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FORESTS DEPARTMENT UTILIZATION RESEARCH

SITUATION REPORT - SEPTEMBER 1984

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1. HISTORICAL

Up to June 1982, the remaining softwood mill at Harvey, although ostensibly a research mill, was largely preoccupied with production. The last hardwood mill at Dwellingup was in the same position until March 1982 when it was closed due to reduced commercial viability and an apparent lack of resource.

The key to a realistic research programme with hardwoods is an ability to conduct seasoning research. Plans for the establishment of a solar-powered progressive tunnel kiln at Dwellingup fell through due to a staff shortage.

Fortunately the high temperature kiln at Harvey had been completed several years prior to the cessation of production at the centre. This kiln, being the only one of its type in W.A., enabled a seasoning research programme with jarrah to be commenced late in 1982. This programme initially was a joint venture by the Department and Millars, which is now continuing with Bunning Bros after their takeover of Millars.

The move away from production and into more concentrated utilization research coincided with a direct involvement by Dr Siemon and heralded a new era of co-operative action by the Utilization and Research Sections of the Department. It is evident that the combined experience of production and research personnel together with a closer liaison with industry, provided an ideal medium for worthwhile applied utilization research to develop.

In 1983, the Australian Timber Research Institute (ATRI) was formed, which broadened the utilization research approach to cover all the sawmill industry. Three Departmental staff have been asked to serve on the local ATRI Committee, indicating an acceptance by industry of the Department's role in utilization research.

The appointment and subsequent activities of the W.A. Timber Utilization and Marketing Task Force have provided additional impetus to the research programmes by highlighting the urgency for results of the work. The Task Force activities have in particular been responsible for improved communications with timber manufacturers. Foresters looking at the needs of sawmillers and foresters, and sawmillers looking at the needs of timber consumers, has added a much needed perspective to the direction of utilization research.

2. PRESENT SITUATION

2.1 Staff

The following is the team of staff directly engaged in utilization research. In most cases utilization research occupies not more than 50% of the individuals time.

Phil Shedley, Utilization Section, Co-ordinator, Industry Liaison and Manufacturing;

Graeme Siemon, Research Section, Scribe and Scientific Specialist;

Des Donnelly, Utilization Section, Technical Specialist and Equipment Design;

Gary Brennan, Research Sections, Research Project Officer;

Greg Beange, Engineering Services, Engineer;

Kevin White, Utilization Section, Technical Construction and Project Officer;

Lex Mathews, Administration, Manager - Harvey Research Complex;

Jack Doble, Administration, Clerical and Technical Assistant;

Don Challis, Utilization, Clerical and Marketing;

Colleen Hill, Administration, Clerical and Technical Assistant (temporary).

2.2 Equipment

Harvey Sawmill Complex

* Log stockpile facilities - hard surface log yard, dam, electric pumps and sprinkler system.

* Sawmill - a twin edger and band saw are being installed as a specialist small log conversion unit, in line with the old mill. The new mill is designed to handle logs from 1.2 metres to 6.0 metres length and 150 to 350mm small end diameter. Larger diameter logs can be handled by the old mill.

* Commercial high temperature kiln - diesel fired hot oil heat transfer. Capacity 12-20m^3/charge. Commercial steaming chamber diesel fired, in line with the commercial H.T. kiln and the same capacity.

* Laboratory high temperature kiln under construction (completion date September 1984). Electric fired, 1m^3 capacity and facilities for steaming, temperature, humidity and air speed control and monitoring.

* Progressive tunnel kiln. Stage 1 of this experimental model was commissioned in July 1984. It is a modified version of a CSIRO designed kiln, fully wired for continuous temperature and humidity monitoring. Stage 2 is under construction (completion date September 1984).

* Four sider planing machine - square dressing only.

* Mechanical proof grading machine.

2.3 Research Projects in Progress

* Seasoning mature jarrah. A joint project with Bunning Bros which involves conventional techniques at Yarloop and the use of tunnel and high temperature kilns at Harvey. Significant potential is seen for improving the recovery into higher value grades of jarrah. High temperature seasoning from fibre saturation point (about 28% moisture content) to equilibrium moisture content (about 10%) has proved to be very rapid and not causing any degrade. The progressive tunnel kiln programme has just commenced - preliminary indications are promising.

* Sheoak seasoning. This is a joint project with sawmiller Mr G Saunders of Collie and furniture manufacturer, Inglewood Products Group of Malaga. It is designed to test the utilization and marketing of sheoak trees below the current commercial standards with a view to increasing the resource available for high value furniture for export.

A comparison of air seasoning, tunnel kiln seasoning, dehumidifiying and high temperature kiln seasoning will test heartwood and sapwood from small logs down to 1.2 metres in length and 150mm small end diameter.

* Two piece dowelled railway sleepers. This is a joint project with Westrail, the Forest Products Association and Koppers. Dowelled sections of pinaster pine, radiata pine and jarrah are being tested as replacements for one piece sleepers. The two piece sleepers can be produced from small and knotty trees below present commercial standards and the resultant sleeper has superior strength properties to the one piece sleepers of the same species. The trial includes some sleepers seasoned in the high temperature kiln at Harvey.

* Development of Furniture Grade Specifications. The Forest Products Association, the Guild of Furniture Manufacturers and the Forests Department are preparing industry standard specifications for furniture grades of jarrah.

* Freeze drying. A small company, Colonial Drumsticks, producing one piece jarrah shells for drums. The Department is giving them advice and assistance in developing freeze drying techniques for these high value articles. In return, an examination of freeze drying applications in other areas is being conducted on the company equipment. Additional tests have been carried out on the Fremantle Maritime Museum freeze drying equipment and a literature search conducted.

* End point moisture content determination. A comparison of microwave and conventional oven drying of kiln samples is being conducted in an attempt to speed up the determination of the end point of drying.

* Conversion of the high temperature kiln furnace to wood fuel. This project is being conducted with a W.A. furnace manufacturer, Pyrotherm and Amalgamated Mining Consultants. A fluidised bed gasifier will replace the diesel injection equipment for a series of tests using a range of wood fuels produced as residues by the Harvey mill complex.

High temperature kiln seasoning for pine and hardwood is technically effective but operational costs need to be significantly reduced to make the method more commercially viable. This project aims to reduce the cost to approximately half those when diesel fuel is used.

Some possibilities for by-product production will be investigated during the tests.

* Market survey of the use of local speciality timbers. This survey has been directed at craft industries using a variety of minor forest products such as jarrah burls. The aim is to determine consumer needs and wants. It is nearing completion.

* Preservative retention in jarrah transition sapwood. A joint project with Bunning Bros is testing the variability of preservative retention in sapwood, heartwood and transition wood.

2.4 Projects Concluded

* Pinaster strength tests.

* Proof Grader Codes of Practice with pine.

* High temperature seasoning of radiata pine - confirming RPAA codes.

* High temperature seasoning of pinaster pine.

* Water spray storage of pine logs.

* Phoracantha study - joint project with Whittakers and the Department of Agriculture.

* Survey of materials used in house construction.

* Survey of timber used by timber manufacturers.

* Determination of fibre saturation point moisture content in jarrah.

2.5 Proposed Projects

* Utilization of thinnings from hardwood regrowth forests. The major thrust is to develop techniques for storage, conversion and seasoning of timber from small jarrah, karri and marri logs. Production of quality timber is the key to a commercial thinning of regrowth forests and hence a massive increase in forest productivity.

  The increasing demands by society for alternate forest uses, requires that greatly improved productivity is obtained from remaining forest areas available for timber production.

  All the equipment in the Harvey complex is intended for use in these areas. Log stockpiling trials have commenced and the conversion stage will start as soon as the restructuring of the mill is complete, early in 1985.

* Public Interest Project. Notwithstanding the present expenditure on the Harvey complex, the limited funds available have restricted the degree of high technology and staff required to obtain the maximum benefits in a reasonable time frame. A preliminary application for a Public Interest Project has been lodged through the Commonwealth Department of Science and Technology for consideration by the Australian Industrial Research and Development Incentives Advisory Committee.

* Comparison of dehumidifying and high temperature kiln seasoning for pine. The Radiata Pine Research Institute has indicated its willingness to contract this project out to the Department. The intention is to use a commercial dehumidifying kiln in a direct comparison with the high temperature facilities at Harvey.

* Utilization trials on agro-forestry pine. Using early thinnings from agro-forestry lots in the Donnybrook Sunkland, the proposal envisages an examination of the full processing range of storage, conversion, seasoning, dressing, grading and marketing. The end point is a direct comparison with straight forest grown timber.

* Determination of critical moisture contents in pine conversion. Premature lowering of moisture content in pine logs and sawn timber can result in blue staining, invalidate the high temperature seasoning code of practice for heart-in material and retard the kiln seasoning schedules of other material significantly. Low moisture contents in the standing trees of drought stressed stands are thought to exaggerate the problem in W.A. compared to most Eastern States conditions. Duplication of this project is necessary to cover both radiata pine and pinaster pine.

* Proof grade testing of hardwood scantling. The use of the mechanical proof grader in pine reduced the rejection rate from 20%+ to around 5%. The proposed project will directly compare mechanical proof grading with the present practice of visual grading to AS2082. A considerable amount of laboratory strength testing will be required.

* Preservation of round hardwood utility poles. This project envisages a joint approach by a timber user (e.g. the State Energy Commission) and a preservation company. It will of necessity involve seasoning techniques and the use of much of the specialised equipment at Harvey.

* Seasoning of round pine for preservative treatment. There is a need for improved seasoning techniques for treated pine rounds. Following discussions with Departmental staff and inspection of the facilities at Harvey, Independent Forestry Services Pty Ltd will construct a modified version of the tunnel kiln at their treatment plant in Bridgetown. As time permits, the perceived need for accurate data on this subject will be obtained by trials with the Harvey tunnel kiln. The project is seen as a joint venture with a treatment company.

* Durability tests. The CSIRO have several "graveyard" sites in the eastern states for testing the resistance of various timber species to attack by termites and decay. Western Australian timbers are included in these trials. This project proposal is to establish and maintain two graveyard sites in Western Australia.