	7,510	=	107,300
Piping Manhours	=	18.13	X	30,000	=	544,000
Structural Steel Manhours	=	38.25	X	3,480	=	133,100
Electrical Manhours	=	66.98	X	3,480	=	233,100
Concrete Manhours	=	114.78	X	2,490	=	285,800
Site Improvement Manhours	=	83.00	X	1000	=	83,000
Major Equipment Manhours*					=	66,700
TOTAL DIRECT LABOR MANHOURS						1,453,000

*Major equipment manhours obtained from Bechtel's proprietary "Manhour Standard" document.

DIRECT LABOR COST	
1,453,000 @ $20.70/hr.	= 30,080
SPARE PARTS	= 2,490
SALES TAX	= -
FIELD INDIRECT COSTS	
75% of Labor Cost	= 22,560
SUBTOTAL FIELD COSTS	
49,760 + 52,190 + 30,080 + 2,490 + 22,560	= 157,080
HOME OFFICE MANHOURS	= 295,000
HOME OFFICE COSTS	
295,000 @ $36.79	= 10,850
ENGINEERING BY OTHERS	= -
SUBTOTAL PLANT AREA COSTS	
157,080 + 10,850	= 167,930

PLANT # 4

RCE - 10 C
10/70

JOB NO. & TITLE JOB NO. 14222 BRECKINRIDGE PROJECT — TAKEOFF — APPROVED —

CLIENT ASHLAND SYNTHETIC FUELS, INC. — PRICED — DATE —

JOB LOCATION BRECKINRIDGE CO., KENTUCKY — CHECKED — SHEET ___ OF ___

DIRECT FIELD COST SUMMARY

H Coil @ PRIMARY SELECTION

	QUANTITY / UNIT	$M QUOTED	MANHOURS TOTAL	MANHOURS $/MH	TOTAL COST MATERIAL	TOTAL COST LABOR	TOTAL COST SUBCONTRACT	TOTAL COST TOTAL
.11 "C" - Columns & Vessels	80 EA		30.880		19581000		49700	
.12 "D" - Tanks								
.13 "E" - Exchangers	64 EA		15.410		23276000			
.14 "F" - Fired Heaters								
.15 "G" - Pumps & Drivers	96 EA		20.400		4936000			
.16 "H" - Vacuum Equipment								
.17 "K" - Compressors & Drs.								
.18 "T" - Special Equipment								
FREIGHT 4%					1912000			
TOTAL MAJOR EQUIPMENT	240 EA		66.690		49708000		49700	49757700
								ADJ. 2300
								49760000
.21 "J" - Instruments								
.22 "L" - Piping								
.23 "M" - Structural Steel								
.24 "N" - Insulation								
.25 "P" - Electrical								
.26 "Q" - Concrete Work								
.27 "R" - Buildings								
.28 "S" - Site Improvements								
.29 "X" - Painting								
TOTAL OTHER MATERIALS								
TOTAL DIRECT COST								

SHEET NO ___ PLANT 4

7.0 PLANT 5 H-COAL® RECYCLE SLURRY PREPARATION

7.1 GENERAL

H-Coal® Recycle Slurry Preparation (Plant 5) processes hydroclone feed from H-Coal® Primary Separation (Plant 4). Hydroclone overflow is recycled to Coal Slurry Preparation (Plant 2) as recycle slurry oil, while hydroclone underflow is steam stripped in the Atmospheric Stripper before being fed to the Vacuum Tower. Vacuum Tower bottoms are gasified in Gasification and Purification (Plant 12), while the vacuum tower overhead streams are sent to Distillate Separation (Plant 17). Most of the hydrocarbons in these streams exit Plant 17 in the fractionator bottoms, most of which are recycled to Plant 2.

Costs for this plant are based on HRI design consisting of a process design, major equipment list, plot plan, and material specifications.

Major equipment has been priced by individual item, and bulk materials are included as percentages of the equipment costs.

7.0 PLANT 5 H-COAL® RECYCLE SLURRY PREPARATION

7.1 FACTORED CAPITAL COST ESTIMATE

NOTE: All costs are in thousands of dollars.

MAJOR EQUIPMENT, MATERIAL AND SUBCONTRACT COSTS

Price developed from vendor quotes or in-house data = $16,230

BULK MATERIAL AND SUBCONTRACT COSTS

The bulk material and subcontract costs are taken as percentages (or cost "factors") of the major equipment costs. The cost factors are based on Bechtel's historical, proprietary data for similar types of plants and vary with type and size of plant.

Bulk Material Costs		Cost Factor, %				
Instruments	=	0.1399	X	16,230	=	2,270
Piping	=	0.3802	X	16,230	=	6,170
Structural Steel	=	0.0801	X	16,230	=	1,300
Electrical	=	0.0998	X	16,230	=	1,620
Concrete	=	0.0598	X	16,230	=	970
Site Improvements	=	0.0598	X	16,230	=	970
TOTAL BULK MATERIAL COST					=	$13,300

Subcontract Costs		Cost Factor, %				
Insulation	=	0.0998	X	16,230	=	1,620
Buildings	=	-	X	-	=	-
Painting	=	0.0148	X	16,230	=	240
Total Subcontract Cost					=	1,860
TOTAL BULK MATERIAL AND SUBCONTRACT COSTS					=	$15,160

DIRECT LABOR MANHOURS

Direct labor manhours are taken as multipliers (or manhour "factors") of the bulk material costs. The manhour factors are based on Bechtel's historical, proprietary data for similar types of plants, varying with type and size of plant and adjusted as required for labor productivity based on jobsite data.

		Manhour Factor Hrs/$1000 of Cost				Hours
Instrument Manhours	=	76.52	X	2,270	=	173,700
Piping Manhours	=	51.01	X	6,170	=	314,700
Structural Steel Manhours	=	38.31	X	1,300	=	49,800
Electrical Manhours	=	66.98	X	1,620	=	108,500
Concrete Manhours	=	114.85	X	970	=	111,400
Site Improvement Manhours	=	82.89	X	970	=	80,400
Major Equipment Manhours*					=	33,400
TOTAL DIRECT LABOR MANHOURS						871,900

*Major equipment manhours obtained from Bechtel's proprietary "Manhour Standard" document.

DIRECT LABOR COST		
871,900 @ $20.70/hr.	=	18,050
SPARE PARTS	=	800
SALES TAX	=	-
FIELD INDIRECT COSTS		
75% of Labor Cost	=	13,540
SUBTOTAL FIELD COSTS		
16,230 + 15,160 + 18,050 + 800 + 13,540	=	63,780
HOME OFFICE MANHOURS	=	139,000
HOME OFFICE COSTS		
139,000 @ $36.79	=	5,110
ENGINEERING BY OTHERS	=	-
SUBTOTAL PLANT AREA COSTS		
63,780 + 5,110	=	68,890

PLANT #5

JOB NO. & TITLE JOB NO. 14222 BRECKINRIDGE PROJECT — TAKEOFF — APPROVED

CLIENT ASHLAND SYNTHETIC FUELS, INC. — PRICED — DATE

JOB LOCATION BRECKINRIDGE CO., KENTUCKY — CHECKED — SHEET ___ OF ___

RCE - 10 C 10/70

DIRECT FIELD COST SUMMARY

H-COAL® RECYCLE SLURRY PREPERATION

	QUANTITY / UNIT	$M QUOTED	MANHOURS TOTAL	MANHOURS $/MH	TOTAL COST MATERIAL	TOTAL COST LABOR	TOTAL COST SUBCONTRACT	TOTAL COST TOTAL
.11 "C" - Columns & Vessels	22 EA		5510		33752000		2060000	
.12 "D" - Tanks	2 EA		-				2472000	
.13 "E" - Exchangers	8 EA		7920		39064000			
.14 "F" - Fired Heaters	6 EA		2720		7600000			
.15 "G" - Pumps & Drivers	48 EA		11980		35827000			
.16 "H" - Vacuum Equipment	4 EA		1190		4074000			
.17 "K" - Compressors & Drs.			-					
.18 "T" - Special Equipment	24 EA		4080		33192000			
					6140000			
TOTAL MAJOR EQUIPMENT	114 EA		33,400		159644900		2678000	162327000
								< 270000 >
.21 "J" - Instruments								162300000
.22 "L" - Piping								
.23 "M" - Structural Steel								
.24 "N" - Insulation								
.25 "P" - Electrical								
.26 "Q" - Concrete Work								
.27 "R" - Buildings								
.28 "S" - Site Improvements								
.29 "X" - Painting								
TOTAL OTHER MATERIALS								
TOTAL DIRECT COST								

SHEET NO ___ PLANT 5

8.0 PLANT 6 H-COAL® RECYCLE HYDROGEN COMPRESSION

8.1 GENERAL

H-Coal® Recycle Hydrogen Compression (Plant 6) processes and compresses hydrogen recycle from H-Coal® Primary Separation (Plant 4), and then recycles it to H-Coal® Preheating and Reaction (Plant 3).

This estimate is based on a HRI process design. The data consisted of a major equipment list, equipment design data sheets, plot plans and material specifications.

Major equipment costs were priced by item, with vendor estimates utilized for the large compressor units. Bulks have been applied as a percentage of the equipment costs, based on Bechtel's historical experience for similar compression facilities.

8.2 FACTORED CAPITAL COST ESTIMATE

NOTE: All costs are in thousands of dollars.

MAJOR EQUIPMENT, MATERIAL AND SUBCONTRACT COSTS

Price developed from vendor quotes or in-house data	=	$8,340

BULK MATERIAL AND SUBCONTRACT COSTS

The bulk material and subcontract costs are taken as percentages (or cost "factors") of the major equipment costs. The cost factors are based on Bechtel's historical, proprietary data for similar types of plants and vary with type and size of plant.

Bulk Material Costs		Cost Factor, %				
Instruments	=	0.0995	X	8,340	=	830
Piping	=	0.2602	X	8,340	=	2,170
Structural Steel	=	0.0396	X	8,340	=	330
Electrical	=	0.0995	X	8,340	=	830
Concrete	=	0.0504	X	8,340	=	420
Site Improvements	=	0.0204	X	8,340	=	170
TOTAL BULK MATERIAL COST					=	$4,750

Subcontract Costs		Cost Factor, %				
Insulation	=	0.0803	X	8,340	=	670
Buildings	=	-	X	-	=	-
Painting	=	0.0156	X	8,340	=	130
Total Subcontract Cost					=	800
TOTAL BULK MATERIAL AND SUBCONTRACT COSTS					=	$5,550

DIRECT LABOR MANHOURS

Direct labor manhours are taken as multipliers (or manhour "factors") of the bulk material costs. The manhour factors are based on Bechtel's historical, proprietary data for similar types of plants, varying with type and size of plant and adjusted as required for labor productivity based on jobsite data.

		Manhour Factor Hrs/$1000 of Cost				Hours
Instrument Manhours	=	19.16	X	830	=	15,900
Piping Manhours	=	44.75	X	2,170	=	97,100
Structural Steel Manhours	=	38.18	X	330	=	12,600
Electrical Manhours	=	66.99	X	830	=	55,600
Concrete Manhours	=	114.8	X	420	=	48,200
Site Improvement Manhours	=	82.94	X	170	=	14,100
Major Equipment Manhours*					=	84,500
TOTAL DIRECT LABOR MANHOURS						328,000

*Major equipment manhours obtained from Bechtel's proprietary "Manhour Standard" document.

DIRECT LABOR COST		
328,000 @ $20.70/hr.	=	6,790
SPARE PARTS	=	420
SALES TAX	=	-
FIELD INDIRECT COSTS		
75% of Labor Cost	=	5,090
SUBTOTAL FIELD COSTS		
8,340 + 5,550 + 6,790 + 420 + 5,090	=	26,190
HOME OFFICE MANHOURS	=	47,000
HOME OFFICE COSTS		
47,000 @ $36.79	=	1,730
ENGINEERING BY OTHERS	=	-
SUBTOTAL PLANT AREA COSTS		
26,190 + 1,730	=	27,920

PLANT #6

JOB NO. 14222

JOB NO. & TITLE BRECKINRIDGE PROJECT

CLIENT ASHLAND SYNTHETIC FUELS, INC.

JOB LOCATION BRECKINRIDGE CO., KENTUCKY

TAKEOFF _____ APPROVED _____

PRICED _____ DATE _____

CHECKED _____ SHEET ___ OF ___

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DIRECT FIELD COST SUMMARY

H-COAL® RECYCLE H2 CONCENTRATION & COMPRESSION

	QUANTITY / UNIT	$M QUOTED	MANHOURS TOTAL	MANHOURS $/MH	TOTAL COST MATERIAL	TOTAL COST LABOR	TOTAL COST SUBCONTRACT	TOTAL COST TOTAL
.11 "C" - Columns & Vessels	8 EA		2040		954400			
.12 "D" - Tanks								
.13 "E" - Exchangers	8 EA		880		465600			
.14 "F" - Fired Heaters								
.15 "G" - Pumps & Drivers								
.16 "H" - Vacuum Equipment								
.17 "K" - Compressors & Drs.	12 EA		81.600		6600000			
.18 "T" - Special Equipment								
FREIGHT 4%					320800			
TOTAL MAJOR EQUIPMENT	28 EA		84,520		8340800			8340800
								ADJ 1 <8000>
.21 "J" - Instruments								8340000
.22 "L" - Piping								
.23 "M" - Structural Steel								
.24 "N" - Insulation								
.25 "P" - Electrical								
.26 "Q" - Concrete Work								
.27 "R" - Buildings								
.28 "S" - Site Improvements								
.29 "X" - Painting								
TOTAL OTHER MATERIALS								
TOTAL DIRECT COST								

SHEET NO _____

PLANT 6

9.0 PLANT 7 GAS PLANT

9.1 GENERAL

The Gas Plant (Plant 7) receives feed streams from a number of sources and, through compression, fractionation and treating, processes them to produce a hydrogen-rich feed to Cryogenic Hydrogen Purification (Plant 8), LPG products, light naphtha, heavy naphtha and plant fuel gas.

The scope for this estimate is based on Bechtel's preliminary Phase Zero design. The information consisted of an equipment list, design data sheets and plot plan.

The estimate is a factored type, based on the cost of major equipment. Bulk ratios for instrumentation and piping were adjusted upward to accommodate the large number of equipment items in this facility.

9.0 PLANT 7 GAS PLANT

9.2 FACTORED CAPITAL COST ESTIMATE

NOTE: All costs are in thousands of dollars.

MAJOR EQUIPMENT, MATERIAL AND SUBCONTRACT COSTS

Price developed from vendor quotes or in-house data = $26,180

BULK MATERIAL AND SUBCONTRACT COSTS

The bulk material and subcontract costs are taken as percentages (or cost "factors") of the major equipment costs. The cost factors are based on Bechtel's historical, proprietary data for similar types of plants and vary with type and size of plant.

Bulk Material Costs		Cost Factor, %				
Instruments	=	0.1398	X	26,180	=	3,660
Piping	=	0.3300	X	26,180	=	8,640
Structural Steel	=	0.0699	X	26,180	=	1,830
Electrical	=	0.0798	X	26,180	=	2,090
Concrete	=	0.0401	X	26,180	=	1,050
Site Improvements	=	0.0199	X	26,180	=	520
Total Bulk Material Cost					=	$17,790

Subcontract Costs		Cost Factor, %				
Insulation	=	0.1001	X	26,180	=	2,620
Buildings	=	-	X	-	=	-
Painting	=	0.0149	X	26,180	=	390
Total Subcontract Cost					=	3,010
TOTAL BULK MATERIAL AND SUBCONTRACT COSTS					=	$20,800

DIRECT LABOR MANHOURS

Direct labor manhours are taken as multipliers (or manhour "factors") of the bulk material costs. The manhour factors are based on Bechtel's historical, proprietary data for similar types of plants, varying with type and size of plant and adjusted as required for labor productivity based on jobsite data.

		Manhour Factor Hrs/$1000 of Cost				Hours
Instrument Manhours	=	19.24	X	3,660	=	70,400
Piping Manhours	=	51.00	X	8,640	=	440,600
Structural Steel Manhours	=	38.25	X	1,830	=	70,000
Electrical Manhours	=	67.13	X	2,090	=	140,300
Concrete Manhours	=	114.5	X	1,050	=	120,200
Site Improvement Manhours	=	83.65	X	520	=	43,500
Major Equipment Manhours*					=	111,500
TOTAL DIRECT LABOR MANHOURS						996,500

*Major equipment manhours obtained from Bechtel's proprietary "Manhour Standard" document.

DIRECT LABOR COST		
996,500 @ $20.70/hr.	=	20,630
SPARE PARTS	=	1,300
SALES TAX	=	-
FIELD INDIRECT COSTS		
75% of Labor Cost	=	15,470
CHEMICALS	=	430
SUBTOTAL FIELD COSTS		
26,180 + 20,800 + 20,630 + 1,300 + 15,470 + 430	=	84,810
HOME OFFICE MANHOURS	=	423,000
HOME OFFICE COSTS		
423,000 @ $36.79	=	15,560
ENGINEERING BY OTHERS	=	-
SUBTOTAL PLANT AREA COSTS		
84,810 + 15,560	=	100,370

PLANT # 7

RCE - 10 C
10/70

JOB NO. & TITLE JOB NO. 14222 BRECKINRIDGE PROJECT
CLIENT ASHLAND SYNTHETIC FUELS, INC.
JOB LOCATION BRECKINRIDGE CO., KENTUCKY

TAKEOFF _____ APPROVED _____
PRICED _____ DATE _____
CHECKED _____ SHEET ___ OF ___

DIRECT FIELD COST SUMMARY — GAS PLANT

	QUANTITY / UNIT	$ M QUOTED	MANHOURS TOTAL	MANHOURS $/MH	TOTAL COST MATERIAL	TOTAL COST LABOR	TOTAL COST SUBCONTRACT	TOTAL COST TOTAL
.11 "C" - Columns & Vessels	76		16,490		6,429,800		790,000	
.12 "D" - Tanks	4		40		16,900		31,300	
.13 "E" - Exchangers	84		8590		612,790			
.14 "F" - Fired Heaters	-		-					
.15 "G" - Pumps & Drivers	52		9220		865,900			
.16 "H" - Vacuum Equipment	2		85		2,000			
.17 "K" - Compressors & Drs.	12		10,210		1,140,270,000			
.18 "T" - Special Equipment	4		605		210,200			
FREIGHT					101,200			
CHEMICALS			6220					
TOTAL MAJOR EQUIPMENT	234		111,460		26,067,400		1,103,000	26,177,700
								ADJ. 23,000
.21 "J" - Instruments								26,180,000
.22 "L" - Piping								
.23 "M" - Structural Steel								
.24 "N" - Insulation								
.25 "P" - Electrical								
.26 "Q" - Concrete Work								
.27 "R" - Buildings								
.28 "S" - Site Improvements								
.29 "X" - Painting								
TOTAL OTHER MATERIALS								
TOTAL DIRECT COST								

SHEET NO _____ PLANT 7

10.0 PLANT 8 CRYOGENIC HYDROGEN PURIFICATION

10.1 GENERAL

Cryogenic Hydrogen Purification (Plant 8) upgrades the purity of the hydrogen rich stream from the Gas Plant (Plant 7).

Costs for this plant are based on an estimate by Airco Cryoplants, utilizing Airco's historical data for similar cryogenic processing units.

The bulk materials have been developed from preliminary drawings, sketches, and takeoff quantities. The bulk ratios reflect the fact that a large portion of the costs are included in the equipment account as part of the packaged unit price.

10.0 PLANT 8 CRYOGENIC HYDROGEN PURIFICATION

10.2 FACTORED CAPITAL COST ESTIMATE

NOTE: All costs are in thousands of dollars.

MAJOR EQUIPMENT, MATERIAL AND SUBCONTRACT COSTS

Price developed from vendor quotes or in-house data = $8,770

BULK MATERIAL AND SUBCONTRACT COSTS

The bulk material and subcontract costs are taken as percentages (or cost "factors") of the major equipment costs. The cost factors are based on Bechtel's historical, proprietary data for similar types of plants and vary with type and size of plant.

Bulk Material Costs		Cost Factor, %				
Instruments	=	0.0399	X	8,770	=	350
Piping	=	0.0274	X	8,770	=	240
Structural Steel	=	0.0057	X	8,770	=	50
Electrical	=	0.0638	X	8,770	=	560
Concrete	=	0.0080	X	8,770	=	70
Site Improvements	=	0.0023	X	8,770	=	20
TOTAL BULK MATERIAL COST					=	$1,290

Subcontract Costs		Cost Factor, %				
Insulation	=	0.0513	X	8,770	=	450
Buildings	=	-	X	-	=	-
Painting	=	0.0046	X	8,770	=	40
Total Subcontract Cost	=				=	490
TOTAL BULK MATERIAL AND SUBCONTRACT COSTS					=	$1,780

DIRECT LABOR MANHOURS

Direct labor manhours are taken as multipliers (or manhour "factors") of the bulk material costs. The manhour factors are based on Bechtel's historical, proprietary data for similar types of plants, varying with type and size of plant and adjusted as required for labor productivity based on jobsite data.

		Manhour Factor Hrs/$1000 of Cost				Hours
Instrument Manhours	=	16.86	X	350	=	5,900
Piping Manhours	=	94.58	X	240	=	22,700
Structural Steel Manhours	=	86.00	X	50	=	4,300
Electrical Manhours	=	12.32	X	560	=	6,900
Concrete Manhours	=	170.0	X	70	=	11,900
Site Improvement Manhours	=	135.0	X	20	=	2,700
Major Equipment Manhours*					=	15,500
TOTAL DIRECT LABOR MANHOURS						69,900

*Major equipment manhours obtained from Bechtel's proprietary "Manhour Standard" document.

DIRECT LABOR COST		
69,900 @ $20.70/hr.	=	1,450
SPARE PARTS	=	440
SALES TAX	=	-
FIELD INDIRECT COSTS		
75% of Labor Cost	=	1,090
CHEMICALS	=	230
SUBTOTAL FIELD COSTS		
8,770 + 1,780 + 1,450 + 440 + 1,090 + 230	=	13,760
HOME OFFICE MANHOURS	=	14,000
HOME OFFICE COSTS		
14,000 @ $36.79	=	520
ENGINEERING BY OTHERS	=	1,700
SUBTOTAL PLANT AREA COSTS		
13,760 + 520 + 1,700	=	15,980

PLANT # 8

RCE - 10 C
10/70

JOB NO. & TITLE JOB NO. 14222 BRECKINRIDGE PROJECT
CLIENT ASHLAND SYNTHETIC FUELS, INC.
JOB LOCATION BRECKINRIDGE CO., KENTUCKY

TAKEOFF _____ APPROVED _____
PRICED _____ DATE _____
CHECKED _____ SHEET ___ OF ___

DIRECT FIELD COST SUMMARY — CRYOGENIC HYDROGEN PURIFICATION

	QUANTITY / UNIT	$ M QUOTED	MANHOURS TOTAL	MANHOURS $/MH	TOTAL COST MATERIAL	TOTAL COST LABOR	TOTAL COST SUBCONTRACT	TOTAL COST TOTAL
.11 "C" - Columns & Vessels	8		14022		1448100			
.12 "D" - Tanks								
.13 "E" - Exchangers	30				1680700			
.14 "F" - Fired Heaters								
.15 "G" - Pumps & Drivers					8300			
.16 "H" - Vacuum Equipment								
.17 "K" - Compressors & Drs.	6				5534600			
.18 "T" - Special Equipment	5				990000			
CHEMICALS			1500		17100	(NITROGEN VENT STACK)		
TOTAL MAJOR EQUIPMENT	49		15522		8772400			8772400
								Adj. (24000)
.21 "J" - Instruments								8770000
.22 "L" - Piping								
.23 "M" - Structural Steel								
.24 "N" - Insulation								
.25 "P" - Electrical								
.26 "Q" - Concrete Work								
.27 "R" - Buildings								
.28 "S" - Site Improvements								
.29 "X" - Painting								
TOTAL OTHER MATERIALS								
TOTAL DIRECT COST								

SHEET NO _____ PLANT 8

11.0 PLANT 9 SOUR WATER TREATING

11.1 GENERAL

Sour Water Treating (Plant 9) processes in absorbers and regeneration equipment the sour water produced in many plants; this processing removes hydrogen sulfide and carbon dioxide and recovers ammonia and phenolic compounds.

Costs are based on Bechtel's Phase Zero preliminary design. Estimating data consisted of a list of major equipment, design data sheets, plot plans and sketches.

Major equipment was priced separately, with eight special titanium heat exchangers comprising most of the cost. Bulk materials have been allowed as a percentage of equipment costs, based on Bechtel's historical experience for similar processing facilities.

11.0 PLANT 9 SOUR WATER TREATING

11.2 FACTORED CAPITAL COST ESTIMATE

NOTE: All costs are in thousands of dollars.

MAJOR EQUIPMENT, MATERIAL AND SUBCONTRACT COSTS

Price developed from vendor quotes or in-house data = $13,540

BULK MATERIAL AND SUBCONTRACT COSTS

The bulk material and subcontract costs are taken as percentages (or cost "factors") of the major equipment costs. The cost factors are based on Bechtel's historical, proprietary data for similar types of plants and vary with type and size of plant.

Bulk Material Costs		Cost Factor, %				
Instruments	=	0.1196	X	13,540	=	1,620
Piping	=	0.2999	X	13,540	=	4,060
Structural Steel	=	0.0798	X	13,540	=	1,080
Electrical	=	0.0901	X	13,540	=	1,220
Concrete	=	0.0598	X	13,540	=	810
Site Improvements	=	0.0399	X	13,540	=	540
TOTAL BULK MATERIAL COST					=	$9,330

Subcontract Costs		Cost Factor, %				
Insulation	=	0.0798	X	13,540	=	1,080
Buildings	=	-	X	-	=	-
Painting	=	0.0148	X	13,540	=	200
Total Subcontract Cost					=	1,280
TOTAL BULK MATERIAL AND SUBCONTRACT COSTS					=	$10,610

DIRECT LABOR MANHOURS

Direct labor manhours are taken as multipliers (or manhour "factors") of the bulk material costs. The manhour factors are based on Bechtel's historical, proprietary data for similar types of plants varying with type and size of plant and adjusted as required for labor productivity based on jobsite data.

		Manhour Factor Hrs/$1000 of Cost				Hours
Instrument Manhours	=	19.20	X	1,620	=	31,100
Piping Manhours	=	44.73	X	4,060	=	181,600
Structural Steel Manhours	=	37.04	X	1,080	=	40,000
Electrical Manhours	=	70.25	X	1,220	=	85,700
Concrete Manhours	=	114.8	X	810	=	93,000
Site Improvement Manhours	=	83.15	X	540	=	44,900
Major Equipment Manhours*					=	15,100
TOTAL DIRECT LABOR MANHOURS						491,400

*Major equipment manhours obtained from Bechtel's proprietary "Manhour Standard" document.

DIRECT LABOR COST		
491,400 @ $20.70/hr.	=	10,170
SPARE PARTS	=	670
SALES TAX	=	-
FIELD INDIRECT COSTS		
75% of Labor Cost	=	7,630
CHEMICALS	=	60
SUBTOTAL FIELD COSTS		
13,540 + 10,610 + 10,170 + 670 + 7,630 + 60	=	42,680
HOME OFFICE MANHOURS	=	155,000
HOME OFFICE COSTS		
155,000 @ $36.79	=	5,700
ENGINEERING BY OTHERS	=	-
SUBTOTAL PLANT AREA COSTS		
42,680 + 5,700	=	48,380

PLANT # 9

RCE - 10 C 10/70

JOB NO. & TITLE JOB NO. 14222
CLIENT BRECKINRIDGE PROJECT
JOB LOCATION ASHLAND SYNTHETIC FUELS, INC. BRECKINRIDGE CO., KENTUCKY

TAKEOFF _____ APPROVED _____
PRICED _____ DATE _____
CHECKED _____ SHEET ___ OF _____

DIRECT FIELD COST SUMMARY

SOUR WATER & AMMONIA

	QUANTITY / UNIT	$M QUOTED	MANHOURS TOTAL	MANHOURS $/MH	TOTAL COST MATERIAL	TOTAL COST LABOR	TOTAL COST SUBCONTRACT	TOTAL COST TOTAL
.11 "C" - Columns & Vessels	31 EA		4700		27370000		1059000	
.12 "D" - Tanks	3 EA		70		3600000		21000	
.13 "E" - Exchangers	35 EA		2310		9011700			
.14 "F" - Fired Heaters			-					
.15 "G" - Pumps & Drivers	57 EA		7790		11106000			
.16 "H" - Vacuum Equipment	1 EA				1200			
.17 "K" - Compressors & Drs.								
.18 "T" - Special Equipment			110					
					5160000			
TOTAL MAJOR EQUIPMENT	127 EA		15110		134125000		1269000	135394000
								ADJ 600
								135400000
.21 "J" - Instruments								
.22 "L" - Piping								
.23 "M" - Structural Steel								
.24 "N" - Insulation								
.25 "P" - Electrical								
.26 "Q" - Concrete Work								
.27 "R" - Buildings								
.28 "S" - Site Improvements								
.29 "X" - Painting								
TOTAL OTHER MATERIALS								
TOTAL DIRECT COST								

SHEET NO _____ PLANT 9

12.0 PLANT 10 SULFUR PLANT

12.1 GENERAL

The Sulfur Plant (Plant 10) recovers by-product sulfur compounds produced in H-Coal® Preheating and Reaction (Plant 3), Gasification and Purification (Plant 12), and Stack Gas Scrubbing (Plant 35).

This plant was estimated on a factored basis utilizing Bechtel's historical experience for similar facilities.

Major equipment was priced by individual piece, based on Bechtel's Phase Zero preliminary design.

12.2 FACTORED CAPITAL COST ESTIMATE

NOTE: All costs are in thousands of dollars.

MAJOR EQUIPMENT, MATERIAL AND SUBCONTRACT COSTS

Price developed from vendor quotes or in-house data	=	$3,830

BULK MATERIAL AND SUBCONTRACT COSTS

The bulk material and subcontract costs are taken as percentages (or cost "factors") of the major equipment costs. The cost factors are based on Bechtel's historical, proprietary data for similar types of plants and vary with type and size of plant.

Bulk Material Costs		Cost Factor, %				
Instruments	=	0.1305	X	3,830	=	500
Piping	=	0.2585	X	3,830	=	990
Structural Steel	=	0.0705	X	3,830	=	270
Electrical	=	0.1201	X	3,830	=	460
Concrete	=	0.0809	X	3,830	=	310
Site Improvements	=	0.0287	X	3,830	=	110
TOTAL BULK MATERIAL COST					=	$2,640

Subcontract Costs		Cost Factor, %				
Insulation	=	0.0992	X	3,830	=	380
Buildings	=	-	X	-	=	-
Painting	=	0.0157	X	3,830	=	60
Total Subcontract Cost					=	440
TOTAL BULK MATERIAL AND SUBCONTRACT COSTS					=	$3,080

DIRECT LABOR MANHOURS

Direct labor manhours are taken as multipliers (or manhour "factors") of the bulk material costs. The manhour factors are based on Bechtel's historical, proprietary data for similar types of plants varying with type and size of plant and adjusted as required for labor productivity based on jobsite data.

		Manhour Factor Hrs/$1000 of Cost				Hours
Instrument Manhours	=	21.81	X	500	=	10,900
Piping Manhours	=	51.31	X	990	=	50,800
Structural Steel Manhours	=	37.78	X	270	=	10,200
Electrical Manhours	=	67.17	X	460	=	30,900
Concrete Manhours	=	113.8	X	310	=	35,300
Site Improvement Manhours	=	90.91	X	110	=	10,000
Major Equipment Manhours*					=	34,000
TOTAL DIRECT LABOR MANHOURS						182,100

*Major equipment manhours obtained from Bechtel's proprietary "Manhour Standard" document.

DIRECT LABOR COST		
182,100 @ $20.70/hr.	=	3,770
SPARE PARTS	=	190
SALES TAX	=	-
FIELD INDIRECT COSTS		
75% of Labor Cost	=	2,830
CHEMICALS	=	300
SUBTOTAL FIELD COSTS		
3,830 + 3,080 + 3,770 + 190 + 2,830 + 300	=	14,000
HOME OFFICE MANHOURS	=	85,000
HOME OFFICE COSTS		
85,000 @ $36.79	=	3,130
ENGINEERING BY OTHERS	=	-
SUBTOTAL PLANT AREA COSTS		
14,000 + 3,130	=	17,130

PLANT #10

RCE - 10 C
10/70

JOB NO. & TITLE JOB NO. 14222 BRECKINRIDGE PROJECT
CLIENT ASHLAND SYNTHETIC FUELS, INC.
JOB LOCATION BRECKINRIDGE CO., KENTUCKY

TAKEOFF _____ APPROVED _____
PRICED _____ DATE _____
CHECKED _____ SHEET ___ OF ___

DIRECT FIELD COST SUMMARY

SULFUR PLANT

	QUANTITY / UNIT	$ M QUOTED	MANHOURS TOTAL	MANHOURS $/MH	TOTAL COST MATERIAL	TOTAL COST LABOR	TOTAL COST SUBCONTRACT	TOTAL COST TOTAL
.11 "C" - Columns & Vessels	13		13020		7,140,000			
.12 "D" - Tanks	12		510		114,000			
.13 "E" - Exchangers	24		950		1,527,300			
.14 "F" - Fired Heaters	9		5360		990,000			
.15 "G" - Pumps & Drivers	7		300		39,000			
.16 "H" - Vacuum Equipment								
.17 "K" - Compressors & Drs.	4		6800		2,971,00			
.18 "T" - Special Equipment								
FREIGHT 4%					147,000			
CHEMICALS			7102					
TOTAL MAJOR EQUIPMENT	69		34,042		3,828,500			3,828,500
							ADJ.	1,500
								3,830,000
.21 "J" - Instruments								
.22 "L" - Piping								
.23 "M" - Structural Steel								
.24 "N" - Insulation								
.25 "P" - Electrical								
.26 "Q" - Concrete Work								
.27 "R" - Buildings								
.28 "S" - Site Improvements								
.29 "X" - Painting								
TOTAL OTHER MATERIALS								
TOTAL DIRECT COST								

SHEET NO _____ PLANT 10

13.0 PLANT 12 GASIFICATION AND PURIFICATION

13.1 GENERAL

Gasification and Purification (Plant 12) receives vacuum tower bottoms from H-Coal® Recycle Slurry Preparation (Plant 5) for gasification in a Texaco gasifier, which produces makeup hydrogen at a purity of 98.7 mol% for H-Coal® Preheating and Reaction (Plant 3) and medium Btu fuel gas for consumption in fired heaters.

This estimate was prepared by Bechtel's Refinery and Chemical Division utilizing information developed in the Phase Zero preliminary design and also from Texaco for the gasifier components.

Costs for the major equipment were estimated on an individual basis and bulk installation materials priced as a percentage of the equipment cost. Piping factors have the appearance of being lower in this plant, mainly because the process design and the materials do not involve some of the extreme conditions found elsewhere in the faciltiy.

13.0 PLANT 12 GASIFICATION AND PURIFICATION

13.2 FACTORED CAPITAL COST ESTIMATE

NOTE: All costs are in thousands of dollars.

MAJOR EQUIPMENT, MATERIAL AND SUBCONTRACT COSTS

Price developed from vendor quotes or in-house data = $98,150

BULK MATERIAL AND SUBCONTRACT COSTS

The bulk material and subcontract costs are taken as percentages (or cost "factors") of the major equipment costs. The cost factors are based on Bechtel's historical, proprietary data for similar types of plants and vary with type and size of plant.

Bulk Material Costs		Cost Factor, %				
Instruments	=	0.0999	X	98,150	=	9,810
Piping	=	0.2200	X	98,150	=	21,590
Structural Steel	=	0.0800	X	98,150	=	7,850
Electrical	=	0.0800	X	98,150	=	7,850
Concrete	=	0.0600	X	98,150	=	5,890
Site Improvements	=	0.0200	X	98,150	=	1,960
TOTAL BULK MATERIAL COST					=	$54,950

Subcontract Costs		Cost Factor, %				
Insulation	=	0.0999	X	98,150	=	9,810
Buildings	=	-	X	-	=	-
Painting	=	0.0150	X	98,150	=	1,470
Total Subcontract Cost					=	11,280
TOTAL BULK MATERIAL AND SUBCONTRACT COSTS					=	$66,230

DIRECT LABOR MANHOURS

Direct labor manhours are taken as multipliers (or manhour "factors") of the bulk material costs. The manhour factors are based on Bechtel's historical, proprietary data for similar types of plants varying with type and size of plant and adjusted as required for labor productivity based on jobsite data.

		Manhour Factor Hrs/$1000 of Cost				Hours
Instrument Manhours	=	19.22	X	9,810	=	188,500
Piping Manhours	=	51.00	X	21,590	=	1,101,100
Structural Steel Manhours	=	38.24	X	7,850	=	300,200
Electrical Manhours	=	66.90	X	7,860	=	525,800
Concrete Manhours	=	114.75	X	5,890	=	675,900
Site Improvement Manhours	=	82.91	X	1,960	=	162,500
Major Equipment Manhours*					=	322,900
TOTAL DIRECT LABOR MANHOURS						3,276,900

*Major equipment manhours obtained from Bechtel's proprietary "Manhour Standard" document.

DIRECT LABOR COST		
3,276,900 @ $20.70/hr.	=	67,830
SPARE PARTS	=	4,890
CHEMICALS	=	11,720
SALES TAX	=	-
FIELD INDIRECT COSTS		
75% of Labor Cost	=	50,870
SUBTOTAL FIELD COSTS		
98,150 + 66,230 + 67,830 + 4,890 + 11,720 + 50,870	=	299,690
HOME OFFICE MANHOURS	=	636,000
HOME OFFICE COSTS		
636,000 @ $36.79	=	23,400
ENGINEERING BY OTHERS	=	-
SUBTOTAL PLANT AREA COSTS		
299,690 + 23,400	=	323,090

PLANT 12

RCE - 10 C
10/70

JOB NO. & TITLE JOB NO. 14222 ~~BRECKINRIDGE PROJECT~~
CLIENT ~~ASHLAND SYNTHETIC FUELS, INC.~~
JOB LOCATION ~~BRECKINRIDGE CO., KENTUCKY~~

TAKEOFF _____ APPROVED _____
PRICED _____ DATE _____
CHECKED _____ SHEET ___ OF _____

DIRECT FIELD COST SUMMARY

CLARIFICATION & EXCLUSIONS

	QUANTITY / UNIT	$M QUOTED	MANHOURS TOTAL	MANHOURS $/MH	TOTAL COST MATERIAL	TOTAL COST LABOR	TOTAL COST SUBCONTRACT	TOTAL COST TOTAL
.11 "C" - Columns & Vessels	109 EA		131100		3602240		201400	
.12 "D" - Tanks	8 EA				30000		90000	
.13 "E" - Exchangers	197 EA		16,200		1763610 0			
.14 "F" - Fired Heaters	21 EA		3000		179500			
.15 "G" - Pumps & Drivers	131 EA		46500		813300			
.16 "H" - Vacuum Equipment	18 EA		5900		64350			
.17 "K" - Compressors & Drs.	20 EA		92800		2771000			
.18 "T" - Special Equipment	22 EA		14,900		2026600			
FREIGHT 4%					376400			
CHEMICALS			12,500					
TOTAL MAJOR EQUIPMENT	526 EA				9785390 0		291400	98145300
								INT. 47000
								98150000
.21 "J" - Instruments								
.22 "L" - Piping								
.23 "M" - Structural Steel								
.24 "N" - Insulation								
.25 "P" - Electrical								
.26 "Q" - Concrete Work								
.27 "R" - Buildings								
.28 "S" - Site Improvements								
.29 "X" - Painting								
TOTAL OTHER MATERIALS								
TOTAL DIRECT COST								

SHEET NO _____ PLANT 12

14.0 PLANT 15 OXYGEN PLANT

14.1 GENERAL

The Oxygen Plant (Plant 15) separates air through low-temperature distillation to produce oxygen required for the Gasification and Purification (Plant 12) gasifier and nitrogen for Inert Gas Systems (Plant 38).

Costs for this plant are based on an estimate by Airco Cryoplants utilizing Airco's historical data for similar air separation facilities. This design uses three 1670 TPD units.

Equipment costs are built up by subunit or module, and bulk materials have been applied as factors and ratios modified to be site-specific for this installation.

14.2 FACTORED CAPITAL COST ESTIMATE

NOTE: All costs are in thousands of dollars.

MAJOR EQUIPMENT, MATERIAL AND SUBCONTRACT COSTS

Price developed from vendor quotes or in-house data. = $64,910

BULK MATERIAL AND SUBCONTRACT COSTS

The bulk material and subcontract costs are taken as percentages (or cost "factors") of the major equipment costs. The cost factors are based on Bechtel's historical, proprietary data for similar types of plants and vary with type and size of plant.

Bulk Material Costs		Cost Factor, %				
Instruments	=	0.0237	X	64,910	=	1,540
Piping	=	0.0518	X	64,910	=	3,360
Structural Steel	=	0.0055	X	64,910	=	360
Electrical	=	0.0165	X	64,910	=	1,070
Concrete	=	0.0062	X	64,910	=	400
Site Improvements	=	0.0003	X	64,910	=	20
Buildings	=	0.0009	X		=	60
TOTAL BULK MATERIAL COST					=	$6,810

Subcontract Costs		Cost Factor, %				
Insulation	=	0.0532	X	64,910	=	3,450
Buildings	=	-	X	-	=	-
Painting	=	0.0092	X	64,910	=	600
Total Subcontract Cost					=	4,050
TOTAL BULK MATERIAL AND SUBCONTRACT COSTS					=	$10,860

DIRECT LABOR MANHOURS

Direct labor manhours are taken as multipliers (or manhour "factors") of the bulk material costs. The manhour factors are based on Bechtel's historical, proprietary data for similar types of plants varying with type and size of plant and adjusted as required for labor productivity based on jobsite data.

		Manhour Factor Hrs/$1000 of Cost				Hours
Instrument Manhours	=	16.56	X	1,540	=	25,500
Piping Manhours	=	96.01	X	3,360	=	322,600
Structural Steel Manhours	=	88.33	X	360	=	31,800
Electrical Manhours	=	13.27	X	1,070	=	14,200
Concrete Manhours	=	179.0	X	400	=	71,600
Site Improvement Manhours	=	180.0	X	20	=	3,600
Buildings Manhours	=	81.67	X	60	=	4,900
Major Equipment Manhours*					=	237,300
TOTAL DIRECT LABOR MANHOURS						711,500

*Major equipment manhours obtained from Bechtel's proprietary "Manhour Standard" document.

DIRECT LABOR COST		
711,500 @ $20.70/hr.	=	14,730
SPARE PARTS	=	3,090
SALES TAX	=	-
FIELD INDIRECT COSTS		
75% of Labor Cost	=	11,050
SUBTOTAL FIELD COSTS		
64,910 + 10,860 + 14,730 + 3,090 + 11,050	=	104,640
HOME OFFICE MANHOURS	=	27,000
HOME OFFICE COSTS		
27,000 @ $36.79	=	990
ENGINEERING BY OTHERS	=	7,300
SUBTOTAL PLANT AREA COSTS		
104,640 + 990 + 7,300	=	112,930

PLANT #15

JOB NO. & TITLE JOB NO. 14222 BRECKINRIDGE PROJECT

CLIENT ASHLAND SYNTHETIC FUELS, INC.

JOB LOCATION BRECKINRIDGE CO., KENT C.

TAKEOFF _____ APPROVED _____

PRICED _____ DATE _____

CHECKED _____ SHEET ___ OF ___

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DIRECT FIELD COST SUMMARY — OXYGEN PLANT

	QUANTITY / UNIT	$ M QUOTED	MANHOURS TOTAL	MANHOURS $/MH	TOTAL COST MATERIAL	TOTAL COST LABOR	TOTAL COST SUBCONTRACT	TOTAL COST TOTAL
.11 "C" - Columns & Vessels	11		237,316		28,767,200		3,156,200	
.12 "D" - Tanks	4							
.13 "E" - Exchangers	176				8,055,900			
.14 "F" - Fired Heaters								
.15 "G" - Pumps & Drivers	39				994,500			
.16 "H" - Vacuum Equipment								
.17 "K" - Compressors & Drs.					22,918,300			
.18 "T" - Special Equipment	73				1,017,700			
FREIGHT 4%								
TOTAL MAJOR EQUIPMENT	303		237,316		61,753,600		3,156,200	64,909,800
							ADJ.	200
.21 "J" - Instruments								64,910,000
.22 "L" - Piping								
.23 "M" - Structural Steel								
.24 "N" - Insulation								
.25 "P" - Electrical								
.26 "Q" - Concrete Work								
.27 "R" - Buildings								
.28 "S" - Site Improvements								
.29 "X" - Painting								
TOTAL OTHER MATERIALS								
TOTAL DIRECT COST								

SHEET NO _____ PLANT 15

15.0 PLANT 17 DISTILLATE SEPARATION

15.1 GENERAL

Distillate Separation (Plant 17) processes by fractionation the distillate streams from H-Coal® Primary Separation (Plant 4) and H-Coal® Recycle Slurry Preparation (Plant 5) in order to recover: light naphtha and overhead vapor for processing in the Gas Plant (Plant 7); middle distillate, flush oil, and heavy distillate which are pumped to Tankage (Plant 20); heavy naphtha for further processing in Naphtha Hydrotreating and Reforming (Plant 18).

The estimate for this plant was based on a HRI design. The scope information consisted of an equipment list, design data sheets and a plot plan.

Major equipment was priced by individual item utilizing vendor estimates or unit prices from similar Bechtel purchases. Bulk materials were estimated as percentages of the equipment costs.

15.0 PLANT 17 DISTILLATE SEPARATION

15.2 FACTORED CAPITAL COST ESTIMATE

NOTE: All costs are in thousands of dollars.

MAJOR EQUIPMENT, MATERIAL AND SUBCONTRACT COSTS

Price developed from vendor quotes or in-house data. = $13,380

BULK MATERIAL AND SUBCONTRACT COSTS

The bulk material and subcontract costs are taken as percentages (or cost "factors") of the major equipment costs. The cost factors are based on Bechtel's historical, proprietary data for similar types of plants and vary with type and size of plant.

Bulk Material Costs		Cost Factor, %				
Instruments	=	0.1398	X	13,380	=	1,870
Piping	=	0.3199	X	13,380	=	4,280
Structural Steel	=	0.0800	X	13,380	=	1,070
Electrical	=	0.1203	X	13,380	=	1,610
Concrete	=	0.0598	X	13,380	=	800
Site Improvements	=	0.0202	X	13,380	=	270
TOTAL BULK MATERIAL COST					=	$9,900

Subcontract Costs		Cost Factor, %				
Insulation	=	0.1002	X	13,380	=	1,340
Buildings	=	-	X	-	=	-
Painting	=	0.0150	X	13,380	=	200
Total Subcontract Cost					=	1,540
TOTAL BULK MATERIAL AND SUBCONTRACT COSTS					=	$11,440

DIRECT LABOR MANHOURS

Direct labor manhours are taken as multipliers (or manhour "factors") of the bulk material costs. The manhour factors are based on Bechtel's historical, proprietary data for similar types of plants varying with type and size of plant and adjusted as required for labor productivity based on jobsite data.

		Manhour Factor Hrs/$1000 of Cost				Hours
Instrument Manhours	=	19.20	X	1,870	=	35,900
Piping Manhours	=	51.01	X	4,280	=	218,300
Structural Steel Manhours	=	38.32	X	1,070	=	41,000
Electrical Manhours	=	66.96	X	1,610	=	107,800
Concrete Manhours	=	114.8	X	800	=	91,800
Site Improvement Manhours	=	82.96	X	270	=	22,400
Major Equipment Manhours*					=	44,600
TOTAL DIRECT LABOR MANHOURS						561,800

*Major equipment manhours obtained from Bechtel's proprietary "Manhour Standard" document.

DIRECT LABOR COST		
561,800 @ $20.70/hr.	=	11,630
SPARE PARTS	=	670
SALES TAX		-
FIELD INDIRECT COSTS		
75% of Labor Cost	=	8,720
CHEMICALS	=	10
SUBTOTAL FIELD COSTS		
13,380 + 11,440 + 11,630 + 670 + 8,720 + 10	=	45,850
HOME OFFICE MANHOURS	=	168,000
HOME OFFICE COSTS		
168,000 @ $36.79	=	6,180
ENGINEERING BY OTHERS	=	-
SUBTOTAL PLANT AREA COSTS		
45,850 + 6,180	=	52,030

PLANT #17

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10/70

JOB NO. & TITLE JOB NO. 14222 ~~BRECKINRIDGE PROJECT~~

CLIENT ASHLAND SYNTHETIC FUELS, INC.

JOB LOCATION BRECKINRIDGE CO., KENTUCKY

TAKEOFF _____ APPROVED _____

PRICED _____ DATE _____

CHECKED _____ SHEET ___ OF ___

DIRECT FIELD COST SUMMARY

DISTILLATE SEPERATION

	QUANTITY / UNIT	$ M QUOTED	MANHOURS TOTAL	MANHOURS $/MH	TOTAL COST MATERIAL	LABOR	SUBCONTRACT	TOTAL
.11 "C" - Columns & Vessels	18		9400		3,677,200		68,800	
.12 "D" - Tanks								
.13 "E" - Exchangers	64		10,200		5,455,400			
.14 "F" - Fired Heaters	2		3400		953,400			
.15 "G" - Pumps & Drivers	44		1040		85,800			
.16 "H" - Vacuum Equipment								
.17 "K" - Compressors & Drs.	4		6800		1,412,000			
.18 "T" - Special Equipment	6		4400		451,600			
FREIGHT 4%					512,000			
CHEMICALS			-0-					
TOTAL MAJOR EQUIPMENT	138		44,600		13,312,400		68,800	13,381,200
								Appr. <120,000>
								13,380,000
.21 "J" - Instruments								
.22 "L" - Piping								
.23 "M" - Structural Steel								
.24 "N" - Insulation								
.25 "P" - Electrical								
.26 "Q" - Concrete Work								
.27 "R" - Buildings								
.28 "S" - Site Improvements								
.29 "X" - Painting								
TOTAL OTHER MATERIALS								
TOTAL DIRECT COST								

SHEET NO _____ PLANT 17

16.0 PLANT 18 NAPHTHA HYDROTREATING AND REFORMING

16.1 GENERAL

Naphtha Hydrotreating and Reforming (Plant 18) upgrades raw H-Coal® naphtha by the processes of hydrotreating and UOP platforming.

Costs for this plant are based on a UOP estimate, utilizing UOP's historical data for similar facilities. This estimate was summarized on an overall installed cost basis but has been broken down and distributed to various component levels for the purpose of incorporation into the summary format of this capital cost estimate.

Comparing UOP's cost estimate to Bechtel's historical data for units of similar capacity, good correlation was obtained.

16.0 PLANT 18 NAPHTHA TREATING & REFORMING

16.2 FACTORED CAPITAL COST ESTIMATE

NOTE: All costs are in thousands of dollars.

MAJOR EQUIPMENT, MATERIAL AND SUBCONTRACT COSTS

Price developed from vendor quotes or in-house data. = $10,310

BULK MATERIAL AND SUBCONTRACT COSTS

The bulk material and subcontract costs are taken as percentages (or cost "factors") of the major equipment costs. The cost factors are based on Bechtel's historical, proprietary data for similar types of plants and vary with type and size of plant.

Bulk Material Costs		Cost Factor, %				
Instruments	=	0.1503	X	10,310	=	1,550
Piping	=	0.2599	X	10,310	=	2,680
Structural Steel	=	0.0495	X	10,310	=	510
Electrical	=	0.0805	X	10,310	=	830
Concrete	=	0.0495	X	10,310	=	510
Site Improvements	=	0.0204	X	10,310	=	210
TOTAL BULK MATERIAL COST					=	$6,290

Subcontract Costs		Cost Factor, %				
Insulation	=	0.1193	X	10,310	=	1,230
Site Improvements	=	0.0204	X	10,310	=	210
Painting	=	0.0204	X	10,310	=	210
Total Subcontract Cost					=	1,650
TOTAL BULK MATERIAL AND SUBCONTRACT COSTS					=	$7,940

DIRECT LABOR MANHOURS

Direct labor manhours are taken as multipliers (or manhour "factors") of the bulk material costs. The manhour factors are based on Bechtel's historical, proprietary data for similar types of plants varying with type and size of plant and adjusted as required for labor productivity based on jobsite data.

		Manhour Factor Hrs/$1000 of Cost				Hours
Instrument Manhours	=	26.13	X	1,550	=	40,500
Piping Manhours	=	51.00	X	2,680	=	136,700
Structural Steel Manhours	=	38.63	X	510	=	19,700
Electrical Manhours	=	66.63	X	830	=	55,300
Concrete Manhours	=	116.1	X	510	=	59,200
Site Improvement Manhours	=	81.43	X	210	=	17,100
Major Equipment Manhours*					=	95,900
TOTAL DIRECT LABOR MANHOURS					=	424,400

*Major equipment manhours obtained from Bechtel's proprietary "Manhour Standard" document.

DIRECT LABOR COST		
424,400 @ $20.70/hr.	=	8,790
SPARE PARTS	=	510
SALES TAX		-
FIELD INDIRECT COSTS		
75% of Labor Cost	=	6,590
CHEMICALS	=	9,290
SUBTOTAL FIELD COSTS		
10,310 + 7,940 + 8,790 + 510 + 6,590 + 9,290	=	43,430
HOME OFFICE MANHOURS	=	136,000
HOME OFFICE COSTS		
136,000 @ $36.79	=	5,000
ENGINEERING BY OTHERS	=	-
SUBTOTAL PLANT AREA COSTS		
43,430 + 5,000	=	48,430

PLANT #18

JOB NO. & TITLE JOB NO. 14222 ~~BRECKINRIDGE PROJECT~~ TAKEOFF _____ APPROVED _____

CLIENT ~~ASHLAND SYNTHETIC FUELS, INC.~~ PRICED _____ DATE _____

JOB LOCATION ~~BRECKINRIDGE CO., KENTUCKY~~ CHECKED _____ SHEET ___ OF ___

RCE - 10 C 10/70

DIRECT FIELD COST SUMMARY

NAPHTHA TREATING & REFORMING

	QUANTITY / UNIT	$ M QUOTED	MANHOURS TOTAL	MANHOURS $/MH	TOTAL COST MATERIAL	TOTAL COST LABOR	TOTAL COST SUBCONTRACT	TOTAL COST TOTAL
.11 "C" - Columns & Vessels	32		91660					
.12 "D" - Tanks								
.13 "E" - Exchangers	30							
.14 "F" - Fired Heaters	4							
.15 "G" - Pumps & Drivers	21							
.16 "H" - Vacuum Equipment								
.17 "K" - Compressors & Drs.	8							
.18 "T" - Special Equipment	7							
CHEMICALS			4250					
TOTAL MAJOR EQUIPMENT	102		95,910		10269000		371100	10306100
								ADJ 3900
								10310000
.21 "J" - Instruments								
.22 "L" - Piping								
.23 "M" - Structural Steel								
.24 "N" - Insulation								
.25 "P" - Electrical								
.26 "Q" - Concrete Work								
.27 "R" - Buildings								
.28 "S" - Site Improvements								
.29 "X" - Painting								
TOTAL OTHER MATERIALS								
TOTAL DIRECT COST								

SHEET NO _____ PLANT 18

17.0 PLANT 19 FLARE SYSTEM

17.1 GENERAL

Flare System (Plant 19) provides primary and auxiliary flare systems for safe collection and disposal of hazardous vapors and liquids released during overpressure and emergency venting situations in process plants and product loading facilities.

This estimate is based on Bechtel's Phase Zero design. The scope consisted of an equipment list and design data sheets.

The flare stacks and associated equipment items have been priced utilizing vendor estimates as well as unit prices from Bechtel historical experience.

Bulk materials have been allowed as a percentage of the equipment costs. It should be noted that the blowdown and relief headers associated with the flare system are included in Plant 21 (Interconnecting Piping). The piping included in Plant 19 consists only of subheaders and some utility systems.

17.0 PLANT 19 FLARE SYSTEM

17.2 FACTORED CAPITAL COST ESTIMATE

NOTE: All costs are in thousands of dollars.

MAJOR EQUIPMENT, MATERIAL AND SUBCONTRACT COSTS

Price developed from vendor quotes or in-house data. = $3,370

BULK MATERIAL AND SUBCONTRACT COSTS

The bulk material and subcontract costs are taken as percentages (or cost "factors") of the major equipment costs. The cost factors are based on Bechtel's historical, proprietary data for similar types of plants and vary with type and size of plant.

Bulk Material Costs		Cost Factor, %				
Instruments	=	0.1395	X	3,370	=	470
Piping	=	0.0712	X	3,370	=	240
Structural Steel	=	0.0890	X	3,370	=	300
Electrical	=	0.1306	X	3,370	=	440
Concrete	=	0.0712	X	3,370	=	240
Site Improvements	=	0.0415	X	3,370	=	140
TOTAL BULK MATERIAL COST					=	$1,830

Subcontract Costs		Cost Factor, %				
Insulation	=	0.0415	X	3,370	=	140
Buildings	=	-	X	-	=	-
Painting	=	0.0148	X	3,370	=	50
Total Subcontract Cost					=	190
TOTAL BULK MATERIAL AND SUBCONTRACT COSTS					=	$2,020

DIRECT LABOR MANHOURS

Direct labor manhours are taken as multipliers (or manhour "factors") of the bulk material costs. The manhour factors are based on Bechtel's historical, proprietary data for similar types of plants varying with type and size of plant and adjusted as required for labor productivity based on jobsite data.

		Manhour Factor Hrs/$1000 of Cost				Hours
Instrument Manhours	=	28.94	X	470	=	13,600
Piping Manhours	=	50.83	X	240	=	12,200
Structural Steel Manhours	=	38.67	X	300	=	11,600
Electrical Manhours	=	63.41	X	440	=	27,900
Concrete Manhours	=	112.5	X	240	=	27,000
Site Improvement Manhours	=	79.28	X	140	=	11,100
Major Equipment Manhours*					=	21,100
TOTAL DIRECT LABOR MANHOURS						124,500

*Major equipment manhours obtained from Bechtel's proprietary "Manhour Standard" document.

DIRECT LABOR COST		
124,500 @ $20.70/hr.	=	2,580
SPARE PARTS	=	170
SALES TAX	=	310
FIELD INDIRECT COSTS		
75% of Labor Cost	=	1,940
SUBTOTAL FIELD COSTS		
3,370 + 2,020 + 2,580 + 170 + 310 + 1,940	=	10,390
HOME OFFICE MANHOURS	=	65,000
HOME OFFICE COSTS		
65,000 @ $36.79	=	2,390
ENGINEERING BY OTHERS	=	-
SUBTOTAL PLANT AREA COSTS		
10,390 + 2,390	=	12,780

PLANT# 19 JOB NO. & TITLE JOB NO. 14222 BRECKINRIDGE PROJECT

CLIENT ASHLAND SYNTHETIC FUELS, INC.

JOB LOCATION BRECKINRIDGE CO., KENTUCKY

RCE - 10 C 10/70

TAKEOFF _____ APPROVED _____

PRICED _____ DATE _____

CHECKED _____ SHEET ___ OF ___

DIRECT FIELD COST SUMMARY

FLARE SYSTEM.

	QUANTITY / UNIT	$M QUOTED	MANHOURS TOTAL	MANHOURS $/MH	TOTAL COST MATERIAL	TOTAL COST LABOR	TOTAL COST SUBCONTRACT	TOTAL COST TOTAL
.11 "C" - Columns & Vessels	16 EA		3700		1259300			
.12 "D" - Tanks								
.13 "E" - Exchangers	1 EA		70		1000			
.14 "F" - Fired Heaters	6 EA		12,720		1701600			
.15 "G" - Pumps & Drivers	30 EA				279900			
.16 "H" - Vacuum Equipment								
.17 "K" - Compressors & Drs.								
.18 "T" - Special Equipment								
FREIGHT 4%					1300000			
TOTAL MAJOR EQUIPMENT	53		21,080		3371800			3371800
								ADJ. 41800
.21 "J" - Instruments								3370000
.22 "L" - Piping								
.23 "M" - Structural Steel								
.24 "N" - Insulation								
.25 "P" - Electrical								
.26 "Q" - Concrete Work								
.27 "R" - Buildings								
.28 "S" - Site Improvements								
.29 "X" - Painting								
TOTAL OTHER MATERIALS								
TOTAL DIRECT COST								

SHEET NO _____ PLANT 19

18.0 PLANT 20 TANKAGE

18.1 GENERAL

Tankage (Plant 20) provides product, by-product and intermediate storage and pumping facilities.

Tankage equipment was priced by individual numbered storage unit, based on Bechtel's preliminary Phase Zero design and vendor estimates. The tank units were priced separately, based on supply and erect type subcontracts.

In this plant, bulk installation materials were not factored. Instead, estimating quantities were developed based on preliminary routings, preliminary design characteristics and typical scope allowances for tank farm installations. These bulk quantities were then priced on the basis of current Bechtel purchases for similar commodities.

18.0 PLANT 20 TANKAGE

18.2 FACTORED CAPITAL COST ESTIMATE

NOTE: All costs are in thousands of dollars.

MAJOR EQUIPMENT, MATERIAL AND SUBCONTRACT COSTS

Price developed from vendor quotes or in-house data. = $43,720

BULK MATERIAL AND SUBCONTRACT COSTS

The bulk material and subcontract costs are taken as percentages (or cost "factors") of the major equipment costs. The cost factors are based on Bechtel's historical, proprietary data for similar types of plants and vary with type and size of plant.

Bulk Material Costs		Cost Factor, %				
Instruments	=	0.0169	X	43,720	=	740
Piping	=	0.0432	X	43,720	=	1,890
Structural Steel	=	0.00595	X	43,720	=	260
Electrical	=	0.0169	X	43,720	=	740
Concrete	=	0.0300	X	43,720	=	1,310
Site Improvements	=	0.0300	X	43,720	=	1,310
TOTAL BULK MATERIAL COST					=	$6,250

Subcontract Costs		Cost Factor, %				
Insulation	=	0.0801	X	43,720	=	3,500
Buildings	=	-	X	-	=	-
Painting	=	0.0151	X	43,720	=	660
Total Subcontract Cost					=	4,160
TOTAL BULK MATERIAL AND SUBCONTRACT COSTS					=	$10,410

DIRECT LABOR MANHOURS

Direct labor manhours are taken as multipliers (or manhour "factors") of the bulk material costs. The manhour factors are based on Bechtel's historical, proprietary data for similar types of plants varying with type and size of plant and adjusted as required for labor productivity based on jobsite data.

		Manhour Factor Hrs/$1000 of Cost				Hours
Instrument Manhours	=	25.54	X	740	=	18,900
Piping Manhours	=	46.40	X	1,890	=	87,700
Structural Steel Manhours	=	25.38	X	260	=	6,600
Electrical Manhours	=	73.24	X	740	=	54,200
Concrete Manhours	=	95.80	X	1,310	=	125,500
Site Improvement Manhours	=	82.90	X	1,310	=	108,600
Major Equipment Manhours*					=	31,700
TOTAL DIRECT LABOR MANHOURS						433,200

*Major equipment manhours obtained from Bechtel's proprietary "Manhour Standard" document.

DIRECT LABOR COST		
433,200 @ $20.70/hr.	=	8,970
SPARE PARTS	=	120
SALES TAX	=	440
FIELD INDIRECT COSTS		
75% of Labor Cost	=	6,730
SUBTOTAL FIELD COSTS		
43,720 + 10,410 + 8,970 + 120 + 440 + 6,730	=	70,390
HOME OFFICE MANHOURS	=	217,000
HOME OFFICE COSTS		
217,000 @ $36.79	=	7,980
ENGINEERING BY OTHERS	=	-
SUBTOTAL PLANT AREA COSTS		
70,390 + 7,980	=	78,370

PLANT #20

JOB NO. & TITLE JOB NO. 14222 ~~BRECKINRIDGE PROJECT~~

CLIENT ASHLAND SYNTHETIC FUELS, INC.

JOB LOCATION BRECKINRIDGE CO., KENTUCKY

TAKEOFF _____ APPROVED _____

PRICED _____ DATE _____

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DIRECT FIELD COST SUMMARY

TANKAGE

	QUANTITY / UNIT	$M QUOTED	MANHOURS TOTAL	MANHOURS $/MH	TOTAL COST MATERIAL	TOTAL COST LABOR	TOTAL COST SUBCONTRACT	TOTAL COST TOTAL
.11 "C" - Columns & Vessels	7						1,240,000	
.12 "D" - Tanks	40						247,490	
.13 "E" - Exchangers	27		5300		302,600			
.14 "F" - Fired Heaters								
.15 "G" - Pumps & Drivers	56		14,720		1,361,700			
.16 "H" - Vacuum Equipment								
.17 "K" - Compressors & Drs.	2		3400		220,000			
.18 "T" - Special Equipment	45		8280		395,000		420,000	
FREIGHT 4%					91,000			
TOTAL MAJOR EQUIPMENT	177		31,700		2,373,300		4,134,490	4,372,230
								ADJ (2,300)
.21 "J" - Instruments								4,372,000
.22 "L" - Piping								
.23 "M" - Structural Steel								
.24 "N" - Insulation								
.25 "P" - Electrical								
.26 "Q" - Concrete Work								
.27 "R" - Buildings								
.28 "S" - Site Improvements								
.29 "X" - Painting								
TOTAL OTHER MATERIALS								
TOTAL DIRECT COST								

SHEET NO _____ PLANT 20

19.0 PLANT 21 INTERCONNECTING PIPING

19.1 GENERAL

Interconnecting Piping (Plant 21) consists of interconnecting process and utility piping between process plants and between process plants and offsites and includes the fuel gas blending and distribution system.

For this plant, costs were developed on the basis of piping quantities established from preliminary routing studies and P&ID's. These piping quantities were priced using current Bechtel experience for similar purchases.

Some major equipment items were priced individually, but the remaining bulk installation materials were estimated as a percentage of the piping costs.

19.0 PLANT 21 INTERCONNECTING PIPING

19.2 FACTORED CAPITAL COST ESTIMATE

NOTE: All costs are in thousands of dollars.

MAJOR EQUIPMENT, MATERIAL AND SUBCONTRACT COSTS

Price developed from vendor quotes or in-house data. = $20

BULK MATERIAL AND SUBCONTRACT COSTS

The bulk material and subcontract costs are taken as percentages (or cost "factors") of the major equipment costs. The cost factors are based on Bechtel's historical, proprietary data for similar types of plants and vary with type and size of plant.

Bulk Material Costs		Cost Factor, %			
Instruments	=	NA	X	=	1,420
Piping	=	NA	X	=	9,080
Structural Steel	=	NA	X	=	1,420
Electrical	=	NA	X	=	2,270
Concrete	=	NA	X	=	850
Site Improvements	=	NA	X	=	570
TOTAL BULK MATERIAL COST				=	$15,610

Subcontract Costs		Cost Factor, %				
Insulation	=	113.5	X	20	=	2,270
Buildings	=	-	X	-	=	-
Painting	=	21.50	X	20	=	430
Total Subcontract Cost					=	2,700
TOTAL BULK MATERIAL AND SUBCONTRACT COSTS					=	$18,310

DIRECT LABOR MANHOURS

Direct labor manhours are taken as multipliers (or manhour "factors") of the bulk material costs. The manhour factors are based on Bechtel's historical, proprietary data for similar types of plants varying with type and size of plant and adjusted as required for labor productivity based on jobsite data.

		Manhour Factor Hrs/$1000 of Cost				Hours
Instrument Manhours	=	17.11	X	1,420	=	24,300
Piping Manhours	=	71.40	X	9,080	=	648,300
Structural Steel Manhours	=	31.97	X	1,420	=	45,400
Electrical Manhours	=	42.69	X	2,270	=	96,900
Concrete Manhours	=	95.76	X	850	=	81,400
Site Improvement Manhours	=	43.86	X	570	=	25,000
Major Equipment Manhours*					=	-
TOTAL DIRECT LABOR MANHOURS						921,300

*Major equipment manhours obtained from Bechtel's proprietary "Manhour Standard" document.

DIRECT LABOR COST		
921,300 @ $20.70/hr.	=	19,070
SPARE PARTS	=	-
SALES TAX	=	780
FIELD INDIRECT COSTS		
75% of Labor Cost	=	14,300
SUBTOTAL FIELD COSTS		
20 + 18,310 + 19,070 + 780 + 14,300	=	52,480
HOME OFFICE MANHOURS	=	73,000
HOME OFFICE COSTS		
73,000 @ $36.79	=	2,690
ENGINEERING BY OTHERS	=	-
SUBTOTAL PLANT AREA COSTS		
52,480 + 2,690	=	55,170

PLANT #21

JOB NO. 14222

JOB NO. & TITLE BRECKINRIDGE PROJECT

CLIENT ASHLAND SYNTHETIC FUELS, INC.

JOB LOCATION BRECKINRIDGE CO., KENTUCKY

TAKEOFF _____ APPROVED _____

PRICED _____ DATE _____

CHECKED _____ SHEET ___ OF ___

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DIRECT FIELD COST SUMMARY

INTERCONNECTING PIPING

	QUANTITY / UNIT	$ M QUOTED	MANHOURS TOTAL	MANHOURS $/MH	TOTAL COST MATERIAL	LABOR	SUBCONTRACT	TOTAL
.11 "C" - Columns & Vessels	21EA		80		19300			
.12 "D" - Tanks								
.13 "E" - Exchangers								
.14 "F" - Fired Heaters								
.15 "G" - Pumps & Drivers								
.16 "H" - Vacuum Equipment								
.17 "K" - Compressors & Drs.								
.18 "T" - Special Equipment								
FREIGHT 4%					800			
TOTAL MAJOR EQUIPMENT	21EA		80		20100			20100
								ADJ 410
								20000
.21 "J" - Instruments								
.22 "L" - Piping								
.23 "M" - Structural Steel								
.24 "N" - Insulation								
.25 "P" - Electrical								
.26 "Q" - Concrete Work								
.27 "R" - Buildings								
.28 "S" - Site Improvements								
.29 "X" - Painting								
TOTAL OTHER MATERIALS								
TOTAL DIRECT COST								

SHEET NO _____

PLANT 21

20.0 PLANT 22 RIVER FACILITIES

20.1 GENERAL

River Facilities (Plant 22) provides marine facilities for coal barge unloading, as well as separate facilities for liquid product loading into barges.

This estimate was prepared by Bechtel's Pipeline and Production Facilities Division based on the Phase Zero design.

The major equipment items in this plant were priced separately. Bulk materials were established by takeoff quantities based on drawings, sketches, plot layouts and equipment arrangement details. These quantities were priced according to direct-hire or subcontract construction, as appropriate for each activity.

20.2 FACTORED CAPITAL COST ESTIMATE

NOTE: All costs are in thousands of dollars.

MAJOR EQUIPMENT, MATERIAL AND SUBCONTRACT COSTS

Price developed from vendor quotes or in-house data.	=	NA

BULK MATERIAL AND SUBCONTRACT COSTS

The bulk material and subcontract costs are taken as percentages (or cost "factors") of the major equipment costs. The cost factors are based on Bechtel's historical, proprietary data for similar types of plants and vary with type and size of plant.

Bulk Material Costs		Cost Factor, %			
Instruments	=	NA	X	=	70
Piping	=	NA	X	=	1,030
Structural Steel	=	NA	X	=	500
Electrical	=	NA	X	=	70
Concrete	=	NA	X	=	550
Site Improvements	=	NA	X	=	2,680
TOTAL BULK MATERIAL COST				=	$4,900

Subcontract Costs			Cost Factor, %			
Insulation	=	-	X	-	=	NA
Buildings	=	-	X	-	=	NA
Painting	=	-	X	-	=	NA
Total Subcontract Cost					=	NA
TOTAL BULK MATERIAL AND SUBCONTRACT COSTS		-			=	$4,900

DIRECT LABOR MANHOURS

Direct labor manhours are taken as multipliers (or manhour "factors") of the bulk material costs. The manhour factors are based on Bechtel's historical, proprietary data for similar types of plants varying with type and size of plant and adjusted as required for labor productivity based on jobsite data.

		Manhour Factor Hrs/$1000 of Cost				Hours
Instrument Manhours	=	65.71	X	70	=	4,600
Piping Manhours	=	23.11	X	1,030	=	23,800
Structural Steel Manhours	=	105.6	X	500	=	52,800
Electrical Manhours	=	117.1	X	70	=	8,200
Concrete Manhours	=	86.36	X	550	=	47,500
Site Improvement Manhours	=	53.73	X	2,680	=	144,000
Painting Manhours					=	7,100
Major Equipment Manhours*					=	-
TOTAL DIRECT LABOR MANHOURS						288,000

*Major equipment manhours obtained from Bechtel's proprietary "Manhour Standard" document.

DIRECT LABOR COST		
288,000 @ $20.70/hr.	=	5,960
COMMERCIAL EQUIPMENT	=	2,000
SPARE PARTS	=	100
SALES TAX	=	350
FIELD INDIRECT COSTS		
75% of Labor Cost	=	4,470
SUBTOTAL FIELD COSTS		
4,900 + 5,960 + 2,000 + 100 + 350 + 4,470	=	17,780
HOME OFFICE MANHOURS	=	34,000
HOME OFFICE COSTS		
34,000 @ $36.79	=	1,250
ENGINEERING BY OTHERS		
SUBTOTAL PLANT AREA COSTS		
17,780 + 1,250	=	19,030

PLANT #22

JOB NO. 14222

JOB NO. & TITLE BRECKINRIDGE PROJECT

CLIENT ASHLAND SYNTHETIC FUELS, INC.

JOB LOCATION BRECKINRIDGE CO., KENTUCKY

TAKEOFF _____ APPROVED _____

PRICED _____ DATE _____

CHECKED _____ SHEET ___ OF _____

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DIRECT FIELD COST SUMMARY — River Facilites

	QUANTITY / UNIT	$ M QUOTED	MANHOURS TOTAL	MANHOURS $/MH	TOTAL COST MATERIAL	TOTAL COST LABOR	TOTAL COST SUBCONTRACT	TOTAL COST TOTAL
.11 "C" - Columns & Vessels								
.12 "D" - Tanks								
.13 "E" - Exchangers								
.14 "F" - Fired Heaters								
.15 "G" - Pumps & Drivers								
.16 "H" - Vacuum Equipment								
.17 "K" - Compressors & Drs.								
.18 "T" - Special Equipment								
TOTAL MAJOR EQUIPMENT	2	Commercial Equip			2000000			2000000
.21 "J" - Instruments								
.22 "L" - Piping								
.23 "M" - Structural Steel								
.24 "N" - Insulation								
.25 "P" - Electrical								
.26 "Q" - Concrete Work								
.27 "R" - Buildings								
.28 "S" - Site Improvements								
.29 "X" - Painting								
TOTAL OTHER MATERIALS								
TOTAL DIRECT COST								

SHEET NO _____

PLANT 22

21.0 PLANT 23 RAIL AND TRUCK FACILITIES

21.1 GENERAL

Rail and Truck Facilities (Plant 23) provides railcar and tank truck liquid product loading facilities.

The estimate was made in two ways. First, for the unloading and loading facilities, the individual equipment items were priced utilizing vendor estimates. Bulk materials for these areas were included as a percentage of the equipment cost.

In the second method, the railroad was estimated by an analysis of the individual bulk quantities involved using layouts, routings and sketches to establish the scope. These quantities were then priced on a unit-cost basis.

21.0 PLANT 23 RAIL AND TRUCK FACILITIES

21.2 FACTORED CAPITAL COST ESTIMATE

NOTE: All costs are in thousands of dollars.

MAJOR EQUIPMENT, MATERIAL AND SUBCONTRACT COSTS

Price developed from vendor quotes or in-house data. = $700

BULK MATERIAL AND SUBCONTRACT COSTS

The bulk material and subcontract costs are taken as percentages (or cost "factors") of the major equipment costs. The cost factors are based on Bechtel's historical, proprietary data for similar types of plants and vary with type and size of plant.

Bulk Material Costs		Cost Factor, %				
Instruments	=	0.3571	X	700	=	250
Piping	=	0.9143	X	700	=	640
Structural Steel	=	0.2285	X	700	=	160
Electrical	=	0.3000	X	700	=	210
Concrete	=	0.1714	X	700	=	120
Site Improvements	=	-	X	-	=	-
Total Bulk Material Cost					=	$1,380

Subcontract Costs		Cost Factor, %				
Insulation	=	0.1000	X	700	=	70
Site Improvements	=	4.1000	X	700	=	2,870
Painting	=	0.0428	X	700	=	30
Total Subcontract Cost					=	2,970
TOTAL BULK MATERIAL AND SUBCONTRACT COSTS					=	$4,350

DIRECT LABOR MANHOURS

Direct labor manhours are taken as multipliers (or manhour "factors") of the bulk material costs. The manhour factors are based on Bechtel's historical, proprietary data for similar types of plants varying with type and size of plant and adjusted as required for labor productivity based on jobsite data.

		Manhour Factor Hrs/$1000 of Cost				Hours
Instrument Manhours	=	28.40	X	250	=	7,100
Piping Manhours	=	36.88	X	640	=	23,600
Structural Steel Manhours	=	31.88	X	160	=	5,100
Electrical Manhours	=	67.62	X	210	=	14,200
Concrete Manhours	=	85.83	X	120	=	10,300
Site Improvement Manhours	=	-	X		=	-
Major Equipment Manhours*					=	13,600
TOTAL DIRECT LABOR MANHOURS						73,900

*Major equipment manhours obtained from Bechtel's proprietary "Manhour Standard" document.

DIRECT LABOR COST		
73,900 @ $20.70/hr.	=	1,530
SPARE PARTS	=	30
SALES TAX	=	110
FIELD INDIRECT COSTS		
75% of Labor Cost	=	1,150
SUBTOTAL FIELD COSTS		
700 + 4,350 + 1,530 + 30 + 110 + 1,150	=	7,870
HOME OFFICE MANHOURS	=	63,000
HOME OFFICE COSTS		
63,000 @ $36.79	=	2,320
ENGINEERING BY OTHERS	=	-
SUBTOTAL PLANT AREA COSTS		
7,870 + 2,320	=	10,190

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PLANT # 23 JOB NO. & TITLE JOB NO. 14222 BRECKINRIDGE PROJECT
CLIENT ASHLAND SYNTHETIC FUELS, INC.
JOB LOCATION BRECKINRIDGE CO., KENTUCKY

TAKEOFF _____ APPROVED _____
PRICED _____ DATE _____
CHECKED _____ SHEET ___ OF _____

DIRECT FIELD COST SUMMARY

Rail & Truck Facilities

	QUANTITY / UNIT	$ M QUOTED	MANHOURS TOTAL	MANHOURS $/MH	TOTAL COST MATERIAL	TOTAL COST LABOR	TOTAL COST SUBCONTRACT	TOTAL COST TOTAL
.11 "C" - Columns & Vessels								
.12 "D" - Tanks								
.13 "E" - Exchangers								
.14 "F" - Fired Heaters								
.15 "G" - Pumps & Drivers	1		40		4000			
.16 "H" - Vacuum Equipment								
.17 "K" - Compressors & Drs.	8		13,600		650000		21000	
.18 "T" - Special Equipment								
FREIGHT 4%					26000			
TOTAL MAJOR EQUIPMENT	9				680006		21000	701000
							ADJ	< 1000 >
								700000
.21 "J" - Instruments								
.22 "L" - Piping								
.23 "M" - Structural Steel								
.24 "N" - Insulation								
.25 "P" - Electrical								
.26 "Q" - Concrete Work								
.27 "R" - Buildings								
.28 "S" - Site Improvements								
.29 "X" - Painting								
TOTAL OTHER MATERIALS								
TOTAL DIRECT COST								

SHEET NO _____ PLANT 23

22.0 PLANT 26 COAL RECEIVING AND STORAGE

22.1 GENERAL

Coal Receiving and Storage (Plant 26) unloads run-of-mine (ROM) or prewashed coal from barges or railcar, conveys and stores the coal in stockpiles, and subsequently reclaims the coal for transfer to Coal Washing (Plant 27).

This estimate was prepared by Bechtel's Research and Engineering Division, reviewed by the project estimating team and incorporated into the overall summary totals.

The direct cost estimates for this plant are based on the conceptual design and engineering information prepared for the Phase Zero Study, consisting of drawings, specifications and a list of major equipment. Estimating methods consistent with the conceptual nature of the design were employed utilizing vendor information as well as current Bechtel information.

Approximately 80% of the major equipment was priced from vendor estimates. The remainder was evaluated using curves and unit prices for similar items from other projects.

Quantities for bulk materials such as concrete, steel, piping, wire and conduit were not available at the time of the estimate, resulting in factors being used to determine approximate costs for these materials.

22.0 PLANT 26 COAL RECEIVING AND STORAGE

22.2 FACTORED CAPITAL COST ESTIMATE

NOTE: All costs are in thousands of dollars.

MAJOR EQUIPMENT, MATERIAL AND SUBCONTRACT COSTS

Price developed from vendor quotes or in-house data. = $40,900

BULK MATERIAL AND SUBCONTRACT COSTS

The bulk material and subcontract costs are taken as percentages (or cost "factors") of the major equipment costs. The cost factors are based on Bechtel's historical, proprietary data for similar types of plants and vary with type and size of plant.

Bulk Material Costs		Cost Factor, %				
Instruments	=	0.0171	X	40,900	=	700
Piping	=	0.0513	X	40,900	=	2,100
Structural Steel	=	0.1565	X	40,900	=	6,400
Electrical	=	0.1834	X	40,900	=	7,500
Concrete	=	-	X	-	=	-
Site Improvements	=	-	X	-	=	-
Total Bulk Material Cost					=	$16,700

Subcontract Costs		Cost Factor, %				
Insulation	=	-	X	-	=	-
Site Improvements	=	0.0056	X	40,900	=	230
Painting	=	-	X	-	=	-
Total Subcontract Cost					=	230
TOTAL BULK MATERIAL AND SUBCONTRACT COSTS					=	$16,930

DIRECT LABOR MANHOURS

Direct labor manhours are taken as multipliers (or manhour "factors") of the bulk material costs. The manhour factors are based on Bechtel's historical, proprietary data for similar types of plants varying with type and size of plant and adjusted as required for labor productivity based on jobsite data.

		Manhour Factor Hrs/$1000 of Cost				Hours
Instrument Manhours	=	37.14	X	700	=	26,000
Piping Manhours	=	69.05	X	2,100	=	145,000
Structural Steel Manhours	=	86.41	X	6,400	=	553,000
Electrical Manhours	=	35.20	X	7,500	=	264,000
Concrete Manhours	=	-	X	-	=	-
Site Improvement Manhours	=	-	X	-	=	-
Major Equipment Manhours*					=	629,000
TOTAL DIRECT LABOR MANHOURS						1,617,000

*Major equipment manhours obtained from Bechtel's proprietary "Manhour Standard" document.

DIRECT LABOR COST		
1,617,000 @ $20.70/hr.	=	33,470
SPARE PARTS	=	1,070
SALES TAX	=	1,950
FIELD INDIRECT COSTS		
75% of Labor Cost	=	25,100
SUBTOTAL FIELD COSTS		
40,900 + 16,930 + 33,470 + 1,070 + 1,950 + 25,100	=	119,420
HOME OFFICE MANHOURS	=	114,000
HOME OFFICE COSTS		
114,000 @ $36.79	=	4,190
ENGINEERING BY OTHERS	=	-
SUBTOTAL PLANT AREA COSTS		
119,420 + 4,190	=	123,610

PLANT # 26

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10/70

JOB NO. & TITLE JOB NO. 14222
CLIENT BRECKINRIDGE PROJECT
JOB LOCATION ASHLAND SYNTHETIC FUELS, INC.
BRECKINRIDGE CO., KENTUCKY

TAKEOFF _____ APPROVED _____
PRICED _____ DATE _____
CHECKED _____ SHEET ___ OF _____

DIRECT FIELD COST SUMMARY

RUN OF MINE COAL RECEIVING & BULK STORAGE

	QUANTITY / UNIT	$ M QUOTED	MANHOURS TOTAL	MANHOURS $/MH	TOTAL COST MATERIAL	TOTAL COST LABOR	TOTAL COST SUBCONTRACT	TOTAL COST TOTAL
.11 "C" - Columns & Vessels	CONVEYS + FEEDERS		519 000					
.12 "D" - Tanks	STORAGE SILOS		11,000					
.13 "E" - Exchangers	SAMPLING SYSTEM		90 000					
.14 "F" - Fired Heaters	OTHER EQUIP.		9000					
.15 "G" - Pumps & Drivers								
.16 "H" - Vacuum Equipment								
.17 "K" - Compressors & Drs.								
.18 "T" - Special Equipment								
TOTAL MAJOR EQUIPMENT	275		629 000		21 300 000		19 600 000	40 900 000
.21 "J" - Instruments								
.22 "L" - Piping								
.23 "M" - Structural Steel								
.24 "N" - Insulation								
.25 "P" - Electrical								
.26 "Q" - Concrete Work								
.27 "R" - Buildings								
.28 "S" - Site Improvements								
.29 "X" - Painting								
TOTAL OTHER MATERIALS								
TOTAL DIRECT COST								

SHEET NO _____ PLANT 26

23.0 PLANT 27 COAL WASHING

23.1 GENERAL

Coal Washing (Plant 27) receives ROM coal from Coal Receiving and Storage (Plant 26) or reclaimed coal from storage, and washes and separates the coal into: clean coal feed to Coal Drying and Pulverizing (Plant 1); boiler fuel to Steam Generation and Boiler Feedwater Treating (Plant 31); coal refuse.

The estimate for this plant was prepared by Roberts and Schaefer Company, incorporating a customized design prepared specifically for this project.

Major equipment items were priced on the basis of vendor quotations or from similar items from other Roberts and Schaefer projects.

Quantities for bulk materials were developed by takeoffs from section and elevation drawings on an individual account basis. These bulk materials were priced on the basis of recent Roberts and Schaefer experience for similar purchases.

23.0 PLANT 27 COAL WASHING

23.2 FACTORED CAPITAL COST ESTIMATE

NOTE: All costs are in thousands of dollars.

MAJOR EQUIPMENT, MATERIAL AND SUBCONTRACT COSTS

Price developed from vendor quotes or in-house data. = $16,070

BULK MATERIAL AND SUBCONTRACT COSTS

The bulk material and subcontract costs are taken as percentages (or cost "factors") of the major equipment costs. The cost factors are based on Bechtel's historical, proprietary data for similar types of plants and vary with type and size of plant.

Bulk Material Costs		Cost Factor, %				
Instruments	=	-	X	-	=	-
Piping	=	0.3161	X	16,070	=	5,080
Structural Steel	=	0.5663	X	16,070	=	9,100
Electrical	=	0.2371	X	16,070	=	3,810
Concrete	=	0.1002	X	16,070	=	1,610
Siding	=	0.0404	X	16,070	=	650
Total Bulk Material Cost					=	$20,250

Subcontract Costs		Cost Factor, %				
Electrical	=	0.2545	X	16,070	=	4,090
Buildings	=	-	X	-	=	-
HVAC	=	0.0753	X	16,070	=	1,210
Total Subcontract Cost					=	5,300
TOTAL BULK MATERIAL AND SUBCONTRACT COSTS					=	$25,550

DIRECT LABOR MANHOURS

Direct labor manhours are taken as multipliers (or manhour "factors") of the bulk material costs. The manhour factors are based on Bechtel's historical, proprietary data for similar types of plants varying with type and size of plant and adjusted as required for labor productivity based on jobsite data.

		Manhour Factor Hrs/$1000 of Cost				Hours
Instrument Manhours	=	-	X	-	=	-
Piping & Platework	=	87.006	X	5,080	=	441,990
Structural Steel Manhours	=	41.184	X	9,100	=	374,770
Electrical Manhours	=	-	X	-	=	-
Concrete Manhours	=	62.04	X	1,610	=	99,880
Site Improvement Manhours	=	-	X	-	=	-
Siding Manhours	=	80.68	X	650	=	52,440
TOTAL DIRECT LABOR MANHOURS						969,080

*Major equipment manhours obtained from Bechtel's proprietary "Manhour Standard" document.

DIRECT LABOR COST		
969,080 @ $20.70/hr.	=	20,060
SPARE PARTS	=	800
SALES TAX		-
FIELD INDIRECT COSTS		
75% of Labor Cost	=	15,050
CHEMICALS	=	170
SUBTOTAL FIELD COSTS		
16,070 + 25,550 + 20,060 + 800 + 15,050 + 170	=	77,700
HOME OFFICE MANHOURS	=	341,000
HOME OFFICE COSTS		
341,000 @ $36.79	=	12,550
ENGINEERING BY OTHERS	=	-
ADJUSTMENT - DEDUCT ONE 600 TPH WASHING PLANT	=	(12,500)
SUBTOTAL PLANT AREA COSTS		
77,700 + 12,550 + (12,500)	=	77,750

PLANT # 27

RCE - 10 C 10/70

JOB NO. & TITLE JOB NO. 14222 BRECKINRIDGE PROJECT

CLIENT ASHLAND SYNTHETIC FUELS, INC.

JOB LOCATION BRECKINRIDGE CO., KENTUCKY

TAKEOFF _____ APPROVED _____

PRICED _____ DATE _____

CHECKED _____ SHEET ___ OF ___

DIRECT FIELD COST SUMMARY

COAL WASHING & SECONDARY CRUSHING

	QUANTITY / UNIT	$ M QUOTED	MANHOURS TOTAL	MANHOURS $/MH	TOTAL COST MATERIAL	TOTAL COST LABOR	TOTAL COST SUBCONTRACT	TOTAL COST TOTAL
.11 "C" - Columns & Vessels								
.12 "D" - Tanks	22	RAW COAL FACILITIES			400000			
.13 "E" - Exchangers	685	PREP PLANT FAC.			9200000			
.14 "F" - Fired Heaters	4	COARSE REFUSE FAC.			140000			
.15 "G" - Pumps & Drivers	55	BOILER FUEL FAC.			2100000			
.16 "H" - Vacuum Equipment	55	CLEAN COAL FAC.			4225000			
.17 "K" - Compressors & Drs.								
.18 "T" - Special Equipment								
TOTAL MAJOR EQUIPMENT	821				16065000			16065000
								Adj. 50000
								16072000
.21 "J" - Instruments								
.22 "L" - Piping								
.23 "M" - Structural Steel								
.24 "N" - Insulation								
.25 "P" - Electrical								
.26 "Q" - Concrete Work								
.27 "R" - Buildings								
.28 "S" - Site Improvements								
.29 "X" - Painting								
TOTAL OTHER MATERIALS								
TOTAL DIRECT COST								

SHEET NO _____ PLANT 27

24.0 PLANT 30 ELECTRICAL DISTRIBUTION

24.1 GENERAL

Electrical Distribution (Plant 30) receives main utility power from Big River Electric Corporation (161 kV) via two overhead transmission lines to each of two main substations; each main substation distributes power at 161 kV through SF6 gas insulated type indoor switchgear to three (total of six) satellite substations located to suit plant grouping of loads.

The power distribution system was estimated on the basis of a preliminary single-line diagram and associated general site plan. Individual control equipment was taken off and priced on an itemized basis. Quantities of cable, wire and conduit were generated on the basis of preliminary routings.

Associated bulk materials such as support steel, concrete and site work were applied as a percentage of the electrical material cost utilizing Bechtel's historical data.

24.0 PLANT 30 ELECTRICAL DISTRIBUTION

24.2 FACTORED CAPITAL COST ESTIMATE

NOTE: All costs are in thousands of dollars.

MAJOR EQUIPMENT, MATERIAL AND SUBCONTRACT COSTS

Price developed from vendor quotes or in-house data. = NA

BULK MATERIAL AND SUBCONTRACT COSTS

The bulk material and subcontract costs are taken as percentages (or cost "factors") of the major equipment costs. The cost factors are based on Bechtel's historical, proprietary data for similar types of plants and vary with type and size of plant.

Bulk Material Costs		Cost Factor, %			
Instruments	=	NA	X	=	NA
Piping	=	NA	X	=	NA
Structural Steel	=	NA	X	=	2,490
Electrical	=	NA	X	=	29,820
Concrete	=	NA	X	=	7,460
Site Improvements	=	NA	X	=	3,720
Total Bulk Material Cost				=	$43,490

Subcontract Costs		Cost Factor, %			
Insulation	=	NA	X	=	NA
Buildings	=	NA	X	=	NA
Painting	=	NA	X	=	NA
Total Subcontract Cost				=	NA
TOTAL BULK MATERIAL AND SUBCONTRACT COSTS				=	$43,490

DIRECT LABOR MANHOURS

Direct labor manhours are taken as multipliers (or manhour "factors") of the bulk material costs. The manhour factors are based on Bechtel's historical, proprietary data for similar types of plants varying with type and size of plant and adjusted as required for labor productivity based on jobsite data.

		Manhour Factor Hrs/$1000 of Cost				Hours
Instrument Manhours	=	-	X	-	=	-
Piping Manhours	=	-	X	-	=	-
Structural Steel Manhours	=	36.83	X	2,490	=	91,700
Electrical Manhours	=	10.10	X	29,820	=	301,200
Concrete Manhours	=	73.54	X	7,460	=	548,600
Site Improvement Manhours	=	65.46	X	3,720	=	243,500
Major Equipment Manhours*					=	-
TOTAL DIRECT LABOR MANHOURS						1,185,000

*Major equipment manhours obtained from Bechtel's proprietary "Manhour Standard" document.

DIRECT LABOR COST		
1,185,000 @ $20.70/hr.	=	24,530
SPARE PARTS	=	-
SALES TAX	=	2,090
FIELD INDIRECT COSTS		
75% of Labor Cost	=	18,400
SUBTOTAL FIELD COSTS		
43,490 + 24,530 + 2,090 + 18,400	=	88,510
HOME OFFICE MANHOURS	=	127,000
HOME OFFICE COSTS		
127,000 @ $36.79	=	4,670
ENGINEERING BY OTHERS	=	-
SUBTOTAL PLANT AREA COSTS		
88,510 + 4,670	=	93,180

PLANT #30

JOB NO. 14222

JOB NO. & TITLE BRECKINRIDGE PROJECT

CLIENT ASHLAND SYNTHETIC FUELS, INC.

JOB LOCATION BRECKINRIDGE CO., KENTUCKY

TAKEOFF _____ APPROVED _____

PRICED _____ DATE _____

CHECKED _____ SHEET ___ OF _____

RCE - 10 C 10/70

DIRECT FIELD COST SUMMARY ELECTRICAL DISTRIBUTION

	QUANTITY / UNIT	$ M QUOTED	MANHOURS TOTAL	MANHOURS $/MH	TOTAL COST MATERIAL	TOTAL COST LABOR	TOTAL COST SUBCONTRACT	TOTAL COST TOTAL
.11 "C" - Columns & Vessels								
.12 "D" - Tanks								
.13 "E" - Exchangers								
.14 "F" - Fired Heaters								
.15 "G" - Pumps & Drivers								
.16 "H" - Vacuum Equipment								
.17 "K" - Compressors & Drs.								
.18 "T" - Special Equipment								
TOTAL MAJOR EQUIPMENT	NOT APPLICABLE - NO MAJOR EQUIPMENT							
.21 "J" - Instruments								
.22 "L" - Piping								
.23 "M" - Structural Steel								
.24 "N" - Insulation								
.25 "P" - Electrical								
.26 "Q" - Concrete Work								
.27 "R" - Buildings								
.28 "S" - Site Improvements								
.29 "X" - Painting								
TOTAL OTHER MATERIALS								
TOTAL DIRECT COST								

SHEET NO _____

PLANT 30

25.0 PLANT 31 STEAM GENERATION AND BOILER FEEDWATER TREATING

25.1 GENERAL

Steam generation and BFW Treating (Plant 31) generates steam at 900 psig in the main boilers. Facilities are provided for treating boiler feedwater, distributing and collecting steam and condensate at different levels from various plants within the entire complex.

This estimate was prepared by Bechtel's Los Angeles Power Division incorporating scope from the Phase Zero preliminary design. The documentation consisted of equipment lists, design specifications and data sheets, flow diagrams and general layout drawings.

Major equipment was estimated by individual item with vendor budget quotes obtained for 98% of the costs. In particular, vendor estimates were used for these items:

- Ash handling system
- Coal handling system
- Precipitators
- Stacks
- Pumps and drivers
- Condensers
- Cooling water heat exchangers
- Deaerators
- Tanks
- Boiler feedwater treating systems

Bulk materials have been included as a percentage of the equipment costs based on Bechtel experience for facilities of similar type and size.

25.0 PLANT 31 STEAM GENERATION AND BFW TREATING

25.2 FACTORED CAPITAL COST ESTIMATE

NOTE: All costs are in thousands of dollars.

MAJOR EQUIPMENT, MATERIAL AND SUBCONTRACT COSTS

Price developed from vendor quotes or in-house data. = $81,800

BULK MATERIAL AND SUBCONTRACT COSTS

The bulk material and subcontract costs are taken as percentages (or cost "factors") of the major equipment costs. The cost factors are based on Bechtel's historical, proprietary data for similar types of plants and vary with type and size of plant.

Bulk Material Costs		Cost Factor, %				
Instruments	=	0.0940	X	81,800	=	7,690
Piping	=	0.1410	X	81,800	=	11,530
Structural Steel	=	0.1280	X	81,800	=	10,470
Electrical	=	0.1141	X	81,800	=	9,330
Concrete	=	0.0380	X	81,800	=	3,110
Site Improvements	=	0.0400	X	81,800	=	3,270
Total Bulk Material Cost					=	$45,400

Subcontract Costs		Cost Factor, %				
Insulation	=	0.0359	X	81,800	=	2,940
Buildings	=	-	X	-	=	-
Painting	=	0.0160	X	81,800	=	1,310
Total Subcontract Cost					=	4,250
TOTAL BULK MATERIAL AND SUBCONTRACT COSTS					=	$49,650

DIRECT LABOR MANHOURS

Direct labor manhours are taken as multipliers (or manhour "factors") of the bulk material costs. The manhour factors are based on Bechtel's historical, proprietary data for similar types of plants varying with type and size of plant and adjusted as required for labor productivity based on jobsite data.

		Manhour Factor Hrs/$1000 of Cost				Hours
Instrument Manhours	=	20.60	X	7,690	=	158,400
Piping Manhours	=	97.7	X	11,530	=	1,126,500
Structural Steel Manhours	=	26.80	X	10,470	=	280,600
Electrical Manhours	=	70.50	X	9,330	=	657,800
Concrete Manhours	=	88.30	X	3,110	=	274,600
Site Improvement Manhours	=	48.81	X	3,270	=	159,600
Major Equipment Manhours*					=	87,400
TOTAL DIRECT LABOR MANHOURS						2,744,900

*Major equipment manhours obtained from Bechtel's proprietary "Manhour Standard" document.

DIRECT LABOR COST		
2,744,900 @ $20.70/hr.	=	56,820
SPARE PARTS	=	800
SALES TAX		-
FIELD INDIRECT COSTS		
75% of Labor Cost	=	42,620
CHEMICALS	=	240
SUBTOTAL FIELD COSTS		
81,800 + 49,650 + 56,820 + 800 + 42,620 + 240	=	231,930
HOME OFFICE MANHOURS	=	491,000
HOME OFFICE COSTS		
491,000 @ $36.79	=	18,060
ENGINEERING BY OTHERS	=	-
SUBTOTAL PLANT AREA COSTS		
231,930 + 18,060	=	249,990

PLANT #31

RCE - 10 C
10/70

JOB NO. & TITLE JOB NO. 14222 ~~BRECKINRIDGE PROJECT~~ TAKEOFF _____ APPROVED _____

CLIENT ASHLAND SYNTHETIC FUELS, INC. PRICED _____ DATE _____

JOB LOCATION BRECKINRIDGE CO., KENTUCKY CHECKED _____ SHEET ___ OF ___

DIRECT FIELD COST SUMMARY

STIMULATION & BENEFICIATING

	QUANTITY / UNIT	$M QUOTED	MANHOURS TOTAL	MANHOURS $/MH	TOTAL COST MATERIAL	TOTAL COST LABOR	TOTAL COST SUBCONTRACT	TOTAL COST TOTAL
.11 "C" - Columns & Vessels	25 EA		700		6540000			
.12 "D" - Tanks	13 EA		200		1820000		9880000	
.13 "E" - Exchangers	11 EA		6000		10500000			
.14 "F" - Fired Heaters	6 EA		1280		8000000		47972000	
.15 "G" - Pumps & Drivers	51 EA		6600		9630000			
.16 "H" - Vacuum Equipment			-					
.17 "K" - Compressors & Drs.	2 EA		24,000		85000000			
.18 "T" - Special Equipment	12/LOT		52400		32820000		16793000	
FREIGHT 4%					6170000			
CHEMICALS			1146					
TOTAL MAJOR EQUIPMENT	120		87,426		160480000		65753000	81801000
								ADJ. <1000
.21 "J" - Instruments								81800000
.22 "L" - Piping								
.23 "M" - Structural Steel								
.24 "N" - Insulation								
.25 "P" - Electrical								
.26 "Q" - Concrete Work								
.27 "R" - Buildings								
.28 "S" - Site Improvements								
.29 "X" - Painting								
TOTAL OTHER MATERIALS								
TOTAL DIRECT COST								

SHEET NO _____ PLANT 31

26.0 PLANT 32 WATER SYSTEMS: RAW, POTABLE, COOLING

26.1 GENERAL

Water Systems: Raw, Potable, Cooling (Plant 32), together with Sewers and Wastewater Treating (Plant 34) provide project-wide water management, based on river water use and total reuse of waters within the project. Main units include:

- Ohio River Raw Water Treatment
- Cooling Water Systems
- Cooling Tower Sidestream Treatment
- Potable Water System

Bechtel's Refinery and Chemical Division had prime responsibility for the production of this plant estimate, utilizing a conceptual design provided by the Research and Engineering Division. The scope consisted of a process description, process flow diagrams and a list of major equipment with overall duty requirements. In addition to the process duty information, certain minimum estimating parameters were also specified such as surface area for heat exchangers and drive horsepower for pumps.

The major equipment was priced by individual tagged item using vendor estimates for pricing. Bulk materials were estimated as a percentage of the equipment cost from historical data for facilities of similar type, size and complexity.

26.0 PLANT 32 WATER SYSTEMS: RAW, POTABLE, COOLING

26.2 FACTORED CAPITAL COST ESTIMATE

NOTE: All costs are in thousands of dollars.

MAJOR EQUIPMENT, MATERIAL AND SUBCONTRACT COSTS

Price developed from vendor quotes or in-house data. = $13,890

BULK MATERIAL AND SUBCONTRACT COSTS

The bulk material and subcontract costs are taken as percentages (or cost "factors") of the major equipment costs. The cost factors are based on Bechtel's historical, proprietary data for similar types of plants and vary with type and size of plant.

Bulk Material Costs		Cost Factor, %				
Instruments	=	0.1202	X	13,890	=	1,670
Piping	=	0.2304	X	13,890	=	3,200
Structural Steel	=	0.0497	X	13,890	=	690
Electrical	=	0.1001	X	13,890	=	1,390
Concrete	=	0.0698	X	13,890	=	970
Site Improvements	=	0.0403	X	13,890	=	560
Total Bulk Material Cost					=	$8,480

Subcontract Costs		Cost Factor, %				
Insulation	=	0.0497	X	13,890	=	690
Buildings	=	-	X	-	=	-
Painting	=	0.0151	X	13,890	=	210
Total Subcontract Cost					=	900
TOTAL BULK MATERIAL AND SUBCONTRACT COSTS					=	$9,380

DIRECT LABOR MANHOURS

Direct labor manhours are taken as multipliers (or manhour "factors") of the bulk material costs. The manhour factors are based on Bechtel's historical, proprietary data for similar types of plants varying with type and size of plant and adjusted as required for labor productivity based on jobsite data.

		Manhour Factor Hrs/$1000 of Cost				Hours
Instrument Manhours	=	28.68	X	1,670	=	47,900
Piping Manhours	=	51.00	X	3,200	=	163,200
Structural Steel Manhours	=	32.03	X	690	=	22,100
Electrical Manhours	=	41.44	X	1,390	=	57,600
Concrete Manhours	=	89.18	X	970	=	86,500
Site Improvement Manhours	=	82.86	X	560	=	46,400
Major Equipment Manhours*					=	108,100
TOTAL DIRECT LABOR MANHOURS						531,800

*Major equipment manhours obtained from Bechtel's proprietary "Manhour Standard" document.

DIRECT LABOR COST		
531,800 @ $20.70/hr.	=	11,010
SPARE PARTS	=	350
SALES TAX	=	810
FIELD INDIRECT COSTS		
75% of Labor Cost	=	8,260
CHEMICALS	=	270
SUBTOTAL FIELD COSTS		
13,890 + 9,380 + 11,010 + 350 + 810 + 8,260 + 270	=	43,970
HOME OFFICE MANHOURS	=	164,000
HOME OFFICE COSTS		
164,000 @ $36.79	=	6,030
ENGINEERING BY OTHERS	=	-
SUBTOTAL PLANT AREA COSTS		
43,970 + 6,030	=	50,000

PLANT #32

JOB NO. & TITLE JOB NO. 14222 BRECKINRIDGE PROJECT
CLIENT ASHLAND SYNTHETIC FUELS, INC.
JOB LOCATION BRECKINRIDGE CO., KENTUCKY

TAKEOFF _____ APPROVED _____
PRICED _____ DATE _____
CHECKED _____ SHEET ___ OF _____

RCE - 10 C 10/70

DIRECT FIELD COST SUMMARY

WATER SYSTEM 3 RAW POTABLE C.W.

	QUANTITY / UNIT	$ M QUOTED	MANHOURS TOTAL	MANHOURS $/MH	TOTAL COST MATERIAL	TOTAL COST LABOR	TOTAL COST SUBCONTRACT	TOTAL COST TOTAL
.11 "C" - Columns & Vessels	4		210					
.12 "D" - Tanks	25		2430		64000		148000	
.13 "E" - Exchangers	4		510		61000		553600	
.14 "F" - Fired Heaters								
.15 "G" - Pumps & Drivers	85		22,990		3169800			
.16 "H" - Vacuum Equipment	6		510		2000			
.17 "K" - Compressors & Drs.	5		850					
.18 "T" - Special Equipment	37		63990		3461000		1180000	
FREIGHT 4%					270000			
CHEMICALS			16,620					
TOTAL MAJOR EQUIPMENT	166		108110		7027800		6864000	13891800
							MU	1800
								13890000
.21 "J" - Instruments								
.22 "L" - Piping								
.23 "M" - Structural Steel								
.24 "N" - Insulation								
.25 "P" - Electrical								
.26 "Q" - Concrete Work								
.27 "R" - Buildings								
.28 "S" - Site Improvements								
.29 "X" - Painting								
TOTAL OTHER MATERIALS								
TOTAL DIRECT COST								

SHEET NO _____ PLANT 32

27.0 PLANT 33 FIRE SYSTEMS

27.1 GENERAL

Fire Systems (Plant 33) includes fire water, foam systems, dry chemicals, and inert gas, providing fire protection for equipment and structures in the total plant area.

The Plant 33 estimate was based on a preliminary design for the fire water system where certain assumptions were made for line sizes, layouts and routings. From this preliminary design, quantities for the various bulk accounts were developed and estimated using unit price information obtained from Bechtel's historical data.

27.0 PLANT 33 FIRE SYSTEMS

27.2 FACTORED CAPITAL COST ESTIMATE

NOTE: All costs are in thousands of dollars.

MAJOR EQUIPMENT, MATERIAL AND SUBCONTRACT COSTS

Price developed from vendor quotes or in-house data. = $680

BULK MATERIAL AND SUBCONTRACT COSTS

The bulk material and subcontract costs are taken as percentages (or cost "factors") of the major equipment costs. The cost factors are based on Bechtel's historical, proprietary data for similar types of plants and vary with type and size of plant.

Bulk Material Costs		Cost Factor, %			
Instruments	=	NA	X	=	100
Piping	=	NA	X	=	4,080
Structural Steel	=	NA	X	=	50
Electrical	=	NA	X	=	80
Concrete	=	NA	X	=	50
Site Improvements	=	NA	X	=	650
Total Bulk Material Cost				=	$5,010

Subcontract Costs		Cost Factor, %				
Piping	=	0.0147	X	680	=	10
Painting	=	0.0147	X	680	=	10
Total Subcontract Cost					=	20
TOTAL BULK MATERIAL AND SUBCONTRACT COSTS					=	$5,030

DIRECT LABOR MANHOURS

Direct labor manhours are taken as multipliers (or manhour "factors") of the bulk material costs. The manhour factors are based on Bechtel's historical, proprietary data for similar types of plants varying with type and size of plant and adjusted as required for labor productivity based on jobsite data.

		Manhour Factor Hrs/$1000 of Cost				Hours
Instrument Manhours	=	27.00	X	100	=	2,700
Piping Manhours	=	68.46	X	4,080	=	279,300
Structural Steel Manhours	=	42.00	X	50	=	2,100
Electrical Manhours	=	68.75	X	80	=	5,500
Concrete Manhours	=	100.0	X	50	=	5,000
Site Improvement Manhours	=	343.2	X	650	=	223,100
Major Equipment Manhours*					=	4,300
TOTAL DIRECT LABOR MANHOURS						522,000

*Major equipment manhours obtained from Bechtel's proprietary "Manhour Standard" document.

DIRECT LABOR COST		
522,000 @ $20.70/hr.	=	10,810
SPARE PARTS	=	20
SALES TAX	=	270
FIELD INDIRECT COSTS		
75% of Labor Cost	=	8,110
SUBTOTAL FIELD COSTS		
680 + 5,030 + 10,810 + 20 + 270 + 8,110	=	24,920
HOME OFFICE MANHOURS	=	45,000
HOME OFFICE COSTS		
45,000 @ $36.79	=	1,660
ENGINEERING BY OTHERS	=	-
SUBTOTAL PLANT AREA COSTS		
24,920 + 1,660	=	26,580

PLANT #33

JOB NO. & TITLE JOB NO. 14222 BRECKINRIDGE PROJECT

CLIENT ASHLAND SYNTHETIC FUELS, INC.

JOB LOCATION BRECKINRIDGE CO., KENTUCKY

TAKEOFF _____ APPROVED _____

PRICED _____ DATE _____

CHECKED _____ SHEET ___ OF ___

RCE - 10 C 10/70

DIRECT FIELD COST SUMMARY

FIRE SYSTEM

	QUANTITY / UNIT	$ M QUOTED	MANHOURS TOTAL	MANHOURS $/MH	TOTAL COST MATERIAL	LABOR	SUBCONTRACT	TOTAL
.11 "C" - Columns & Vessels								
.12 "D" - Tanks	1 EA						260000	
.13 "E" - Exchangers								
.14 "F" - Fired Heaters								
.15 "G" - Pumps & Drivers	6 EA		3550		359000			
.16 "H" - Vacuum Equipment								
.17 "K" - Compressors & Drs.								
.18 "T" - Special Equipment	2 EA		720		44700			
FREIGHT 4%					16000			
TOTAL MAJOR EQUIPMENT	9		4270		419700		260000	679700
							APPT.	3000
.21 "J" - Instruments								680000
.22 "L" - Piping								
.23 "M" - Structural Steel								
.24 "N" - Insulation								
.25 "P" - Electrical								
.26 "Q" - Concrete Work								
.27 "R" - Buildings								
.28 "S" - Site Improvements								
.29 "X" - Painting								
TOTAL OTHER MATERIALS								
TOTAL DIRECT COST								

SHEET NO _____ PLANT 33

28.0 PLANT 34 SEWERS AND WASTEWATER TREATMENT

28.1 GENERAL

Sewers and Wastewater Treatment (Plant 34) collects process plant and offplot contaminated process waste streams and storm runoff (contaminated and uncontaminated), and performs treating as required for water reuse with waste sludge transferred to Solid Waste Management (Plant 42).

This estimate was prepared by Bechtel's Refinery and Chemical Division based on a conceptual design provided by the Research and Engineering Division. The scope consisted of information similar to that used in the Plant 32 (Water Systems) estimate.

Major equipment was priced by individual item based largely on vendor information. Bulk materials were included as a percentage of the major equipment cost.

The bulk factors used in this plant are considerably lower than other process units. This is the result of extensive skid mounting and pre-packaging of the equipment where much of the bulk material cost that would normally be included in the factors has already been priced in the equipment accounts.

28.2 FACTORED CAPITAL COST ESTIMATE

NOTE: All costs are in thousands of dollars.

MAJOR EQUIPMENT, MATERIAL AND SUBCONTRACT COSTS

Price developed from vendor quotes or in-house data. = $47,350

BULK MATERIAL AND SUBCONTRACT COSTS

The bulk material and subcontract costs are taken as percentages (or cost "factors") of the major equipment costs. The cost factors are based on Bechtel's historical, proprietary data for similar types of plants and vary with type and size of plant.

Bulk Material Costs		Cost Factor, %				
Instruments	=	0.0600	X	47,350	=	2,840
Piping	=	0.0900	X	47,350	=	4,260
Structural Steel	=	0.0501	X	47,350	=	2,370
Electrical	=	0.0800	X	47,350	=	3,790
Concrete	=	0.0500	X	47,350	=	2,370
Site Improvements	=	0.0699	X	47,350	=	3,310
Total Bulk Material Cost					=	$18,940

Subcontract Costs		Cost Factor, %				
Insulation	=	0.0399	X	47,350	=	1,890
Site Improvements	=	0.0201	X	47,350	=	950
Painting	=	0.0201	X	47,350	=	950
Total Subcontract Cost					=	3,790
TOTAL BULK MATERIAL AND SUBCONTRACT COSTS					=	$22,730

DIRECT LABOR MANHOURS

Direct labor manhours are taken as multipliers (or manhour "factors") of the bulk material costs. The manhour factors are based on Bechtel's historical, proprietary data for similar types of plants varying with type and size of plant and adjusted as required for labor productivity based on jobsite data.

		Manhour Factor Hrs/$1000 of Cost				Hours
Instrument Manhours	=	19.23	X	2,840	=	54,600
Piping Manhours	=	51.01	X	4,260	=	217,300
Structural Steel Manhours	=	38.23	X	2,370	=	90,600
Electrical Manhours	=	63.75	X	3,790	=	241,600
Concrete Manhours	=	84.64	X	2,370	=	200,600
Site Improvement Manhours	=	170.36	X	3,310	=	563,900
Major Equipment Manhours*					=	179,040
TOTAL DIRECT LABOR MANHOURS						1,547,640

*Major equipment manhours obtained from Bechtel's proprietary "Manhour Standard" document.

DIRECT LABOR COST		
1,547,640 @ $20.70/hr.	=	32,040
SPARE PARTS	=	930
SALES TAX	=	1,990
FIELD INDIRECT COSTS		
75% of Labor Cost	=	24,030
CHEMICALS	=	820
SUBTOTAL FIELD COSTS		
47,350 + 22,730 + 32,040 + 930 + 1,990 + 24,030 + 820	=	129,890
HOME OFFICE MANHOURS	=	477,000
HOME OFFICE COSTS		
477,000 @ $36.79	=	17,550
ENGINEERING BY OTHERS	=	-
SUBTOTAL PLANT AREA COSTS		
129,890 + 17,550	=	147,440

PLANT #34 — JOB NO. 14222

JOB NO. & TITLE: BRECKINRIDGE PROJECT
CLIENT: ASHLAND SYNTHETIC FUELS, INC.
JOB LOCATION: BRECKINRIDGE CO., KENTUCKY

TAKEOFF _____ APPROVED _____
PRICED _____ DATE _____
CHECKED _____ SHEET ___ OF _____

RCE - 10 C 10/70

DIRECT FIELD COST SUMMARY — CLEAN & WASTE TREATMENT

	QUANTITY / UNIT	$ M QUOTED	MANHOURS TOTAL	MANHOURS $/MH	TOTAL COST MATERIAL	TOTAL COST LABOR	TOTAL COST SUBCONTRACT	TOTAL COST TOTAL
.11 "C" - Columns & Vessels	2		90		-0-			
.12 "D" - Tanks	50		4050		124200		535800	
.13 "E" - Exchangers	20		990		2300			
.14 "F" - Fired Heaters			-					
.15 "G" - Pumps & Drivers	114		12900		421900			
.16 "H" - Vacuum Equipment			-					
.17 "K" - Compressors & Drs.	27		35790		1650000			
.18 "T" - Special Equipment	122		124510		15696700		28200800	
FREIGHT					716000			
CHEMICALS			690					
TOTAL MAJOR EQUIPMENT	335				18611100		28735800	47346900
								ADJ <3100
								47350000
.21 "J" - Instruments								
.22 "L" - Piping								
.23 "M" - Structural Steel								
.24 "N" - Insulation								
.25 "P" - Electrical								
.26 "Q" - Concrete Work								
.27 "R" - Buildings								
.28 "S" - Site Improvements								
.29 "X" - Painting								
TOTAL OTHER MATERIALS								
TOTAL DIRECT COST								

SHEET NO _____ PLANT 34

29.0 PLANT 35 STACK GAS SCRUBBING

29.1 GENERAL

Stack Gas Scrubbing (Plant 35) treats tail gas from the Sulfur Plant (Plant 10), as well as flue gas from the boilers, by a process of absorption and regeneration to remove sulfur dioxide, which is then recycled back to the Sulfur Plant (Plant 10); the treated gas is then released to the stacks.

The estimate for the plant was prepared by Davy McKee based on a proprietary process design, the Wellman Lord Flue Gas Desulfurization process. Costs were identified by subsystem, with major equipment listed by individual item. The equipment was priced by Davy McKee utilizing vendor quotations or unit prices for similar items from other related installations.

Bulk materials were estimated in detail by individual account. Quantities were taken off from drawings and layouts and priced on a unit rate basis using Davy McKee procurement data.

29.0 PLANT 35 STACK GAS SCRUBBING

29.2 FACTORED CAPITAL COST ESTIMATE

NOTE: All costs are in thousands of dollars.

MAJOR EQUIPMENT, MATERIAL AND SUBCONTRACT COSTS

Price developed from vendor quotes or in-house data. = $13,160

BULK MATERIAL AND SUBCONTRACT COSTS

The bulk material and subcontract costs are taken as percentages (or cost "factors") of the major equipment costs. The cost factors are based on Bechtel's historical, proprietary data for similar types of plants and vary with type and size of plant.

Bulk Material Costs		Cost Factor, %				
Instruments	=	0.1292	X	13,160	=	1,700
Piping	=	0.3191	X	13,160	=	4,200
Structural Steel	=	0.1353	X	13,160	=	1,780
Electrical	=	0.0760	X	13,160	=	1,000
Concrete	=	0.0494	X	13,160	=	650
Site Improvements	=	-	X	-	=	-
Total Bulk Material Cost					=	$9,330

Subcontract Costs		Cost Factor, %				
Insulation	=	0.1976	X	13,160	=	2,600
Buildings	=	0.0403	X	13,160	=	530
Painting	=	0.0327	X	13,160	=	430
Total Subcontract Cost					=	3,560
TOTAL BULK MATERIAL AND SUBCONTRACT COSTS					=	$12,890

DIRECT LABOR MANHOURS

Direct labor manhours are taken as multipliers (or manhour "factors") of the bulk material costs. The manhour factors are based on Bechtel's historical, proprietary data for similar types of plants varying with type and size of plant and adjusted as required for labor productivity based on jobsite data.

		Manhour Factor Hrs/$1000 of Cost				Hours
Instrument Manhours	=	32.53	X	1,700	=	55,300
Piping Manhours	=	52.00	X	4,200	=	218,400
Structural Steel Manhours	=	32.87	X	1,780	=	58,500
Electrical Manhours	=	104.00	X	1,000	=	104,000
Concrete Manhours	=	169.08	X	650	=	109,900
Site Improvement Manhours	=	NA	X	NA	=	12,800
Major Equipment Manhours*					=	100,300
TOTAL DIRECT LABOR MANHOURS						659,200

*Major equipment manhours obtained from Bechtel's proprietary "Manhour Standard" document.

DIRECT LABOR COST		
659,200 @ $20.70/hr.	=	13,650
SPARE PARTS	=	500
SALES TAX	=	990
FIELD INDIRECT COSTS		
75% of Labor Cost	=	10,240
SUBTOTAL FIELD COSTS		
13,160 + 12,890 + 13,650 + 500 + 10,240	=	50,440
HOME OFFICE MANHOURS	=	281,000
HOME OFFICE COSTS		
281,000 @ $36.79	=	10,340
ENGINEERING BY OTHERS	=	-
SUBTOTAL PLANT AREA COSTS		
50,440 + 10,340	=	60,780

PLANT # 35

RCE - 10 C
10/70

JOB NO. & TITLE JOB NO. 14222 BRECKINRIDGE PROJECT — TAKEOFF — APPROVED

CLIENT ASHLAND SYNTHETIC FUELS, INC. — PRICED — DATE

JOB LOCATION BRECKINRIDGE CO., KENTUCKY — CHECKED — SHEET ___ OF ___

DIRECT FIELD COST SUMMARY

STACK GAS SCRUBBING

	QUANTITY / UNIT	$ M QUOTED	MANHOURS TOTAL	MANHOURS $/MH	TOTAL COST MATERIAL	TOTAL COST LABOR	TOTAL COST SUBCONTRACT	TOTAL COST TOTAL
.11 "C" - Columns & Vessels	30							
.12 "D" - Tanks	14							
.13 "E" - Exchangers	20							
.14 "F" - Fired Heaters	5							
.15 "G" - Pumps & Drivers	88							
.16 "H" - Vacuum Equipment								
.17 "K" - Compressors & Drs.	16							
.18 "T" - Special Equipment	29							
TOTAL MAJOR EQUIPMENT	202		131,130		10022400		31346000	131570000
								ADJ 3000
.21 "J" - Instruments								131600000
.22 "L" - Piping								
.23 "M" - Structural Steel								
.24 "N" - Insulation								
.25 "P" - Electrical								
.26 "Q" - Concrete Work								
.27 "R" - Buildings								
.28 "S" - Site Improvements								
.29 "X" - Painting								
TOTAL OTHER MATERIALS								
TOTAL DIRECT COST								

SHEET NO ___ PLANT 35

30.0 PLANT 36 INSTRUMENT AIR AND PLANT AIR SYSTEMS

30.1 GENERAL

Instrument Air and Plant Air Systems (Plant 36) provides compressed, filtered, cool, dry air to instruments, as well as to utility station plant users.

Costs for this plant are based on Bechtel's Phase Zero preliminary design. Estimating scope consisted of a list of major equipment and design data sheets.

Major equipment was estimated by individual item or packaged unit, and bulk materials were applied as a percentage of the equipment cost.

30.0 PLANT 36 INSTRUMENT AIR AND PLANT AIR SYSTEMS

30.2 FACTORED CAPITAL COST ESTIMATE

NOTE: All costs are in thousands of dollars.

MAJOR EQUIPMENT, MATERIAL AND SUBCONTRACT COSTS

Price developed from vendor quotes or in-house data. = $720

BULK MATERIAL AND SUBCONTRACT COSTS

The bulk material and subcontract costs are taken as percentages (or cost "factors") of the major equipment costs. The cost factors are based on Bechtel's historical, proprietary data for similar types of plants and vary with type and size of plant.

Bulk Material Costs		Cost Factor, %				
Instruments	=	0.09721	X	720	=	70
Piping	=	0.2639	X	720	=	190
Structural Steel	=	0.0417	X	720	=	30
Electrical	=	0.0556	X	720	=	40
Concrete	=	0.0278	X	720	=	20
Site Improvements	=	0.0139	X	720	=	10
Total Bulk Material Cost					=	$360

Subcontract Costs		Cost Factor, %				
Insulation	=	0.0833	X	720	=	60
Buildings	=	-	X	-	=	-
Painting	=	0.0139	X	720	=	10
Total Subcontract Cost					=	70
TOTAL BULK MATERIAL AND SUBCONTRACT COSTS					=	$430

DIRECT LABOR MANHOURS

Direct labor manhours are taken as multipliers (or manhour "factors") of the bulk material costs. The manhour factors are based on Bechtel's historical, proprietary data for similar types of plants varying with type and size of plant and adjusted as required for labor productivity based on jobsite data.

		Manhour Factor Hrs/$1000 of Cost				Hours
Instrument Manhours	=	20.00	X	70	=	1,400
Piping Manhours	=	43.68	X	190	=	8,300
Structural Steel Manhours	=	40.00	X	30	=	1,200
Electrical Manhours	=	60.00	X	40	=	2,400
Concrete Manhours	=	130.0	X	20	=	2,600
Site Improvement Manhours	=	120.0	X	10	=	1,200
Major Equipment Manhours*					=	6,000
TOTAL DIRECT LABOR MANHOURS						23,100

*Major equipment manhours obtained from Bechtel's proprietary "Manhour Standard" document.

DIRECT LABOR COST		
23,100 @ $20.70/hr.	=	480
SPARE PARTS	=	40
SALES TAX	=	-
FIELD INDIRECT COSTS		
75% of Labor Cost	=	360
SUBTOTAL FIELD COSTS		
720 + 430 + 480 + 40 + 360	=	2,030
HOME OFFICE MANHOURS	=	22,000
HOME OFFICE COSTS		
22,000 @ $36.79	=	810
ENGINEERING BY OTHERS	=	-
SUBTOTAL PLANT AREA COSTS		
2,030 + 810	=	2,840

PLANT # 36

JOB NO. & TITLE JOB NO. 14222 BRECKINRIDGE PROJECT

CLIENT ASHLAND SYNTHETIC FUELS, INC.

JOB LOCATION ~~BRECKINRIDGE CO., KENTUCKY~~

RCE - 10 C 10/70

TAKEOFF _____ APPROVED _____

PRICED _____ DATE _____

CHECKED _____ SHEET ___ OF _____

DIRECT FIELD COST SUMMARY

INSTRUMENT AIR & PLANT AIR SYSTEMS

	QUANTITY / UNIT	$ M QUOTED	MANHOURS TOTAL	MANHOURS $/MH	TOTAL COST MATERIAL	TOTAL COST LABOR	TOTAL COST SUBCONTRACT	TOTAL COST TOTAL
.11 "C" - Columns & Vessels	2		170		80000			
.12 "D" - Tanks								
.13 "E" - Exchangers								
.14 "F" - Fired Heaters								
.15 "G" - Pumps & Drivers								
.16 "H" - Vacuum Equipment								
.17 "K" - Compressors & Drs.								
.18 "T" - Special Equipment	5		5870		613600			
FREIGHT 4%					28000			
TOTAL MAJOR EQUIPMENT	7		6040		721600			721600
							Adj.	41600
								720000
.21 "J" - Instruments								
.22 "L" - Piping								
.23 "M" - Structural Steel								
.24 "N" - Insulation								
.25 "P" - Electrical								
.26 "Q" - Concrete Work								
.27 "R" - Buildings								
.28 "S" - Site Improvements								
.29 "X" - Painting								
TOTAL OTHER MATERIALS								
TOTAL DIRECT COST								

SHEET NO _____ PLANT 36

31.0 PLANT 37 TELECOMMUNICATION SYSTEMS

31.1 GENERAL

Telecommunication Systems (Plant 37) provides for communication within the plant and offsite and with transportation carriers. It also provides links with information systems within the plant and offsite.

The scope for the communication system was developed by Bechtel's Hydro and Community Facilities Division, making use of similar facilities from other recent Bechtel projects.

In this case, a detailed list of applicable communication equipment and devices was developed and priced using vendor estimates and unit prices.

31.0 PLANT 37 TELECOMMUNICATIONS

31.2 FACTORED CAPITAL COST ESTIMATE

NOTE: All costs are in thousands of dollars.

MAJOR EQUIPMENT, MATERIAL AND SUBCONTRACT COSTS

Price developed from vendor quotes or in-house data. = NA

BULK MATERIAL AND SUBCONTRACT COSTS

The bulk material and subcontract costs are taken as percentages (or cost "factors") of the major equipment costs. The cost factors are based on Bechtel's historical, proprietary data for similar types of plants and vary with type and size of plant.

Bulk Material Costs		Cost Factor, %			
Instruments	=	NA	X	=	
Piping	=	NA	X	=	
Structural Steel	=	NA	X	=	
Electrical	=	NA	X	=	1,090
Concrete	=	NA	X	=	
Site Improvements	=	NA	X	=	
Total Bulk Material Cost	=	NA	X	=	$1,090

Subcontract Costs		Cost Factor, %				
Insulation	=	NA	X		=	-
Electrical	=	-	X	-	=	160
Painting	=	NA	X	-	=	-
Total Subcontract Cost					=	160
TOTAL BULK MATERIAL AND SUBCONTRACT COSTS					=	$1,250

DIRECT LABOR MANHOURS

Direct labor manhours are taken as multipliers (or manhour "factors") of the bulk material costs. The manhour factors are based on Bechtel's historical, proprietary data for similar types of plants varying with type and size of plant and adjusted as required for labor productivity based on jobsite data.

		Manhour Factor Hrs/$1000 of Cost			
Instrument Manhours	=	NA	X	=	
Piping Manhours	=	NA	X	=	
Structural Steel Manhours	=	NA	X	=	
Electrical Manhours	=	NA	X	=	
Concrete Manhours	=	NA	X	=	
Site Improvement Manhours	=	NA	X	=	
Major Equipment Manhours*				=	
TOTAL DIRECT LABOR MANHOURS					NA

*Major equipment manhours obtained from Bechtel's proprietary "Manhour Standard" document.

DIRECT LABOR COST		
@ $20.70/hr.	=	-
SPARE PARTS	=	-
SALES TAX	=	60
FIELD INDIRECT COSTS		
75% of Labor Cost	=	-
SUBTOTAL FIELD COSTS		
1,250 + 60	=	1,310
HOME OFFICE MANHOURS	=	7,000
HOME OFFICE COSTS		
7,000 @ $36.79	=	260
ENGINEERING BY OTHERS	=	-
SUBTOTAL PLANT AREA COSTS		
1,310 + 260	=	1,570

PLANT #37 JOB NO. & TITLE JOB NO. 14222 BRECKINRIDGE PROJECT

CLIENT ASHLAND SYNTHETIC FUELS, INC.

JOB LOCATION BRECKINRIDGE CO., KENTUCKY

TAKEOFF _____ APPROVED _____

PRICED _____ DATE _____

CHECKED _____ SHEET ___ OF ___

RCE - 10 C 10/70

DIRECT FIELD COST SUMMARY — TELE COMMUNICATION SYSTEM

	QUANTITY / UNIT	$ M QUOTED	MANHOURS TOTAL	MANHOURS $/MH	TOTAL COST MATERIAL	TOTAL COST LABOR	TOTAL COST SUBCONTRACT	TOTAL COST TOTAL
.11 "C" - Columns & Vessels								
.12 "D" - Tanks								
.13 "E" - Exchangers								
.14 "F" - Fired Heaters								
.15 "G" - Pumps & Drivers								
.16 "H" - Vacuum Equipment								
.17 "K" - Compressors & Drs.								
.18 "T" - Special Equipment								
TOTAL MAJOR EQUIPMENT	NOT APPLICABLE - NO MAJOR EQUIPMENT							
.21 "J" - Instruments								
.22 "L" - Piping								
.23 "M" - Structural Steel								
.24 "N" - Insulation								
.25 "P" - Electrical								
.26 "Q" - Concrete Work								
.27 "R" - Buildings								
.28 "S" - Site Improvements								
.29 "X" - Painting								
TOTAL OTHER MATERIALS								
TOTAL DIRECT COST								

SHEET NO _____ PLANT 37

32.0 PLANT 38 INERT GAS SYSTEMS

32.1 GENERAL

Inert Gas Systems (Plant 38) pressurizes waste nitrogen from the Oxygen Plant (Plant 15), and distributes the pressurized nitrogen to users such as Coal Drying and Pulverizing (Plant 1) and the Gas Plant (Plant 7), as well as to other plants where nitrogen is needed for blanketing and purging.

This estimate was based on Bechtel's Phase Zero design. The scope consisted of a list of major equipment with accompanying design data sheets.

Major equipment was estimated by individual item utilizing vendor estimates for the compressor equipment and historical data for the remaining pieces. Bulk materials were applied as ratios of the major equipment utilizing Bechtel experience for similar inert gas facilities.

32.0 PLANT 38 INERT GAS SYSTEM

32.2 FACTORED CAPITAL COST ESTIMATE

NOTE: All costs are in thousands of dollars.

MAJOR EQUIPMENT, MATERIAL AND SUBCONTRACT COSTS

Price developed from vendor quotes or in-house data. = $830

BULK MATERIAL AND SUBCONTRACT COSTS

The bulk material and subcontract costs are taken as percentages (or cost "factors") of the major equipment costs. The cost factors are based on Bechtel's historical, proprietary data for similar types of plants and vary with type and size of plant.

Bulk Material Costs		Cost Factor, %				
Instruments	=	0.1205	X	830	=	100
Piping	=	0.3253	X	830	=	270
Structural Steel	=	0.0843	X	830	=	70
Electrical	=	0.1205	X	830	=	100
Concrete	=	0.0602	X	830	=	50
Site Improvements	=	0.0241	X	830	=	20
Total Bulk Material Cost					=	$610

Subcontract Costs		Cost Factor, %				
Insulation	=	0.0482	X	830	=	40
Buildings	=	-	X	-	=	-
Painting	=	0.0120	X	830	=	10
Total Subcontract Cost					=	50
TOTAL BULK MATERIAL AND SUBCONTRACT COSTS					=	$660

DIRECT LABOR MANHOURS

Direct labor manhours are taken as multipliers (or manhour "factors") of the bulk material costs. The manhour factors are based on Bechtel's historical, proprietary data for similar types of plants varying with type and size of plant and adjusted as required for labor productivity based on jobsite data.

		Manhour Factor Hrs/$1000 of Cost				Hours
Instrument Manhours	=	20.00	X	100	=	2,000
Piping Manhours	=	45.77	X	260	=	11,900
Structural Steel Manhours	=	28.57	X	70	=	2,000
Electrical Manhours	=	63.00	X	100	=	6,300
Concrete Manhours	=	102.0	X	50	=	5,100
Site Improvement Manhours	=	40.00	X	20	=	800
Major Equipment Manhours*	=	16.75	X	830	=	13,900
TOTAL DIRECT LABOR MANHOURS						42,000

*Major equipment manhours obtained from Bechtel's proprietary "Manhour Standard" document.

DIRECT LABOR COST		
42,000 @ $20.70/hr.	=	870
SPARE PARTS	=	40
SALES TAX	=	-
FIELD INDIRECT COSTS		
75% of Labor Cost	=	650
SUBTOTAL FIELD COSTS		
830 + 660 + 870 + 40 + 650	=	3,050
HOME OFFICE MANHOURS	=	14,000
HOME OFFICE COSTS		
14,000 @ $36.79	=	520
ENGINEERING BY OTHERS	=	-
SUBTOTAL PLANT AREA COSTS		
3,050 + 520	=	3,570

PLANT #38

JOB NO. & TITLE JOB NO. 14222 BRECKINRIDGE PROJECT

CLIENT ASHLAND SYNTHETIC FUELS, INC.

JOB LOCATION BRECKINRIDGE CO., KENTUCKY

TAKEOFF _____ APPROVED _____

PRICED _____ DATE _____

CHECKED _____ SHEET ___ OF ___

RCE - 10 C 10/70

DIRECT FIELD COST SUMMARY

INERT GAS SYSTEM

	QUANTITY / UNIT	$ M QUOTED	MANHOURS TOTAL	MANHOURS $/MH	TOTAL COST MATERIAL	TOTAL COST LABOR	TOTAL COST SUBCONTRACT	TOTAL COST TOTAL
.11 "C" - Columns & Vessels	4 EA		170		212000			
.12 "D" - Tanks								
.13 "E" - Exchangers	2 EA		70		160000			
.14 "F" - Fired Heaters								
.15 "G" - Pumps & Drivers								
.16 "H" - Vacuum Equipment								
.17 "K" - Compressors & Drs.	4 EA		13600		760000			
.18 "T" - Special Equipment								
FREIGHT					32000			
TOTAL MAJOR EQUIPMENT	10 EA		13840		829200			829200
								INT. 8000
.21 "J" - Instruments								830000
.22 "L" - Piping								
.23 "M" - Structural Steel								
.24 "N" - Insulation								
.25 "P" - Electrical								
.26 "Q" - Concrete Work								
.27 "R" - Buildings								
.28 "S" - Site Improvements								
.29 "X" - Painting								
TOTAL OTHER MATERIALS								
TOTAL DIRECT COST								

SHEET NO _____ PLANT 38

33.0 PLANT 39 PURGE AND FLUSH OIL SYSTEMS

33.1 GENERAL

Purge and Flush Oil Systems (Plant 39) distributes flush oils and warmup oils for purge and/or flush purposes for equipment and piping involving H-Coal slurry preparation, reaction, and separation, and Gasification and Purification (Plant 12).

This estimate is based on Bechtel's Phase Zero design. The scope consisted of a list of major equipment, equipment specifications and design data sheets. The major equipment, which in the plant consisted mainly of pumps, was priced by individual item using unit prices and curves developed from vendor estimates and experience from other current Bechtel projects.

Bulk materials have been included as a percentage of major equipment, making use of historical factors developed from similar facilities.

33.0 PLANT 39 PURGE AND FLUSH OIL SYSTEMS

33.2 FACTORED CAPITAL COST ESTIMATE

NOTE: All costs are in thousands of dollars.

MAJOR EQUIPMENT, MATERIAL AND SUBCONTRACT COSTS

Price developed from vendor quotes or in-house data. = $3,280

BULK MATERIAL AND SUBCONTRACT COSTS

The bulk material and subcontract costs are taken as percentages (or cost "factors") of the major equipment costs. The cost factors are based on Bechtel's historical, proprietary data for similar types of plants and vary with type and size of plant.

Bulk Material Costs		Cost Factor, %				
Instruments	=	0.0701	X	3,280	=	230
Piping	=	0.2012	X	3,280	=	660
Structural Steel	=	0.0793	X	3,280	=	260
Electrical	=	0.1189	X	3,280	=	390
Concrete	=	0.0610	X	3,280	=	200
Site Improvements	=	0.0396	X	3,280	=	130
Total Bulk Material Cost					=	$1,870

Subcontract Costs		Cost Factor, %				
Insulation	=	0.0701	X	3,280	=	230
Buildings	=	-	X	-	=	-
Painting	=	0.0152	X	3,280	=	50
Total Subcontract Cost					=	280
TOTAL BULK MATERIAL AND SUBCONTRACT COSTS					=	$2,150

DIRECT LABOR MANHOURS

Direct labor manhours are taken as multipliers (or manhour "factors") of the bulk material costs. The manhour factors are based on Bechtel's historical, proprietary data for similar types of plants varying with type and size of plant and adjusted as required for labor productivity based on jobsite data.

		Manhour Factor Hrs/$1000 of Cost				Hours
Instrument Manhours	=	19.13	X	230	=	4,400
Piping Manhours	=	41.21	X	660	=	27,200
Structural Steel Manhours	=	38.46	X	260	=	10,000
Electrical Manhours	=	47.95	X	390	=	18,700
Concrete Manhours	=	94.50	X	200	=	18,900
Site Improvement Manhours	=	82.31	X	130	=	10,700
Major Equipment Manhours*					=	15,100
TOTAL DIRECT LABOR MANHOURS						105,000

*Major equipment manhours obtained from Bechtel's proprietary "Manhour Standard" document.

DIRECT LABOR COST		
105,000 @ $20.70/hr.	=	2,170
SPARE PARTS	=	160
SALES TAX		—
FIELD INDIRECT COSTS		
75% of Labor Cost	=	1,630
SUBTOTAL FIELD COSTS		
3,280 + 2,150 + 2,170 + 160 + 1,630	=	9,390
HOME OFFICE MANHOURS	=	22,000
HOME OFFICE COSTS		
22,000 @ $36.79	=	810
ENGINEERING BY OTHERS	=	-
SUBTOTAL PLANT AREA COSTS		
9,390 + 810	=	10,200

PLANT #39

RCE - 10 C 10/70

JOB NO. & TITLE JOB NO. 14222 BRECKINRIDGE PROJECT

CLIENT ASHLAND SYNTHETIC FUELS, INC.

JOB LOCATION BRECKINRIDGE CO., KENTUCKY

TAKEOFF _____ APPROVED _____

PRICED _____ DATE _____

CHECKED _____ SHEET ___ OF ___

DIRECT FIELD COST SUMMARY

PURGE & FLUSH OIL SYSTEMS

	QUANTITY / UNIT	$ M QUOTED	MANHOURS TOTAL	MANHOURS $/MH	TOTAL COST MATERIAL	TOTAL COST LABOR	TOTAL COST SUBCONTRACT	TOTAL COST TOTAL
.11 "C" - Columns & Vessels	46 EA		1960		377600			
.12 "D" - Tanks								
.13 "E" - Exchangers	24 EA		1550		450700			
.14 "F" - Fired Heaters								
.15 "G" - Pumps & Drivers	76 EA		11,310		2305200			
.16 "H" - Vacuum Equipment								
.17 "K" - Compressors & Drs.								
.18 "T" - Special Equipment	4 EA		270		16200			
FREIGHT 4%					126000			
TOTAL MAJOR EQUIPMENT	150				3275700			3275700
								Adj. 4300
								3280000
.21 "J" - Instruments								
.22 "L" - Piping								
.23 "M" - Structural Steel								
.24 "N" - Insulation								
.25 "P" - Electrical								
.26 "Q" - Concrete Work								
.27 "R" - Buildings								
.28 "S" - Site Improvements								
.29 "X" - Painting								
TOTAL OTHER MATERIALS								
TOTAL DIRECT COST								

SHEET NO _____ PLANT 39

34.0 PLANT 40 SITE DEVELOPMENT AND ROADS

34.1 GENERAL

Site Development and Roads (Plant 40) includes site clearing, cut and fill operations, drainage ditches, roads, and parking lots, tank farm dikes, bridges, finish grading, and fencing.

The scope for this portion of the estimate was developed as a part of the preliminary Phase Zero design. The information consisted of an overall site arrangement plan which located the major process and utility boundaries as well as associated offplot facilities.

For estimating purposes, quantities for individual civil account activities were developed and priced on a unit-cost basis. The estimate is based on all of this work being subcontracted.

34.0 PLANT 40 SITE DEVELOPMENT AND ROADS

34.2 FACTORED CAPITAL COST ESTIMATE

NOTE: All costs are in thousands of dollars.

MAJOR EQUIPMENT, MATERIAL AND SUBCONTRACT COSTS

Price developed from vendor quotes or in-house data. = NA

BULK MATERIAL AND SUBCONTRACT COSTS

The bulk material and subcontract costs are taken as percentages (or cost "factors") of the major equipment costs. The cost factors are based on Bechtel's historical, proprietary data for similar types of plants and vary with type and size of plant.

Bulk Material Costs		Cost Factor, %			
Instruments	=	NA	X	=	
Piping	=	NA	X	=	
Structural Steel	=	NA	X	=	
Electrical	=	NA	X	=	
Concrete	=	NA	X	=	
Site Improvements	=	NA	X	=	
Total Bulk Material Cost	=	NA	X	=	NA

Subcontract Costs		Cost Factor, %				
Insulation	=	NA	X	-	=	-
Buildings	=	NA	X	-	=	-
Site Improvements	=	NA	X	-	=	58,560
Total Subcontract Cost					=	58,560
TOTAL BULK MATERIAL AND SUBCONTRACT COSTS					=	$58,560

DIRECT LABOR MANHOURS

Direct labor manhours are taken as multipliers (or manhour "factors") of the bulk material costs. The manhour factors are based on Bechtel's historical, proprietary data for similar types of plants varying with type and size of plant and adjusted as required for labor productivity based on jobsite data.

		Manhour Factor Hrs/$1000 of Cost			
Instrument Manhours	=	NA	X	=	
Piping Manhours	=	NA	X	=	
Structural Steel Manhours	=	NA	X	=	
Electrical Manhours	=	NA	X	=	
Concrete Manhours	=	NA	X	=	
Site Improvement Manhours	=	NA	X	=	
Major Equipment Manhours*				=	
TOTAL DIRECT LABOR MANHOURS					NA

*Major equipment manhours obtained from Bechtel's proprietary "Manhour Standard" document.

DIRECT LABOR COST		
@ $20.70/hr.	=	-
SPARE PARTS	=	-
SALES TAX		-
FIELD INDIRECT COSTS		
75% of Labor Cost	=	-
SUBTOTAL FIELD COSTS	=	58,560
HOME OFFICE MANHOURS	=	89,000
HOME OFFICE COSTS		
89,000 @ $36.79	=	3,270
ENGINEERING BY OTHERS	=	-
SUBTOTAL PLANT AREA COSTS		
58,560 + 3,270	=	61,830

PLANT 40

JOB NO. & TITLE JOB NO. 14222 BRECKINRIDGE PROJECT — TAKEOFF — APPROVED —

CLIENT ASHLAND SYNTHETIC FUELS, INC. — PRICED — DATE —

JOB LOCATION BRECKINRIDGE CO., KENTUCKY — CHECKED — SHEET ___ OF ___

RCE - 10 C 10/70

DIRECT FIELD COST SUMMARY — SITE DEVELOPMENT

	QUANTITY / UNIT	$ M QUOTED	MANHOURS TOTAL	MANHOURS $/MH	TOTAL COST MATERIAL	TOTAL COST LABOR	TOTAL COST SUBCONTRACT	TOTAL COST TOTAL
.11 "C" - Columns & Vessels								
.12 "D" - Tanks								
.13 "E" - Exchangers								
.14 "F" - Fired Heaters								
.15 "G" - Pumps & Drivers								
.16 "H" - Vacuum Equipment								
.17 "K" - Compressors & Drs.								
.18 "T" - Special Equipment								
TOTAL MAJOR EQUIPMENT	NOT APPLICABLE - NO MAJOR EQUIPMENT							
.21 "J" - Instruments								
.22 "L" - Piping								
.23 "M" - Structural Steel								
.24 "N" - Insulation								
.25 "P" - Electrical								
.26 "Q" - Concrete Work								
.27 "R" - Buildings								
.28 "S" - Site Improvements								
.29 "X" - Painting								
TOTAL OTHER MATERIALS								
TOTAL DIRECT COST								

SHEET NO ___ PLANT 40

35.0 PLANT 41 BUILDINGS

35.1 GENERAL

Buildings (Plant 41) provides various types of buildings to support the activities of employees in the plant, as well as to protect critical equipment and/or instrumentation.

For this estimate, a complete list of buildings was provided indicating type of service, materials of construction, and approximate square footage. Buildings were priced on a $/square foot subcontract basis.

Furnishings and removable internal fixtures were estimated separately, based on the building size and purpose.

35.0 PLANT 41 BUILDINGS

35.2 FACTORED CAPITAL COST ESTIMATE

NOTE: All costs are in thousands of dollars.

MAJOR EQUIPMENT, MATERIAL AND SUBCONTRACT COSTS

Price developed from vendor quotes or in-house data. = NA

BULK MATERIAL AND SUBCONTRACT COSTS

The bulk material and subcontract costs are taken as percentages (or cost "factors") of the major equipment costs. The cost factors are based on Bechtel's historical, proprietary data for similar types of plants and vary with type and size of plant.

Bulk Material Costs		Cost Factor, %			
Instruments	=	NA	X	=	-
Piping	=	NA	X	=	-
Structural Steel	=	NA	X	=	-
Electrical	=	NA	X	=	-
Concrete	=	NA	X	=	-
Buildings	=	NA	X	=	3,730
Total Bulk Material Cost				=	$3,730

Subcontract Costs		Cost Factor, %			
Insulation	=	NA	X	=	-
Buildings	=	NA	X	=	23,520
Painting	=	NA	X	=	-
Total Subcontract Cost				=	23,520
TOTAL BULK MATERIAL AND SUBCONTRACT COSTS				=	$27,250

DIRECT LABOR MANHOURS

Direct labor manhours are taken as multipliers (or manhour "factors") of the bulk material costs. The manhour factors are based on Bechtel's historical, proprietary data for similar types of plants varying with type and size of plant and adjusted as required for labor productivity based on jobsite data.

		Manhour Factor Hrs/$1000 of Cost		
Instrument Manhours	=	NA	X	=
Piping Manhours	=	NA	X	=
Structural Steel Manhours	=	NA	X	=
Electrical Manhours	=	NA	X	=
Concrete Manhours	=	NA	X	=
Site Improvement Manhours	=	NA	X	=
Major Equipment Manhours*				=
TOTAL DIRECT LABOR MANHOURS				NA

*Major equipment manhours obtained from Bechtel's proprietary "Manhour Standard" document.

DIRECT LABOR COST		
@ $20.70/hr.	=	-
SPARE PARTS	=	-
SALES TAX	=	190
FIELD INDIRECT COSTS		
75% of Labor Cost	=	-
SUBTOTAL FIELD COSTS		
27,250 + 190	=	27,440
HOME OFFICE MANHOURS	=	109,000
HOME OFFICE COSTS		
109,000 @ $36.79	=	4,010
ENGINEERING BY OTHERS	=	-
SUBTOTAL PLANT AREA COSTS		
27,440 + 4,010	=	31,450

PLANT# 41

RCE - 10 C
10/70

JOB NO. & TITLE JOB NO. 14222 BRECKINRIDGE PROJECT
CLIENT ASHLAND SYNTHETIC FUELS, INC.
JOB LOCATION BRECKINRIDGE CO., KENTUCKY

TAKEOFF _____ APPROVED _____
PRICED _____ DATE _____
CHECKED _____ SHEET ___ OF ___

DIRECT FIELD COST SUMMARY

BUILDINGS

	QUANTITY / UNIT	$M QUOTED	MANHOURS TOTAL	MANHOURS $/MH	TOTAL COST MATERIAL	TOTAL COST LABOR	TOTAL COST SUBCONTRACT	TOTAL COST TOTAL
.11 "C" - Columns & Vessels								
.12 "D" - Tanks								
.13 "E" - Exchangers								
.14 "F" - Fired Heaters								
.15 "G" - Pumps & Drivers								
.16 "H" - Vacuum Equipment								
.17 "K" - Compressors & Drs.								
.18 "T" - Special Equipment								
TOTAL MAJOR EQUIPMENT	NOT APPLICABLE - NO MAJOR EQUIPMENT							
.21 "J" - Instruments								
.22 "L" - Piping								
.23 "M" - Structural Steel								
.24 "N" - Insulation								
.25 "P" - Electrical								
.26 "Q" - Concrete Work								
.27 "R" - Buildings								
.28 "S" - Site Improvements								
.29 "X" - Painting								
TOTAL OTHER MATERIALS								
TOTAL DIRECT COST								

SHEET NO _____ PLANT 41

36.0 PLANT 42 SOLID WASTE MANAGEMENT

36.1 GENERAL

Solid Waste Management (Plant 42) processes solids remaining from process plant sludge and oily water treatment units through dewatering and solid incineration facilities.

The scope for this estimate consisted of a list of major equipment, with accompanying design specifications and data sheets.

Major equipment was priced on the basis of vendor estimates with the waste sludge incinerators accounting for most of the cost. Bulk materials were included as a percentage of the major equipment.

36.0 PLANT 42 SOLID WASTE MANAGEMENT

36.2 FACTORED CAPITAL COST ESTIMATE

NOTE: All costs are in thousands of dollars.

MAJOR EQUIPMENT, MATERIAL AND SUBCONTRACT COSTS

Price developed from vendor quotes or in-house data. = $6,360

BULK MATERIAL AND SUBCONTRACT COSTS

The bulk material and subcontract costs are taken as percentages (or cost "factors") of the major equipment costs. The cost factors are based on Bechtel's historical, proprietary data for similar types of plants and vary with type and size of plant.

Bulk Material Costs		Cost Factor, %				
Instruments	=	0.1101	X	6,360	=	700
Piping	=	0.2500	X	6,360	=	1,590
Structural Steel	=	0.0802	X	6,360	=	510
Electrical	=	0.1195	X	6,360	=	760
Concrete	=	0.0802	X	6,360	=	510
Site Improvement	=	0.0896	X	6,360	=	570
Total Bulk Material Cost					=	$4,640

Subcontract Costs		Cost Factor, %				
Insulation	=	0.1006	X	6,360	=	640
Buildings	=	-	X	-	=	-
Painting	=	0.0157	X	6,360	=	100
Total Subcontract Cost					=	740
TOTAL BULK MATERIAL AND SUBCONTRACT COSTS					=	$5,380

DIRECT LABOR MANHOURS

Direct labor manhours are taken as multipliers (or manhour "factors") of the bulk material costs. The manhour factors are based on Bechtel's historical, proprietary data for similar types of plants varying with type and size of plant and adjusted as required for labor productivity based on jobsite data.

		Manhour Factor Hrs/$1000 of Cost				Hours
Instrument Manhours	=	19.14	X	700	=	13,400
Piping Manhours	=	51.01	X	1,590	=	81,100
Structural Steel Manhours	=	35.09	X	510	=	17,900
Electrical Manhours	=	42.11	X	760	=	32,000
Concrete Manhours	=	114.7	X	510	=	58,500
Site Improvement Manhours	=	63.86	X	570	=	36,400
Major Equipment Manhours*					=	35,600
TOTAL DIRECT LABOR MANHOURS						274,900

*Major equipment manhours obtained from Bechtel's proprietary "Manhour Standard" document.

DIRECT LABOR COST		
274,900 @ $20.70/hr.	=	5,690
SPARE PARTS	=	320
SALES TAX	=	560
FIELD INDIRECT COSTS		
75% of Labor Cost	=	4,270
SUBTOTAL FIELD COSTS		
6,360 + 5,380 + 5,690 + 320 + 560 + 4,270	=	22,580
HOME OFFICE MANHOURS	=	109,000
HOME OFFICE COSTS		
109,000 @ $36.79	=	4,010
ENGINEERING BY OTHERS	=	-
SUBTOTAL PLANT AREA COSTS		
22,580 + 4,010	=	26,590

PLANT # 42

JOB NO. 14222

JOB NO. & TITLE BRECKINRIDGE PROJECT

CLIENT ASHLAND SYNTHETIC FUELS, INC.

JOB LOCATION BRECKINRIDGE CO., KENTUCKY

TAKEOFF _____ APPROVED _____

PRICED _____ DATE _____

CHECKED _____ SHEET ___ OF ___

RCE - 10 C 10/70

DIRECT FIELD COST SUMMARY

SOLID WASTE MANAGEMENT

	QUANTITY / UNIT	$M QUOTED	MANHOURS TOTAL	MANHOURS $/MH	TOTAL COST MATERIAL	TOTAL COST LABOR	TOTAL COST SUBCONTRACT	TOTAL COST TOTAL
.11 "C" - Columns & Vessels	7		1150		1000000			
.12 "D" - Tanks	9		1560		1492000		4000000	
.13 "E" - Exchangers								
.14 "F" - Fired Heaters								
.15 "G" - Pumps & Drivers	35		2250		4200000			
.16 "H" - Vacuum Equipment	3		130					
.17 "K" - Compressors & Drs.	8		5440					
.18 "T" - Special Equipment	37		25040		4890200			
FREIGHT 4%					2430000			
TOTAL MAJOR EQUIPMENT	99		35.570		63244000		40000000	636440000
								Adj. (4400000)
.21 "J" - Instruments								636000000
.22 "L" - Piping								
.23 "M" - Structural Steel								
.24 "N" - Insulation					1			
.25 "P" - Electrical								
.26 "Q" - Concrete Work								
.27 "R" - Buildings								
.28 "S" - Site Improvements								
.29 "X" - Painting								
TOTAL OTHER MATERIALS								
TOTAL DIRECT COST								

SHEET NO _____ PLANT 42

37.0 PLANT 44 LANDFILL

37.1 GENERAL

Landfill (Plant 44) hauls by truck a daily variety of dewatered solid wastes from plant operations for disposal in constructed and monitored landfill sites.

Quantities for this plant were developed in detail for both the hazardous and nonhazardous areas. The scope consisted of a topographic site plan as well as engineering specifications for liner design and materials of construction.

Each activity has been separately identified and priced on a unit cost basis. The work will be subcontracted.

Also included in the plant under the special equipment category is an allowance for mobile equipment to be dedicated to the landfill operation.

37.0 PLANT 44 LANDFILL

37.2 FACTORED CAPITAL COST ESTIMATE

NOTE: All costs are in thousands of dollars.

MAJOR EQUIPMENT, MATERIAL AND SUBCONTRACT COSTS

Price developed from vendor quotes or in-house data. = $5,890

BULK MATERIAL AND SUBCONTRACT COSTS

The bulk material and subcontract costs are taken as percentages (or cost "factors") of the major equipment costs. The cost factors are based on Bechtel's historical, proprietary data for similar types of plants and vary with type and size of plant.

Bulk Material Costs		Cost Factor, %				
Instruments	=	-	X	-	=	-
Piping	=	-	X	-	=	-
Structural Steel	=		X	-	=	
Electrical	=	-	X	-	=	-
Concrete	=	0.0005	X	5,890	=	3
Buildings	=	-	X	-	=	-
Total Bulk Material Cost					=	$3

Subcontract Costs		Cost Factor, %				
Insulation	=	-	X	-	=	-
Buildings	=	0.0102	X	5,890	=	60
Site Improvement	=	0.9542	X	5,890	=	5,620
Total Subcontract Cost					=	5,680
TOTAL BULK MATERIAL AND SUBCONTRACT COSTS					=	$5,680

DIRECT LABOR MANHOURS

Direct labor manhours are taken as multipliers (or manhour "factors") of the bulk material costs. The manhour factors are based on Bechtel's historical, proprietary data for similar types of plants varying with type and size of plant and adjusted as required for labor productivity based on jobsite data.

		Manhour Factor Hrs/$1000 of Cost				Hours
Instrument Manhours	=	-	X	-	=	-
Piping Manhours	=	-	X	-	=	-
Structural Steel Manhours	=	-	X	-	=	-
Electrical Manhours	=	-	X	-	=	-
Concrete Manhours	=	133.3	X	3	=	400
Site Improvement Manhours	=	-	X	-	=	
Major Equipment Manhours*					=	1,200
TOTAL DIRECT LABOR MANHOURS						1,600

*Major equipment manhours obtained from Bechtel's proprietary "Manhour Standard" document.

DIRECT LABOR COST		
1,600 @ $20.70/hr.	=	30
SPARE PARTS	=	290
SALES TAX	=	310
FIELD INDIRECT COSTS		
75% of Labor Cost	=	20
SUBTOTAL FIELD COSTS		
5,890 + 5,680 + 30 + 290 + 310 + 20	=	12,220
HOME OFFICE MANHOURS	=	14,000
HOME OFFICE COSTS		
14,000 @ $36.79	=	520
ENGINEERING BY OTHERS	=	-
SUBTOTAL PLANT AREA COSTS		
12,220 + 520	=	12,740

PLANT 44

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10/70

JOB NO. & TITLE: JOB NO. 14222 BRECKINRIDGE PROJECT
CLIENT: ASHLAND SYNTHETIC FUELS, INC.
JOB LOCATION: BRECKINRIDGE CO., KENTUCKY

TAKEOFF _____ APPROVED _____
PRICED _____ DATE _____
CHECKED _____ SHEET ___ OF ___

DIRECT FIELD COST SUMMARY

LANDFILL

	QUANTITY / UNIT	$M QUOTED	MANHOURS TOTAL	MANHOURS $/MH	TOTAL COST MATERIAL	TOTAL COST LABOR	TOTAL COST SUBCONTRACT	TOTAL COST TOTAL
.11 "C" - Columns & Vessels								
.12 "D" - Tanks								
.13 "E" - Exchangers								
.14 "F" - Fired Heaters								
.15 "G" - Pumps & Drivers	4 EA		1190		110000			
.16 "H" - Vacuum Equipment								
.17 "K" - Compressors & Drs.								
.18 "T" - Special Equipment	11 ea.				5500000			
FREIGHT @ 4%					226000			
TOTAL MAJOR EQUIPMENT	15 ea.				5886000			5886000
								ADJ. 4000
								5890000
.21 "J" - Instruments								
.22 "L" - Piping								
.23 "M" - Structural Steel								
.24 "N" - Insulation								
.25 "P" - Electrical								
.26 "Q" - Concrete Work								
.27 "R" - Buildings								
.28 "S" - Site Improvements								
.29 "X" - Painting								
TOTAL OTHER MATERIALS								
TOTAL DIRECT COST								

SHEET NO _____

PLANT 44

38.0 PLANT 45 TRANSPORTATION

38.1 GENERAL

Transportation (Plant 45) provides the mobile equipment necessary for plant operations and support of operations.

Costs for permanent plant mobile equipment are estimated by individual item. The scope is based on a list of equipment which was developed from an analysis of the mobile equipment requirements on other similar grass roots facilities.

The equipment was grouped by type and priced by individual piece on the basis of recent procurement experience.

38.0 PLANT 45 TRANSPORTATION

38.2 FACTORED CAPITAL COST ESTIMATE

NOTE: All costs are in thousands of dollars.

MAJOR EQUIPMENT, MATERIAL AND SUBCONTRACT COSTS

Price developed from vendor quotes or in-house data.	=	NA

BULK MATERIAL AND SUBCONTRACT COSTS

The bulk material and subcontract costs are taken as percentages (or cost "factors") of the major equipment costs. The cost factors are based on Bechtel's historical, proprietary data for similar types of plants and vary with type and size of plant.

Bulk Material Costs		Cost Factor, %			
Instruments	=	NA	X	=	
Piping	=	NA	X	=	
Structural Steel	=	NA	X	=	
Electrical	=	NA	X	=	
Concrete	=	NA	X	=	
Buildings	=	NA	X	=	
Total Bulk Material Cost	=	NA	X	=	NA

Subcontract Costs		Cost Factor, %				
Insulation	=	NA	X	-	=	
Buildings	=	NA	X	-	=	
Painting	=	NA	X	-	=	
Total Subcontract Cost					=	
TOTAL BULK MATERIAL AND SUBCONTRACT COSTS					=	NA

DIRECT LABOR MANHOURS

Direct labor manhours are taken as multipliers (or manhour "factors") of the bulk material costs. The manhour factors are based on Bechtel's historical, proprietary data for similar types of plants varying with type and size of plant and adjusted as required for labor productivity based on jobsite data.

		Manhour Factor Hrs/$1000 of Cost			
Instrument Manhours	=	NA	X	=	
Piping Manhours	=	NA	X	=	
Structural Steel Manhours	=	NA	X	=	
Electrical Manhours	=	NA	X	=	
Concrete Manhours	=	NA	X	=	
Site Improvement Manhours	=	NA	X	=	
Major Equipment Manhours*				=	
TOTAL DIRECT LABOR MANHOURS					NA

*Major equipment manhours obtained from Bechtel's proprietary "Manhour Standard" document.

DIRECT LABOR COST		
@ $20.70/hr.	=	NA
COMMERCIAL EQUIPMENT	=	6,910
SPARE PARTS	=	350
SALES TAX	=	360
FIELD INDIRECT COSTS		
75% of Labor Cost	=	NA
SUBTOTAL FIELD COSTS		
6,910 + 350 + 360	=	7,620
HOME OFFICE MANHOURS	=	7,000
HOME OFFICE COSTS		
7,000 @ $36.79	=	260
ENGINEERING BY OTHERS	=	-
SUBTOTAL PLANT AREA COSTS		
7,620 + 260	=	7,880

PLANT 45

JOB NO. & TITLE JOB NO. 14222 BRECKINRIDGE PROJECT
CLIENT ASHLAND SYNTHETIC FUELS, INC.
JOB LOCATION BRECKINRIDGE CO., KENTUCKY

TAKEOFF _____ APPROVED _____
PRICED _____ DATE _____
CHECKED _____ SHEET ___ OF _____

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DIRECT FIELD COST SUMMARY TRANSPORTATION

	QUANTITY / UNIT	$ M QUOTED	MANHOURS TOTAL	MANHOURS $/MH	TOTAL COST MATERIAL	LABOR	SUBCONTRACT	TOTAL
.11 "C" - Columns & Vessels								
.12 "D" - Tanks								
.13 "E" - Exchangers								
.14 "F" - Fired Heaters								
.15 "G" - Pumps & Drivers								
.16 "H" - Vacuum Equipment								
.17 "K" - Compressors & Drs.								
.18 "T" - Special Equipment	41 /ea.	COMMERCIAL EQUIPT.			6641000			
FREIGHT					266000			
TOTAL MAJOR EQUIPMENT	41 /ea.				6907000			6907000
								ADD. 3000
								6910000
.21 "J" - Instruments								
.22 "L" - Piping								
.23 "M" - Structural Steel								
.24 "N" - Insulation								
.25 "P" - Electrical								
.26 "Q" - Concrete Work								
.27 "R" - Buildings								
.28 "S" - Site Improvements								
.29 "X" - Painting								
TOTAL OTHER MATERIALS								
TOTAL DIRECT COST								

SHEET NO _____ PLANT 45