The following quotations are included to show that, in theory at least, the scheme is feasible from the standpoint of pressure and temperature and that the major problems are design, materials, and heat transfer. These will be special phases of problems familiar to pressure gasification with oxygen:

G. E. Evans, Physics Division, Oak Ridge National Laboratory, December 1951.

> In principle, a nuclear chain reaction can be maintained at any temperature and pressure for which materials can be found.
>
> In a first approximation, one may think of a nuclear reactor, from an engineering viewpoint, as a new type of heat exchanger. Whatever the purpose of the reactor, whether it be for the production of power, or radio isotopes, or for research, one inevitable product of the chain reaction is a great deal of heat.
>
> To a certain extent then, we may expect the specifications for a reactor material to be similar to the specifications for a heat exchanger operating at the same temperature and heat transfer rate.
>
> The factors which influence materials selection for such an application are fairly well understood and for reasonable choices of temperature, heat transfer rate and pressure, many of the problems have standard engineering solutions.

Richard M. Lyon, Reactor Experimental Engineering Division, ORNL, 1951:

> The heat-transfer problems in reactors involve no unique principles. They simply require a revised emphasis. Such a revision can best be accomplished by good comprehension of the basic principles which govern the flow of heat. With the vital assistance of the academic research laboratories throughout the country, we can develop the knowledge required to build better nuclear reactors for national security and for peaceful purposes from which everyone will benefit.

The overall problem is to supply heat to a mixture of steam and coal at a temperature high enough so that the steam-carbon reaction will take place. Several schemes are being considered.

It is visualized that much preliminary work can be done on the steam-carbon reaction at elevated temperatures in tubes of a composition that would be used in the nuclear reactor. The heating could be done electrically or by a gas-oxygen flame. Some studies in this type of apparatus are under way.

## New Morgantown Experiment Station

The Synthesis Gas Branch occupied temporary quarters on the campus of West Virginia University from early 1946 until July 1954. A contract to move and reinstall the pilot-plant equipment at the Morgantown Experiment Station was awarded to the Interstate Engineers and Constructors, Inc., Fairmont, W. Va., in June 1954. Notice to proceed was given the contractor on June 16.

The Synthesis Gas Branch, with the Petroleum and Natural Gas Branch formerly at Franklin, Pa., and the Accident Prevention and Health Division from Fairmont, W. Va., started to move into the new quarters on June 17.

The contractor moved and reerected the oxygen plant, coal-preparation equipment, gasifiers and their auxiliaries, compressors and inert-gas machines, gasholders, and the gas treating and testing pilot plant. Also, under this contract, the repiping and rewiring of the oxygen plant, coal-preparation equipment, inert-gas machines, and compressors were done by the contractor.

The equipment was satisfactorily reerected under the direction of branch personnel. All piping and wiring done by the contractor were tested before acceptance. The oxygen plant and 5,000 cu. ft. gasholder underwent performance tests before acceptance.

The principal items handled by change orders were (a) demolition of the old pilot-plant supporting structure, (b) erection of a steel building for equipment storage, (c) paving of a 50 by 70 foot area with concrete for coal storage, (d) construction of an 8 by 25 foot addition to the oxygen-plant building for the storage of supplies and spare parts.

The West Virginia University facilities used by the branch to house the pilot plant were renovated and returned to university control in mid-October. Bureau personnel is now completing reinstallation of pilot-plant equipment, in addition to extending the station services as required.

The new station consists of 9 buildings with the foundation in place for a tenth, which together cover approximately 15 acres of the 45-acre site. The general arrangement is shown schematically in figure 38.

Building 1, at the extreme left of figure 39, includes the administration offices, engineering facilities, various laboratories (also see fig. 40), and general office areas for the field workers.

Building 2, at the extreme right in figure 39, is a garage for station vehicles.

Building 3 (see fig. 41) includes the shop, warehouse, experimental oil well, and heavy equipment laboratory.

Building 4 at the right in figure 42, is the pilot plant structure, which now houses the high-pressure gasifier, the gas-purification unit, and the coal-water-slurry feeding equipment.

Building 5, at the left in figure 42, includes a compressor room which provides gas services for the station, a boiler room which provides steam for heating the station, and an inert-gas generating unit which provides gas for purging equipment.

Building 6, at the right in figure 43, is the coal-handling building in which run-of-mine coal is reduced to the required size and then distributed to the process units in building 4 by a pneumatic transfer system. Also included in this building is equipment for performing various tests on coals to ascertain their physical properties.

Building 7, shown at the left in figure 43, is the oxygen plant. High-pressure oxygen storage bottles may be seen immediately adjacent to the building. The plant capacity is 7,000 std. c. f. per hour. The bottle-storage capacity is about 160,000 std. c. f. at 2,000 p.s.i.g. and 70° F.

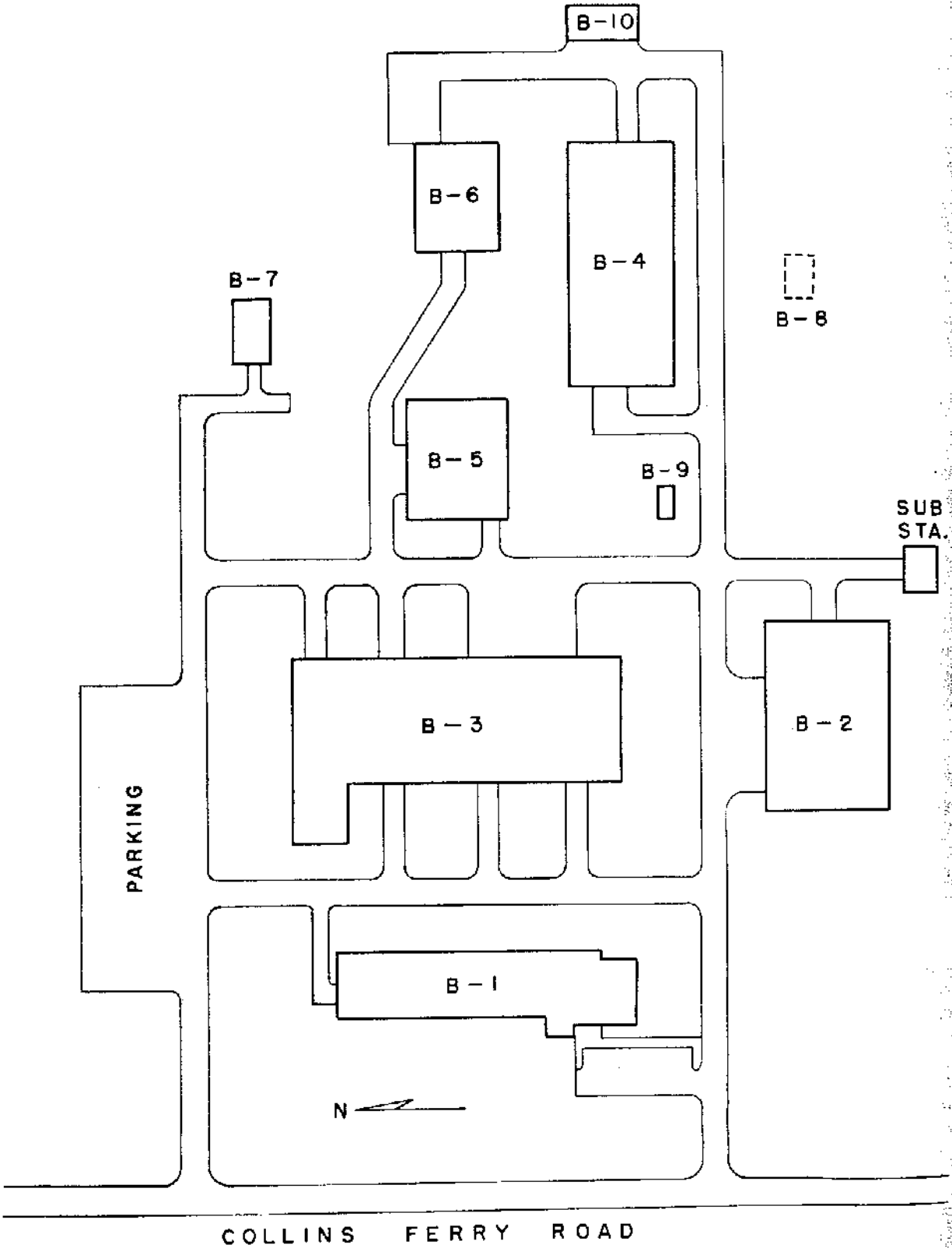


Figure 38. - Schematic diagram of Morgantown Experiment Station, showing building locations.

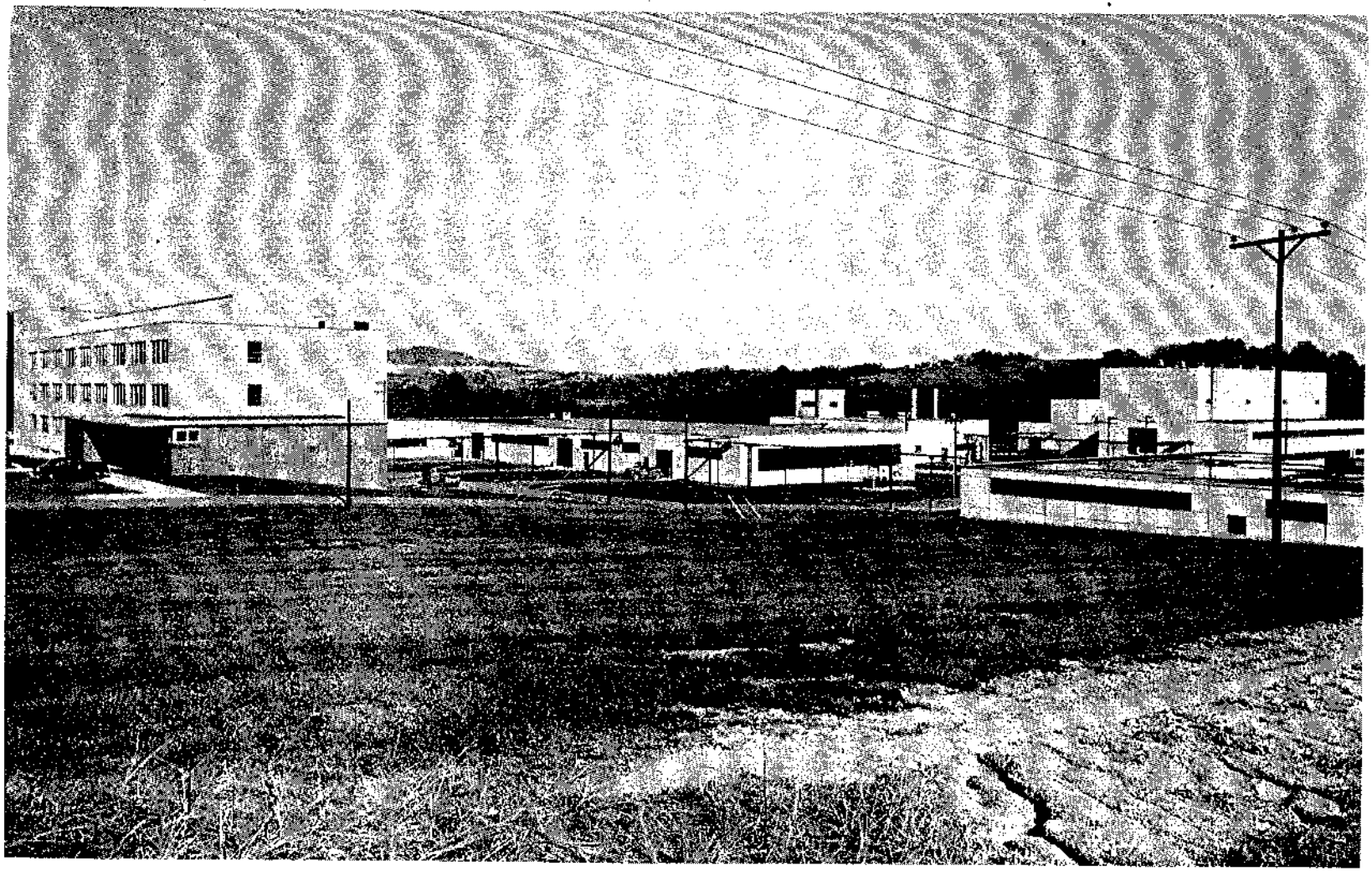

Figure 39. - Overall view from northeast, showing portions of all buildings at Morgantown Experiment Station.

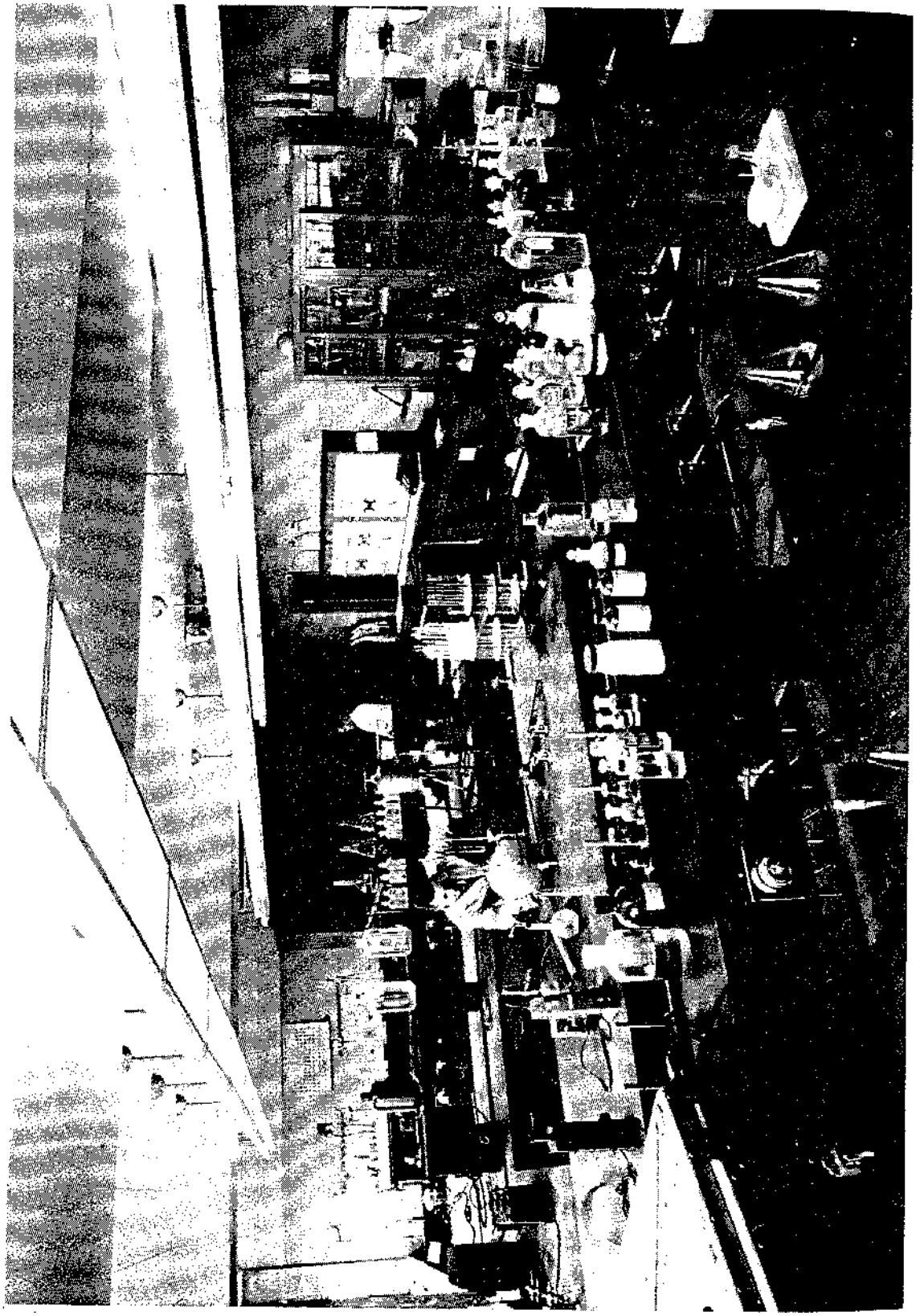

Figure 40. - An analytical laboratory in Building 1.

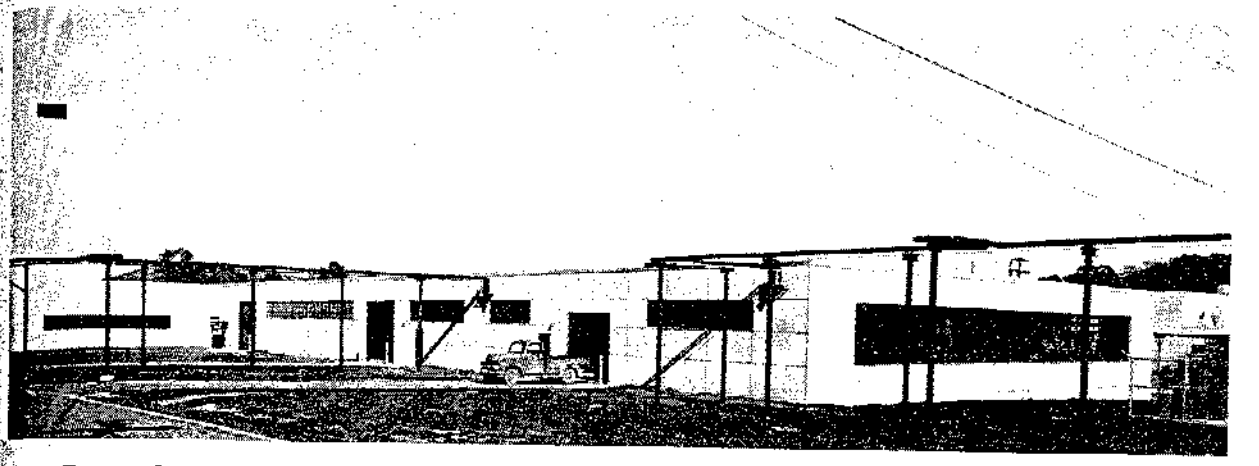

Figure 41. - Building 3 housing shop, warehouse, experimental oil well, and heavy-duty equipment.

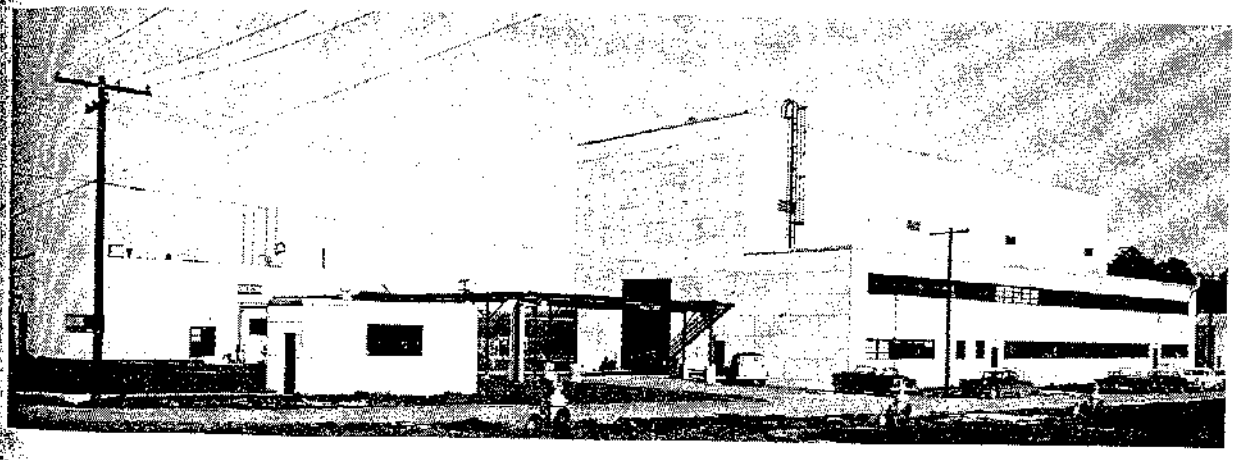

Figure 42. - Building 4, at right, houses high-pressure gasifier, coal-water-slurry operations, and purification unit. Small structure in foreground is Building 9, station gas metering house, and Building 5, left rear, is service building housing compressor room and boiler plant.

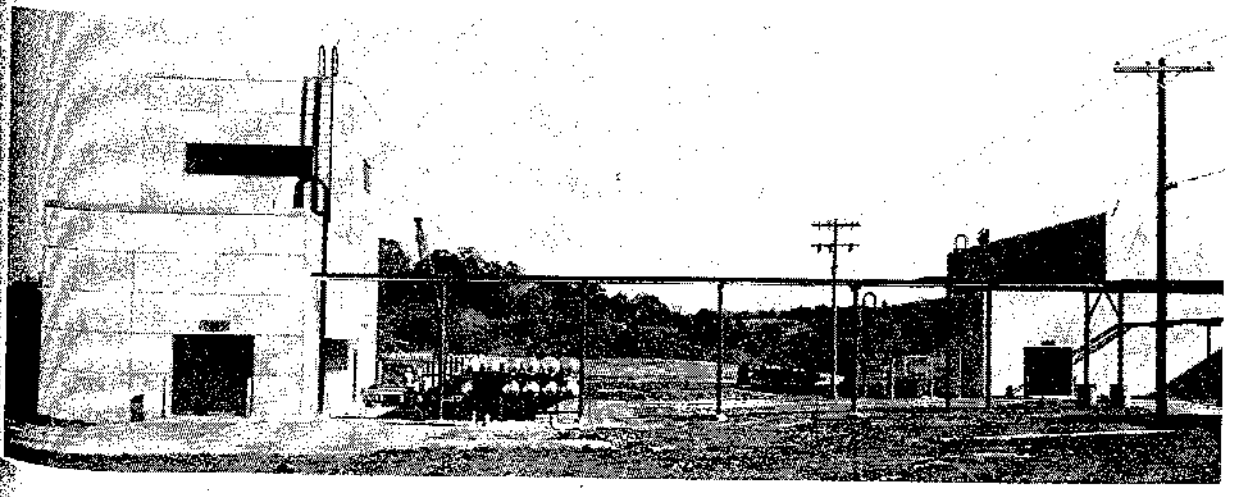

Figure 43. - Buildings 6 and 7 house coal-handling equipment (right) and oxygen plant (left).

Building 8 is the proposed water-treatment plant, which has not yet been built.

Building 9, in the center foreground of figure 42, is a gas-metering house for distribution of natural gas throughout the station.

Building 10 is for storage of equipment.

The station services distributed to the various buildings include 100 p.s.i. steam; city water 1, 50, 100 and 600 p.s.i. inert gas; 10 and 600 p.s.i. natural gas; 40 and 100 p.s.i. air; 100 and 600 p.s.i. oxygen; and 300 p.s.i. synthesis gas from process.