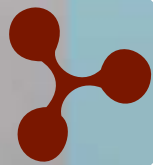


Our world | their future



Building a better future for the next generation

renewable consumer products
page 21

commercial forestry
page 13

biomaterial futures
page 25

Murray Davis, based at Forest Research CŃngchurch, Rawinia Wilson, (Ngāi Kōwhiri) (the daughter of Dr Phillip Wilson (Scientist, Forest Research) and Ngāia Wilson.

Our World - Senior Scientist Murray Davis represents the huge reservoir of knowledge and experience at Forest Research.

their future - Eight-year-old Rawinia Wilcox explores the possibilities of what can grow from that knowledge.

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The year at a glance

The second year of our journey was marked by excitement, discovery and learning. In fulfilling its owners' charter "to lead and inform debate in areas where they have expertise", Forest Research is performing a facilitative role to lead the way into new Biomimetic Futures for us, key stakeholders and client groups.

See page 06

The "A-grader" is the only machine on-site grader that can only measure efficiency on random lengths of green rough-sawn timber. By using principles of some resonance, A-grader readings are not affected by varying variations on the surface of the timber as are the traditional machine on-site graders. As such, this earlier grading can allow sawmills to see on many of the downstream costs, such as kiln drying and planing, for pieces of timber that don't make the grade.

See page 18

The safety and ergonomics unit – the Centre of Human Factors and Ergonomics has secured an investment from the Health Research Council of New Zealand into work related to musculoskeletal disorders. The investment is \$480,000 over two years. See page 11

A new technique developed by materials scientists at Forest Research enables the chemical reduction of silver ions to form metallic silver inside wood cells. This is believed to be the first time that metallic deposition has been achieved in situ from a chemical reaction created inside the wood. Scientists are now characterising the properties of this material to see how it may be developed.

See page 26

PAFRC has received \$1.4 million of Government funding as part of a collaborative team to develop better packaging for export produce. Sending fresh food overseas has always been a challenge for New Zealand due to its physical isolation, but specialised packaging systems enhance the quality of transported goods. Although major food exports, such as apples and kiwifruit are already well serviced in terms of custom-packaging, substantial growth potential exists in niche... See page 18



The pitch canker fungus *Funaria* omission was identified for the first time in New Zealand by Forest Research scientists. The pathogen has been recognised as a serious threat to radiata pine in New Zealand. It was isolated during a routine check of imported material held in a MAF-supervised quarantine facility. Forest Research pathologists isolated and identified the pitch canker fungus *Funaria* omission using the molecular technique developed by Dr Tod Rainfield and Kayla Dobbin. See page 15



A unique facility has been developed at Forest Research to test the decay rate of different treatment systems. Wood preservation scientists have built small segments of fumant timber with wet, then and installed them with species of brown-rot fungi isolated in Auckland houses. These samples are then stored in warm, humid conditions and left to rot. This allows different treatment systems to be assessed in a relatively short space of time. See page 22

Scientists and surveillance officers have been active over the last year in helping the Ministry of Agriculture and Forestry (MAF) to push for the eradication of painted apple moth, Asian gypsy moth and Fall webworm, a few that many other countries could scarcely contemplate, let alone achieve. See page 13

By entering the consumer sector Forest Research is interacting with a range of clients hitherto beyond its sphere of knowledge, but of critical importance to the primary sector clients. Opportunities offered to these clients include: around developing innovative and renewable solutions for consumers' material needs in the form of a range of new sophisticated and sustainably-sourced products. See page 07

Forest Research provides expertise in formulating treatment systems and ensuring their appropriate application. This year scientists have provided knowledge critical to the drafting of timber preservation and finishing standards (NZS8340 and 3062 respectively) that protect consumers from being associated with inadequate durability in "leaky" buildings. Timber engineering specialists have also contributed to the revision of grading standards that ensure higher performance in timber-fanned construction. See page 21

During the previous fire seasons, which saw a number of serious fires in the Canterbury region, fire behaviour models designed by Forest Research were used to help make decisions about what homes to evacuate and how fire fighters should be deployed. Decision support systems of this kind will become increasingly important as the rate of rural fires in New Zealand continues to climb. See page 16

Declining water quality in Lake Taupo has prompted studies into alternative land uses in the Taupo basin. To demonstrate how forestry income compares with that from sheep and beef farming, researchers used 'The Calculator', a software package designed by Forest Research to determine the profitability of farm forestry.

See page 17

Ralf Mieller completed a PhD project that enables radiata pine wood-like cells to be grown in tissue culture for the first time. This technique can be used for testing the function of genes in terms of cell wall development. The system allows researchers to introduce new genes, and see how it affects cell growth. There are about 5000 genes involved in cell wall formation. See page 27

Work on advanced treatment systems has primarily focused on the N-VinylTech[®] system developed and patented by Forest Research. This system uses nitrogen fixation to increase chemical rates and lower discharges of nutrients to the environment. This year, full-scale trials were completed at a pulp mill in Östbo, Sweden. See page 27





Rawlins quizzes
Brian Armstrong (Chairman)
and Bryce Head
(Chief Executive).

The road to Biomaterial Futures

FROM THE CHAIRMAN AND CHIEF EXECUTIVE

If 2001-2002 was a year of pivotal change in thinking with a new vision and a new strategy, 2002-2003 was a year of putting the building blocks into place, and 2003-2004 has been dedicated to turning the vision and strategy into reality.

The second year of our journey was marked by excitement, discovery and learning. In fulfilling its owners' charter "to lead and inform debate in areas where they have expertise", Forest Research is performing a facilitative role to lead the way into new Biomaterial Futures for its key stakeholders and client groups. This requires maturity in leadership and interacting with client groups.

An underlying theme in major developments in the year under review has been partnering:

- Forest Research is playing a role in helping to bring together the Science Enterprise Group (SEG) comprising the Association of Crown Research Institutes (ACRI), the Universities and the Research Association. SEG is working cooperatively toward developing a better environment for science in this country. It has been active throughout the year and by year end is bringing to work to completion for presentation to policy and science bodies in Government, as well as to commercial interests.
- Forest Research is also playing a role in bringing about a wider, more inclusive dialogue within the forestry sector, which represents Forest Research's key stakeholder group. Industry unity on key strategic matters is seen as an important precursor to the change process required to fully exploit the potential new futures confronting the sector.
- Fulfilling its charter to help build "inter-connectivity and a successful innovation system", Forest Research has actively been setting up collaboration vehicles both on- and off-shore in its key strategic areas with an array of new partners – many in new areas of science and research for the nation.

Our three part strategy

The new strategy is metaphorical in nature and is transforming forest research from a commercial forestry industry service centre, to a leader in breaking down traditional paradigms and highlighting new opportunities to access consumer markets for forestry participants both in the short and longer terms.

commercial forestry

Once encapsulating the whole of Forest Research's business, this area has been significantly strengthened and grown during the year with a "fit" for a major New Zealand science enterprise in forming a very large strategic partnership with a traditional competitor, CSIRO in Australia.

The new unimproved joint venture called **enda** will be one of the largest dedicated, forestry research providers in the world (see page 30).

Other aspects of the strategy have been advanced in several areas:

- The Wood Quality Initiative (WQI Limited) which was set up with industry and other provider partners the preceding year has moved forward strongly, with new partners joining the consortium and extending its programmes.
- By year end significant progress was being made in working toward the formation of a new consortium around tree breeding with relevant partners.

renewable consumer products

As part of our strategy, this new area of activity has been introduced to Forest Research's portfolio of research. One early manifestation is with the Built Environment Advanced Consortium (Beacon). Beacon was commissioned with three initial partners at year-end.

One objective of the Renewable Consumer Products strategy is to provide a lens to the market for the traditional forestry businesses and for the Biomaterial Futures Sciences carried out in the other parts of the organisation. This groundbreaking work fills a vacuum of need for the benefit of current and future commercial stakeholder groups.

By entering the consumer sector Forest Research is interacting with a range of clients hitherto beyond its sphere of knowledge, but of critical importance to the primary sector clients. Opportunities offered to these clients revolve around developing innovative and renewable solutions for consumer material needs in the form of a range of new sophisticated and sustainably-sourced products.

A significant amount of consumer market research constitutes part of this strategy.

biomaterial futures

The third, and more futuristic, part of Forest Research's new strategy is the entry into fundamental Biomaterial Science. In this area there are Transformational Science Platforms (TSP) operate in carefully selected research niches, chosen and developed to give the maximum impact to stakeholders through new biomaterials science discovery at the cellular and molecular levels, as well as novel engineering approaches.

The three science platforms, Biomaterials Engineering (BME), BioConversion, and the CellWall Biotechnology Centre (CBC) are each focused on fundamental science domains that are seeking to leverage

New Zealand's comparative advantages in sustainable plant production systems into new bio-based opportunities.

Already under development are a number of high performance bio-derived specialty materials.

Underlying the new strategy have been a number of themes:

- Growth through strategic alliances and partnering (see page 10).
- Seeing the whole picture – throughout the value chain from fundamental science, through growing and manufacturing into consumer uptake and new product development.
- Breaking down paradigms that exist all along that value chain.
- Conveying the new thinking as widely as possible among all stakeholders – old and new.

New group structure emerging

The three parts of the strategy, each with different ownership and partnering arrangements, are leading directly to a new Group structure. This new entity is

being nurtured and consciously developed. It will be headed with a new name and will be launched in the new financial year.

Managing the Group structure and leading it with strong, constant focus on strategy, while accepting diversity in ownership, partners and style of delivery

throughout the Group, represents a new set of management challenges.

The journey so far has not been without its challenges and although many will have been confounded to date, even more will undoubtedly arise in the future.

Some challenges met along the way

Bidding for government investment funds

The bid outcomes for the Sustainability round with the Foundation for Research, Science and Technology (FRST) were announced at the beginning of the year. The result was a negative outcome for Forest Research. Significant losses were sustained in key policy and strategy areas such as the Built Environment, Strategic Market Intelligence, Bioenergy, Safety, Sustainable Forestry, Carbon Monitoring and Climate Change, and Tree Breeding.

Forest Research's response was to deal with the outcomes proactively and constructively at three levels:

- At the internal level, immediate measures were put in place with staff and leadership to mitigate the impact as much as was possible, and to maintain key policy and strategic capability through the transition to a more stable situation.
- At the corporate level, negotiations were undertaken with FRST and other affected Government and industry groups. Simultaneously, Forest Research led a process in which case studies were used to illustrate to key audiences the impact on Crown Research Institutes (CRIs) and other providers from sudden and unexpected losses in income from the bidding process. Several rounds of negotiation were successfully concluded with FRST and other industry organisations and Government departments, to maintain the capability of critical centres, for

example around carbon monitoring, climate change, and the Built Environment (as well as others).

- At the national level, Forest Research has been proactive through ACRI, SEG and in its own right, in bringing about a better environment for science and helping Government to put measures in place to maintain capability in the face of changed investment priorities.

The second FRST Advancement round was concluded towards year end, and Forest Research was successful in recovering all of its lost ground and making up a net increase over the losses sustained earlier in the year. This result arose from improved bidding processes, better relationships, and forging alliances with appropriate partners to impact strategic areas. This outcome was a measure of the credibility that is ascribed to Forest Research's new direction.

Subsidiaries

Three subsidiaries failed to reach their revenue targets during the year:

- VIGIL (forest health advisory services);
- SignaGen (DNA testing services); and
- ATLAS (forestry software).

Together these had an adverse impact on what would otherwise have been a successful financial year for the new Forest Research Group.

ATLAS had a difficult start to the year and a change in leadership. The unit is now refocusing and results have improved.

The SignaGen DNA testing services unit is the subject of ongoing discussion with potential partners to bring it to the critical mass required for a successful business venture.

VIGIL has been re-formed and put under new leadership with a view to providing a better and more economic service to its client group.

New clients

One of the challenging and exciting aspects of the new strategy has been to introduce Forest Research to a range of new clients, particularly those further up the value chain. For example, Forest Research now interacts with regional planners, local authorities, building industry participants, infrastructure facilities, energy-based businesses, and a range of others close to the consumer end of the value chain.

The Renewable Consumer Products part of the strategy is the most challenging in the medium term, with the biggest potential to deliver value to the nation as a whole.

A large amount of work is being put into identifying those client groups with whom Biomaterial Futures has the most affinity and therefore offers the greatest benefit.

Forest ownership

Another challenge has been the changing forest ownership patterns occurring during the course of the year.

Fletcher Challenge Forests has disappeared from the scene with the sale of its entire forest estate to a range of offshore and onshore buyers. Significantly Prudential Timber, the Kiwi Forest Group, Hancock, Viking and Harvard Management Company (represented by GMO Renewable Resources) have emerged as major forest owners in New Zealand. Further changes are heralded with Carter Hill Harvey recently announcing plans to sell half of its 330 000-hectare estate. These changes bring new dynamics with new expectations and new requirements to research and service providers such as Forest Research.

Investing in our future

staging

Some intense activity during the year around implementation of a staging process to bring technologies through to commercialisation has been a feature of new capability building at Forest Research. Utilising an external consultant, and underpinned by two Americas software staging management systems, Forest Research is implementing new processes which facilitate an orderly transition of selected technologies through a milestone-based process to maturity and commercialisation.

Intellectual Property (IP) policy

Consistent with the Shareholders Operating Framework requirement, the company has kept an IP policy "under active review" during the year and the review judged the policy to be comprehensive and to remain appropriate for the protection of the organisation's intellectual capital and strategic IP assets.

Staff benefit sharing measures are in place and under review; and the processes, dispositions and IP management practices were deemed to be appropriate.

Maori

Forest Research has continued to develop and foster its relationship with its Maori stakeholder group, and now operates a three level engagement framework with Maori at local and national levels.

People

This year's only achievement have been possible only through the widespread commitment and efforts of our staff throughout the Group. Notable individual achievements have been highlighted elsewhere in this report.

Financial

Group operating surplus before taxation and non-recurring expenses was \$780,000 on total revenue of \$39,022 million. There were no non-recurring items in the latest period.

From the operating surplus, \$746,000 was reinvested in areas that support our future direction. This included \$502,000 investment in Australia, \$150,000 to underpin the development of Maori business and \$125,000 in the industry connection, SQJ Limited. The reinvestment contained a portion of corporate overhead costs. The Group surplus also included one-off costs of \$246,000 to establish ends.

Total revenues of \$39,022 million show an unfavourable variance of \$3,263 million compared to budget of \$42,285 million. A significant loss in funding from the FRST sustainability bid round, was offset by transitional funding and gains in the Advancement round. This resulted in a net Government revenue loss of \$900,000. The remaining unfavourable revenue variance of \$2,300 million was largely due to lower commercial revenues from the business units, VIGIL, SignaGen and ATLAS.

Personnel costs, which account for more than 56% of total costs, were kept at a 2% increase on the previous period. With reduced revenues and an ongoing corporate efficiency review, total operating expenses were kept in check, which was essential to maintain the net surplus.

Net surplus attributable to the shareholders was \$685,000, compared to \$600,000 in the previous period.

Net cashflows from operating activities were strong at \$3,241 million in the previous period, to \$2,363 million in the current period. Revenues were lower than the previous period but with a lower cash outflow; the net result was an increase of \$878,000.

The net debt level decreased from \$2,000 million to \$1,183 million over the reporting period.

Forest Research invested \$2,342 million in capital expenditure. A proportion of this related to completion of the last major refurbishment of the main campus. A wholly owned subsidiary, FR Properties Limited was incorporated. The Board of the property company is working closely with Tangata Whenua to extend the best utilisation of the campus land.

Conclusion

As is so often the case, the journey as it unfolds has many more pathways, obstacles and challenges than are apparent at the outset. It also provides many more opportunities. It is therefore much more exciting and rewarding than first imagined.

Steady hands and minds, for making sense out of complexity and ambiguity, are essential ingredients in the next phase of building forward. Our staff are unwaveringly committed to the journey, and our clients and partners are progressively buying into the pieces that are of importance to them.

Forest Research is in transition to a new Group, establishing the whole and helping each part play its role effectively.

Our thanks go to the staff, management and Board for their continuing commitment. We look forward to the forthcoming year with renewed excitement, a reinvigorated Group, and confidence in the pathway we have chosen to travel.



JOHN CUNNINGHAM,
CHIEF-CITY, FMC LEE
RISCOLLTON FUND, FRST

ANGELLE FOLY,
INVESTMENT MANAGER,
ECONOMIC INVESTMENTS, FRST

COLDEN REID,
INVESTMENT MANAGER,
TECHNOLOGY
NEW ZEALAND

DR NISSELL BURTIN,
GENOMIC RESEARCH,
SCIENCE FUTURES

DR TOM ARCHERSON,
CHIEF OPERATING
OFFICER, SCIENCE

New Science - Partnerships and Opportunities

where 2002-2003 was the year for the biomaterials strategy formulation and the beginnings of implementation, 2003-2004 was the year for translating that strategic intent into new science-driven partnerships and opportunities.

In this respect, it has been a year of singular success in science repositioning and new partnership development. Through this year's achievements and

more that are on the way, a strong foundation has been laid to deliver the science outcomes we have set for Forest Research.

the three science domains

1. The science platform – science-facing focus areas developing the knowledge and technologies to create future bio-based innovations;
2. Consumer and market led sustainable solutions, and
3. Science to underpin a strong biological production base

have all made significant advances in consolidation of the science direction, the development of new strategic partnerships and substantial progress in innovation. These achievements have arisen as the Forest Research biomaterials strategy gains traction and meshes with growth in Government investment and stronger partnerships with an industry sector similarly focused on creating sustainable, bio-based higher value products.

The three science platforms, Biomaterials Engineering (BME), BioConversion and the CellWall Biotechnology Centre (CBC) are each focused on fundamental science domains that are seeking to leverage New Zealand's comparative advantages in sustainable plant production systems into new bio-based opportunities.

This year the CBC has developed a strategic partnership with biotech start-up AgriGenesis to combine their expertise in in silico and model system analysis with CBC's plants and statistical genetics strengths. On this front, the CBC has developed a tissue culture-based functional testing system for cell wall related genes. This breakthrough significantly strengthens the CBC's capacity to determine the effect of specific gene combinations on plant cell wall formation. And plant cell walls are at the heart of the new bio-economy vision.

The flagship system for BME has been the development of the Biopolymer Network (BPN), a collaboration between Forest Research, Casestri Network Ltd and Coop & Food Research, with a special partnership with the University of Auckland through the Centre for Advanced Engineering. The focus for the network is 'New Zealand Inc.' assual on creating specialty bio-based chemicals and advanced biomaterials using the best team and sector partners. The BPN has secured investment from FRST and industry partners, of some \$4 million per annum from July 2004. In a related development, the Forest Research-University of Auckland Centre for Advanced Composite materials was opened by Minister Hodgson in April.

This year BioConversion activities centred on a drive to commercialise the N-Fix technology suite while also defining the focus areas for their longer-term strategic science. Particularly noteworthy is the rising profile of the economically programme. By linking Maori development opportunities, lakes management issues and strong collaborations with Landcare Research and the University of Waikato, the team is gaining international recognition for unravelling the effects of anthropogenic impacts on New Zealand ecosystems.

Already emerging from the Science Platform is a portfolio of products in development. This portfolio, which includes development of high performance bio-derived specialty materials, spearheads the organisational target of creating sustainable products and taking these to market. In 2003, an investment injection of \$375,000 was made from the FRST pre-seed accelerator fund, which has helped accelerate the growth of this portfolio to beyond \$1.2 million per annum.

The second science domain focuses on meeting the explicit and implicit needs of the consumer and market place. This component creates a critical linkage between the discovery focus of the science platform and the ultimate consumer. The initial research focus here is in Energy and the Built Environment. The signal event is the realisation of the residential heater and neighbourhood research consortium, Bescon Parkway Ltd, a partnership between Fletcher Building Ltd, Watacote City Council, the Building Research Association of New Zealand and Forest Research. The outcome for this consortium will be systems and solutions that will enhance the sustainability of existing and new houses and neighbourhoods. Bescon Parkway Ltd has an investment base of some \$12 million over 6 years, jointly contributed by the partners and FRST.


A second, and associated outcome, is the successful FRST investment into a

project of particular interest to Forest Research's biomaterials strategy – to conduct environmental life-cycle analysis, social and ethical impacts research on a range of biomaterials technologies and create a framework to facilitate national dialogue and decision making on design, regulation and adoption of biomaterials. This work is being undertaken in partnership with a social research consulting company and UNITEC.

A sustainable biological resource underpins any strategy to build sustainable high value bio-based industries. In 2002-2003, Forest Research's core programme in Sustainable Forest Management, Applied Genetics and Safety suffered a decline in national investment into their core underpinning science. Over the course of the year there has been consolidation and we are optimistic that stability of the core programmes will develop as industry and Government partnerships unite behind the area of soil science and applied genetics. The Forest Biosecurity and Protection unit has seen a growth in funding up to \$3 million in the area of health and security and also in hazards research – the latter specifically addressing rural and forest fire. Both of these are associated with substantial industry and Government partnerships – the latter being across Australia. As a result of this new investment platform, we have been able to recruit a new cohort of young scientists to join established teams.

The safety and ergonomics unit – the Centre of Human Factors and Ergonomics has secured an investment from the Health Research Council of New Zealand into work related to musculoskeletal disorders. The investment is \$450,000 over 2 years.

This has been a successful year in building strong science foundations, spearheaded in nearly every instance by strategic partnerships. There is much to be done to deliver on this potential, and we are in a good place to move forward.



"We have an immense resource, one which we are only beginning to exploit to its best potential."

Hon Jim Anderton - Minister for Economic Development



Commercial Forestry

Forest research has played an integral role in helping the forestry and wood industries to take a central position in New Zealand's economic development.

A priority for the organisation has always been to assist this sector in gaining maximum potential from the plantation resource. Over many years Forest Research has led the industry in the development of new germplasm, optimum silvicultural regimes and forest management practices for growers. Much work remains to be done in transforming exports of low-value commodities to high-value products, and this is where increased science effort is being applied.

Government commitment to the sector has been demonstrated through the Wood Processing Task Force. Further industry-supported projects have taken the form of the Wood Quality Initiative (WQI Limited), and the Multicent Drying Group, a Forest Research-based grouping that serves all the major softwood processors in the Southern Hemisphere. From July 2004 onwards, a joint venture between Forest Research and CSIRO

Forestry and Forest Products, brings together the two leading forest research agencies in Australasia to provide even greater thrust to future developments in the industry (see page 30).

Over the past year, Forest Research has made significant contributions to wood quality research through gains in knowledge of fundamental wood structure principles. Advanced research tools allow a better understanding of how wood quality is linked to tree growth, which can in turn be linked to forest management practices.

At the sawmilling level, kiln drying is the key to added-value wood processing. Good drying involves both designing plant wisely and operating it skillfully. Forest Research has continued to upgrade control systems and refine processes that enable sawmills to achieve consistently higher standards and increase the competitiveness of wood products. The

COMMERCIAL
FORESTRY

Multicent Drying Group steers the direction of this work and benefits from results as they emerge.

For wood processing companies to develop business propositions that are achievable and sustainable, they will need to access stable resource supply over time. This means ensuring that the resource is managed responsibly and protected from damaging agents. Forest Research is the central provider of forest health and protection knowledge in New Zealand. Scientists and surveillance officers have been active over the last year in helping the Ministry of Agriculture and Forestry (MAF) to push for the eradication of painted apple moth, Asian gypsy moth, and fall webworms, a fear that many other countries could scarcely contemplate, let alone achieve.

The history of plantation forestry in New Zealand consistently demonstrates the ability of a small country to generate significant economic value, often against the odds. Forest Research continues to strive for the betterment of this extraordinary industry, now and into the future.

Assisting central government agencies

carbon research emerges from the ashes

Funding support from the New Zealand Climate Change Office (CCO) and MAF has allowed Forest Research to rebuild core science competencies around carbon monitoring and climate change research for planted forestry. The newly reformed Carbon team will support the Government's obligations under the ratified Kyoto Protocol, and the United Nations Framework Convention on Climate Change to report on carbon in forests. CCO funding provides for the ongoing implementation of the carbon monitoring system (with LandCare Research and Wildland Consultants Ltd) over the indigenous estate and scrublands, and allows for a similar system to be established in planted forests. Of particular interest will be post-1990 plantings on ex-pasture sites, which is where the greatest changes in carbon sequestration are expected to take place.

reaping harvests of information

During the past year, researchers have begun reaping a huge crop of new data as site quality plots are harvested nationwide. The plots are part of a trial series that extend across the forest plantation soils of New Zealand. The purpose of this research is to understand how site resources such as nutrients, climate, and physical soil characteristics are utilised by commercially grown trees.

The ultimate aim is to produce guidelines on sustainable forestry for the industry. The information yielded from this study will also enable the Government to report on criterion indicators for sustainable forest management under the Montreal Process.

energy use revisited

Forest Research undertook a study for the Energy Efficiency and Conservation Authority, looking at energy usage in the wood processing industry. Surveys have shown that the sector consumes 10-11% of New Zealand's primary energy, with over 50% of this derived from burning biomass. Results indicate that total energy use has increased by around 40% over the

past 5 years, due largely to higher production by sawmills and panel-producers. This work was undertaken partly with a view to assessing energy efficiency potential and monitoring improvements related to New Zealand's overall energy management.

FOREST RESEARCH ASSISTS CLIENTS IN THEIR MOVES TO IMPROVE PRODUCTION AND ENERGY EFFICIENCY.

Pictured at the Red Stag Timber mill are Bruce Davy (left) and Site Manager, Tim Rigter.



predicting pest movements

The ability to predict population spread allows a more informed approach to pest or weed management. Forest Research recruited Dr Darren Kriticos, an ecological modeller formerly with CSIRO in Canberra, to boost capability in this area. Over the past year, population modelling has been used to predict where *Ulsula lignosus* (ginsleaf skeletoniser) is likely to spread in New Zealand, and how bad it could get in different parts of the country. Dr Kriticos has also mapped the potential spread of a vigorous weed species that threatens pastureland in dry areas. A clear picture of how far a problem species can spread enables authorities to focus surveillance efforts and work out the best strategies for containment within a cost-benefit framework.

pitch canker stopped in its tracks

The pitch canker fungus *Fusicoccum cinctum* was identified for the first time in New Zealand by Forest Research scientist. The pathogen has been recognised as a serious threat to radiata pine in New Zealand. It was isolated during a routine check of imported material held in a MAF-supervised quarantine facility. Forest Research pathologists isolated and identified the pitch canker fungus *Fusicoccum cinctum* using the molecular technique developed by Dr Ted Ramsfield and Kyrin Dobbie. Their positive results was confirmed by researchers in California who also tested the pathogenicity of the isolate. As a consequence of this discovery, MAF has placed restrictions on the importation of Douglas fir material from the USA.

steering biosecurity research

The Forest Biosecurity Research Council (FBRC) was formed by Forest Research, the New Zealand Forest Owners' Association (FOA), MAI, and the National Centre for Advanced Bio-Protection Technologies at Lincoln University. The purpose of this new steering group is to fund and oversee research to protect and improve the health of New Zealand's forests. The strength of the FBRC will be the combined perspectives of researcher, producers, the forest industry and MAF who are charged with implementing national biosecurity policies.



FOREST RESEARCH'S QUARRANTINE FACILITY IS MAF ACCREDITED

Here Michelle Watson shows Wei-Young Wang (PP Glass & Co) her work with *Ulsula lignosus* (ginsleaf skeletoniser).



MASTERING FOREST INFORMATION

ATLAS Technology has been successful in developing GeoMaster, forest information management software for a growing range of clients. Pictured are Kaitiakiwa Timberlands General Manager Operations, Russell Dale with GeoMaster software developer, Christian Pillar.

Assisting regional councils

fire research elazes ahead

The Rural Fire Research programme has received investment to continue developing fire management tools. During the previous fire season, which saw a number of serious fires in the Canterbury region, fire behaviour models designed by Forest Research were used to help make decisions about what homes to evacuate and how fire fighters should be deployed. Decision support systems of this kind will become increasingly important as the rate of rural fires in New Zealand continues to climb.

New Zealand is now well placed to lead research into assessment of the potential die-off of grass fuels, an essential input into grassland fire behaviour models and fire danger rating systems. This expertise is recognised by Australian researchers, who have included Forest Research in their recently formed Bushfire Cooperative Research Centre. New Zealand is expected to benefit greatly from this Australian partnership.

checking in on kiln emissions

Wood drying kilns are significant users of air and water, so regulatory bodies must ensure that they do not have a significant detrimental effect on the environment.

In response to concerns from regional councils, Forest Research prepared a report outlining research conducted in this area to date. This report ensures stakeholders have access to the same information on kiln emissions, along with an explanation of the work done at Forest Research and the issues relating to airborne emissions. Existing studies have concentrated on radiata pine lumber and on lumber sizes and kiln temperatures commonly used in New Zealand. As increased pressure is placed on wood processing sites by environmental conservation, more detailed studies are required to quantify emissions and how they can best be managed.

waging war on wildlings

The spread of wild conifers as a weed species is causing concern to the Department of Conservation and territorial authorities in many parts of New Zealand. Forest Research is using accumulated research data to construct models that will assist management decisions for controlling the spread of wildlings. High country specialist, Nick Ledgerd has been working with a number

of District and Regional bodies to compile management strategies for wildling control in specific areas, most recently Lake Wakatipu and Marlborough.

trees for taupo

Declining water quality in Lake Taupo has prompted studies into alternative land uses in the Taupo basin. To demonstrate how forestry income compares with that from sheep and beef farming, researchers used 'The Calculator', a software package

designed by Forest Research to determine the profitability of farm forestry. The results showed that sheep and beef farmers in the Taupo basin can change their land-use from pastoral farming to a mix of farming with woodlots, particularly on their least productive land, without compromising their long-term profitability. Funded by the MAF Sustainable Farming Fund, the Lake Taupo project represents the first large-scale application of this modelling tool.

Assisting producers

getting sorted in mechanical pulping

For many years, the relative effectiveness of the chip refining process on eucalyptus and larchwood fibres has been the subject of intense debate. The most common belief, based on Northern Hemisphere species, is that larchwood fibres require more energy to process and are the frequent cause of paper sheet roughness and printing problems. Mechanical pulping specialist, Kai Marton, completed a PhD thesis which showed that the opposite is true for radiata pine. He demonstrated that eucalyptus requires more energy for pulping than larchwood. Having provided this new insight, Dr Marton then went on to identify a processing strategy that could allow the separate treatment of eucalyptus and larchwood fibres in an industrial situation. This knowledge will enable

producers to minimise the negative impact of larchwood fibre refining behaviour, thereby saving both energy and cost.

cooperating for growth

The Small Growth Modelling Cooperative gave the Radiata Pine Breeding Company (RPBC) access to its large-pilot genetic gain data. This valuable body of information was used for analyses in support of the GF Plus system of rating radiata pine growth. The results were published in the RPBC Information Bulletin No. 3, 'Radiata Pine Growth'. The bulletin points out that genetic selection can significantly increase growth rates, with increasing GF Plus rating for growth showing progressive improvement in volume. Also, trial data demonstrate that genetic improvement in growth can be achieved consistently across forest regions, sites, silvicultural regimes and throughout the life of a stand.



FOREST RESEARCH IS A SIGNIFICANT RESEARCH PROVIDER TO THE WOOD QUALITY INITIATIVE (WQI LTD.)

Wayne Miller, centre (Chairman of WQI Ltd) talks to John Lee (standing at left) and Grant Holden.

wind effects on tree growth

Forest Research scientists understand that the influence of wind on tree stem and branch form is not only of interest to physiologists, but also of considerable importance to forest managers in determining how to maximise the return from their resource. A recent study has shown that wind significantly affects branch diameter in radiata pine. To determine why this occurs, field and laboratory experiments were initiated to investigate the physiological responses of branches to different levels of wind exposure. Results contribute to the improvement of growth modelling systems for different conditions.

growing relationship

This year Forest Research Nursery staff have nurtured thousands of plants which will form the basis of the new tree breeds for forests and farms. Jointly funded by Forest Research's strategic partner Corrections Institute Employment (CIE), the plants will be supplied for establishing stocked orchards on CIE farms. The management of stockbeds for the production of cutting will provide the Corrections Department with another technology for teaching to inmates. Cuttings produced from these new Forest Research breeds will be supplied to independent nursery growers for propagation and on-sale to forest growers. The joint venture project with CIE is based on over 40 years knowledge of tree improvement at Forest Research, and is focused on delivering the next generation of tree and wood quality traits for future forests.

saving rare and endangered species

Tissue culture specialists spent 2 weeks with the Australian Department of Primary Industries initiating new clones for multiplication of their pine hybrid and Willmann pine, the rare and endangered New South Wales conifer. Both species were successfully propagated in Rotovava and plants have been shipped back to Australia. Tissue-cultured plants provide an excellent way of transferring genetic material across international borders. Current research indicates commercialisation of these technologies may be possible in the future.

making the grade

A new timber-grading technology was developed by Forest Research in conjunction with Falcon Engineering to determine the stiffness of timber, using sound waves. The "A-grade" is the only machine stem grader that can easily measure stiffness on random lengths of green rough-sawn timber. By using principles of sonic resonance, A-grade readings are not affected by sawing variation on the surface of the timber as are the traditional machine stem graders. As such, this earlier grading can allow sawmillers to save on many of the downstream costs, such as kiln drying and planing, for pieces of timber that don't make the grade.

photonarvl goes digital

PhotonARVL is an established technique developed by Forest Research that enables measurements to be made from stereoscopic photographs taken of stems of standing trees. The technology has

emerged as an important research tool, particularly for silviculture/tree-breeding studies investigating the effects of site on stem form and branching characteristics. Forest Research has now developed a fully digital version of PhotonARVL, called TREEED which is capable of processing 35-mm-format, digital images. This technology has seen increased commercial application over the past year and a study has just been completed linking stem shape with internal distribution of compression wood. TREEED offers a cost-effective alternative to destructive methods of obtaining detailed stem measurements.

making freshness go further


PAPRO has received \$1.4 million of Government investment as part of a collaborative team to develop better packaging for export produce. Sending fresh food overseas has always been a challenge for New Zealand due to its physical isolation, but specialised packaging systems have the potential to enhance the quality of transported products. Although major food exports, such as apples and kiwifruit are already well served in terms of custom-packaging, substantial growth potential exists in niche horticultural and chilled seafood sectors. The packaging technologies developed to assist these goods to market may then be adapted to high volume meat, dairy, and flower exports. The collaborative team involved with PAPRO in this research are Canisius Network Ltd, Crop & Food Research, and Auckland, Victoria, and Massey Universities.



PAPRO SCIENTISTS WORK
SIDE-BY-SIDE WITH AN
INTERNATIONAL PAPER,
PACKAGING, AND RECYCLING
CORPORATE.

Dr Bob Allison (left) is
pictured with Murray Johnson,
Director of the XRAY Technical
Centre in Melbourne.





"Many of the most advanced and most intelligent building products I have found and worked with are based on wood".

Mike McDonough, US-based award-winning architect, artist, and industrial designer

new zealand's economy is traditionally based on the production of renewable materials.

New Zealand's economy is based on primary production of a largely renewable nature. However, much of this production is commodity-based. In many primary sectors, the emphasis is now on changing to "value-add" and the production of more processed product.

The wood industry is no exception, and as part of its strategy, Forest Research is building relationships with a wide range of companies who are successful in manufacturing finished products based on plantation-grown wood and fibre. These companies range from building material suppliers to makers of fine furniture. Their success is based on a strong market focus, a commitment to research and development, and enhanced productivity. The outcome is a growing range of innovative products that generate sustainable high-value returns for the industry.

Forest Research is in the business of seeding and feeding new ideas, and improving the performance of existing products. At the same time, science

knowledge is often required to assist in improving traditional applications such as in the building industry.

The strength of radiata pine lies in its versatility. To perform in a large range of applications requires specialised timber treatment. Forest Research provides expertise in formulating treatment systems and ensuring their appropriate application. This year scientists have provided knowledge critical to the drafting of timber preservation and framing standards (NZS3640 and 3602 respectively), that protect consumers from losses associated with inadequate durability in 'sally' buildings. Timber engineering specialists have also contributed to the revision of grading standards that ensure higher performance in timber-framed construction (NZS3103 - Timber Structures, and the production of NZS3622 - Verification of Timber Properties).

Forest Research is committed to supporting the development of products that consumers want to buy, and which

reflect the unique qualities of New Zealand's sustainable resources. As New Zealand becomes an increasingly urbanised nation (87% of us now live in an urban area), a focus on the way we use our built environment is essential.

retrofitting

Over the past year, the Built Environment unit increased its emphasis on retrofitting older houses as part of a sustainable urban development programme. This involves understanding the future needs of consumers in the built environment, and the development of technologies that enable existing houses to be modified for greater functionality. Progress has been made in determining the current state of retrofitting in New Zealand and designing systems for improving the energy efficiency and comfort of timber-framed buildings by increasing their thermal mass. Tobias Kersch of the Swiss School of Architecture, Civil and Wood Engineering and Dr Mike Collins are currently undertaking a project to determine the market potential for a New Zealand business to specialise in coordinating sustainable retrofits.



RENEWABLE
CONSUMER
PRODUCTS

Renewable Consumer Products

Built Environment

spotting the rot

A study was carried out focussing on the performance of two-generation wood preservatives intended to replace copper chromate arsenic or crotonic for soil contact applications. Results highlighted the importance of site type on preservative performance, which prompted a close look at the types of decay in each treatment, and classification of offending fungi. Preservative-treated wood was decayed by a complex mixture of 18 identified decay types, of which 5 fitted within current decay classification. It was found that some fungi produce decay micromorphology in the field that is vastly more diverse than that observed in the laboratory. Fifty percent of decay across all sites was caused by decay types not described (or inadequately described) by the currently accepted decay types. This research will help to improve the interpretation of decay patterns in timber.

improving apartment sound control

Timber inter-tenancy floor systems used in Australasia are generally perceived as being unacceptably noisy. To overcome this, a team of New Zealand building acoustics researchers and Australian companies have formed a project to tackle this problem, including acoustics scientist Dr Grant Emmis. Research is currently under way to produce improved floor/ceiling system designs

recommendations that have comparable acoustic properties to other material systems that are perceived as quieter than timber-based systems. The work will result in designs for timber-framed inter-tenancy floor systems with impact sound insulation performance at least as good as (if not better than) a concrete slab, while maintaining buildability and cost effectiveness, and using local materials and techniques. This is good news for those living in future apartments who don't want to hear the neighbours (or the plumbing)!

framing the korean market

Visiting Professor Sang-uk Jung, from Chungnam University in Korea, undertook a project with Dr Bryan Walford funded by the Wood Processing Strategy. Their task was to write a Korean version of the New Zealand light timber framing standard, NZS3604, plus a training manual to go with it. The objective of this work is to enhance the value of radiata pine log sold into Korea and create the opportunity for direct sales of home-grown materials from New Zealand.

framing protection


A unique facility has been developed at Forest Research to test the decay rate of different treatment systems. Wood preservation scientists have built small segments of framed timber walls, test them and inoculated them with species of brown-rot fungi isolated in Auckland

homes. These samples are then stored in warm, humid conditions and left to rot. This allows different treatment systems to be assessed in a relatively short space of time. Under the tropical conditions, most samples are completely infested with fungi within 6 months, and total decay has been observed in untreated framing in less than 18 months. This facility has attracted the interest of chemical companies keen to test their products. The results of the study contributed to the review of NZS3602 (Timber and wood-based products) and the Building Code, which requires the treatment of exterior framing timbers.

MEMBERS OF THE BUILT ENVIRONMENT TEAM SEEK TO UNDERSTAND THE FUTURE NEEDS OF CONSUMERS

Visiting Swiss student Tobias Krehl (left) interviews Justin Ford-Robertson at his family home.





"Primary production is where a significant part of our new economy will come from..." Hon Pete Hodgson - Minister

of Research, Science and Technology - Future Sectors Conference, Auckland, 2000

biopolymers and biocomposites represent the next generation of new material development.

There are clear global trends relating to unsustainable, finite, petroleum resources, and Forest Research is in a prime position to create alternatives in the form of new bio-based materials, products, and technologies.

The past year has been dominated by initiatives to build a solid science foundation for biomaterials research in New Zealand.

biopolymer network

Forest Research has joined with three other leading research organisations to form a collaborative partnership known as the Biopolymer Network. This partnership provides the necessary knowledge and facilities to develop new ways of using renewable biological resources in industrial applications.

Comprising Forest Research, Canem Network Ltd, and Cop & Food Research with a close alliance with the University of Auckland, this partnership combines the country's top experts researching the most important natural polymers, such as



Biomaterial Futures

cellulose, proteins, starch, and others into a "virtual institute." The network allows New Zealand to pool its resources and develop internationally applicable new technologies.

This partnership is the first time that national science capability in forestry, wool, and agricultural crops has combined for the advancement of these primary sectors. The combined expertise in polymers, fibres, composites, textiles, and manufacturing technologies gives an opportunity to make the most of New Zealand's renewable biological resources.

centre for advanced composite materials

The Centre for Advanced Composite Materials (CACM) officially opened in April 2004. Located at the University of Auckland's Tamaki Campus, the new research centre focuses on pre-competitive research in the field of composite materials. Formed by a partnership between the University of Auckland and Forest Research, the CACM will develop leading

BIOMATERIAL FUTURE'S

technologies for advanced materials and manufacturing technologies. At the same time, it will foster the talent of young scientists in a field of increasing global importance.

cellWall biotechnology centre

The CellWall Biotechnology Centre (CBC) at Forest Research investigates the development of plant cell walls. Cellulose, a complex carbohydrate, is the main component of cell walls and also the world's most abundant biopolymer. Carbohydrates can also be broken down into ethanol, which is a renewable energy source.

Cell wall research will open the door to significant wood quality and fibre improvement. Breakthroughs in this area will help to keep the New Zealand forestry sector competitive in a world where biotechnology is being advanced on all fronts. For plant-derived composites and other materials to be produced economically, plant fibres of specific types will be required in massive quantities. This will mean tailoring fibre crops through advanced biotechnologies to meet demand.



DEVELOPING BIODEGRADABLE PLASTICS

Forest Research has been working with Vortex-Pacific, a publicly listed New Zealand plastics company with a strategic commitment to food packaging. Pictured are (standing) – Ron Starmer (Vortex-Pacific) and Jeremy Wares, (sitting) Paddy Boyle (Vortex-Pacific) and Dr Alan Frenyhoah.

Biomaterials Knowledge

Resin visualisation in natural fibre composites

Natural fibres derived from wood, hemp, or flax are being added to polymers (plastics) to reinforce polymer matrix composites and improve the properties of resulting composites. The approach is similar to the use of glass fibre reinforcements in composites such as GRP (glass-fibre reinforced polyester).

An improvement in mechanical properties, and particularly strength, is possible only if there is good adhesion and interaction between the fibres and the polymer, and if the fibres are relatively uniform and undamaged. Another factor is that natural fibres tend to be porous rather than dense and solid, as are glass fibres.

To gain greater insight into the interactions between the polymers and natural fibres, Forest Research developed new techniques using confocal microscopes. These allowed the visualisation of polymers, fibres, and other features that may be present in the composites. Features such as cell wall interactions, voids between or within the fibre-plastic interface, and the extent of lumen filling by plastic were examined. Ongoing work seeks to combine microscopic profiles and features with end-composite performance

such as strength, and to determine whether cell wall penetration by polymers is desirable. Similar work has been undertaken with resins used in the Medium Density Fibreboard (MDF) industry with success achieved in visualising the resins and/or waxes on fibre surfaces and in their cell walls in MDF products.

Advancing microscopy of wood cells

Forest Research scientist, Dr Ping Xu, completed an AGMARDT Post-Doctoral Fellowship on the structural mechanics of wood cells. Dr Xu achieved a number of significant outcomes in his project related to the understanding of cell wall stiffness – stiffer cell walls can mean stiffer trees.

As part of his project, he obtained an opportunity to learn new microscopy technology and to test wood cells using leading-edge technologies – 3D Dual-axis Tomography & Vertical micro-level cutting". This cutting-edge technique and the experimental methods that were developed are now one of Forest Research's core competencies in the area of biological structure of natural fibre.

Dr Xu's research involved a wood-dust testing to explore spatial orientation of microfibrils in wood. This capability allows a deeper research level into the cellular

and molecular structure on the physical, mechanical, and chemical properties of biomaterials.

metals in wood

A new technique developed by materials scientists at Forest Research enables the chemical reduction of iron ions to form metallic fibres inside wood cells. This is believed to be the first time that metallic deposition has been achieved in situ from a chemical reaction created inside the wood. Scientists are now characterising the properties of this material to see how it may be developed. Potential application may include highly-electrical conducting wood or wood with increased conductivity leading to highly-efficient powder coatings or electromagnetically radiation-shielded living environments. This work has been carried out in collaboration with the Electrical Engineering Department of the University of Auckland.

BETTER MANAGEMENT OF RECALCITANT POLLUTANTS IS A KEY ISSUE FOR PULP AND PAPER MILLS

Allison Slade (left) works with Carter Holt Harvey, Kieldale personnel, Jim Newfield and Yvette Hejl at the mill's wastewater treatment facility.



CellWall Biotechnology

Testing GM in a jar

Ralf Miessler completed a PhD project that enables radicals pine wood-like cells to be grown in tissue culture for the first time. This technique can be used for testing the function of genes in cell wall development. The system allows researchers to introduce new genes, and see how they affect cell growth. There are about 5000 genes involved in cell wall formation, and tissue culture allows their function to be tested individually. This technique enables scientists to experiment with genetic modification in a manner

that is risk-free. Dr Miessler has since increased the efficiency of a tissue culture technique that forms secondary cell walls. Up to 50% of cells are now producing secondary walls, enabling scientists to perform functional gene testing with genes related to secondary cell wall development.

ec field trial yields first year of results

Forest Research collected the first year of data from a field trial established to answer questions about the interaction between genetically modified GM trees and the environment. The trial contains radials

and Norway spruce that have been genetically modified with "reporter genes". These introduced genes (*gfpII* and *uidA*) produce proteins, which can be easily measured. Depending upon the quantity of protein produced, this information is used to monitor the behaviour of the GM trees in the environment. Measurements are taken to evaluate how the inserted genes are behaving. Results from the first year suggest that the trees are growing normally and no gene transfer is occurring from the GM trees into bacteria in the soil.

BioConversion

gaseous nitrogen from the atmosphere and/or synthetic biological systems.

Work on advanced treatment systems has primarily focused on the N-VivoTech[®] system developed and patented by Forest Research. This system uses nitrogen fixation to decrease chemical costs and lower discharges of nitrogen into the environment. This year, full-scale trials were completed at a pulp mill in Okohaki, Southland. These confirmed that the N-VivoTech[®] process offered these cost and environmental benefits, and revealed significant reductions in power consumption, leading to combined operational savings of 35% per annum for waste treatment costs. A further proprietary process, N-VivoPh[®], integrates nitrogen-fixing technology developed by Forest Research into a process to produce biodegradable plastics. In experiments with synthetic wastewaters, up to 50% yields of biopolymer in the harvested biomass have been achieved.

The Eco-Smart Technologies team are now using the advanced multi-reactor biological treatment facility to enhance the performance of these emerging technologies and extend their application into non-pulp and paper sectors.

environmental know-how pays off for industry

Better management of recalcitrant pollutants, particularly nitrogen and colour, is a key issue for pulp and paper mills in their existing wastewater treatment systems. Eco-Smart Technologies senior scientist, Allison Slade, has been working closely with industry partners, CHH Pulp and Paper and Norske Skog to identify options and technical requirements for improving these aspects of the companies wastewater treatment systems. The aim is to develop sustainable long-term operational plans to allow consistent compliance with resource consent conditions. Alison has worked with mill staff on a daily basis to obtain an intimate knowledge of their systems, management strategies, and historical trends. Complementary laboratory-based studies on in-mill sources of nutrient and colour, their behaviour during biological treatment, and advanced oxidation process for colour removal, have greatly enhanced the ability to design client-focused solutions. Overall, this integrated approach has been highly successful, providing some clear directions for the mills to implement new strategies for improved environmental performance.



Pictured from front to back are Pipi Make, Penelope Miller-Dolaney, Ben Hona, Donkey Kabukawa, Jackie Aratema, (members of the Tangata Whenua Consultative Committee) and Dr Phillip Wilcox, Dr Armin Wagner and Tupua Morrison.

Working with Maori

Forest research has made significant advances in the development of relationships with Maori. The corporate strategy targets Maori business development within the context of the special relationship between tangata whenua and the Crown.



Maori business development

The past year has focused on connecting with Maori organisations, creating interest in the current and future directions for Forest Research, and forging a strategy to attain preferred provider status for Maori organisations entering, or already in, the research, science and technology sector.

Underpinning Maori business development are three key result areas – Maori Consultation, Maori Awareness, and Maori in Science. Each of these areas has had unique challenges, and through

addressing those, we have produced some important outcomes that provide the foundation for future growth of our Maori client base.

Maori consultation

Forest Research developed the framework above which recognises Tangata Whenua status in relation to the lands on which Forest Research is based. The framework emphasises early engagement as a key principle, and illustrates the support each level of engagement can give to the sector. The Environmental Risk Management Authority (ERMA) has been particularly supportive of this development due to the

emphasis on consultative processes required under the Hazardous Substances and New Organisms Act 1996.

Within the framework, Forest Research and Tangata Whenua jointly initiated the following:

- an agreement with kaitiaki Ben Hona as key advisor to the Chief Executive;
- a bi-monthly consultative committee meeting with five Tangata Whenua representatives;
- consultative input on the GM field trial, waste-to-resource programmes and biological pest control.

In addition, from 1 July 2004, Forest Research and Tangata Whenua will operate a subsidiary company to consider strategic planning for the Forest Research site.

Maori awareness (learning and development)

The Human Resources Group is assisting to address learning and development in respect of Maori business. Tangata Whenua are fully engaged in the provision of practical requirements for visitors to Forest Research, with a whakataua being given to the Minister for Crown

Research Institutes for the first time in January 2004.

As well, 14 staff undertook a pilot Te Reo programme as scientists are becoming more involved in delivering presentations at hui on marae.

Maori in science

There is a significant gap in Maori participation at Forest Research and we have focused on creating relationships with Maori education providers who have natural linkages to our strategy. These include:

- Te Kōwhiri Whakarewarewa;

- Where Tokiata – the Waitaki Institute of Technology;
- Te Whānau Wairangi o Te Anamahiwhiri, and
- Mira Szalay Research Centre for Maori and Pacific Economic Development at the University of Auckland Business School.

The association developed over the past year will enable the Maori Relationships strategy to be implemented and create business opportunities for Maori and Forest Research that can assist with improving economic, environmental, social, and cultural outcomes.

"Forest Research staff and management are excited about the opportunities **ensis** opens up, both for our clients and for researchers. After a tough few years in this sector, we believe that this initiative will make the forestry science dollar go a lot further. By aligning investment, we'll reduce duplication of science on both sides of the Tasman, resulting in improved value from forestry science investment for both governments and industry."

Bryce Heard - Chief Executive

Joining Forces for a better future

For many years, forest research has worked alongside the forestry and wood processing sectors, with government and public entities, and research providers in a range of alliances.

This year, the organisation made a significant step forward in its partnership programme with the establishment of an unincorporated joint venture with its Australian equivalent, CSIRO Forestry and Forest Products (CSIRO FFP).

Forest Research and CSIRO FFP respectively, are the first and second largest forestry and forest products R&D providers in Australasia. Both organisations have a complementary skill base and closely aligned strategic objectives. Both also conduct a mixture of commercial and Government-funded research and are required to deliver public good. As such, this joint venture represents an optimum collaboration.

The new entity called **ensis** – a joint venture of CSIRO and Forest Research – commenced operations on 1 July 2014.

ensis represents a major step in Forest Research's strategic objective to retain a

substantial and sustainable R&D business in the traditional forest industries.

It will account for one-third of our activities (in both employee numbers and revenue terms) and will be long-term. Increased scientific scale and critical mass will significantly enhance the ability to

transfer major science and commercial partnerships both trans-Tasman and beyond.

In planning for the partnership, both parties sought reactions to the proposed venture. Extensive canvassing was conducted with clients, stakeholders, and research providers, in New Zealand and Australia. Feedback was overwhelmingly positive and endorsement was also forthcoming from the Science Ministers in both countries.

In the international context, the corporate forestry and forest products industry is consolidating and globalising through mergers and acquisitions, and

ensis is well positioned to engage as an R&D partner to these players.

Furthermore, **ensis** will provide better technology outcomes for clients and partners by exploiting research and development investment synergies.

For New Zealand, the joint venture will:

- enhance world-class capability, to bring consequential benefits to industry;
- deliver better value to the forestry and wood processing sectors in both countries through enhanced capability and alignment of science investment;
- mirror, in science R&D, the enhancements in trans-Tasman commercial relationships in the forestry sector;
- provide industry with the efficiencies and advantages of a single point of entry to wider and deeper scientific capabilities.

"**ensis** is about pooling the capabilities of two complementary research organisations to provide the scale needed for delivery of high quality science and commercial products in Australasia, and globally. **ensis** is an exciting new challenge that will help attract and hold good people.

We expect **ensis** will be a catalyst for even closer trans-Tasman research linkages in the future."

Dr Paul Cottrell - Chief Executive, **ensis**

At start-up, **ensis** will operate over four strategic business areas:

- Pulp, paper and packaging – optimising processes and products.
- Wood and fibre quality – linking quality to value.
- Wood processing and products – ensuring the place of wood in a modern market.
- Tree improvement and genoplasm – breeding better forests for maximum returns.

It is intended that two additional Forest Research business units, the Centre for Sustainable Forest Management and Forest Biosecurity and Protection (and their CSIRO counterparts), will join **ensis** in 2015.

As with any new venture, significant planning and organisational support is required prior to start-up. In this respect, Forest Research appreciates the huge degree of enthusiasm and support for the joint venture provided by staff from both organisations. Particular acknowledgement

goes to Andrew Newman of Forest Research in Australia, and his counterpart from CSIRO, Dr Rick Ede. Through their efforts and the support of staff from both organisations, **ensis** is well placed to meet the needs of its clients and stakeholders.



Staff Achievements

Forest Research is proud to record the achievements of our staff



Dr Karl Murton completed his PhD in chemical engineering at the University of Auckland.



For his PhD at the University of Auckland, Dr Ralf Moeller specialised in plant biotechnology.



At the University of Wisconsin in the United States, Dr James Turner concentrated his PhD studies on forestry and economics.

Medals/Awards

Lisa Langer received the Halvorsen Travel Award from the New Zealand Institute of Forestry. Lisa will undertake a study tour to the United States.

Brenda Bullie was awarded a FRST Enterprise Scholarship to complete a Doctorate on 'Catchment scale woody debris dynamics in forested streams' at the University of Waikato.

Royal Society travel funding was awarded for proposals from **Dr Ralf Moeller**,

David Pout, **Dr Adya Singh**, **Charlie Low**, **Kathy Horgan** and **Dr Bernhard Kreyher**.

Erina Hingston, a Waikato BSc (Tech) student was awarded a FRST Triupapa Putaiao Maori Fellowship to undertake a Masters degree with the CellWall Biotechnology Centre.

PhD student **Steve Pawson**, who studies the effects of deerfall size on invertebrate biodiversity, won the Best Student Paper award at the annual meeting of the Entomological Society of New Zealand.

Dr Gujja Mageean was awarded a Commonwealth Science Council travel grant to attend the International Symposium on Transitions in Agriculture for Enhancing Water Productivity, held in India.

In the Queen's Birthday honours, retired scientist **John Nicholls** was awarded a Member of the New Zealand Order of Merit for services to ecology and forest research.

Ian Simpson won a QEII Technicians' Study Award and travelled to Canada to study a quality assurance scheme used by furniture factories and a kiln monitoring system developed by Fortitek, the Canadian forest research institute.

The Forest Research Annual Report was a finalist in the Large Companies category at the 2004 Institute of Chartered Accountants of New Zealand Annual Report Awards.

The New Zealand Farm Forestry Association bestowed their Distinguished Service Award on **Leth Knowles** for his long-time contribution to farm forestry.

Dr Russell Burton was awarded the Rio Tinto Award for outstanding achievement in applied chemical engineering. This award, conferred by the Australian and New Zealand Federation of Chemical Engineers, has been given to only four New Zealanders in the last 30 years.

Dr Bryan Walford joined a select group of people when he received a Standards New Zealand Meritioris Service Award.

Dr Christine Todoroki earned the status of Advanced Teammaster Bronze through the Teammaster's International Communication and Leadership programme.

Dave Moore received an Ergonomics Society Medal in recognition of his presentation at the Annual Society Lecture at the Ergonomics Society [United Kingdom] conference in Swansea, Wales.

Relationships/Memberships

Dr Christine Todoroki was appointed to the University of British Columbia's Doctoral Examination Committee as an External Examiner.

Dr Russell Burton was elected a Fellow of the New Zealand Institute of Professional Engineers for his contribution to the advancement of engineering knowledge and leadership.

Dr Christian Walter accepted an invitation to serve on the Malaysian Oil Palm Board (MOP), as an expert on genetic modification.

Dr Lloyd Donaldson was appointed Associate Editor for the International Association of Wood Anatomists Journal with editorial responsibility for wood quality manuscripts.

Dr Adya Singh accepted a position on the Editorial Board of *Holzforschung* for a period of 5 years. Adya was also re-elected to the Council of the International Association of Wood Anatomists for a second term.

Dr Trevor Stuthridge was appointed to an Adjunct Professor position with the Department of Civil Engineering and Applied Chemistry at the University of Toronto, Canada.

Dr Mike van den Heuvel was appointed to Adjunct Professor positions with the School of Biological Sciences, University of Waikato and Queen's University, Ontario, Canada respectively.

Dr Eckehard Breckerhoff was appointed Deputy Coordinator of a new IUFRO working group, 'Biodiversity effects on forest pest dynamics'.

At the annual general meeting of the Australian Pulp and Paper Technical Association, **Dr John Richardson** was elected Vice-President.

Tapara Morrison accepted a Ministerial appointment to the Waikato Institute of Technology Council.

Qualifications

Richard Parker was awarded his Masters degree in Ergonomics with first-class honours.

Tracey Bowers was awarded her Masters degree in Science with second-class honours.

David Joy was awarded his Master of Philosophy.

Pavell Berwill completed his Masters degree in Forest Science and has now been accepted to undertake a PhD at Berkeley.

Sporting Triumphs

Barbara Hack and **Frances Mylesdon** were members of the New Zealand Women's Masters Underwear Hockey team that won a bronze medal at the 2004 Underwear Hockey World Championships.

Sonia Foote represented New Zealand at the World Cup Mountain Biking Championships held in Spain, Belgium and Scotland. Sonia received sponsorship from Kaingaroa Timberlands, Forest Research, Corvina and Aranui.

Sarah Skinner was a double gold medalist at the New Zealand Skydiving Championships.



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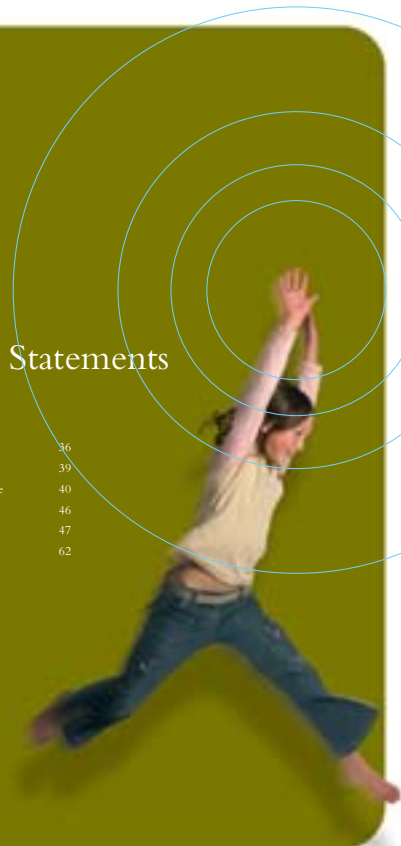
ENSIS - A JOINT VENTURE OF CSIRO AND FOREST RESEARCH

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Principal Activities

Forest Research is a company registered under the Companies Act 1993 and our principal activity is to conduct research in accordance with the purpose and principles specified in Sections 4 and 5 of the Crown Research Institutes Act 1992 (the Act). Forest Research has met all the obligations under the Act in the year ended 30 June 2014.

Forest Research is a commercially focused science and technology company, delivering solutions to both commercial and Crown clients. The principal research facility is located in Rotorua.

Forest Research, at balance date, has nine wholly owned subsidiaries, FHS Limited (FHS), Lavo Limited, N-Fix Technologies Limited, Forest Research (Australia) Pty Limited, Forest Research (Australia) #2 Pty Limited, Adva Technology Limited, SignaGen Limited,

FR Properties Limited, Forest Research Trans-Tasman Limited, and three associates – 50% shareholding in Centre for Advanced Composite Materials Limited (CACM), 25% ownership of Frontier Biosciology Limited, and 25% ownership of Beacon Pathway Limited. Forest Research is a member of a consortium with a 12.8% shareholding in WQJ Limited.

FHS, currently trading as VIGIL, provides a range of services to industry, aimed at the early detection of pests and diseases.

Forest Research (Australia) Pty Limited is the Australian trading vehicle. The Company is a New Zealand registered company.

FR Properties Limited will own and administer the Group's land assets.

Forest Research Trans-Tasman Limited is a special purpose company for an unincorporated joint venture with

Australia's national science agency, CSIRO N-Fix Technologies Limited, CACM and Lavo Limited are non-trading companies. Adva Technology Limited, SignaGen Limited and Forest Research (Australia) #2 Pty Limited are shelf companies. Forest Research (Australia) #2 Pty Limited is an Australian registered company held for name protection purposes.

Frontier Biosciology Limited is an incorporated joint venture, the purpose of which is to collaborate in the research, development and commercialisation of the heat denaturation process and other bioscience processes.

Beacon Pathway Limited carries out research in the area of sustainability in the built environment.

WQJ Limited (Wood Quality Institute) is a consortium with 14 other shareholders.

DNA Testing Services Limited, a wholly owned subsidiary, was liquidated during the year.

The business of Forest Research involves science and innovation in sustainable forestry, wood, and fibre product technologies. Core activities comprise research and economics, consumer market knowledge, built environment, environmental impacts of processing and production, pulp and paper, materials science, engineered wood products, wood processing, tree nutrition and physiology, management decision support and harvesting systems, silviculture, propagation, molecular biology and genetics.

In response to a comprehensive planning exercise that built off strategic market intelligence, Forest Research has broadened its scope of business to embrace the plant-based (non-food) biomanufacturing value chain.

Remuneration

Remuneration included performance awards, superannuation benefits and pay-outs of equity leave provisions. Some other benefits were not quantified and therefore excluded, including staff parking, home telephone and fax costs, and membership of relevant professional societies.

Band	Number in Each Band
\$240,000 – \$249,999 *	1
\$170,000 – \$179,999	2
\$160,000 – \$169,999	0
\$150,000 – \$159,999	1
\$140,000 – \$149,999	5
\$130,000 – \$139,999	1
\$120,000 – \$129,999	3
\$110,000 – \$119,999	4
\$100,000 – \$109,999	8

*Onwards Salary of Chief Executive

The increase in numbers of staff earning more than \$100,000 is due to the payout of equity leave provisions during the year.

Dividend

No dividend payment is recommended (2003 nil).

Summary of Group Financial Results to 30 June 2014

	2014 \$'000	2013 \$'000
Operating Revenue	39,022	39,594
Operating Surplus before non-recurring expenses and taxation	780	1,204
Non-recurring revenues	-	380
Non-recurring expense	-	(306)
Net surplus before taxation	780	1,278
Taxation expense	95	583
Net surplus after taxation	685	695
Share of after tax retained (deficits) of associate companies	-	(5)
Net surplus attributable to the Shareholders	685	690
EQUITY		
Issued and paid up capital	15,716	15,716
Retained earnings	8,498	7,829
Total equity	24,214	23,545

Directors' Profiles

Mr Brian Armstrong (Chairman)

– is a Consultant and Company Director. Mr Armstrong is currently a Director of Kevitfruit International Limited and a number of private companies.

Mr Armstrong has considerable experience in international business, his own entrepreneurial ventures and a private investment consultancy. Mr Armstrong has recently retired from the Zepori Group where he held a range of positions – Deputy Chair of Zepori Group Ltd and Chair of Zepori International Ltd and Director of NZKMB. He has also recently retired as a long term Chair of Athensbury Holdings Ltd. Mr Armstrong holds a MSc (Hons) and a BCom.

Mr Bryce Whitcher (Deputy Chairman)

– is Managing Director, Industrial of Becs Carter Holdings and Forest Ltd and the former CEO of Electronics Data Holdings Ltd. He is also a Director of several other companies in the Becs Group. Mr Whitcher previously held senior management positions with Tannan Pulp and Paper and Fletcher Challenge Paper both in New Zealand and Chile. Mr Whitcher holds a BSc in Chemistry

Ms Jane Taylor (Director)

– is a Barrister and Company Director. Ms Taylor previously practised as a Chartered Accountant. Her business background includes business and share valuations, corporate finance, insurance and company reconstruction, and litigation support. Ms Taylor has a long association with the forest industry. She was previously a Director of Forestry Corporation of New Zealand. Ms Taylor holds an LLB (Hons), a Post Graduate Diploma in Accountancy, a BSc (Hons) Forestry, and is a member of the Institute of Directors, NZ Law Society and the Institute of Chartered Accountants of NZ.

Mr Giff Davidson OBE, JP (Director)

– is a professional Company Director, Chairman of Animal Control Products Limited, Chairman of the Korea/New Zealand Business Council and Chairman/Treasurer of three private forest trusts. He is past and now Vice-President of the New Zealand Institute of Foreign Affairs, past Chairman and now Life Member of the New Zealand Chamber of Commerce, and past Chairman of the Energy Authority. Mr Davidson is a Trustee of the Pacific Cooperation Foundation and Honorary Council for Rotomania in New Zealand. He had a long and successful business career with Shell NZ Holdings Ltd.

OUR DIRECTORS			
1	2	3	
4	5	6	

1. Jane Taylor, 2. Bryce Whitcher, 3. Trimmera Hall, 4. Brian Armstrong (Chairman), 5. Giff Davidson, 6. Margaret Emere

Mr Tomasz Hall (Te Arawa, Ngāi Tahu) (Director)

– is Managing Director of LTF Limited, Investment Company, a subsidiary of Lake Taupo Forest Trust. Mr Hall is also a Director of Tuharua Ltd, Coordinator of the Tuharua Wānanga and a Director of T3000 Financial Services. Mr Hall holds a BScSci with a Geography major.

Ms Margaret Emerse (Director)

– is Relationship Manager with the Leadership Development Centre. She was formerly the Manager R&D of the NZ Forest Industries Council and CEO of the Queensland Science and Technology Council, Director of the Queensland Innovation Centre, Director of the Electronic and Electricity Industry Training Organisation, and some small commercial companies. Ms Emerse has also managed the Graduate Business Development Programme at Victoria University. She holds an MSc, a Post Graduate Diploma in Administration, a BSc in Biological Sciences and a Diploma in Physical Education. Ms Emerse also holds a Certificate in Company Directoring from the Institute of Directors.

use of company information

During the year no notices were received from members of the Board regarding to use Forest Research information received in their capacity as Directors which would not otherwise have been available to them. There have been no additions to the Interest Register.

directors' interests

Any business the company has transacted with organisations in which a Director has an association has been carried out on a commercial "arms-length" basis.

change in directors

Dr Mere Roberts resigned as a Director of Forest Research on 18 December 2003. Dr Russell Ballard and Ms Bouayry Monopolu have been appointed Directors of Forest Research from 22 July 2004.

Directors' Remuneration

	30 June 2004 Forest Research	30 June 2004 emls	30 June 2003
Brian Armstrong	44,750	8,000	38,000
Bryce Whitaker	28,000	750	29,375
Janie Taylor	24,000		26,500
Giff Davidson	19,750		22,500
Tommaso Hall	21,750		17,500
Margaret Emerse	20,500		18,250
Mare Roberts resigned 18/12/03	8,000		17,500
External Director, Shaun Stevens (FFR, Technology - resigned 20/12/02)			6,250
Total	\$166,750	\$8,750	\$175,875

The state of the company's affairs

A commentary on the year's performance is outlined in the Chairman and Chief Executive's Report, and in the opinion of the Directors the state of the Group's affairs continues to be satisfactory and the outlook bright.

Auditor

In accordance with Section 21 of the Crown Research Institutes Act 1992, the Audit Office is Auditor for the Company and pursuant to Section 29 of the Public Finance Act 1977 has appointed Ernst & Young to undertake the audit on its behalf.

Directors' Indemnity and insurance

Forest Research has insured all Directors and the Directors of its subsidiaries against liabilities to other parties (except for Forest Research or a related party of Forest Research) that may arise from their position as Directors. The insurance does not cover liabilities that may arise from criminal actions.

For and on behalf of the Board

BD Armstrong - Chairman
27 August 2004

management statement

The following statement from management is made in accordance with Section 42 of the Public Finance Act 1989:

- The management is responsible for the preparation of the annual financial statements and the judgements used in these;
- The management is responsible for establishing and maintaining a system of internal control designed to provide reasonable assurance as to the integrity and reliability of the financial reporting; and
- In the opinion of the management, the annual financial statements for the year ended 30 June 2004 fairly reflect the financial position and operations of the New Zealand Forest Research Institute Limited.

BD Armstrong - Chairman

BC Heard - Chief Executive
27 August 2004

Forest Research's performance against the targets contained in the 2003-2006 statement of corporate intent was:

	ACTUAL	ACTUAL	BUDGET
	2003	2004	2004
Revenue (\$000)	39,553	38,948	42,285
EBIT Margin	3.30%	2.04%	6.0%
(EBIT % of revenue)			
Return on average equity	2.97%	2.87%	6.5%
Return on average total assets ^{1,2}	2.56%	2.16%	5.1%
Equity ratio	67.2%	69.76%	70.5%
Quick ratio ¹	1.05	1.05	1.05
Gearing	7.83%	4.66%	7.3%
Interest coverage	10.71	56.71	14.9
Five caddies to average total assets	6.8%	9.47%	9.5%
NON-FINANCIAL PERFORMANCE MEASURES			
Staff Composition (FTEs)			
Research	266	263	276
Management and Support	74	70	75
Total FTEs	340	333	351
Revenue per FTE (\$)	116,332	125,000	120,000
SCIENCE OUTPUT AND EXCELLENCE			
Science reviews for excellence	3	3	2
Papers in international/externally refereed journals, series or books	79	139	75
Papers in local, internally or editor refereed journals, series, or books	90	102	70
Research monographs or books	2	4	2
Conference papers	127	100	120
Patented inventions ³	6	5	5
Product Licences ⁴	18	38	40
Confidential client reports ⁵	362	363	380
APPLICATION AND PROMOTION OF SCIENCE			
Number of industry seminars or field days ⁶	38	199	50
Number of current Technology New Zealand contracts	1	3	5
Workshops or field days	74	28	60
Number of MSc and PhD Students supported	36	48	30
Social Responsibility/ Community Environment Responsibility	Commentary	See commentary	Report
TREATY OF WAITANGI			
Consultation with Maori on significant scientific research and business issues	Commentary	See commentary	Report
Maori scholarships	0	0	1
R&D proposals incorporating Maori	4	6	5
BENEFIT TO NEW ZEALAND			
Good Employer	Report	See commentary	Report
Policies to meet provisions of the CRI Act	0.5%	0.63%	3%
Percentage time in training	3	3	3
Number of post-Doctorate programmes	28	9	0
Work days lost in work-related accident	28	9	0
Human Capital Protection	Stat & report	See commentary	Stat & report

¹ Note return on average total assets is calculated using a post-tax return. ² The Board notes that Forest Research's return on assets is impacted by non-revenue into the science capability of the business and the existence of surplus assets. ³ A new category; inventions with granted patents. ⁴ Previously recorded together with patents. ⁵ Previously recorded as Technical Research/Scientific Papers. ⁶ Under-reported.



Non-Financial Performance

policies to meet provisions of the crown research institutes act, 1992

Forest Research complies in all respects with its obligations under the CIR Act.

Social Responsibility/Community

Forest Research continues its ongoing commitment to support a number of social and community activities.

The annual Forest Research Staffage Scholarship was awarded to Kerry Hitchcock who commenced her undergraduate study majoring in Chemistry at the University of Auckland this year.

The scholarship is open to young women from all secondary schools in the Rotorua region and provides a cash grant along with vacation work at Forest Research throughout the scholar's undergraduate year. Kerry has already made the most of this opportunity and worked in a number of research programmes over the 2003-2004 summer vacation.

Sponsorship funding was awarded to the Bay of Plenty and Canterbury Science Fairs, Community Watch, the Police Manager's Guild "Kick programme", the Cancer Society, Three Bears and the Heart Foundation.

Forest Research staff are renowned for their participation in a range of sporting activities. The company provided financial support for staff to participate in the Cateye Moawake (24-hour mountaineering race), the Rotorua marathon, the Eliden relay, and local inter-club tennis and badminton competitions.

In partnership with Kaingama Tairāwhiti, Arami and Coonric, Forest Research provided significant support to assist Sonia Foster in her bid to gain selection for the New Zealand Mountaineering team at the Athens' Olympics. Sonia competed at the World Cup Mountain Biking Championships held in Europe, but was pipped for the spot on the Olympic team. The experience has proved invaluable and Sonia is determined to work towards

Olympic selection for Beijing in 2008. Once again, the annual Children's Christmas party was a great success. Seventy children along with their parents and grandparents avoided the torrid rain of an unseasonal Christmas afternoon to be entertained by a magician, receive a gift from Santa and enjoy party food and games.

The company supports a School Holiday programme at the Rotorua campus catering for children from the ages of 5 to 13 during the school term breaks. Up to 70 children attend the programme with first priority given to children of Forest Research and Rotorua District Council staff. The programme, which has been in operation for 20 years, provides a range of activities and excursions such as crafts, swimming, zoo visits, golf driving, treats at McDonalds, and horse riding.

some of the forest research programmes that provided direct benefit to New Zealand during the year included:

National Biosecurity

Forest Research remains a central provider of biosecurity services related to pests and diseases of all woody species. Core biosecurity functions provided over the past year include the breeding of populations in quarantine to support the eradication and management of painted apple moth and *Uta ueta* (giant leaf skeletoniser), respectively. In addition, aerial spray specialists have provided operational advice and monitoring support for urban spray programmes over Auckland (painted apple moth) and Hamilton (Asian gypsy moth). Diagnostic capabilities have been strengthened by molecular tools, which were used to identify pink canker for the first time in New Zealand (see page 15). Surveillance activities continue to be provided by VIRGI at major ports and other high-risk areas.

Indigenous Forest Management

The Indigenous Species Programme has been working on the wood quality of plantation-grown kauri (*Araucaria australis*, sourced from Tararua). In cooperation with the New Plymouth District Council and the local community, the study of fast-grown spruce logs revealed surprisingly good results for density, shrinkage, and stiffness. Results suggest that the revenue from timber alone from 40- to 60-year-old stands may make kauri an attractive alternative commercial species.

The completion of the second Indigenous Tree Bulletin (featuring kauri, its ecology, establishment, growth and management) is a significant addition to the information available for growers.

Benefit to New Zealand

better fuel from wood waste

When it comes to bioenergy, sawdust is a plentiful fuel. But in contrast to it's unprocessed form, it is messy to handle and difficult to burn. By converting it into pellets, sawdust becomes the perfect bioenergy fuel - dry, consistent in size, and easy to handle. This is a good way of solving waste disposal problems, while at the same time producing a useful consumable product. Over the past year bioenergy specialist, Dr Per Nielsen, worked on concepts to help industry produce pellets at a competitive price. This included looking at options to tap into heat sources from other industries and sectors to assist in the drying process. Sawdust pellets are a common fact in Europe and the United States.

Looking ahead with microscopy

Dr Adya Singh has recently returned from a 2-year fellowship in Korea. He was one of several international scientists invited by the Korean Government to participate in a "brain pool" over this period. As a specialist in applying electron microscopy to plant and wood science, Adya's return represents a significant boost to Forest Research's microscopy capability. His current work focuses on using modern microscopy techniques to assess product performance for coatings, wood stability enhancement, and improving important properties, such as wood stiffness.

Carbon Credits

During late 2003, the Government ran an open tendering round for 4 million tonnes of carbon credits as part of 4 overall Climate Change Policy Forest Research's Energy Group assisted a Hawke's Bay company to apply for 20 000 mission units to the development of a new pellet manufacturing plant. The carbon credits

are available to the project investor to be sold any time after 2007 and depending on the price of carbon at the time of sale, these could be worth between \$200,000 and \$400,000. The sale of the carbon credits can then effectively be used to offset the capital cost of the project. This is a significant development for bioenergy as it signals that bioenergy can be cost effective in mitigating carbon relative to other energy projects.

Slips, Trips, and Falls

The Centre of Human Factors and Ergonomics (COHFE) has undertaken a detailed study of slips, trips, and falls in two industry sectors with the highest incidence of these types of injuries - dairy farming and residential construction. The 2-year study has identified key risk factors and is currently evaluating the effectiveness of potential interventions. The study received funding from the Health Research Council of New Zealand's Partnership Programme.

Mapping the Bioenergy Resource

Forest Research conducted a GIS-based study to analyse the geographical distribution of biomass resources (i.e., in-forest residues and sawmill waste) and the related transportation costs in any given area of the country. Although wood waste is basically a free, plentiful, and renewable source of fuel for energy, the transport costs associated with collecting it can be prohibitive. Visiting scientist, Dr Bernd Möller from Aalborg University in Denmark, built a model to calculate the costs of biomass relative to any point in New Zealand. The model is based on publicly available MAFF forest inventories and yield prognoses, which quantify the forest resource at district level.

Information produced by the model helps to determine whether proposed bioenergy schemes will be cost effective, by showing how much fuel is available, and how far away it is.

Montreal Process convenor

Dr Tim Paine has assumed the role of Convenor of the Montreal Process Technical Advisory Committee. The Montreal Process is a 12 country initiative formed to develop Criteria and Indicators for the Conservation and Sustainable Management of Temperate and Boreal Forests. Dr Paine will coordinate technical inputs from country experts, and support ongoing review of the indicators. New Zealand will benefit from enhanced access to broad networks in the global Sustainable Forest Management community, and from the ability to apply new international knowledge to the New Zealand forest environment.

coastal Lifesavers

Forest Research leads New Zealand's only programme for sand dune research and restoration. Known as the Coastal Dune Vegetation Network (CDVN), this group comprises representatives from local bodies, resource managers, and other interested parties throughout the country. This year the CDVN held its annual conference in Wellington with the theme "Communities Caring for their Coasts". Keynote addresses by the Honourable Chris Carter (Minister of Local Government) and the Honourable Marian Hebb (Minister for the Environment) both acknowledged the CDVN as a national model for other research/management consortia and its success at bringing diverse stakeholder groups together. It is widely accepted that little is achieved in these dynamic and fragile ecosystems without the involvement of local community groups and without considering the wider implications of land management practices in associated strand and river systems.

atorua Lakes

Ecotoxicologist Dr Mike van den Heuvel has been actively coordinating Forest Research's role in the emerging Rotoma

Lake's nutrient management issues. As well as developing close long-term links with key investigative and regulatory players, Forest Research has been exploring alternative solutions with Environment Bay of Plenty (EBOPL), a key stakeholder in this concern. A post-doctoral fellow, Dr Zulu Yang, is being funded by EBOPL to further refine a novel physico-chemical nutrient removal process developed during her PhD at University of Waikato. Options for removing nutrient-rich water from the bottom of the lakes for such treatment are also being explored. It is hoped that this work will be the first stage in an ongoing opportunity for Forest Research to be a key research provider in the Rotoma Lakes management strategy.

douglas fir in ship shape

Forest Research assisted the National Maritime Museum to locate replacement masts for a heritage schooner. After 10 years of constant service as the Museum's workhorse, the *Tid Aahy* tops 14m kauri masts were in need of replacement. The only tree routinely grown in New Zealand that produces timber for the *Tid Aahy* masts was Douglas fir. Douglas fir was used successfully in 1992 to re-mast Discovery, Robert Falcon Scott's ship for his first Antarctic expedition during 1901-1904. Suitable Douglas fir poles were supplied by Kaingaroa Timberlands and tested for stiffness by Forest Research. The sawn logs were then brought to Forest Research for drying without developing fungal degrade, before being shaped into masts for the ship and preservative treated. This is believed to be the first time that timber of this dimension has been dried in New Zealand.

Land Treatment

The Land Treatment Collective (LTC) which is administered by Forest Research, held their annual conference in Ashburton. Included in the programme was a visit to the newly developed site in

the Bortle Lake Forest Park, Christchurch which is the new home of the Bioshield for Forest Demonstration Site. While most of the land used for bioshield application in Christchurch is well outside the city, the demonstration site is strategically placed in a recreational area that sees more than 250,000 visitors per year. The site is a hold attempt to increase public awareness about using forests to treat bioshields. As more municipal authorities look at using land treatment in this way it is important that the public understand the process.

Work undertaken by scientists in the Water Management Programme has enabled an impressive knowledge base to be accumulated in this area. Now more than ever researchers understand better ways to grow trees under effluent irrigation schemes.

benefit to the nation

Forest Research also provides benefit to the nation through contribution to Government agencies, companies, and stakeholders across a range of sectors. These include:

- Provision of high quality and cost-efficient consultancy, research and development services.
- Undertaking joint development and commercialisation projects with the private sector.
- Licensing and/or assigning technology developments.
- Provision of turnkey customer solutions.
- Publishing science papers, and organising conferences, workshops, field days and seminars.
- Active participation in, and membership of the New Zealand Forest Industries Council, the Association of Crown Research Institutes, the International Union of Forest Research Organisations, of Forest Business Network and a range of other agencies.
- Operating cooperatives in major areas of research and development.

Forest Research has strong science and industry linkages both nationally and internationally. This ensures effective science delivery and an international perspective to its activities.

Good Employer

Health and safety

Forest Research has reached tertiary-level in the Accident Compensation Corporation's Workplace Safety Management Practices Audit Programme. Of the 1445 employers in New Zealand who belong to this programme, only 487 have achieved tertiary-level status. Forest Research is amongst the top third of employers in the programme demonstrating leading-edge health and safety management practices.

This year has seen consolidation of this position in terms of improved health and safety practices, including new policies, a health and safety management system, laboratory procedures, and the development of a company-wide hazard register.

The number of first and last time injuries was reduced during the year.

Human resource Initiatives

An organisational development plan has been established and implementation is under way.

The plan encompasses 7 strategic priorities (plus communication) that link directly to supporting the Forest Research Strategic Plan and achieving its objectives. Using a competency-based approach, the priorities are:

- Visionary Leadership
- Culture for Success
- Talent Management
- Rewards and Recognition
- Learning and Development
- Human Resource Operational Best Practice

Towards the end of the year, the role of Learning and Development Manager was introduced to ensure best practice implementation of some of these initiatives.

The immediate focus has been on developing leadership, talent management,

building an achievement culture, and establishing a pathway for success in the joint venture formed between Forest Research and CSIRO.

HUMAN RESOURCE OPERATIONAL BEST PRACTICE

A comprehensive induction programme has been developed for all new staff.

visionary Leadership

The leadership development programme is focused on developing those strengths that will ensure good leadership. Building on strengths ("from strengths to strengths") will enable Forest Research to move from "Good to Great".

culture for success

To build a "Culture for Success", the "Achievement and Career Enhancement" (ACE) programme has been introduced. The majority of staff have received training that will enable them to establish Key Result Areas and Goals directly related to the Forest Research strategic objectives. Individual development plans and coaching and feedback are central to the success of ACE.

change management/REUSE

The establishment of reuse has taken a great deal of focus from both sides of the Taranaki. It has involved using best practice change management initiatives, resolving employee issues, restructuring, managing virtual teams, and developing business plans.

organisational vitality

Acknowledgement must go to those people who have worked together this year to promote the development of Forest Research:

- The Organisational/Vitality Group who have worked hard to make Forest Research the best environment we can work in. Focus areas for this group were Frequent Fun, Campus Care, and Culture and Communication.

- A women's network that contributes to encouraging women in their careers at Forest Research.
- The mentors who, through handing on their knowledge and experience, benefit the development of our young scientists.
- The school holiday programme commensurate with their efforts, contribute towards a "family friendly" environment.
- The Partnership for Quality, which comprises representatives from management and the Public Service Association. This group is designed to foster good working relationships both here at Forest Research and nationally.

Forest Research is a member of the Equal Employment Opportunities Trust.

Corporate Governance

The New Zealand Forest Research Institute Limited Board is appointed by the Shareholding Ministers to guide and monitor the business of the company and its subsidiaries, which constitute the Forest Research group. The Board has eight Directors (from 22 July 2004) including the Chairperson, who normally meet eleven times a year.

Responsibility for the management and administration of the company is delegated to the Chief Executive, who is responsible to the Board.

The Board has two committees, Audit and Risk and Remuneration and Organisation.

The function of the Audit and Risk Committee is to assist the Board in carrying out its responsibilities under the Companies Act 1993 and the Financial Reporting Act 1993 in respect of the company's financial accounting practices, policies, and controls, and to review and make appropriate inquiry into the audit of the company's Financial Statements by external auditors.

The Remuneration and Organisation Committee assists the Board to review and approve senior executive remuneration arrangements as well as the Group's human resources strategy.

From Good to Great From Strength to Strength

a year ago, forest research identified that the highest staff turnover was among scientists with less than two years' service. feedback revealed that these young scientists were leaving the organisation for a number of reasons, principally related to insufficient or unfocussed career guidance.

A mentoring programme was introduced as part of an organisational development programme to build on capability strength and move Forest Research people from good to great.

"Mentoring" comes from the story of Mentor from Homer's *Odyssey*. When Odysseus, King of Ithaca went to fight in the Trojan War, he entrusted the care of his household to Mentor who served as teacher and guide for Ithaca's son, Odysseus' son. After the war, Odysseus spent ten years trying to return home. Ithaca's son went in search of his father, accompanied by Athena, Goddess of War and patroness of the arts and industry. Athena assumed the role of Mentor.

The word "Mentor" has become synonymous with trusted advisor, friend, teacher and wise person.

At Forest Research mentors and protégés attended training to prepare them for their roles. Eighteen protégés were matched with 14 mentors and together they embarked on an exciting adventure.

The programme is still in its infancy, but feedback so far indicates it is successful, and not only for the protégés. We did not expect the mentors would gain so much from the programme, but it seems it is a win-win situation for all involved.

The Programme

most mentors and protégés meet monthly as well as attending the Hub.

These regular Hub sessions – where mentors and protégés meet to be inspired and challenged, lift Forest Research mentoring from a one-to-one process into a networking and learning event.

Highlights of the Hub included presentations from Dr Robert Francis on *The Power and Place of the Science Story*, from Rod Oram on the economic realities of the New Zealand economy and the importance of innovation, and the Royal Society Leadership Study and its relevance to science leadership. Protégés Sonia Faine, Dr Nicola Duxley and Dr Jonathan Harrington also provided an insight into their own science journey.

"With mentoring, right from the word go, you get the idea that people are interested in your career. I just love the Hub."

Emily Telfer,
Mentor: Dr Christine Todoroki

And the protégés experiences:

sarah addison
Mentor: Dr Rowland Burdon

"The mentoring programme has been really great and has given me many opportunities to listen to other people's experiences, and also to see what decision people have made to help their science careers keep a bright future. It has also held the door open for other opportunities, like the science debate and the presentation course, which are great in helping me to find my strengths and to keep feeling enthused about science."

dr darren kriticos
Mentor: Dr Tom Richardson

"I have many ideas about how to improve the organisation and mentoring gives me an opportunity to discuss these. My mentor has encouraged me in career development discussions."

dr daniel gapes
Mentor: Dr Alan Fernyhough

"I had no expectations when entering the programme. I am now getting to know my mentor and the process is becoming more and more useful to me."

dr naushad haye
Mentor: Dr Christine Todoroki

"My mentor has pointed out sources of information on funding, helped with reviewing a paper and given advice on how to get the best out of a conference. *The Power and Place of the Science Story* was an excellent presentation at the Hub."

Mentor, Dr Christine Todoroki (standing) passes on her experience to protégés, Emily Telfer and Dr Naushad Haye.



Les Haye
Mentor: Barbara Johnson

"I feel that the mentoring programme is a very positive initiative and I applied the effort and foresight from those that have developed and actioned the programme. The meetings with my mentor were very relaxed, inspiring and informative."

BY THE BOARD OF THE EQUITY WITH PARENT COMPANY'S REPORT TO EQUITY WITH LIMITED PARTNERSHIP
 CONSOLIDATED STATEMENT OF FINANCIAL PERFORMANCE

We have audited the consolidated statement of financial performance of the company and its subsidiaries for the year ended 30 June 2004. The consolidated statement of financial performance, including the notes and explanatory information, is presented on pages 21 to 29 of the consolidated financial statements of the company for the year ended 30 June 2004.

Opinion
In our opinion:

- a) the financial statements of the company and its subsidiaries are prepared in accordance with generally accepted accounting practice in New Zealand, and give a true and fair view of the company's financial position as at 30 June 2004 and of its performance for the year ended on that date;
- b) based on the information, the company and its subsidiaries have accounted correctly for the year ended 30 June 2004 and in the last six months of that year.

The audit was conducted in accordance with the standards of the Institute of Chartered Accountants in New Zealand.

The basis of the opinion is explained in notes 1 and 2. In addition, we confirm the responsibilities of the Board of Directors and the auditors, and confirm our independence.

Notes to Opinion

We confirm that the audit was conducted with the highest standard of auditing standards, which are consistent with the New Zealand auditing standards.

We confirm and warrant that the audit was conducted in accordance with the standards and practices of the Institute of Chartered Accountants in New Zealand, and that the financial statements do not contain any material misstatements, whether caused by fraud or error.

We confirm that the financial statements are prepared in accordance with the accounting standards that apply to the company, and that the financial statements are prepared in accordance with the accounting standards that apply to the company.

Our audit involved performing procedures to test the information presented in the financial statements. We assessed the results of these procedures in forming our opinion.

Such procedures generally include:

- a) determining whether significant financial and management controls are working and, if not, what steps to be taken to improve controls and systems;
 - i) identifying controls of acquisition and disposal of investments;
 - ii) performing analysis to identify anomalies in the reported data;
 - iii) identifying significant address and judgement made by the Board of Directors;
 - iv) identifying unusual transactions;
 - v) determining whether accounting entries are appropriate and consistently applied; and
 - vi) determining whether financial statements disclosures are adequate.

We did not conduct any procedures, nor do we guarantee complete accuracy of the financial statements.

We obtained the overall opinion of the presentation of information in the financial statements. We obtained all the information and explanations as required to support our opinion.

Responsibilities of the Board of Directors and the Auditor

The Board of Directors is responsible for preparing financial statements in accordance with generally accepted accounting practice in New Zealand. These financial statements may give a true and fair view of the financial position of the company and its subsidiaries as at 30 June 2004. They also give a true and fair view of the results of operations and cash flows for the year ended on that date. The Board of Directors is responsible for ensuring that the financial statements are prepared in accordance with the accounting standards that apply to the company.

We also have a responsibility to ensure that the financial statements are prepared in accordance with the accounting standards that apply to the company. This includes ensuring that the financial statements are prepared in accordance with the accounting standards that apply to the company.

Disclaimer

We are not providing any assurance on the information presented in the financial statements of the subsidiaries of the company that are not included in the consolidated financial statements of the company.

We also confirm that the audit was conducted with the highest standard of auditing standards, which are consistent with the New Zealand auditing standards.

Ernst & Young
 Chartered Accountants
 100 Victoria Street, Auckland, New Zealand

CONSOLIDATED STATEMENT OF FINANCIAL PERFORMANCE

FOR THE YEAR ENDED 30 JUNE 2004

	GROUP ACTUAL	GROUP BUDGET (estimated)	GROUP ACTUAL	PARENT ACTUAL	PARENT ACTUAL
Note	2004 \$000	2004 \$000	2003 \$000	2004 \$000	2003 \$000
OPERATING REVENUE	2	39,022	42,265	39,594	37,772
Operating surplus/(deficit) before taxation and non-recurring revenues/expenses	3	780	2,355	1,204	1,946
Non-recurring revenues	4	-	-	380	-
Non-recurring expenses	4	-	-	(306)	(372)
Surplus/(Deficit) Before Taxation		780	2,355	1,278	1,946
Taxation expense/(credit)	6	95	777	583	92
Surplus/(Deficit) After Taxation	21	685	1,578	695	1,854
Share of net surplus/(deficit) of associate companies after taxation	7	-	-	(5)	-
NET SURPLUS/(DEFICIT) ATTRIBUTABLE TO THE SHAREHOLDERS OF THE PARENT COMPANY		685	1,578	690	1,854

The accompanying notes form part of these financial statements.

CONSOLIDATED STATEMENT OF MOVEMENTS IN EQUITY

FOR THE YEAR ENDED 30 JUNE 2004

	GROUP ACTUAL	GROUP BUDGET (estimated)	GROUP ACTUAL	PARENT ACTUAL	PARENT ACTUAL
Note	2004 \$000	2004 \$000	2003 \$000	2004 \$000	2003 \$000
EQUITY AT 1 JULY 2003	23,545	23,354	22,854	22,175	20,945
Net surplus attributable to parent entity shareholders	685	1,578	690	1,854	1,230
Movement in foreign currency translation reserve	8	(16)	(1)	1	-
Total recognised revenues and expenses for the year		669	1,577	691	1,854
EQUITY AT 30 JUNE 2004	24,214	24,931	23,545	24,029	22,175


The accompanying notes form part of these financial statements.

CONSOLIDATED STATEMENT OF FINANCIAL POSITION
AS AT 30 JUNE 2004

CONSOLIDATED STATEMENT OF CASH FLOWS
FOR THE YEAR ENDED 30 JUNE 2004

	Note	GROUP ACTUAL	GROUP BUDGET 2004 (\$'000)	GROUP ACTUAL 2003 (\$'000)	PARENT ACTUAL 2004 (\$'000)	PARENT ACTUAL 2003 (\$'000)
EQUITY						
Share capital	9	15,716	15,716	15,716	15,716	15,716
Retained earnings		8,486	9,200	7,801	8,313	6,459
Foreign currency translation reserve	8	12	15	28	-	-
		24,214	24,931	23,545	24,029	22,175
NON CURRENT LIABILITIES						
Term debt	10	2,145	3,000	3,260	2,145	3,260
		2,145	3,000	3,260	2,145	3,260
CURRENT LIABILITIES						
Creditors and accruals	11	7,785	6,456	7,517	8,843	8,968
		7,785	6,456	7,517	8,843	8,968
		34,144	34,387	34,322	35,017	34,403
NON CURRENT ASSETS						
Property, plant and equipment	12	24,835	25,030	24,824	24,817	24,763
Deferred tax benefit	13	681	1,529	736	682	739
Investments in subsidiaries	15	-	-	-	52	52
Investments in associates	15	20	194	-	30	10
Loan	15	432	430	519	340	389
Patents	14	-	-	-	-	-
		25,968	27,183	26,079	25,921	25,953
CURRENT ASSETS						
Cash and short term deposits	16	962	1,050	1,260	398	1,171
Debtors and prepayments	17	6,321	5,361	6,176	7,849	6,525
Inventories	18	428	400	358	428	358
Tax receivable	6	178	-	171	178	132
Current portion of loan	15	120	93	55	76	41
Advance to associate	15	83	-	-	83	-
Equipment for resale		84	300	223	84	223
		8,176	7,204	8,243	9,096	8,450
		34,144	34,387	34,322	35,017	34,403

The accompanying notes form part of these financial statements.
Read on and behalf of the Board, who authorised the issue of these accounts on 27 August 2004.

* 

Director

Director

	Note	GROUP ACTUAL	GROUP BUDGET 2004 (\$'000)	GROUP ACTUAL 2003 (\$'000)	PARENT ACTUAL 2004 (\$'000)	PARENT ACTUAL 2003 (\$'000)
CASH FLOWS FROM OPERATING ACTIVITIES						
Cash was provided from:						
Receipts from customers		38,622	41,765	39,288	36,979	37,410
Interest received		48	30	40	36	27
		38,670	41,795	39,328	37,015	37,437
Cash was applied to:						
Payments to employees		21,021	21,248	20,720	20,033	19,731
Payments to suppliers		14,298	16,120	15,772	12,798	13,934
Interest paid		88	200	167	88	166
Income tax paid		22	968	306	20	329
		35,429	38,536	36,965	32,939	34,160
Net cash flows from operating activities	21	3,241	3,259	2,363	4,076	3,277
CASH FLOWS FROM INVESTING ACTIVITIES						
Cash was provided from:						
Proceeds from sale of fixed assets		6	-	330	3	330
Proceeds from sale of investments		-	-	(28)	-	38
Proceeds from loan repayments		22	51	-	14	-
		28	51	302	17	368
Cash was applied to:						
Purchase of fixed assets		2,342	2,335	2,211	2,342	2,200
Purchase of investments		20	100	5	20	5
Advance to associate		83	-	-	83	-
		2,445	2,435	2,216	2,445	2,205
Net cash flows used in investing activities		(2,417)	(2,384)	(1,914)	(2,428)	(1,837)
CASH FLOWS FROM FINANCING ACTIVITIES						
Cash was applied to:						
Repayment of term debt		1,115	875	590	1,115	590
Finance lease repayments		-	2	-	-	-
Net advances to subsidiaries		-	-	-	1,300	757
Repay shareholders advance		-	-	2	-	-
Net cash flows from financing activities		(1,115)	(875)	(594)	(2,415)	(1,347)
NET INCREASE/(DECREASE) IN CASH HELD						
		(291)	-	(145)	(767)	93
Add opening cash brought forward		1,260	1,050	1,414	1,171	1,087
Less effect of exchange rate change on foreign currency balance		(7)	-	(9)	(6)	(9)
Ending Cash Carried Forward	16	962	1,050	1,260	398	1,171

The accompanying notes form part of these financial statements.

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 30 JUNE 2004

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 30 JUNE 2004 (CONTINUED)

1 STATEMENT OF ACCOUNTING POLICIES

REPORTING ENTITY

New Zealand Forest Research Institute Limited is a Crown Research Institute registered under the Companies Act 1993. The group consists of New Zealand Forest Research Institute Limited, its subsidiaries, and associates.
New Zealand Forest Research Institute Limited is a reporting entity for the purposes of the Financial Reporting Act 1993. The financial statements and group financial statements of New Zealand Forest Research Institute Limited have been prepared in accordance with the Financial Reporting Act 1993.

MEASUREMENT BASE

The group follows the accounting principles recognised as appropriate for the measurement and reporting of financial performance and financial position on a historical cost basis, with the exception that the forest asset has been revalued.

SPECIFIC ACCOUNTING POLICIES

The following accounting policies, which materially affect the measurement of financial performance and the financial position, have been applied:

a) Principles of Consolidation – Purchase Method

The consolidated financial statements include the parent company and its subsidiaries. The group financial statements are prepared using the purchase method of consolidation. All intercompany transactions and unrealised profits and losses between the group of companies are eliminated from the financial statements on consolidation. In the parent company financial statements, investments in subsidiaries are stated at cost.

b) Associate Companies

These are companies in which the group holds substantial shareholdings and in whose commercial and financial policy decisions it participates.

Associate companies have been reflected in the consolidated financial statements on an equity accounting basis which shows the group's share of surpluses in the Consolidated Statement of Financial Performance and its share of post acquisition increases or decreases in net assets, in the Consolidated Statement of Financial Position.

c) Joint Ventures and Partnerships

Interests in joint ventures are accounted for by using proportionate consolidation. Interests in partnerships are accounted for as an investment, by equity accounting, or by consolidating, as appropriate.

d) Goodwill

Goodwill represents the excess of the purchase consideration over the fair value of the net tangible and identifiable intangible assets, acquired at the time of acquisition of a business or an equity interest in a subsidiary, or associate company. Goodwill is amortised by the straight-line method over the period during which benefits are expected to be received. This is a maximum of five years.

e) Property, Plant and Equipment

All items of property, plant and equipment are valued at the cost of purchase from the Crown as at 1 July 1992 adjusted for subsequent additions at cost, disposals and depreciation. Property, plant and equipment other than land, forest assets and capital work in progress are recorded at cost less accumulated depreciation. Land and capital work in progress are recorded at cost. Forest assets have been revalued by using the net present value of the after tax cash flow for each individual crop. Expenditure incurred on property, plant and equipment is capitalised where such expenditure will increase or enhance the future benefits provided by the asset. Expenditure incurred to maintain future benefits is classified as repairs and maintenance.

When an item of property, plant and equipment is disposed of the difference between the net disposal proceeds and the carrying amount is recognised as a gain or loss, in the Statement of Financial Performance.
Depreciation is provided for using the straight-line method to allocate the historical cost, less an estimated residual value, over the estimated useful life of the asset.

The useful lives of the major classes of assets have been calculated as follows:

Buildings and improvements	40–60 years
Plant and Equipment	4–15 years
Furniture and fittings	10 years
Motor Vehicles	3–7 years

The database within the books and periodicals is depreciated over 5 years.

1 STATEMENT OF ACCOUNTING POLICIES – CONTINUED

f) Debts

Debts have been valued at estimated net realisable value, which is considered to be fair value. Provision has been made for potential bad debts.

g) Inventories

Consumable stores are valued at the lower of cost, on a weighted average price of stock on hand, and net realisable value. Costs incurred in the establishment of nursery stocks to be sold during the next planting season are recorded as nursery work in progress. Cost of nursery stock includes labour and consumables only.

h) Research and Development Costs

Research costs are expensed in the period incurred. Development costs are expensed in the period incurred unless certain criteria for asset recognition are met. Capitalised development costs are amortised over future periods in relation to expected future revenue. Unamortised costs are reviewed at the end of each balance date to determine the amount (if any) that no longer meets the criteria. Any amount so identified is written off.

i) Employee Entitlements

Provision has been made for benefits accruing to employees for annual leave in accordance with the provisions of employment contracts in place at balance date. Long service leave, and retirement leave provisions are based on an actuarial valuation.

j) Leases

Operating lease payments, where the lessor effectively retains substantially all the risks and benefits associated with ownership of the leased item, are included as an expense in the Statement of Financial Performance in equal installments over the lease term.

k) Goods and Services Tax (GST)

The financial statements are prepared on a GST exclusive basis.

l) Foreign Currencies

Transactions in foreign currencies are converted at the New Zealand rate of exchange ruling on the date of the transaction. Monetary assets and liabilities at year-end are converted to New Zealand dollars at the exchange rate ruling at balance date; exchange variations arising from these translations are recognised in the Statement of Financial Performance. The assets and liabilities of independent foreign operations are translated at the closing rate. Revenue and expense items are translated at the spot rate at the transaction date or a rate approximating that rate. Foreign currency exchange differences are recognised in the foreign currency translation reserve.

m) Revenue Recognition

Revenue from both Government and commercial sources is recorded when earned based on the percentage of work completed or other contractual commitments. Work completed but not invoiced is recorded as accrued revenue while work invoiced but not completed is recorded as revenue in advance.

n) Taxation

The income tax expense charged to the Statement of Financial Performance includes both the current year's provision and the income tax effects of timing differences calculated using the liability method.

Tax effect accounting is applied on a comprehensive basis to all timing differences. A debt balance in the deferred tax account, arising from timing differences or income tax benefits from income tax losses, is only recognised if there is virtual certainty of realisation.

Subsequent realisation of the tax benefit is subject to the requirements of income tax legislation being met.

o) Financial Instruments

The group is party to financial instruments with off balance sheet risk to meet financing needs. Revenues and expenses in relation to all financial instruments are recognised in the Statement of Financial Performance. The group is a signatory to the International Swap Dealers Agreement.

CHANGES IN ACCOUNTING POLICIES

There have been no changes in accounting policies during the year under review and all policies have been applied on a basis consistent with the previous year.

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 30 JUNE 2004 (CONTINUED)

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 30 JUNE 2004 (CONTINUED)

	GROUP	GROUP	PARENT	PARENT
	2004	2003	2004	2003
	\$000	\$000	\$000	\$000
2 OPERATING REVENUE				
Government revenue	21,822	22,897	21,822	22,881
Commercial revenue	17,126	16,656	15,893	14,299
Interest revenue	74	41	57	28
	39,022	39,594	37,772	37,208

3 OPERATING SURPLUS BEFORE TAXATION

AFTER CHARGING:

Depreciation				
- Improvements and buildings	346	301	346	301
- Plant and equipment	1,864	2,085	1,846	2,051
- Furniture and fittings	59	61	57	58
- Vehicles	14	17	12	9
- Books and periodicals	5	6	-	-
Directors' fees	176	176	176	176
Interest expense	88	165	88	165
Lease and rental costs	1,011	1,196	863	1,029
Personnel remuneration and expenses	20,762	20,070	19,819	19,070
Change in doubtful debts provision	(29)	30	(29)	20
Bad debts expensed	56	6	56	6
Amortisation of goodwill	-	47	-	47
Loss on sale of fixed assets	20	68	7	68
Unrealised exchange fluctuations	7	9	7	9
Impairment of value	150	-	150	-

4 NON-RECURRING ITEMS

NON-RECURRING REVENUE

Revaluation of forest assets	-	96	-	96
Gain on sale relating to land transaction	-	284	-	284
	-	380	-	380

NON-RECURRING EXPENSES

Loss on sale of investment	-	113	-	179
Write-off of fixed assets	-	193	-	193
	-	306	-	372

5 AUDITOR'S REMUNERATION

Amounts payable or due and payable to the auditors for:
Auditing financial statements
Parent entity auditor

GROUP	GROUP	PARENT	PARENT
2004	2003	2004	2003
\$000	\$000	\$000	\$000
68	65	66	63

6 TAXATION EXPENSE

Operating surplus before taxation	780	1,278	1,946	1,908
Prima facie tax at 33%	257	422	642	630
Taxation effect of permanent differences	16	73	13	69
Tax losses carried forward	-	178	-	-
Tax losses recognised from previous years	(178)	(90)	-	-
Tax effect of subvention payment/loss offsets	-	-	(563)	(21)
Taxation expense	95	583	92	678

REPRESENTED BY:

Current taxation	150	(141)	527	12
Tax effect of subvention payment/loss offsets	-	-	(563)	(21)
Tax losses carried forward	-	178	-	-
Tax losses recognised from previous years	(178)	(90)	-	-
Tax on pre-1992 equity previously recognised	-	(154)	-	(154)
Deferred taxation	123	790	128	841
	95	583	92	678

Opening taxation (receivable)/payable

	(171)	338	(132)	320
Tax refunds	34	12	-	-
Transfer from deferred tax benefit	68	36	71	38

	(69)	386	(61)	358
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Current taxation	150	(141)	527	12
Provisional tax paid	(81)	(364)	(81)	(327)
Tax refunds	-	14	-	-
Tax losses carried forward	-	178	-	-
Tax losses recognised from previous years	(178)	(90)	-	-
Tax on pre-1992 equity previously recognised	-	(154)	-	(154)
Tax effect of subvention payment/loss offsets	-	-	(563)	(21)
Closing taxation (receivable)/payable	(178)	(171)	(178)	(132)

7 ASSOCIATE COMPANIES

Share of deficit in Frontline Biosciarity Limited
Share of retained surplus/(deficit) of associate companies

-	(5)	-	-
-	(5)	-	-

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 30 JUNE 2004 (CONTINUED)

	GROUP	GROUP	PARENT	PARENT
	2004	2003	2004	2003
	\$000	\$000	\$000	\$000
8 FOREIGN CURRENCY TRANSLATION RESERVE				
Balance at 1 July	28	27	-	-
Movement during year	(16)	1	-	-
Balance at 30 June	12	28	-	-

9 SHARE CAPITAL

ISSUED AND PAID UP CAPITAL
15,716,000 ORDINARY SHARES

All shares have equal rights with respect to voting, dividends and distribution on winding up.

GROUP & PARENT	
2004	2003
\$000	\$000
15,716	15,716

10 TERM LIABILITIES

TERM DEBT

The interest rate on the term debt is 6.35% reviewable daily (2003: 5.85%).
The term debt is unsecured, but subject to financial covenants being maintained.
The total facility available to the group is \$7,000,000 (2003: \$7,000,000).

2,145	3,260
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11 CREDITORS AND ACCRUALS

Trade creditors	1,435	831	1,409	778
Accounts payable	1,961	1,622	1,894	1,520
Intercompany payable	-	-	1,240	1,740
Payable to directors	26	14	26	14
Revenue in advance	919	1,273	919	1,273
Provision for employee retirement and long service leave	1,291	1,403	1,286	1,398
Provision for other employee entitlements	2,153	2,374	2,069	2,245
	7,785	7,517	8,843	8,968

GROUP	GROUP	PARENT	PARENT
2004	2003	2004	2003
\$000	\$000	\$000	\$000

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 30 JUNE 2004 (CONTINUED)

12 PROPERTY, PLANT AND EQUIPMENT

LAND AND IMPROVEMENTS

At cost	1,519	1,497	1,519	1,497
Less accumulated depreciation (improvements)	46	28	46	28
Net book value land and improvements	1,473	1,469	1,473	1,469

FOREST ASSETS

At valuation

164	164	164	164
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BUILDINGS

At cost	18,252	17,202	18,252	17,202
Less accumulated depreciation	2,571	2,251	2,571	2,251
Net book value of buildings	15,681	14,951	15,681	14,951

PLANT AND EQUIPMENT

At cost	27,769	26,768	27,657	26,655
Less accumulated depreciation	21,101	19,367	21,003	19,287
Net book value of plant and equipment	6,668	7,401	6,654	7,368

FURNITURE AND FITTINGS

At cost

1,460	1,424	1,448	1,412
1,253	1,196	1,244	1,188
207	228	204	224

MOTOR VEHICLES

At cost

178	197	176	161
121	128	120	112
57	69	56	49

BOOKS AND PERIODICALS

At cost

199	199	169	169
36	26	-	-
169	173	169	169

CAPITAL WORK IN PROGRESS

At cost

416	369	416	369
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TOTAL PROPERTY, PLANT AND EQUIPMENT

At cost	49,957	47,820	49,801	47,629
Less accumulated depreciation	25,122	22,996	24,984	22,866
Net book value of property, plant and equipment	24,835	24,824	24,817	24,763

The fair value of land and buildings as per Rating Valuation as at 30 June 2004 is \$27,643,000 (2003: \$26,693,000).

13 DEFERRED TAX BENEFIT

Balance at 1 July	736	1,584	739	1,542
Current year movement	(123)	(790)	(128)	(841)
Over provision from previous year	68	36	71	38
Adjust for sale of subsidiary	-	(94)	-	-
Balance at 30 June	681	736	682	739

736	1,584	739	1,542
(123)	(790)	(128)	(841)
68	36	71	38
-	(94)	-	-
681	736	682	739

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS

FOR THE YEAR ENDED 30 JUNE 2004 (CONTINUED)

	GROUP & PARENT	
	2004 \$000	2003 \$000
14 INTANGIBLE ASSETS		
Patents		
At cost	25	25
Accumulated amortisation	(25)	(25)
Balance at 30 June	-	-

	PARENT	
	2004 \$000	2003 \$000
15 INVESTMENTS		
Investments in Subsidiaries		
Shares in subsidiaries 30 June 2003	\$2	484
Acquired in current year	-	-
Disposed of in current year	-	(432)
Shares in subsidiaries at 30 June 2004	\$2	\$2

SUBSIDIARIES	Shares	Percentage Held	Balance Date
FHS Limited	100	100%	30 June
Liro Limited	1,000	100%	30 June
Forest Research (Australia) Pty Limited	100	100%	30 June
N-Fix Technologies Limited*	100	100%	30 June
Forest Research (Australia) #2 Pty Limited*	100	100%	30 June
SigmaGen Limited*	100	100%	30 June
Atlas Technology Limited*	100	100%	30 June
FR Properties Limited*	100	100%	30 June
Forest Research Trans-Tasman Limited*	100	100%	30 June

FHS Limited commenced operating on 3 January 1996 in the name of FR1 International Limited. The name was changed in May 1999. The company provides a range of services to industry, government, local and regional authorities aimed at the early detection of pests and diseases.

Liro Limited became a wholly owned subsidiary from 1 July 1998. It was previously an associate (50%).

Forest Research (Australia) Pty Limited was incorporated as a wholly owned subsidiary on 22 May 2001. From July 2001 the company has operated a branch in Australia providing software support services. The company does not trade in New Zealand.

FR Properties Limited was incorporated on 25 March 2004. The company will own and administer the Group's land assets from 1 July 2004.

Forest Research Trans-Tasman Limited, a special purpose company for a new joint venture, was incorporated on 14 June 2004.

During the period DNA Testing Services Limited, a wholly owned non-trading subsidiary was liquidated.

* These companies were not trading at balance date and the capital was uncalled.

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS

FOR THE YEAR ENDED 30 JUNE 2004 (CONTINUED)

	GROUP		PARENT	
	2004 \$000	2003 \$000	2004 \$000	2003 \$000
15 INVESTMENTS - CONTINUED				
Investments in Associates				
Opening share of decrease in net assets	(10)	(5)	-	-
Current year share of decrease in net assets of Frontline Biosecurity Ltd	-	(5)	-	-
Closing share of decrease in net assets	(10)	(10)	-	-
Cost of investments 30 June 2003	10	5	10	5
Acquired during the period	20	5	20	5
Cost of investments to 30 June 2004	20	-	30	10

New Zealand Forest Research Institute Limited has a 25% shareholding in a joint venture company, Frontline Biosecurity Limited. The company carries out research, development and commercialisation of biosecurity processes. The company has a balance date of 31 March.

On 28 June 2004 New Zealand Forest Research Institute Limited purchased a 25% share of Beacon Pathway Limited. The company carries out research in the area of sustainability in the built environment.

New Zealand Forest Research Institute Limited owns a 50% share of Centre for Advanced Composite Materials Limited. The company does not yet trade and the capital is uncalled.

The parent entity undertakes research projects with the Forest and Forest Products Research Organisation (FAFPRO) through five cooperatives. Expenditure incurred on research and recoveries from the cooperatives has been included in the financial statements. However, the parent entity's share of the residual cash assets of the cooperatives is not material and has not been disclosed.

The parent entity undertakes research projects with the Logging Industry Research Association (LIRA). Expenditure incurred on research and recoveries from LIRA has been included in the financial statements. However, the parent entity's share of the residual cash assets of LIRA is not material and has not been disclosed.

	GROUP		PARENT	
	2004 \$000	2003 \$000	2004 \$000	2003 \$000
GOODWILL				
Opening balance	-	1,799	-	119
Goodwill on acquisition	-	-	-	-
	-	1,799	-	119
Accumulated amortisation	-	(1,080)	-	(119)
Goodwill write-down	-	(719)	-	-
	-	-	-	-
LOAN				
Balance 1 July 2003	574	-	430	-
Balance of proceeds owing from sale of subsidiary	-	338	-	215
Debt sold on sale of subsidiary	-	236	-	215
Repayments	(22)	-	(14)	-
Balance 30 June 2004	552	574	416	430
Term portion of loan	432	519	340	389
Current portion of loan	120	55	76	41
Total	552	574	416	430

The loan is secured by a Deed of Mortgage over the shares of IFR Technologies Limited (68.8%) and all the shares of the purchasing company.

During the period New Zealand Forest Research Institute Limited provided an unsecured shareholders advance of \$82,940 to an associate, Beacon Pathway Limited.

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 30 JUNE 2004 (CONTINUED)

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 30 JUNE 2004 (CONTINUED)

	GROUP		PARENT	
	2004 \$000	2003 \$000	2004 \$000	2003 \$000
16 CASH AND SHORT TERM DEPOSITS				
Cash on hand	2	2	2	2
Bank (bank overdraft/unsecured)	568	200	4	112
Conference account	-	82	-	82
Foreign currency account	41	57	41	57
On call account	351	919	351	918
	962	1,260	398	1,171

	GROUP		PARENT	
	2004 \$000	2003 \$000	2004 \$000	2003 \$000
17 DEBTORS AND PREPAYMENTS				
Trade debtors	4,548	4,662	4,298	3,833
Provision for doubtful debts	(41)	(70)	(24)	(60)
Intercompany receivable	-	-	1,930	1,170
Other debtors	66	51	62	48
Accrued revenue	1,313	1,072	1,155	1,073
Prepayments	435	461	435	461
	6,321	6,176	7,849	6,525

	GROUP		PARENT	
	2004 \$000	2003 \$000	2004 \$000	2003 \$000
18 INVENTORIES				
Consumable stores	212	260	212	260
Nursery work in progress	216	98	216	98
	428	358	428	358

	GROUP		PARENT	
	2004 \$000	2003 \$000	2004 \$000	2003 \$000
19 FINANCIAL INSTRUMENTS				
CREDIT RISK				
Financial instruments that potentially subject the group to credit risk consist of bank balances and accounts receivable. The group generally does not require any security.				
Maximum exposures to credit risk as at balance date are:				
Foreign currency account	41	57	41	57
Current account	568	200	4	112
Conference account	-	82	-	82
On call account	351	918	351	918
Receivables	4,564	4,636	4,324	3,817
Loans/Advances	-	-	1,930	1,170
	634	574	499	430

The group is not exposed to any significant concentrations of credit risk.
The above maximum exposures are net of any provision for losses on these financial instruments.

19 FINANCIAL INSTRUMENTS - CONTINUED

INTEREST RATE RISK

The group has terms debt with the National Bank of New Zealand Limited.

Amount \$000	Maturity	Rate	2003 \$000
\$2,145	Reviewable daily	6.35%	5,85%

The interest rate on the bank overdraft facility of \$250,000 is currently 10.00% (2003: 10.00%).
The bank overdraft interest rate is based on a floating rate set by the bank.

FAIR VALUES

Financial Instruments include:

Bank Overdraft, Foreign Currency Account, On Call Account, Short Term Deposits, Trade Debtors, Other Debtors, Accounts Payable and Term Loan.

For each class of financial instruments the carrying amount is the fair value.

At balance date the group had no interest rate swap agreement (2003: Nil).

	GROUP		PARENT	
	2004 \$000	2003 \$000	2004 \$000	2003 \$000
20 UNHEDGED FOREIGN CURRENCY DENOMINATED ASSETS AND LIABILITIES				
	NZD	NZD	NZD	NZD
Unhedged assets				
ALD - Current	279	484	279	484
USD - Current	151	117	151	117
Unhedged liabilities				
ALD - Current	220	17	220	17
USD - Current	9	62	9	62
GBP - Current	-	1	-	1

21 RECONCILIATION OF OPERATING SURPLUS AFTER TAXATION WITH CASH FLOWS FROM OPERATING ACTIVITIES

Reported surplus after taxation and before including share of retained surplus of associates

Add/(less) non cash items:

Amortisation of goodwill

Depreciation

Bad debts

Doubtful debts

Movement in future income tax benefit

Unrealised loss on foreign currency account

	GROUP		PARENT	
	2004 \$000	2003 \$000	2004 \$000	2003 \$000
685	695	1,854	1,230	
-	47	-	47	
2,287	2,472	2,261	2,419	
56	10	56	10	
(29)	30	(29)	20	
55	795	57	804	
7	9	6	9	
2,376	3,361	2,351	3,309	

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 30 JUNE 2004 (CONTINUED)

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 30 JUNE 2004 (CONTINUED)

	GROUP		PARENT	
	2004 \$000	2003 \$000	2004 \$000	2003 \$000
21 RECONCILIATION OF OPERATING SURPLUS AFTER TAXATION WITH CASH FLOWS FROM OPERATING ACTIVITIES - CONTINUED				
Add/(less) items classified as investing activity:				
(Gain)/loss on disposal of fixed assets	20	262	7	262
(Gain)/loss on sale of investments	-	113	-	179
Capital/(gain) loss	-	(380)	-	(380)
Movements in working capital items:				
(Increase)/Decrease in debtors and prepayments	(376)	(541)	(795)	(281)
(Increase)/Decrease in inventories	(69)	20	(69)	21
Increase/(Decrease) in creditors and accruals	606	(651)	750	(608)
Increase/(Decrease) in taxation payable	(1)	(516)	(2)	(455)
	160	(1,688)	(136)	(1,323)
Net cash flows from operating activities	3,241	2,363	4,076	3,277

22 CONTINGENT LIABILITIES

TREATY OF WAITANGI ISSUES

Two verified land claims affecting the group currently exist:

- (i) Ngati Whakaeu – covering the whole Rotorua Campus
- (ii) Ngati Whaito – covering the southern end of the Rotorua Campus

No reliable estimates can be made of the potential financial impact of these liabilities.

OTHER ISSUES

The Company has received notice of a possible claim relating to the use of two patents. The Company intends to contest any claim against the company with respect to this matter.

23 CONTINGENT ASSETS

HERITAGE ASSETS

The company has identified in herbarium collection as a heritage asset in accordance with Financial Reporting Standard No.3, Accounting for Property, Plant and Equipment. The Directors believe that there is no practical basis upon which to reliably value this collection. Therefore in accordance with Financial Reporting Standard No.15, Provisions, Contingent Liabilities and Contingent Assets, the herbarium collection meets the definition of a contingent asset.

GROUP & PARENT	
2004	2003
\$000	\$000

24 COMMITMENTS

CAPITAL COMMITMENTS:

Estimated capital expenditure contracted for at balance date but not provided for

581 65

OPERATING LEASE COMMITMENTS:

Lease commitments under non-cancellable operating leases:

Within one year	559	550
One to two years	289	332
Two to five years	52	141
	900	1,023

25 TRANSACTIONS WITH RELATED PARTIES

New Zealand Forest Research Institute Limited is wholly owned by the Crown. All transactions with state-owned enterprises and Government departments and agencies are at arm's length, and are not considered to fall within the intended scope of related party transactions. During the period New Zealand Forest Research Institute Limited entered into the following transactions:

SUBSIDIARY COMPANIES

IFR Technologies Limited

Supply of goods and services

- 59

FHS Limited

Net cash advanced/paid on behalf of

557 (223)

Supply of goods and services

553 471

Amount (payable)/receivable at balance date

- Intercompany account (1) (537)

- Net trade debtors/creditors

106 20

Liro Limited

Net advances

(16) 55

Supply of services

- 83

Amount (payable)/receivable at balance date

- Intercompany account (1,240) (1,224)

Forest Research (Australia) Pty Ltd

Net cash advanced/paid on behalf of

390 478

Supply of goods and services

599 1,140

Amount (payable)/receivable at balance date

- Intercompany account 1,930 1,079

- Trade debtors/creditors

15 92

During the year the Group provided services to the value of \$9,991 (2003: \$28,787) to the Forest Industries Council, of which Margaret Emerie, a director of New Zealand Forest Research Institute Limited, is an employee. These services were provided on normal trading terms.

During the year Jane Taylor, a director of New Zealand Forest Research Institute Limited, supplied services to the group outside normal directors duties, totalling \$9,000 (2003: nil). These services were provided on normal trading terms.

During the year Armstrong Consultancy supplied services to the New Zealand Forest Research Institute Limited group totalling \$6,000 (2003: Nil). Brian Armstrong, a director of New Zealand Forest Research Institute Limited is the principal of Armstrong Consultancy. The services were provided on normal trading terms.

Amounts outstanding at year end are receivable and payable on normal trading terms.

No related party debts were written off or forgiven during the year (2003: Nil).

26 EVENTS SUBSEQUENT TO BALANCE DATE

Effective 1 July 2004, New Zealand Forest Research Institute Limited transferred four business units, which approximate one third of its operations, into a 50/50 Unincorporated Joint Venture with CSIRO, Australia's national science agency. Subsequent to balance date New Zealand Forest Research Institute Limited will transfer its land and some improvement assets to a newly formed wholly owned subsidiary, FR Properties Limited.

27 SEGMENT INFORMATION

The group operates principally in New Zealand providing scientific research and technology to Government and commercial clients.

