5.1.2 Summary Results

The conclusions of the 'large vessel transportability to the Gilberton site - shop vs. field fabrication cost comparison' study are briefly listed below.

- It is not feasible to transport a single large (19' ID x 60' T/T) shop fabricated vessel to the Gilberton site,
- It is feasible to transport (heavy haul) two smaller (13' ID x 60' T/T) shop fabricated vessels to the site for erection, and
- It is also feasible to transport the large (19' ID x 60' T/T) vessel in six 10' high rings plus two heads to the site for field fabrication.

The total cost of shipping, fabrication and erection of the vessels is about the same for option (2) and (3). However, when taking into consideration the bulk materials and labor, and accessory equipment associated with each option, there should be cost saving advantage for a large field-fabricated vessel vs. two smaller shop-fabricated vessels. EECP design and cost estimation for large vessels such as Texaco's gasifer, and Sasol's FT slurry reactor shall follow this guideline.

Details of the transportation study are discussed in the following sections.

5.2 TRANSPORTATION

In order to complete the assessment, truck, rail and barge transportation modes were examined. Ship ports where the equipment would begin overland travel to the site were also evaluated.

5.2.1 Site Access By Truck

Access to the EECP site would be via Interstate 81 to State highway 61. This intersection is approximately ¾ mile south of Morea Road, which runs east and west from the site. Highway 61 is approximately 2 miles west of the site when traveling Morea Road.

The following are guidelines for the transportation of equipment and materials to the site.

- Truckloads up to 8.5 feet wide and up to 13.5 feet in loaded height are legal loads and require no permitting by the state of Pennsylvania. The legal load weight is 80,000 lbs. gross (tractor + trailer + load).
- Truckloads over 8.5 feet wide and up to 12 feet wide require Pennsylvania permits. Truckloads over 13.5 feet loaded height up to 15 feet loaded height require permits. Truckloads grossing more than 80,000 pounds and up to approximately 130,000 pounds require permits.

- Anything larger than 12 feet wide, over 15 feet high and over 130,000 pounds gross weight is defined as a "Superload", and requires permitting and routing by the state permit office located in Harrisburg, PA. The permit process can consume a month or more, depending on the number of bridges that must be reviewed for the move.

Routes south, southeast from the site on State Highway 61 and State Highway 73 (not shown in Figure 5-1 and 5-2) toward Philadelphia were analyzed. There are small towns, narrow roads, low overpasses, old bridges, power lines, telephone lines, and traffic congestion on the routes. Neither route was judged practical or feasible for transport of the single large (18.5' ID) reactor.

5.2.2 Site Access By Rail

Direct rail access to the site is not available. National rail access to the area is with Norfolk Southern and CSX Railroads. They interline with the regional railroad, which is the Blue Mountain Reading and Northern Railroad. The closest railroad siding is approximately 5 miles from the site near the town of Gilberton.

Rail transport alternatives are limited primarily by bridges and tunnels. Oversize cargo requires obtaining clearance from the railroad. Cargo up to 12 feet wide moves via rail with regularity, but once 12 feet wide is exceeded, it is difficult to obtain clearance. Heights up to 19 feet above the rail are typically acceptable. Transporting a load wider than 12 feet or higher than 19 feet, (assuming a clearance is obtained), may have to move via special trains with costs as high as $65 per mile, in addition to the freight cost.

In addition to the rail shipment, cost and risk considerations must be made for the following issues.

- Added cost for rigging and tie down (securing the load on the railcar)
- The cost and schedule issues of using a temporary laydown storage, if the construction team can not begin assembly/erection upon arrival.
- Rail transport typically allows less control of transit times and delivery scheduling by the construction team. Track transport is more flexible as regard schedule changes.

The single large reactor and the multiple ring sections could not be moved by rail. The 2 smaller reactors could move by rail, but truck transport is judged be a better option.

5.2.3 Site Access By Barge

There is no barge access to the site. The closest barge facility is the USX plant at Fairless Hills, PA (also known as Novolog). The facility is also accessible by ship. It is approximately 90 miles from the EECP site. If the equipment is shipped from the supplier by water, this facility would be used to receive and transfer the load to truck for overland transport.

5.2.4 Ports of Import

There are three practical ports where a heavy lift could be received and transferred to another mode of transportation. The port and their locations are noted below.

- Port of Elizabeth, NJ (New York) - This port is approximately 120 miles east of the EECP site. For a heavy lift ship, it is an inducement port.

- Port of Philadelphia, PA - This port is approximately 100 miles south, southeast of the EECP site. For a heavy lift ship, it is also an inducement port.

- USX at Fairless Hills, PA, also known as Novolog - This port is about 90 miles southeast of the EECP site. It is also an inducement port. It is used by Air Products for shipping some of their equipment.

The ports of Elizabeth, NJ, and Philadelphia, PA, are congested and make the import of heavy lift loads difficult. Port Elizabeth also would require overland shipping permits for New Jersey. The best port choice is the USX, Fairless Hills facility. The port is experienced with large loads, and be the best option for highway routing and obtaining Pennsylvania permits.

5.3 REACTOR AND TRANSPORTATION COST ESTIMATES

Costs for shop fabricated and field assembled welded vessels were obtained by informal budget quotes from three potential suppliers. Costs from the data are summarized below for the items.

- Single large vessel 18.5 feet diameter consisting of multiple "can" rings and top and bottom heads. The vessel components will be shop manufactured and field erected. The single large vessel, shop fabricated, was not estimated because it can not be transported to the site.

- Two smaller vessels of 13 feet diameter to be erected as single units, or possibly as two pieces per vessel.

Table 5-1 shows the costs estimated by Nexant and Bechtel for the FT reactors (reactor shell only). The estimate indicates that the total cost for a single vessel, field erected from cans and heads is about $500,000, or 20% less than erection of two smaller vessels. The estimates are expected to be in the range of 30% accuracy. If other issues such as process reliability or operation and maintenance are affected by the selection of single or multiple vessels, the costs may be reviewed when further engineering data is available.

Table 5-1
FT Vessel Fabrication, Transportation and Erection Cost Estimates
$1,000s

Items	A Single Vessel Field Assembled from Cans and Heads	B Two Vessels Shop Fabricated, Field Erected	Difference in Costs (A-B)
Vessel and Erection Cost	1,500	1,500	-----
Shipping to Port of Fairless Hill, PA	230	260	-30
Overland Transport to EECP Site	120	300	-180
Foundations, Piping and Other Direct Field Costs	400	550	-150
Total Direct Cost	2,250	2,610	-360
Construction Indirect Costs	200	300	-100
Subtotal	2,450	2,910	-460
Engineering	240	290	-50
Total	2,690	3,200	-510

6.1 BIWEEKLY PROJECT STATUS REPORT

Informal Biweekly Project Status Reports are transmitted to keep the DOE Project Manager updated of all work in progress.

6.2 PROJECT MILESTONE PLAN AND LOG

Project Milestone Plan and Milestone Log are submitted on time as prescribed by the contract to keep DOE management informed of work-in-progress and accomplishments against major project milestones planned.

Section 7 Experimental

7.1 EXECUTIVE SUMMARY

7.2 EXPERIMENTAL

7.3 RESULTS AND DISCUSSION

7.4 CONCLUSION

7.5 REFERENCE

NOT APPLICABLE - The current project is a design feasibility and economics study, leading to detailed engineering, construction and operation of an EECP plant. It's not a typical research and development (R&D) project where a topical report format described in this section applied. There was no experimental work performed. This section is included only to fulfill DOE's prescribed reporting format.

List of Acronyms and Abbreviations

DOE	U.S. Department of Energy
NETL	National Energy Technology Laboratory
WMPI	Waste Processors Management, Inc.
EECP	Early Entrance Co-Production Plant
FT	Fischer-Tropsch
RD&T	Research, Development & Testing
ISBL	Inside Battery Limits
OSBL	Outside Battery Limits
AFFT	Ash Fusion Fluid Temperature
IT	Initial Deformation Temperature
ST	Softening Temperature
HT	Hemispherical Temperature
WR	Winegartner and Rhodes
ASTM	American Standard Testing Methods
CO2	Carbon Dioxide
PWU	Product Work Up
PSA	Pressure Swing Absorption
ID	Inside Diameter
T/T	Tangent to Tangent