holding grounds will make possible accurate engineering design of the component structures. This project has already developed much of the information required for transverse holding grounds, and is proceeding to the study of parallel holding grounds.

Mechanical Pulping.—A process consisting of grinding wood at low energy and subsequently refining the rejects is being studied as a possible way of reducing energy consumption and improving the products. A basic study of grinding is under way to determine the fundamentals governing the mechanical separation of paper-making fibres from the parent wood. This may lead to a new or improved process for producing mechanical pulp.

Chemical Pulping.—Of particular importance to the field of resources conservation is the Institute's development work in high-yield pulping processes aimed at recovering the greatest possible weight of usable wood fibres from each unit of wood. Experiments on the use of hardwoods in paper-making, to supplement or to supplant the traditional softwoods, are being made. A major change in pulp and paper technology, in which the Institute is providing basic data, concerns new methods of chemical pulping that will permit continuous rather than batch processing.

Paper-Making Studies.—Studies of paper formation, and investigations on the influence of fibre properties on the initial strength development of paper webs, are being carried out. The effect of fibre flocculation on the behaviour of fibre suspensions and the uniformity of paper is being studied to elucidate the mechanism involved in the aggregation of fibres under paper-making conditions.

Process Control.—The Institute carries out research on improving production control and product quality which involves modifying existing control methods and developing new ones. Related to this has been the development of new instruments, among which have been the *Canadian Standard Freeness Tester*, the *PAPRIC Electronic Dirt Counter*, the *Johnson Fibre Classifier*, the *Chapman Smoothness Tester* and the *Reference Electrode* for the continuous measurement of the actual *pH* at the high temperatures and pressures existing inside the pulping digester. At present, a recording flow instrument is being developed for rapid and continuous measurement of lignin concentration in cooking liquors by ultra violet absorption.

Waste Utilization.—The disposal, and if possible the utilization, of all types of waste from the industry—bark, liquor, slash, etc.—has been a major concern of this Institute since its inception. One of the most promising new developments in this line is the *Atomized Suspension Technique*. Solutions or slurries to be treated are atomized into the top of a tower with heated walls, thus creating a finely divided suspension of droplets in their own vapour, which evaporates to dryness and can then be subjected to pyrolysis or other chemical reactions within the same tower. The application of this technique has already been successfully tested on the small pilot-plant scale in the recovery of chemicals and heat from kraft, soda, neutral sodium semi-chemical and acid sodium sulphite spent liquors, and it has also been tested on other mill wastes, ore slurries, fine chemicals, and mineral solutions. It is expected that ultimately the Institute-developed equipment will be widely used in processing not only industrial but also sanitary wastes, which will assist in reducing the contamination and pollution of the nation's waterways. Plans are already being carried forward to test this last application on the pilot-plant scale.

Subsection 4.—The Veneer and Plywood Industries*

The production of hardwood plywood in Canada is confined largely to the eastern provinces. Changes in manufacturing methods applied to hardwood plywood resulted in its adaptation to many uses, particularly to attractive wall finishes for homes and other buildings, flush doors, radio and television cabinets and other home and office furniture.

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