SECTION 12

STARTUP PROCEDURE

12.1 GENERAL PROCEDURE

This is a generalized description. It describes a proper sequence of unit startups for the Oil/Gas plant.

The procedural steps delineated below are based on the successful completion of standard procedures for plant acceptance and preliminary testing, including pressure testing, instrument checkout, rotating equipment tests, and preliminary operation on air, water, or other liquids.

12.2 SPECIAL FEATURES

Certain features of the Oil/Gas plant design will represent operations new to process plants, due either to the use of novel technology or to the large scale of operations in the plant. Because of this factor, special control and safety features will be incorporated into the ultimate plant design. Special attention will be needed for operation of these systems at abnormal rates or conditions, i.e., during startup. These systems include:

(1) Control of gasifier on flame-out or coal feed interruption.

(2) High-capacity gas venting and flaring from several different areas, possibly containing unsafe gas mixtures.

(3) Special requirements for flushing systems with solvent or wash oils on shutdown to prevent line blockages due to coking and/or solids settling.

12.3 STARTUP SEQUENCE

Because of the large size and large power and steam usage of much of the plant equipment, preliminary testing will require substantial power and steam flow. Also, large amounts of electrical power will be required for coal mine development approximately 1 year before startup of the process complex. Therefore, among the first units to be made operational, using either purchased power, portable generators, or the plant emergency power generating system, will be certain portions of Unit 31, Raw Water Treating; Unit 30, Instrument and Plant Air; and Units 32/33, Steam and Power Generation; which will thereafter supply all steam and power for the new plant complex. To allow startup of these units without fuel gas generation, their normal fuel, the boilers and superheaters will be designed for dual firing with a selected liquid fuel. For initial startup, a quantity of liquid fuel will be purchased; after that, product fuel oil will be available.

The expected plant startup procedure, assuming standby operation of power and steam generation on a liquid fuel, will be:

(1) Start Unit 34, Effluent Water Treating, and then start Units 10/11, Coal Preparation and Drying. Start Unit 24, Fuel Gas Gasifier, on liquid fuel, line out, and switch to coal feed. Start Unit 25, Fuel Gas Sulfur Removal, and use clean fuel gas to replace purchased gas or liquid fuels in Units 32/33, Steam and Power Generation.

(2) Start Unit 23, Oxygen Plant; Unit 20, Process Gasifier; Unit 21, Shift Conversion; and Unit 22, Selective Acid Gas Removal. Operation of the plant propane refrigeration system will be required for operation of Unit 22. Start Unit 27, Sulfur Plant, to convert H_2S from Unit 22 to sulfur. Start circulation of amine solution in Unit 17, Acid Gas Removal.

(3) Circulate solvent[1] in Unit 12, Coal Slurrying and Dissolving, and Unit 14, Distillation. Precoat filters in Unit 13, Filtration. Pressurize Unit 12 with hydrogen, and heat Units 12, 13, and 14 to operating temperatures.

(4) Introduce coal to Unit 12 and line out process units. Bring Unit 18, Cryogenic Separation and SNG and LPG treating; Unit 19, Methanation; and Unit 16, Naphtha Hydrotreating, on line when feeds are available.

12.4 GASIFIER STARTUPS

In the case of Unit 24 which is an airblown unit operating at low pressure, startup will be by means of air/fuel oil combustion in the first stage, with steam/water spray in the second stage to moderate the temperature. Temperature rise should be slow to protect the refractory internals, lining out at design temperatures of 1,800°F in the upper zone and 2,500°F in the lower zone. After temperature line-out, coal will be introduced into the second stage, producing gas and char, which will be removed in the cyclone and sent to the first stage. Oil rate will be reduced as coal rate is increased, until operation is completely on coal feed. Oil will be maintained on circulation to the oil burners without introduction into the gasifier to serve as an emergency hydrocarbon feed in case of coal feed failure.

Unit 20 will be started similarly as Unit 24, except that two additional factors, the use of oxygen instead of air and elevated pressure operation, will be taken into account. The initial operation will be on fuel oil and air at low pressure. The coal will be gradually substituted for the fuel oil

[1]For initial startup, SRC-derived solvent will not be available. ERDA's Tacoma Pilot Plant started up successfully on a mixture of petroleum-derived oil and coke oven-derived oils, which is a candidate for startup oil for the Oil/Gas plant.

and oxygen will be substituted for air. After satisfactory operation is proven at low pressure, the pressure will be gradually raised to operating pressure. Fuel oil backup to the first-stage burners will be maintained to serve as an emergency hydrocarbon feed in case of coal or char feed failure.