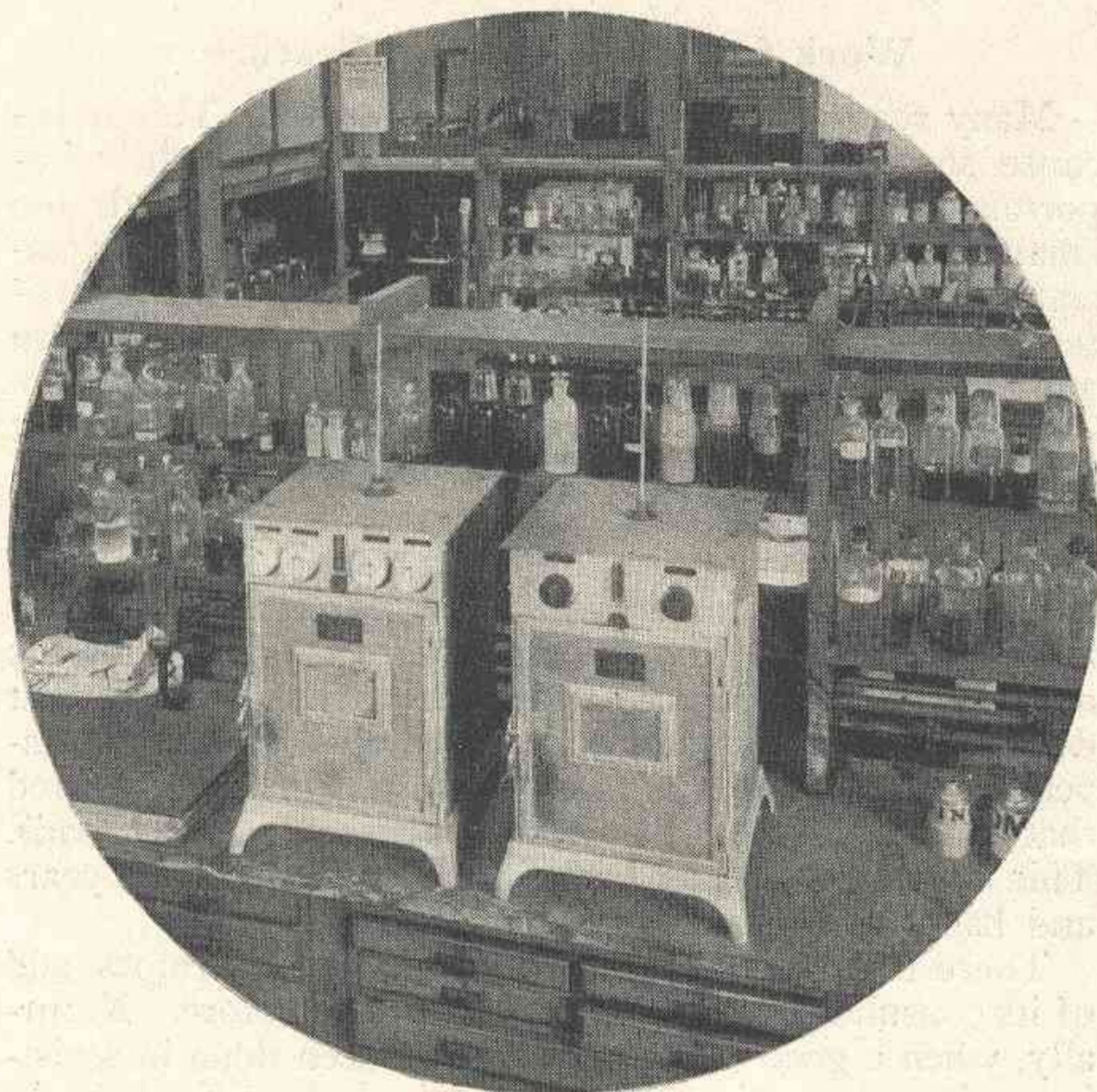


# D., L. & W. Depends More and More on Laboratory Work



In the Chemical Room at Scranton

IT is probable that many railway men do not realize that the microscope and retort of the chemist and physicist are constantly at work on some railroads in much the same way as they are at work for improvements in medicine, in the automobile, the electrical industries, etc. The Delaware, Lackawanna & Western affords an illustration that such is the case in the laboratory work it does at Scranton, Pa. This laboratory has been engaged in scientific work for the road during the past twenty years. Analyzing and testing for the protection of the road's purchases figure prominently in the work, while the services extend to considerable research and routine work as well—among them, bacterial testing and heat-treatment control. About 15,000 samples are analyzed at the laboratory in a year.

The laboratory is a two-story building of concrete and brick, with a basement. The first floor is equipped with testing machines of 500, 50,000 and 200,000 lb. capacity; also with lathes, a drill press, power saw, etc., for preparing samples and test specimens of new material and failed parts under investigation. It is equipped with a vibratory test machine for making fatigue tests of metals, with complete experimental plant apparatus for testing cement, concrete and aggregates; with friction, tensile and pressure apparatus for testing hose, tapes and rubber goods; and has a room where coal, coke and non-metallic materials are ground and sampled.

The second floor is equipped as a chemical laboratory with separate rooms equipped for bacteriological and metallographic work. The chemical laboratory analyzes paints, brass, asphalts and waterproofing material, steel, iron, boiler water and coal, and controls by analysis the shop brass and steel foundry, etc., and the operation of water-softening plants.

The bacteriological laboratory is equipped with electric

*Co-operative analyzing found in technical operations at Scranton—  
Purchasing protected*

By J. J. Laudig

Chemist and Engineer of Tests, Delaware,  
Lackawanna & Western, Scranton, Pa.

refrigerators, sterilizers, incubators and other apparatus for examining drinking-water samples, both city and company supplies, from wells and springs, and for the sanitary control of all drinking-water supplies on the road. The expansion of this department came with the discovery of drinking water of poor quality at isolated locations several years ago. Since that time all locations and labor camps having wells, pumps, etc., on company property, have been inspected and analyzed. As a consequence, many improvements have been recommended and carried out, thereby giving and maintaining better protection to all drinking-water supplies along the railroad. In this work, the laboratory has co-operated with the United States Public Health Service in conducting experiments and tests on water and sanitation.

The metallographic laboratory has a Leitz metallograph and other apparatus for polishing, etching and photographing steel. This department also controls the heat treatment of locomotive alloy forgings and other materials in the locomotive shops. This work is of growing importance, as expensive alloy steels are being used more frequently on locomotives, and uniform, high grade forgings must be supplied free from defects and capable of giving dependable service. The careful metallographic control of the heat treatment of manufactured and purchased forgings has resulted in a remarkable decrease in the number of failures in service and has fully justified its introduction.

The value of the laboratory work to the railroad cannot be expressed in actual monetary figures, but the increasing service to the heads of the various departments has justified its inception. In several cases, the solution of individual problems has resulted in savings to the road sufficient to justify the annual maintenance expense of the entire laboratory.

In order to secure the best materials, standard specifications are used whenever possible, and contact with improvements in manufacture and quality standards is maintained by membership in leading technical societies and active work on committees.

## Prompt Inspection Helps Supply Forces

The testing of many materials which are used in quantity is done at the point of manufacture by the material inspectors of the laboratory force, who visit the plants when the material is ready for shipment. In most of these cases, the test pieces and drillings are forwarded by the inspector to the laboratory for analysis and metallographic examination, and the shipment of the materials is released from the laboratory. Tests on materials, pur-



chased to specifications, but not warranting inspection at the point of manufacture, are sampled by the storekeepers at destination and forwarded to the laboratory with the request for analysis. The laboratory is organized to make the tests promptly, and if the material is satisfactory, the forms are marked with a rubber stamp and one copy is returned immediately to the storekeeper so that the material can be released for service, the invoices approved without delay and advantage taken of any discounts allowed for prompt payment.

Freight-claim problems often find their solution in the laboratory where analytical methods and extensive libraries are available to decide questions which might otherwise entail a needless waste of time and money.

### Boiler Waters Studied

Among the research problems handled by the laboratory are the study of materials for the improvement of concrete, the reclamation of oils, and boiler water conditioning. Like other roads, the Lackawanna has had its share of the locomotive and stationary boiler troubles that arise from poor water supplies. Leaking, scaling and corrosion require heavy outlays for maintenance and keep units out of service for periods of reconditioning. The laboratory has studied and solved such problems individually and now controls the conditioning of water in most of the boiler plants by analysis and inspection. The reduction effected in the cost of cleaning, corrosion, saving of fuel, etc., has shown that such problems yield to scientific study. Boilers which were customarily held out of service for several weeks for cleaning are now out of service but a day for boiler washing and inspection.

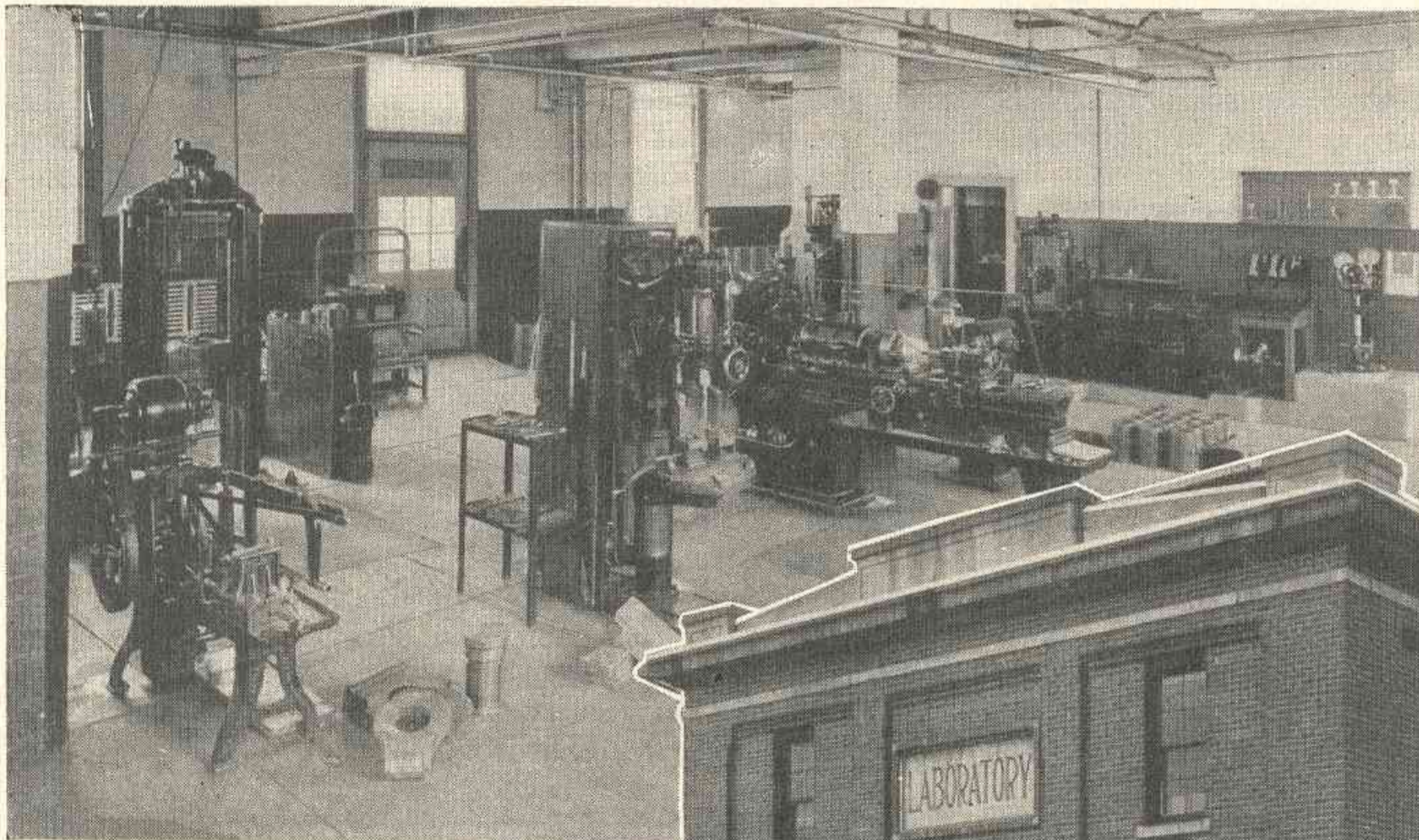
Water surveys have also been made of all locomotive water supplies along the roads as to location and analysis. Analysis in many cases has shown the inferiority of

water supplies, and recommendations for the removal of the facilities in some locations have been made where the water was exceptionally bad. Recommendations have also been made for the installation of water-treating facilities where the quality of the water was poor and a large quantity used and where savings in operation were shown possible by the removal of large amounts of encrustating material.

### Work for Other Roads a Feature

Many roads do not maintain laboratories. This is because some railroads have never appreciated their importance, while others have considered their roads too small to justify the investment in facilities and organization. Co-operative arrangements wherein one laboratory is maintained by several roads have frequently been advanced as a solution of the smaller road's problem. The Lackawanna's laboratory is unique in the respect that it affords an example of what might be termed a co-operative enterprise of this kind, for, besides doing the testing and analyzing for the Lackawanna, it also makes chemical analyses for a neighboring carrier. This work is handled by adjusting the expense on the basis of work done for each. Because of the similarity of work to that done for the Lackawanna, it is handled without inconvenience and affords a volume of the work of one kind that makes the total cost less expensive to both roads. This arrangement has been in effect for several years and has proved mutually satisfactory.

There is a greater appreciation of the laboratory and of its consultation services now than ever before. Naturally, when a good piece of work has been done in assisting a department in solving a particularly difficult problem, requests for additional service are bound to follow. The question now facing the laboratory is not how it can be of assistance to the various departments, but rather how the time can be found to take care of the problems that are continually being presented for solution.



Views of the Lackawanna's Testing and Research Laboratory

