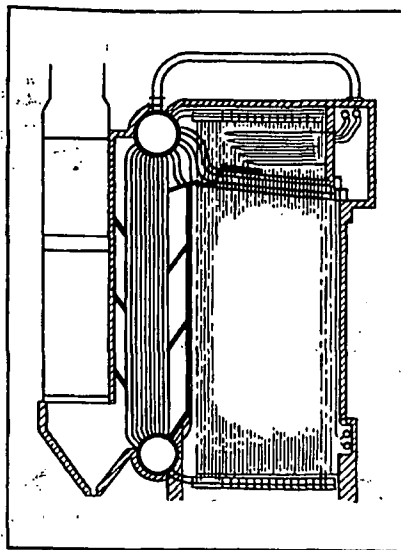
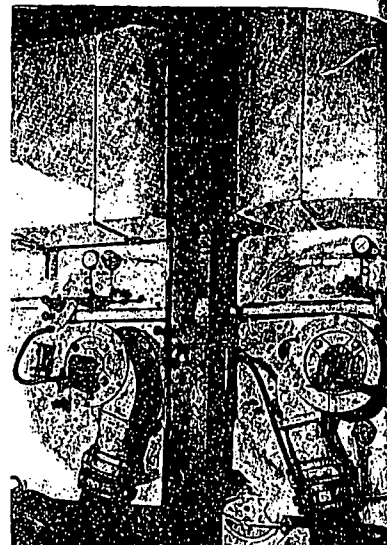
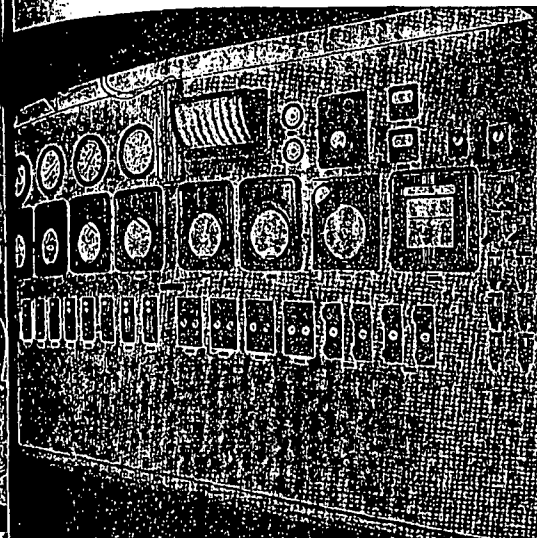




6 First of two 240,000-lb-per-hr steam generators of conservative design. Heat release is only 14,700 Btu per cu ft



7 Combination burner assembly (top pair of four) fires either coal, oil or a combination for complete fuel flexibility



8 Main boiler-room instrument board affords fireman complete control of steam generator plus set of charts for permanent records on vital equipment performance

burner gave a different flame shape—one much shorter. This permits more complete combustion within the present furnace without danger from impingement.

Extended Waterwall. Fan capacity for the new conditions was adequate. The only modification was a change in the gear reducer to meet the increased load and a different admission nozzle for increased speed in the steam turbines driving the fans.

Some changes had to be made in the waterwall supports for the new tube lengths. No change in tube diameter was made. The extensions were welded to

the old tubes and rolled into the new headers. A 45-deg separation plate at the gas outlet from the boiler convection surface directs the outgoing gas into the mechanical dust collector. From there it enters the air heater, and through induced-draft fan and breeching goes to a 200-ft chimney.

All these steps are only part of a full-scale boilerhouse modernization. That modernization, made necessary by a rapidly growing demand for steam, has been founded on a conservative, soundly engineered new steam generator. This unit and another to follow are rated at 240,000 lb per hr at 630 psi, 700 F.

A common header receives the output of both the new and older boilers. It furnishes steam for two 2000-kw back-pressure turbine-generators, fan and feed pump drives and two reducing valves. Additional turbine-generators are planned. Exhaust from these turbines and output from the reducing valves enter a 150-psi process header. Two reducing valves at this level bring steam to (1) 10-psi process line (2) deaerator and hot-process softeners.

Fuel Selection. Before any selection of design for the new boiler was made the U. S. Industrial Chemicals, Inc. considered all coal fields in north-

eastern West Virginia, southern Pennsylvania and all of Maryland. From this survey they drew up a coal-analysis range desirable to purchase, Table I, and selected an average eastern bituminous coal with characteristics in Table II. This fuel served as a basis around which to design a new steam generator.

Each element of that generator received the same thorough, sound reasoning. For instance, the furnace has been designed to burn a coal with an

ash-softening temperature of 1950 F, at a heat release of 14,700 Btu cu ft per hr. The pulverizers, fans and other auxiliaries are built with a margin for overload. In fact, this unit has already produced up to 300,000 lb per hr with no noticeable difficulty. Provisions have been made for oil-burning as well as for coal.

A mechanical dust collector has been located after the gas outlet from the boiler convection section and before the air heater, a spot similar to that in the

older, revamped boilers. The gas finally enters a new stack mounted on the boiler-room extension.

Water Supply. In a similar fashion the water system includes provisions that will enable it to handle up to 720,000 lb per hr—the ultimate planned plant load.

This water supply enters the system from two sources, condensate returns (up to 30%) and raw water (70 to 90%). Raw water comes from deepwell pumps or city supply mains. This tie is necessary because there is a definite limit on the waters that can be drawn from the wells. A raw-water storage tank with a float-operated valve receives city water when the float falls below a definite level.

From here the water passes through a clarifier in which the alumina clay in suspension is removed. Discharge from the clarifier undergoes a cold-water filtering operation before admission to some process-heat exchangers. After gaining in temperature from this service the water goes through the first and second stages of a hot-process softener and a set of hot-water filters. It is now ready for the deaerating heater and then the boiler feed pumps.

Condensate returns to its own storage tank, and leaves from there for the deaerating heater where it joins the makeup water supply. A live-steam line from the 150-psi header supplies through a reducing valve enough steam to hold the deaerator pressure at 5 to 10 psi. A line from the deaerator goes to the first stage hot-process softener, where most heating is done and air is vented.

Feedwater Treatment. These hot-process softeners serve chemical feed-water treatment. Feeder lines, direct to the boiler drums for phosphate and to the deaerator for sulphate, are installed in the event such chemical treatment is temporarily required.

PRINCIPAL POWER-PLANT EQUIPMENT

Curtis Bay, Md. Plant of U. S. Industrial Chemicals, Inc.

I—Coal-Analysis Range, Purchasable

	Minimum	Maximum	Predominating
Moisture	1	11	3-5
Volatile	14	28	28-36
			11-22
Piced carbon	52	76	60-70
Ash	6	24	7-12
Sulphur	1	4	2-3
Btu	9800	14,000	12,500-13,500
Fusion temperature	1838	2900	2100-2400

II—Fuel Analysis as Design Basis

Ultimate analysis	Proximate analysis
H—4.8	Btu/lb—12,797
N—1.4	Moisture—4.8
C—72.2	Volatile—28.15
S—1.7	Carbon—64.79
O—4.3	Ash—16.88
Moisture—4.9	Softening temp ash—1950 F
Ash—11.0	Hardgrove grindability—33

STEAM-GENERATING EQUIPMENT:

Boiler, 240,000 lb per hr, 630 psi, 700 F....Combustion Engrg Co, Inc
Waterwall surface.
Accessions to existing unit.....Combustion Engrg Co, Inc
Pulverizers, 4, bowl-mill type.
60% through 200 mesh.....Raymond Pulveriser Div
Burners, 4 RO type, combination, coal, oil.....Combustion Engrg Co, Inc
Burners, 4, differential-pressure type.....Peabody Engrg Corp
Fans, 4, induced and forced, turbine driven.....B. P. Sturtevant Div
Turbines, 2, 630-psi steam exhausts at 150.....Terry Steam Turbine Co
Combustion control, 2, compressed-air operated.....Hagan Corp
Dust collector, 1, present boilers 160,000 lb of gas per hr,
50 ft idies.....Pratt-Daniel Corp
Dust collector, 1, new boiler, mechanical, tabular.....Bullitt Engrg Co, Inc
Phosphorators.....Bailey Meter Co
Pyrometer, recording, 12 point.....Leeds & Northrup Co

Recorders, CO₂.....The Hays Corp
Regulators, feedwater, 3-element and 3-element.....Bailey Meter Co
Water-level indicator.....Bellanca Gauge Column Co
Water columns, bi-color.....Diamond Power Specialty Corp
Soot blowers, sequential system on new de-slagging, etc.
on old.....Diamond Power Specialty Corp

PUMPS AND WATER CYCLE:

Feedwater, 1, 700 gpm, turbine-driven, differential-pressure control.....Ingervall-Rand Co
Turbine, 1, 630-psi supply steam exhausts to 150 psi.....Terry Steam Turbine Co
Deaerating heater, 1, 720,000 lb per hr, 5 to 10 psi.....The Permutit Co
Water softener, 1, hot process, 2 stages, 504,000 lb per hr.....Cochrane Corp
Clarifier, 1, cold water, 1 stage, 63,000 gal per hr.....Infilco Inc