

4.0

COST ESTIMATE

The cost estimate was prepared by estimating the cost of major equipment based upon first-pass equipment specifications and verbal or written price estimates from outside vendors or Internal Air Products equipment fabrication groups; and applying the standard Air Products-CRSD (Corporate Research Services Department) cost factors on major equipment cost to compute the costs for additional equipment and labor. The estimate is based on prices as of September 1983 and, based upon past experience, should be accurate to within 20%.

Table 11 lists equipment that is not included in the cost estimate since it is assumed to be available from either the LaPorte methanol project or from the laboratory Fischer-Tropsch reactor system. A major study has not been undertaken of the suitability of methanol project equipment for incorporation into the BFTR. Thus, additional equipment might be utilized at the time the BFTR is constructed, or some of the equipment assumed to be available might prove unsatisfactory. The BFTR is assumed to be sited at LaPorte, Texas so that the listed methanol project equipment can be utilized and so that relatively inexpensive synthesis gas is available.

4.1

Major Equipment Costs

Major equipment costs are summarized in Table 12. Vessels represent 36% of the major equipment cost, with process controllers, heaters, and control valves each being about 10% of the total. Vessel costs include both the materials cost as well as fabrication and ASME code-stamp expense, where applicable. The cost of the computer circuit boards, which would be assembled by Air Products, also includes both labor and materials cost.

4.2 Additional Equipment Costs

Additional equipment cost is calculated by multiplying the major equipment cost by 0.315. This gives a \$45,100 estimate of additional equipment cost. This figure includes the cost of piping and fittings, vessel supports, insulation, manual and small solenoid valves, safety equipment, instrument and control equipment, spare parts, and shipping.

4.3 Labor Construction Costs

Labor construction costs are summarized in Table 13. The hours for each function are calculated by multiplying the major equipment cost by a factor that has been determined from past Air Products experience in fabrication of bench-scale experimental units. Labor rates are those which are applicable during September 1983, for equipment fabrication by CRSD. The total labor charges for construction of the BFTR are estimated to be \$290,000.

Table 14 shows the total cost for BFTR construction as \$550,000, including a contingency fixed at 15% of the total equipment plus labor costs. This estimate should be accurate to within 20%.

4.4 Operating Costs

It is assumed that the BFTR will operate at the LaPorte, Texas facility. Three major savings result from operation at LaPorte: 1) proximity to a syngas plant providing low-cost syngas, 2) lower labor rates and 3) the ability to utilize some of the Liquid Phase Methanol equipment. Most of the operating costs used in this report were taken from estimates prepared for the liquid phase methanol contract No. DE-AC22-81PC30019. Projected operating costs are given in Table 15.

The BRTR is assumed to operate 200 days per year with 4000 on-stream hours. It will operate half of the time in the 4-inch-diameter mode and half in the 5-inch-diameter mode. Operation of the BFTR will require one operator per shift; the operator will be assigned from the LaPorte staff only when the BFTR is operating. Two engineers will analyze the data from the BFTR and provide technical direction for the program. An analytical technician will be provided when the unit is operating. Maintenance and part-time supervision will be provided by the LaPorte staff.

The costs listed in Table 15 for carbon monoxide and hydrogen are the sum of a facility availability charge (based upon maximum gas consumption rate) and the charge for gas consumption. The BFTR is assumed to operate 50% with catalyst 'A' and a hydrogen/carbon monoxide feed ratio of 0.65/1 and 50% with catalyst 'B' and a hydrocarbon/carbon monoxide ratio of 0.51/1.

The contracted analytical services are required for diesel fuel characterization and catalyst analyses.

The operating costs in Table 15 are in August 1985 dollars. Thus, they represent average operating cost for a 2-year operating period of a BFTR unit if engineering/construction began in September 1983.