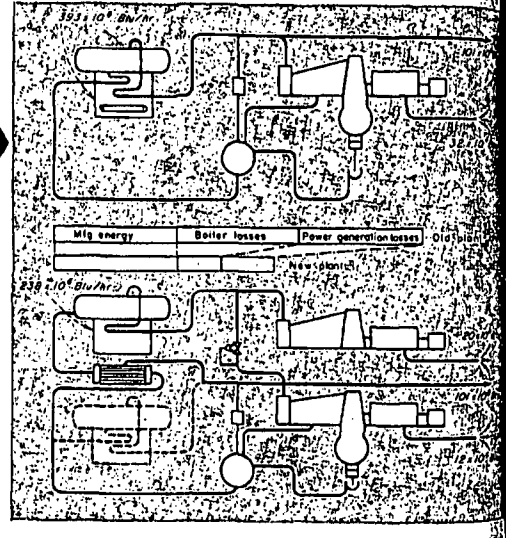
Thorough study of conditions

Heat-cycle studies were based on actual operating loads in 1949, on the theory that if a change were warranted for present loads it would be imperative for future needs. Electric consumption ran 94-million kwhr, with a peak demand of 23,000 kw. Together with other forms of manufacturing energy, this gave an average hourly demand of 133-million Btu. Existing plant cycle is shown in upper part of sketch below, simplified to combine 26th Street and main plant.

With this hookup, it took about 393-million Btu fuel input per hr to meet demand—a cycle efficiency of about 34%. Over-all steam-generating efficiency averaged 67%, so 311 million Btu per hr were available for manufacturing needs. Nearly two-thirds of this went directly to manufacture in the form of process and space heating, direct steam uses. The remaining *third*, 160-million Btu per hr, *supplied* 32-million Btu per hr equivalent of electric energy. Almost all the remainder of 128-million Btu per hr was lost to the condenser cooling water.

Pointed up in graphic style



Showed how modernization pays

Revised heat cycle (lower part of sketch) reduces one of the elements most affecting power cost—fuel. Here, the same manufacturing energy needs of 133-million Btu per hr are supplied by 238-million Btu per hr of fuel. Cycle efficiency of 56% nearly doubles the original 34%.

Bar charts between old and new cycle diagrams show steam-generating losses cut by about 65% and losses charged to *electrical generation just about halved.*

A tie-in with the local utility would look good economically if it were possible to feed back excess energy when available. This the local utility would not consider.

Labor cost, the second major variable in power cost, was not, of course, directly affected by the new power cycle. But Western Electric engineers knew that equipment improvement made labor savings possible. They felt they owed management all the benefits new designs could deliver.

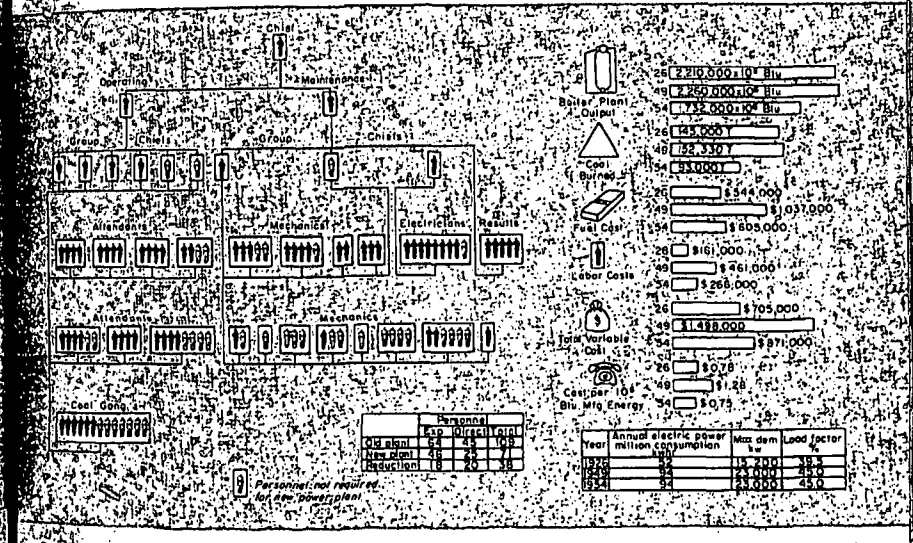
The boiler-room picture *especially showed immediate opportunities* for bringing labor costs down nearer those obtained with modern layouts. Maintenance costs were up to $0.068 per 1000 lb steam—against the usual $0.02 in up-to-date plants. Attendance personnel also ran high compared with equivalent units employing automatic control. Chart below shows personnel setup before and after modernization.

Studies of firing methods singled out pulverized coal as the *choice for economical* results with automatic control. What's more, it promised easy conversion to gas or liquid fuel whenever desired, which allows further economies as fuel prices change. This selection, plus shutting down 26th St. plant, meant lower labor costs—chart, story below:

Complete cost and output comparisons must form part of any presentation to management. So the key years of 1926 and 1949, basis for comparisons in other parts of the investigation, were used for charting key factors. For comparison, estimated totals for 1954 were added. This is the first *year* all new equipment will be running, all old gone.

Improved cycle efficiency promises a reduction in steam input of 19%. This, together with higher steam-generating efficiency, brings fuel consumption down by 39%. Allowing one cent per million Btu saving in coal purchase price because of wider selection possible with new equipment, this means total coal-bill savings of $432,000 annually.

With maintenance and operating costs reduced by some $195,000, annual saving in variable operating cost amounts to $627,000. From this must be deducted fixed charges on the $5,017,000 of new capital investment. So net annual operating savings become $432,000. Unit cost per million Btu of manufacturing energy shows a 41% reduction.



Careful equipment selection and installation promised to cut outage time and maintenance cost. Further, the problem of getting personnel to handle dirty and dull jobs connected with old-style fuel and ash handling largely disappeared. New equipment permitted better operating routine with fewer jobs but attracted personnel of higher caliber.

Table at bottom of chart above shows over-all reduction in personnel possible with the new layout and how it affects operating and maintenance forces, classified respectively as expense and indirect. Maintenance shows a somewhat greater drop—a total reduction of about 38%.

Basis for original study was a production level equivalent to 23,000-kw maximum demand and 45% load factor. At last report, demand was 26,000 kw with 48% load factor. This higher demand increases annual savings possible with the new equipment. Actual experience at higher demand levels indicates that annual savings after fixed charges come to $510,000, against the estimated $432,000.

Over and above this are some sizable savings resulting from speeding new-plant construction. Cutting schedule from 5 to 2½ yr brings immediate saving in contractors' overhead plus $904,000 return from realizing operating savings earlier.