# Field Notes

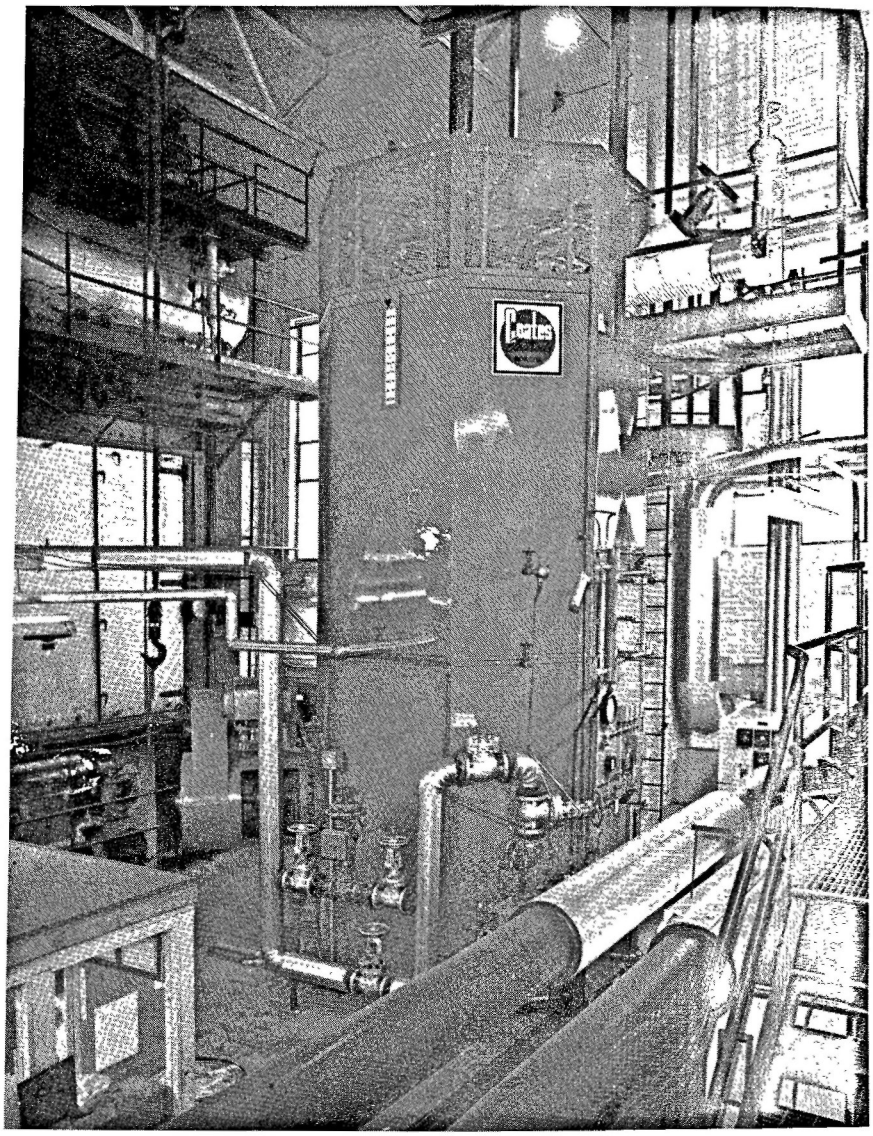
## Electric Boiler For District Heating System

In efforts to assure fuel supplies in the future and take full advantage of available energy, a district steam supplier has installed the first electric boiler in its plant since 1934. Seattle Steam Corp.'s two plants in downtown Seattle serve over 600 buildings through more than 17 miles of steam mains. In addition to the new electric boiler, both plants operate 15 gas- and oil-fired boilers, with a combined capacity of 1,075,000 lb/hr steam.

The firm had used coal until 1951, when it converted to gas and oil, but the cost of reverting back to coal would have meant a complete plant replacement at a cost from eight to ten times that of gas- and oil-fired packaged units.

Electric boilers of the immersed electrode type had been used by the firm from 1934 and intermittently through the late 1940s. Although operating difficulties were experienced at that time, the firm believed that new electrode type boilers should be investigated.

The company realized that electrical costs in the Northwest would continue to rise but their cost projections indicated that electricity as a competitive fuel would be a viable alternative for at least five years when used together with other fuels. It also appeared that the electric boiler and equipment could be amortized within the five-year period.



After evaluating different boiler operations and installations, Seattle Steam ordered a Coates electrode high voltage steam boiler manufactured by CAM Industries, Inc., Kent, Washington. The boiler is a 20-MW, 3-phase, 4-wire model, rated 13.75 kV, 140 psig with 102,000 lb/hr steam capacity. Installed in the same space as the 13,000 lb/hr steam oil-fired boiler it replaced, the Coates electrode boiler package is only 11.5 ft wide by 26 ft high, including the electrodes. The installed electrode boiler cost of less than $3/lb steam, including boiler instrumentation and electrical switchgear, is considerably less than Seattle Steam's experience with an oil- or gas-fired boiler.

Since being put on stream in October 1976, the electrode boiler allows the fossil fuel fired steam boilers to take the hourly and daily load swings, while it is operated at predetermined maximum demand loads during lower rate electric hours. Minimum unit electric costs are thus obtained.

Stepless operation over the entire operating range of the boiler is provided by solid state controls. Water failure would simply cause the boiler to stop operating. Without water, current cannot flow and there is no possibility of overheating or loss of efficiency. Stacks and pollution controls are not required.

C.W. Easton, president of Seattle Steam, said, "The electric boiler has operated continuously for eight months except for two planned shutdowns, each of a few hours duration, for internal precautionary inspections. It was operated at half capacity (50,000 lb) for the first month and then was opened up for inspection. Then it was operated for three months at full capacity (100,000 lb) and was again opened for inspection. No maintenance problems were discovered during these inspections of electrodes, water jets, seals and general boiler internal surfaces. During the boiler's operation, it has performed flawlessly and at an efficiency rate of over 98%."

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