MACMILLAN BLOEDEL LIMITED

ANNUAL ENVIRONMENTAL REPORT 1993

ENVIRONMENTAL POLICY

MacMillan Bloedel Limited is committed to excellence in environmental management by conducting its business in a manner which safeguards the environment and the health and safety of its employees, customers and the public.

1. MacMillan Bloedel will comply with all applicable environmental laws and will develop and implement practicable measures to protect environmental quality and human health.

2. MacMillan Bloedel will manage its operations to prevent the occurrence of any adverse events and minimize potential hazards that may affect its employees, the public and the environment; and in connection with any occurrence it will implement effective control measures and notify all concerned parties.

3. All MacMillan Bloedel operations will be subject to internal audits respecting environmental performance, and a corporate status report will be presented annually to the Board of Directors.

4. All managers and supervisors are responsible for ensuring their operations and employees comply with this policy.

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Glossary

The future of MacMillan Bloedel is linked with the future of British Columbia's forests. We understand that the quality of our stewardship is crucial to our long-term existence. We also understand that as managers of public forests, we must be accountable for what we do, and we must be worthy of the public's trust.

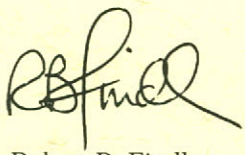
This is our first environmental report. It is intended to let our shareholders, employees, customers and stakeholders know that we are committed to meeting our obligations, and that we will manage the forests and protect environmental values to the very best of our abilities.

We have already come a long way. We have revamped mill processes and installed new secondary effluent treatment systems at our pulp and paper mills and we now meet standards that are among the most stringent in the world.

In Clayoquot Sound on Vancouver Island, MacMillan Bloedel's new forest practices are at the leading edge of change in forest management in British Columbia. We are working with community groups, international scientists, first nations and labour on a special implementation plan. We are determined that our performance in that sensitive area will demonstrate that we have accepted the need for change, and that we are capable of managing old growth forests for all of their diverse values: environmental, cultural and economic.

We support the government's initiative in drafting a new Forest Practices Code which will have the force of law in the forests of British Columbia. This will provide us with consistent and world recognized standards in forest management and we would welcome the opportunity to label our products as "ecologically sustainable" under this new and stringent Code.

The relationship of our industry to the forest resource continues to evolve. MacMillan Bloedel's goal is to be an environmental leader in British Columbia's forest community. We intend to achieve this goal by doing no less than our best.

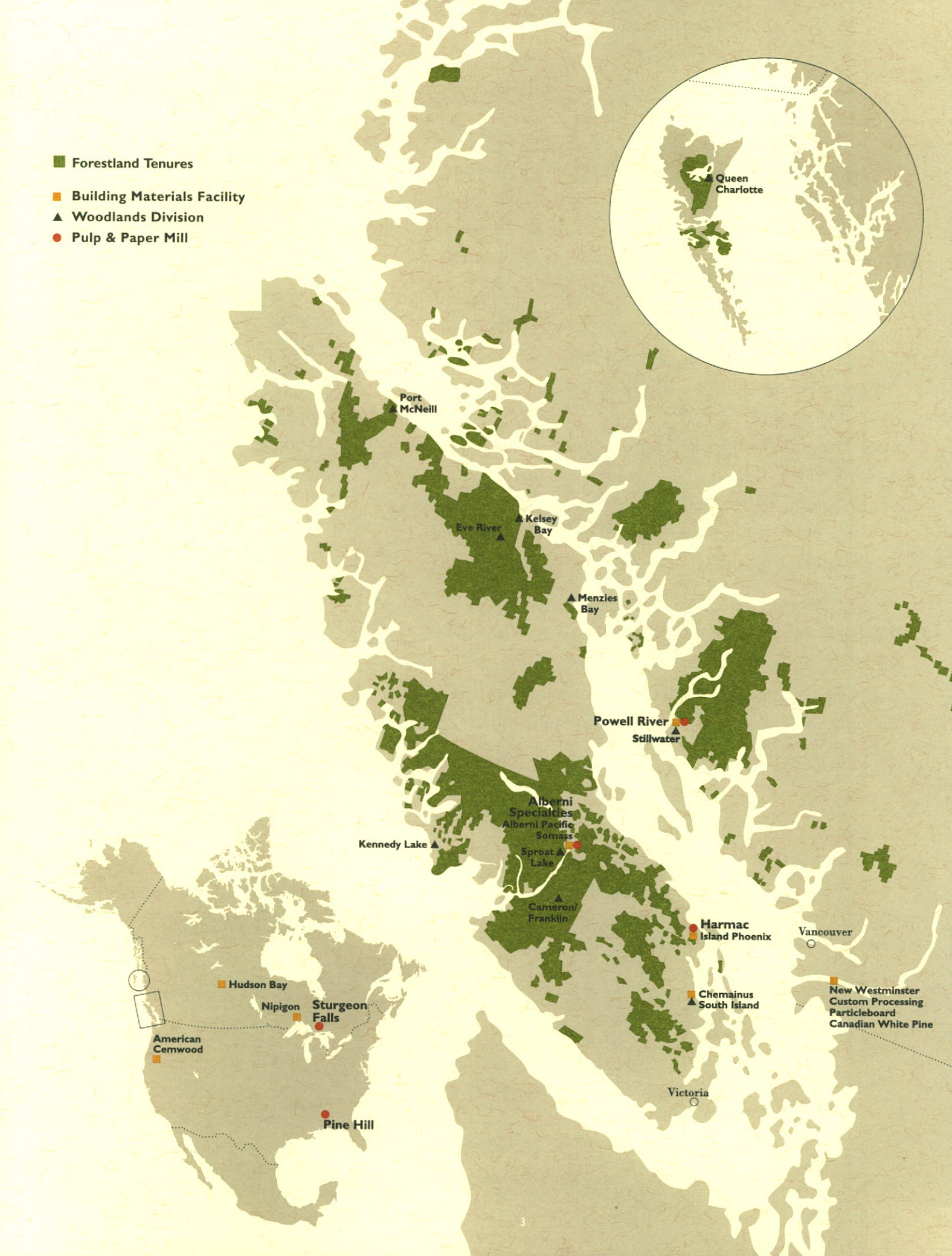


Robert B. Findlay
President and
Chief Executive Officer
February 9, 1994

MacMillan Bloedel, together with its subsidiaries, is the largest forest products company in Canada with integrated operations in Canada and the United States as well as major investments in Canada, the United States and Continental Europe. The company manages 1.5 million hectares of timberlands, including one million hectares in British Columbia. The remaining forest tenures are located in Alabama, Mississippi and Saskatchewan.

MacMillan Bloedel owns and operates three pulp and paper mills in British Columbia: Alberni Specialties (pulp and paper), Harmac Pulp and Powell River Pulp and Paper. Containerboard is produced at Pine Hill, Alabama and Sturgeon Falls, Ontario. The Sturgeon Falls mill was converted to a 100 percent recycled corrugating medium mill in 1993.

The building materials facilities operated by MacMillan Bloedel produce panelboards, lumber and lumber specialties.


Forestland Tenures
Building Materials Facility
Woodlands Division
Pulp & Paper Mill
Queen Charlotte
Port McNeill
Eve River
Kelsey Bay
Menzies Bay
Powell River
Stillwater
Alberni Specialties
Alberni Pacific
Somass
Kennedy Lake
Sproat Lake
Cameron/ Franklin
Harmac
Island Phoenix
Vancouver
Chemainus
South Island
New Westminster
Custom Processing
Particleboard
Canadian White Pine
Victoria
Hudson Bay
Nipigon
Sturgeon Falls
American Cemwood
Pine Hill

During the year MacMillan Bloedel trained Woodlands employees and contractors in the new B.C. fish-forestry guidelines and implemented an extensive road remediation program. These and other initiatives will further reduce sedimentation in streams and protect fish habitat.

New secondary effluent treatment systems were installed at Harmac, Powell River Pulp and Paper and Alberni Specialties. As a result of the new systems, the mills' performance for biochemical oxygen demand, total suspended solids and effluent toxicity is better than new federal and provincial regulatory requirements. Modifications to the Kraft pulping and bleaching processes have virtually eliminated the discharge of chlorinated dioxins and substantially reduced the discharge of AOX.

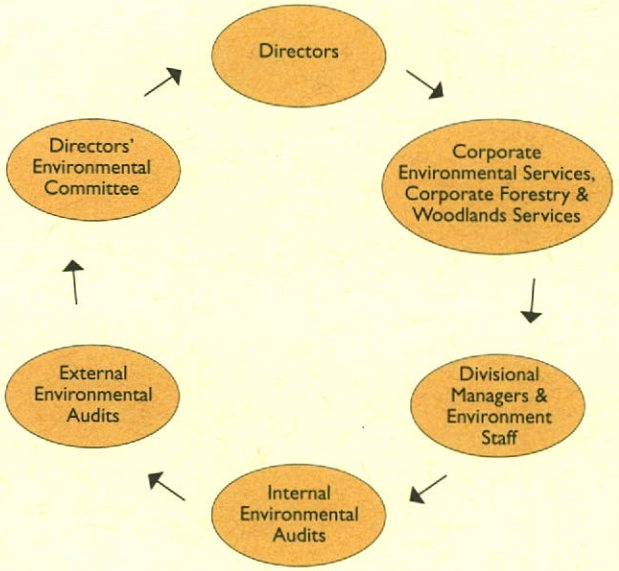
In 1993 B.C. forestry practices were audited for the third year and Canadian manufacturing facilities for the fifth year. The divisions have initiated programs to address deficiencies. MacMillan Bloedel's internal audit protocols and systems are now well-established and contribute to ongoing improvement in environmental performance.

MacMillan Bloedel's environmental policy forms the basis for the management of environmental issues and commits the company to excellence in environmental management in its forestry and manufacturing operations. Environmental performance is a line responsibility and all manufacturing divisions are required to have a written environmental management program. The pulp and paper mills have active environmental committees composed of hourly and management employees that address specific environmental issues on a regular basis.

Three corporate staff groups assist operating divisions with environmental management. Corporate Environmental Services provides all manufacturing operations across Canada with technical assistance and environmental management services, including auditing support. Corporate Forestry and Woodlands Services oversee sustainable forestry programs. The Land Use Planning Advisory Team (LUPAT) within Woodlands Services assists logging divisions with forest land use practices. LUPAT is one of the largest in-house groups of forest science and engineering specialists in the Canadian forest industry.

In addition, MB Research, the company's corporate research department, plays a key role in environmentally related research and technology issues through the development of new products, improved systems and processes and changes to manufacturing technology.

The environmental committee of the Board



of Directors reviews environmental performance of the company to ensure compliance with corporate standards and government regulations. The committee met three times in 1993.

Audits

MacMillan Bloedel's comprehensive environmental audit programs for sustainable forestry and manufacturing are fundamental to continuous improvement in forest management and environmental performance. The audits assess performance, measure progress and identify areas for improvement. Audit action plans provide a program and schedule to ensure deficiencies are corrected.

Sustainable Forestry Audits

Sustainable forestry audits in B.C. have been refined over the past three years and a sophisticated protocol and audit system are now in place. The internal audit teams include a divisional representative, a LUPAT fisheries biologist and a forester, engineer or manager from another division in the company. To ensure consistency, the same audit leader is used for all Woodlands audits. The operating divisions have been audited annually since 1990. Since the introduction of the audits, divisional performance has improved in streamside management, road construction and maintenance and cleanup. Audit findings are rated in terms of severity; in 1993, 96 percent of audit findings had a potential hazard rating of low to moderate. Only four percent of findings had a high hazard rating and no findings were considered extreme. The majority of the findings have been corrected and the remainder are being addressed.

Divisions continue to achieve high performance levels in managing and protecting streams. The 1992 and 1993 audits identified that further attention is required relating to water drainage associated with road maintenance and construction. A major program to improve road maintenance and water management associated with roads has been initiated at the Stillwater and Kennedy Lake divisions. There is increased emphasis by all Woodlands divisions on water management, road maintenance and road deactivation to reduce soil erosion and maintain water quality. Exposed mineral soil along road rights-of-way is revegetated to improve visual quality and reduce the non-productive areas created by road construction.

MacMillan Bloedel's forestry operations in the United States are audited periodically to ensure regeneration and harvesting meet company standards and specifications.

Environmental Audits

Environmental audits are conducted across Canada at pulp and paper divisions, building materials facilities and logging operations. Since the audit program was implemented in 1988, a total of 56 audits have been conducted at 26 sites. As deficiencies have been identified and corrected, the focus of the audit program has shifted

from compliance issues to assessing the effectiveness of divisional environmental management systems. Divisions are now required to develop formal written programs with assigned responsibilities, duties and accountabilities.

The most significant liability identified by the first round of audits related to handling of petroleum products, including the potential for spillage. Corporate Environmental Services subsequently developed a corporate standard for handling petroleum products that serves as a corporate minimum regardless of government regulations. Implementation of the standard started in 1993 at all divisions. The requirements include upgraded secondary containment, removal of old tanks, improved underground storage and new handling procedures designed to reduce potential environmental impacts from fuel storage and handling. The standard has been used as a reference by other forest products companies in British Columbia.

Internal environmental audits are conducted annually at the Pine Hill operations in Alabama and at the packaging plants across the U.S. An external audit of the Pine Hill mill is conducted annually by H.M.M. Associates. With increased regulation, the number of factors assessed by the audits has increased. Major deficiencies identified by the original audits have been corrected and the audits now focus on more specific administrative details.

Property Management

The environment has become more of an issue in property management as concern over contaminated real estate has increased. In 1988 the company implemented a program to assess company sites formerly used for manufacturing and remediate any contaminated property. In 1993 the company added environmental clauses to lease agreements, requiring tenants on company lands to comply with all government environmental regulations. The company regularly audits leased industrial sites and tenants are required to correct deficiencies as part of continuing the lease.

When these sites are no longer required for company operations, proposals for an alternate use include an environmental review. Any redevelopment would include any remediation required to meet government standards for the proposed use.

MacMillan Bloedel is committed to the protection and long-term sustainability of the forest lands under its care. The company safeguards site productivity and non-timber resources through high standards of forestry practices and prompt forest renewal. The internal audit program ensures compliance with government regulations and corporate standards.

In 1993 the company initiated major programs to rehabilitate and "debuild" roads, further protect fish habitat and improve the visual quality of roadways and cutblocks.

British Columbia

Forest management activities are governed by an intensive planning process that involves the preparation of a Management Plan, Development Plan and a Preharvest Silvicultural Prescription. The process requires a minimum of two years and incorporates non-timber resource values, including soils, community watersheds, fish, wildlife, biodiversity, aesthetics, recreation, and heritage and culture.

In 1992 the government of British Columbia established the Commission on Resources and Environment (CORE) to recommend a province-wide land use strategy. In early 1994 CORE released a Vancouver Island Land Use Plan that recommends removal of 90,000 hectares from Vancouver Island's commercial forest land base. If the plan is approved by the provincial cabinet, approximately 16,000 hectares of MacMillan Bloedel managed land plus an unknown volume in "Regionally Significant Lands" could be affected.

Forest Practices

In 1993 a total of 8,200 hectares were harvested in British Columbia, resulting in wood volumes of 6.1 million cubic metres.

The type of system used to harvest trees has a significant impact on forest regeneration. Clearcutting, the primary system used by MacMillan Bloedel, is a safe, economic and environmentally sound method for regenerating the majority of B.C.'s coastal coniferous forests. Clearcutting satisfies many of the ecological requirements of regenerating tree seedlings, offers effective control against disease, insects and weeds, and reduces the risk of blowdown. The size of clearcuts has decreased over the past few years and the maximum size of a clearcut in coastal British Columbia is now 40 hectares. In certain instances, such as blowdown or insect

infestation, the size of clearcuts can exceed 40 hectares with appropriate provincial approvals. The trend to smaller clearcuts is expected to continue, reflecting society's concern for improved visual appearance of logged areas and less disruption to the original forest.

While clearcuts are visually unappealing in the short-term, all harvested areas are regenerated and do grow back as productive forest land ecosystems.

To improve the aesthetics of harvested areas and explore options on sites where clearcutting may not be the most ecologically appropriate system, the company is experimenting with a number of other silvicultural systems. These range from leaving selected trees for regeneration, wildlife or shelter to removal of single trees from an area. The company is also employing a variety of harvesting systems with the goal of minimizing road construction and maintenance which can contribute to site degradation. These systems use balloons, helicopters and skyline yarding systems to remove trees.

Fish-Forestry Guidelines

A program was initiated in 1993 to train employees and contractors in best management practices relating to the provincial government's new fish-forestry guidelines. MacMillan Bloedel participated in the development of the new guidelines which are designed to further protect fish habitat. When the program is completed by the end of March 1994, a total of

MANAGEMENT PLAN (FIVE-YEAR TERM)

A 20-year harvesting plan which recommends an Allowable Annual Cut (AAC) and sets integrated resource management objectives for the Tree Farm Licence. Sets broad standards for forestry activities, environmental protection, road construction and harvesting.

- **Standards approved by government agencies.**
- **Undergoes a public consultation and review process.**
- **Monitored by government agencies.**
- **Approved by the Ministry of Forests.**

DEVELOPMENT PLAN (UPDATED ANNUALLY)

Identifies individual cutblocks by year for five years. At least two years are engineered and the remainder are projected. Identifies site specific information on forestry and environmental aspects related to proposed cutblocks.

- **Undergoes public consultation and review.**
- **Government agencies review the plan and monitor performance in accordance with it.**
- **Approved by the Ministry of Forests.**

PREHARVEST SILVICULTURAL PRESCRIPTION (PHSP)

Prepared for each cutblock under the direction of a professional forester. Identifies harvesting method, summarizes environmental constraints and outlines silvicultural treatments.

- **Available for review by the public.**
- **Approved by the Ministry of Forests.**

1,900 people will have been trained in stream classification and managing sediment, debris and streamside areas.

The results of two major independent audits of provincial fish-forestry practices known as the Tripp Reports, were released in the summer of 1992 and January 1994. For both audits, the company's average compliance was 80.2 percent. The company's training program is aimed at increasing compliance to 100 percent.

Road Rehabilitation

Major initiatives were implemented in 1993 to rehabilitate old forestry road systems. The objectives of the program are to mitigate erosion and stability problems that can cause progressive site deterioration or damage to fish habitat, to restore site productivity where feasible, and to improve the appearance of high-visibility sites. The largest projects started in 1993 involved rehabilitating 370 km of road by the end of 1994. In 1994 a number of smaller projects will involve rehabilitation of an additional 100 km of old roads.

The company's hydroseeding program has significantly decreased erosion, improved visual appearance and reduced sedimentation in streams. The company hydroseeded 134 hectares of road rights-of-way in 1993, double the amount of the previous year.

Biodiversity

Forest land biodiversity is a key component of responsible forest management. The company is developing new planning tools to ensure compliance with new provincial government guidelines. These guidelines emphasize forest ecosystem networks to conserve representative tracts of original forest and its biodiversity throughout watersheds. Forest ecosystem networks are mature forest networks that incorporate fish-forestry streamside leave areas, high-elevation habitats on ridge tops and cross valley connections like deer winter ranges.

A computerized biodiversity planning tool is being developed to ensure harvest schedules don't negatively impact habitat requirements. To meet long-range integrated resource planning needs, MacMillan Bloedel has increased research into bird and wildlife habitat. The company is also conducting experimental spacing in selected regenerated clearcuts to increase spring forage near deer wintering ranges.

B.C. Forest Practices Code

MacMillan Bloedel supports the B.C. Forest Practices Code which is expected to become law in 1994. A government discussion paper on the new code was issued in late 1993 and industry responses have been positive and constructive. The primary implications for the company relate to road construction practices, water management

COMMITMENT TO SUSTAINABLE FORESTRY

MacMillan Bloedel Limited is committed to excellence in forest management. This commitment includes provision, on a sustained basis, for the many diverse demands placed on the forest resources while contributing to the economic viability of the Company and communities in which we operate.

1. **We will practice timber development and harvesting to ensure a sustained flow of timber from the forest, conservation of resource values, maintenance and enhancement of site productivity, and provisions for public recreation.**
2. **We will conduct silviculture treatments to sustain timber yields to meet corporate objectives while sustaining healthy animal populations and adequate habitat diversity.**
3. **We will conduct forest land management to provide an acceptable economic return to shareholders and the public land owners.**
4. **We will conduct prevention, monitoring and control measures to minimize fire, insect and disease losses.**
5. **We will listen to people's concerns and work together in developing forest management programs and policies.**
6. **We will conduct internal audits of forest management performance and a corporate status report will be presented annually to the Board of Directors.**

and the use of alternatives to clearcutting in environmentally and visually sensitive areas. To meet the code's requirements and facilitate implementation of new operating procedures, the company is strengthening training, performance standards and accountability.

Forest Alliance Principles of Sustainable Forestry

MacMillan Bloedel incorporates the Forest Alliance Principles of Sustainable Forestry into its operating philosophy. In 1993 the company conducted internal training to increase employee awareness and understanding of the principles' intent, requirements and implementation. The 21 principles contain a number of measures including prompt reforestation after harvesting, protection of biological diversity and the encouragement of public input in forest planning.

Forest Renewal

Reforestation is conducted in accordance with Preharvest Silvicultural Prescriptions (PHSP) that are approved by the provincial government prior to harvesting. Harvested areas are reforested through natural regeneration or planting, depending on a number of factors such as climate, soil fertility and water availability. The ecologically based biogeoclimatic zones of the province form the basis for regenerating forest lands. Natural regeneration is favoured where it is reliable and the species meet management objectives. During the year 3,940 hectares were naturally regenerated.

The company has planted 211.5 million seedlings since 1938. In 1993 MacMillan Bloedel planted 6,250 hectares with a total of 5.3 million seedlings. Forest renewal through planting contributes to tree survival

and growth because of enhanced seedling qualities. MacMillan Bloedel is the only company in the Canadian forest products industry that conducts its own seedling quality research and tests for root growth capacity, nutritional quality and resistance to frost. This work has contributed to an improvement in initial plantation success in excess of 90 percent and currently focuses on enhancing seedling growth. In support of its planting operations, MacMillan Bloedel maintains a nursery and 10 orchards in B.C.

Research and Technology

MacMillan Bloedel's in-house resource team of forest science and engineering specialists assists operating divisions in achieving best forest management practices and meeting evolving government regulations and company standards on a timely basis. The Land Use Planning Advisory Team (LUPAT) provides operating divisions with advice and specialized skills in fisheries, wildlife ecology, engineering and silviculture, and undertakes research programs in silviculture and engineering. LUPAT, in conjunction with a number of government agencies and universities, is

B.C. DATA SUMMARY

	1993**	1992	1991	1990
Total Accessible Productive Area Managed	1,044,000	1,045,000	1,047,000	1,050,000
Unproductive and Inaccessible Areas	21,100	22,616	16,588	22,936
Total Area Managed (ha)	1,065,100	1,067,616	1,063,588	1,072,936
Total Volume Harvested (m^3)	6,081,000	6,542,000	6,660,000	6,694,000
Total Area Harvested (ha)	8,200	9,278	8,477	9,675
Area Harvested (ha)				
First Growth	7,670	8,751	8,103	9,409
Second Growth	530	527	374	266
Area Replanted (ha)	6,250	7,716	7,535	7,884
*No. of Seedlings Planted	5,338,000	7,869,000	7,336,000	7,976,000
Area Naturally Regenerated (ha)	3,940	3,826	3,663	4,082
Area Not Sufficiently Restocked (outside policy)				
Percentage of Second Growth Forest	.2	.2	.3	.3
Hectares	1,000	1,076	1,426	1,364
First Year Plantation Success	91%-95%	95%-99%	91%-96%	95%-99%

*The number of seedlings planted in 1993 was below previous years because of changes in operating procedures. The company expects to plant 8.1 million seedlings in 1994.

***1993 results are estimated. Actual numbers will be available by June 1, 1994.*

currently involved in a long-term project to assess the impact of alternative harvesting methods in high elevation first-growth stands. Montane Alternative Silvicultural Systems (MASS) is a multi-year experiment that will provide information on the impact of various selective cutting systems on regeneration performance, site productivity, wildlife habitat, biological diversity and visual aesthetics.

Another significant program is the development of rapid rotation poplar plantations to supplement the company's long-term fibre supply. Compared with the average 80-year cycle for coastal conifers, poplars can be grown and harvested within 15 years. The program will move from development into production of commercial plantations in 1994.

MacMillan Bloedel is replacing its forest management GIS (geographical information system) with a new system that will enhance decision making by providing operations with faster and more current information on road development and harvesting areas. The provincial map base used by the Ministry of Environment will be incorporated in the GIS and customized to meet MacMillan Bloedel's specific needs. The new system will be implemented on a progressive basis over three years.

United States

MacMillan Bloedel manages 429,000 acres (174,000 hectares) of productive forest land in Alabama and Mississippi. Approximately 80 percent of these lands are in pine plantations and upland natural pine stands. The remainder are in streamside management zones and hardwood stands.

Forestry operations are conducted in accordance with Alabama's Best Management Practices. These practices were amended two years ago to protect the physical, chemical and biological integrity of the waters of Alabama.

Pine plantations are harvested through thinning and clearcutting. On hardwood stands, MacMillan Bloedel has reduced the size of clearcuts and is increasingly using selective cutting. Harvesting in stream management zones has been restricted and the number of stream crossings in the company's silvicultural operations have been reduced. Forests are replenished and tended with a superior tree improvement program, a seedling nursery and intensive forest management.

MacMillan Bloedel has continued efforts to reduce the environmental impact associated with its pulp and paper operations. Over the past three years, effluent quality has improved significantly as a result of changes in production processes and the installation of new effluent treatment systems. All three mills in B.C. are investigating options to minimize the environmental impact of their landfill operations. Initiatives in previous years reduced air emissions.

Pulp Processes

In 1993 Alberni Specialties, Harmac Pulp and Powell River Pulp and Paper processed about 3.5 million cubic metres of wood chips to make pulp. Wood chips are made from sawmill residues and trees that are unsuitable for solid wood products. A variety of pulps are produced to meet different product requirements. The Kraft process involves cooking wood chips with chemicals to dissolve the lignin that binds the cellulose fibres in wood. The pulp is bleached to produce either fully or semi-bleached pulp or left as unbleached pulp.

For CTMP, wood chips are steamed under pressure with sodium sulfite and "fiberized" by large counter-rotating disk refiners. Groundwood pulps are made by fiberizing blocks of wood in rotating stone grinders. CTMP and groundwood are bleached in chlorine-free processes, using hydrogen peroxide and sodium hydrosulfite.

Alberni Kraft Mill Closure

The Alberni Kraft pulp mill was officially decommissioned in November 1993. Most of the Kraft mill chemical inventory was consumed during the last weeks of operation and the remaining process chemicals were recovered and shipped to other coastal pulp mills for use in their Kraft processes.

Effluent

Process Modifications

Changes to the Kraft pulping and bleaching processes at Harmac and Powell River have virtually eliminated chlorinated dioxins and substantially reduced the amount of chlorinated organic compounds (AOX) in effluent. These chlorinated compounds are produced as unwanted byproducts during the bleaching process. This reduction was accomplished by extended cooking of wood chips and improved pulp washing to reduce the amount of bleaching required.

In addition, changes in the bleaching process, including the use of oxygen, increased chlorine dioxide

substitution for chlorine, and the addition of hydrogen peroxide, have significantly reduced the use of chlorine since 1990. The bleaching of CTMP and groundwood pulps is done with non-chlorine compounds and does not produce AOX.

The current limit for AOX in British Columbia is 2.5 kg per tonne of bleached pulp produced. In 1995 the limit will be 1.5 kg per tonne and the regulations propose total AOX elimination by 2002. AOX levels at Harmac and Powell River are currently lower than the 1995 limits. *See AOX bar charts on page 17.* The dioxin levels are also significantly below the current federal government effluent limit of 20 parts per quadrillion. *See Dioxin bar charts on page 17.*

Dioxin levels in crab and shellfish have declined substantially following the process and bleaching changes and installation of the new effluent treatment systems. Despite this improvement, the areas closed for commercial crab fishing near Harmac and Powell River in 1990 were expanded in 1993. This was because intensive government and industry sampling programs conducted in 1991 and 1992 indicated historical contamination was more widespread than originally estimated. Data collected in 1993 indicates continued sharp declines in dioxins in crab, shellfish and marine sediments. The areas affected are expected to be reopened to commercial fishing as dioxin and furan levels in fish tissues consistently meet federal guidelines. No fishery closures are in effect in Alberni Inlet as a result of mill effluent discharges.

Secondary Effluent Treatment Systems

New secondary treatment systems have been installed at Alberni, Harmac and Powell River at a cost of $200 million. Alberni already had a 30 acre aerated lagoon, installed in 1970, to provide secondary treatment, however, the new system was required to meet standards the federal government legislated in 1992 specifically for Alberni. These standards are among the most stringent in the world and reflect concerns relating to seasonally low dissolved oxygen levels in the poorly flushed Alberni Inlet and estuary. As part of its effort to better understand the issue, in 1992 Alberni Specialties initiated an extensive program to assess oxygen levels in the inlet.

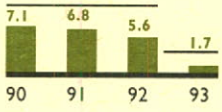
The Powell River treatment system was commissioned in November 1992, the Alberni system in January 1993 and the Harmac system in October 1993. *See bar charts for BOD, TSS and toxicity on pages 16 and 17.*

Environmental Effects Monitoring (EEM)

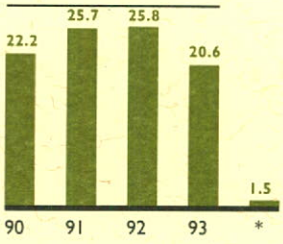
The company has regularly evaluated the marine waters off its three mills since the early 1970s. In 1992 the

Biochemical Oxygen Demand (BOD)

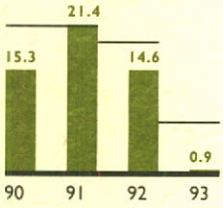
kg/t (annual mean)



Alberni
— Permit Level
1990 to 1992 10.0
1993 3.5



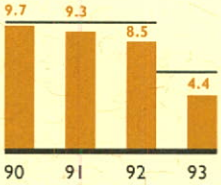
Harmac
— Permit Level
1990 to 1993 27.0
**BOD for January 1994 with the new treatment system in full operation*



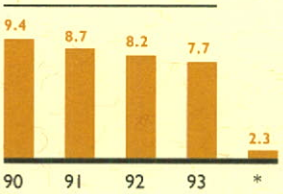
Powell River
— Permit Level
1990 to 1991 21.1
1992 18.9
1993 7.5

Total Suspended Solids (TSS)

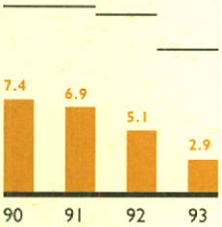
kg/t (annual mean)



Alberni
— Permit Level
1990 to 1992 10.0
1993 6.3



Harmac
— Permit Level 12.0
**TSS for January 1994 with the new treatment system in full operation*



Powell River
— Permit Level
1990 to 1991 14.5
1992 13.9
1993 11.25

federal government initiated a national Environmental Effects Monitoring program aimed at evaluating environmental impacts and the health of fishery resources in waters adjacent to pulp and paper mills. MacMillan Bloedel participated in the development of the program.

In 1993 the company's three B.C. mills initiated the predesign phase of the first three-year monitoring cycle. Field monitoring of the mill receiving waters is scheduled to begin in the summer of 1994.

Air Emissions

The three British Columbia mills consistently meet provincial permits for particulate and total reduced sulfur (TRS) compounds, the odourous compounds associated with Kraft pulp mills.

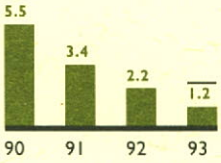
See bar charts on pages 18 and 19.

With the closure of the Alberni Kraft pulp mill in November 1993, the primary sources of TRS (lime kiln and recovery boiler) were decommissioned, eliminating remaining Kraft mill odour in Port Alberni. The mill continues to meet level A requirements for particulate emissions from the power boiler.

Harmac is better than provincial level B+ for TRS and at level A for particulate

Adsorbable Organic Halides (AOX)

kg/t (annual mean)



Alberni

— Permit Level

1993 2.5

1995 1.5

(AOX permit started in 1993)

Harmac

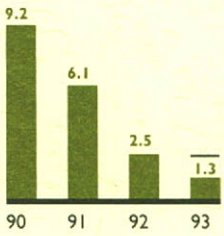
— Permit Level

1993 2.5

1995 1.5

**not available*

(AOX permit started in 1993)



Powell River

— Permit Level

1993 2.5

1995 1.5

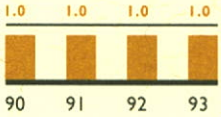
(AOX permit started in 1993)

Toxicity

LC_{50} (annual mean)

Toxicity is reported as

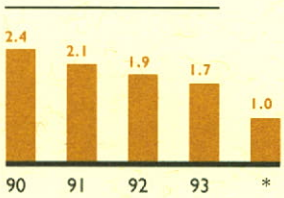
$100/LC_{50}$



Alberni

— Permit Level 1.25

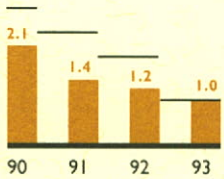
(changed to 1.0 in March 1993)



Harmac

— Permit Level 3.3

**LC_{50} for January 1994 with the new treatment system in full operation*



Powell River

— Permit Level

1990 2.9

1991 2.4

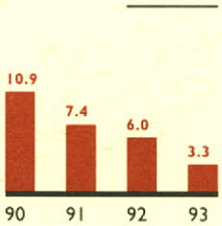
1992 1.9

1993 1.0

Dioxins

parts per quadrillion

(annual mean)

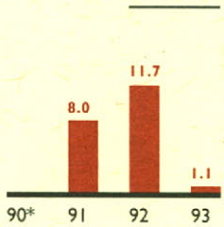


Alberni

— Permit Level

1992 to 1993 20

(Permit started in 1992)



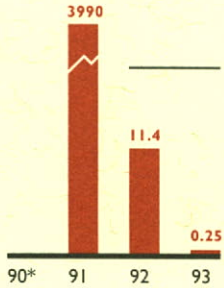
Harmac

— Permit Level

1992 to 1993 20

**not available*

(Permit started in 1992)



Powell River

— Permit Level

1992 to 1993 20

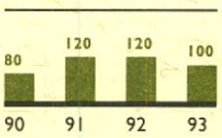
**not available*

(Permit started in 1992)

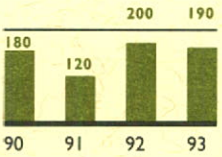
Power Boilers

Particulate

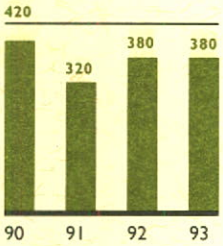
mg/m³ (annual mean)



Alberni
— Permit Level 230



Harmac
— Permit Level 230

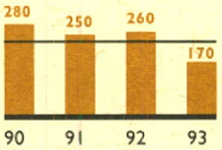


Powell River
— Permit Level 460

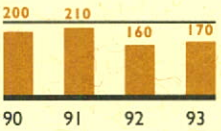
Recovery Boilers

Particulate

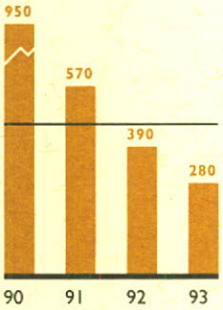
mg/m³ (annual mean)



Alberni
— Permit Level 230



Harmac
— Permit Level 230



Powell River
— Permit Level 460

from the recovery boilers and lime kilns. The mill also meets level A requirements for particulate emissions from the power boilers. Continuous ambient air monitoring stations are used to measure any impact of total reduced sulfur and particulate on local communities. Powell River consistently meets provincial level B requirements for its recovery and power boiler emissions. The addition of an electrostatic precipitator on the lime kiln in 1989 reduced emissions to better than level A and the mill has initiated a project to reduce power boiler particulate by the end of 1996. The mill is also reviewing options to reduce TRS and particulate emissions from the recovery boiler.

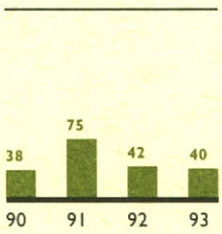
Air emission standards in most jurisdictions are being reviewed and are expected to become more stringent in the next few years. In 1993 Environment Canada conducted a study on emissions from a non-company boiler burning excess secondary treatment bio-solids and salt laden fuel. In response to this study, the B.C. coastal pulp and paper industry, through the Pulp and Paper Research Institute of Canada, has assembled a research team to expand the study of these boiler emissions. If these reviews lead to the introduction of more stringent standards, additional capital expenditures will be required.

Solid Waste Management

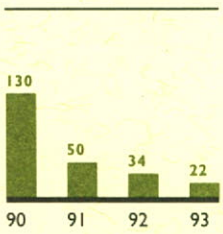
Landfill management is the primary solid waste issue. At Alberni, bark and other wood

Lime Kiln Particulate

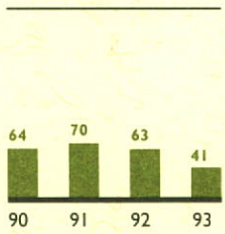
mg/m³ (annual mean)



Alberni
— Permit Level 230



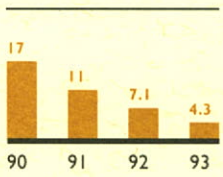
Harmac
— Permit Level 230



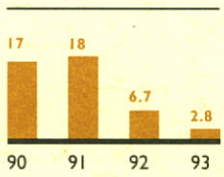
Powell River
— Permit Level 230

Recovery Boilers TRS

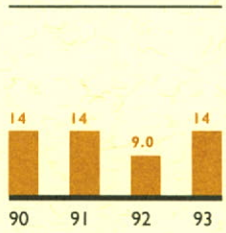
mg/m³ (annual mean)



Alberni
— Permit Level 28



Harmac
— Permit Level 28



Powell River
— Permit Level 40

waste from log sort yards was being sent to the company's regional landfill because it could not be burned as fuel in the pulp mill power boiler. During 1993 equipment was tested to condition the sort yard debris and use it as fuel.

In 1993 Harmac installed a system to collect leachate from the landfill and treat it in the mill's new effluent treatment system. The mill is also upgrading its systems so that more bark and similar wood waste can be burned as fuel. In 1992 Powell River learned that leachate from its landfill was entering the ground water near the landfill. A plan has been submitted to the Ministry of Environment to remediate the site by 1995. The mill is currently working with consultants to develop a site for a new, state-of-the-art landfill.

Energy Management

Pulp and paper operations minimize the amount of energy used per tonne of product and substitute wood waste such as bark for fossil fuels in mill power boilers.

Approximately 75 percent of the heat required in MacMillan Bloedel's manufacturing processes is generated from the burning of waste materials. Approximately one third of the electricity consumed by the company in B.C. is self-generated while in Alabama, the amount is about 90 percent. As mill processes are upgraded, new energy efficient technologies are introduced to continually reduce energy consumption.

MacMillan Bloedel's environmental efforts are reflected in its packaging products. Twenty-five percent of the fibre used to produce containerboard at the Pine Hill, Alabama mill is derived from recycled corrugated containers and the corrugating medium mill at Sturgeon Falls was converted in July 1993 to 100 percent recycled fibre. Containerboard from Pine Hill is used to make SpaceKraft,® a reusable bulk packaging product.

Pine Hill

The effluent treatment system at Pine Hill includes an aerated lagoon followed by a 300-acre polishing lagoon. The system ensures optimum performance during cold weather and keeps the BOD and TSS consistently below permit requirements. The mill is also well within its permit limits for air emissions. The most recent change was the modification to the electrostatic precipitator on the #2 power boiler which significantly reduced particulate emissions. Pine Hill is currently evaluating options and developing a capital schedule to meet the state's new Clean Air Act requirements. These requirements will significantly change the state's air quality standards by 1998.

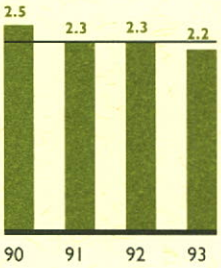
Employee involvement is an integral part of the Pine Hill environmental management system. In 1993 Pine Hill conducted an environmental training program for all of its 980 employees. The half day program increased employee awareness of company policy and environmental regulations, and included a review of scientific terminology, effluent control systems, employee requirements and regulations governing air, liquid and solid waste discharges as well as a review of MacMillan Bloedel's corporate commitment to environmental management. The training program is the first phase of a three-phase program aimed at further improving the mill's environmental performance.

Sturgeon Falls

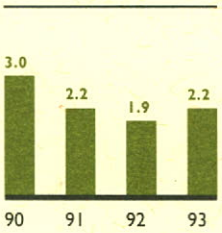
The Sturgeon Falls, Ontario mill was converted to a 100 percent recycled corrugating medium mill in July 1993 at a cost of $13 million. The mill processes waste corrugated containers to make corrugating medium that's used to make new cardboard boxes. The used corrugated containers are collected primarily from southern Ontario. The mill currently produces 200 tonnes per day of corrugating medium. The conversion has reduced effluent discharges

PINE HILL

Effluent

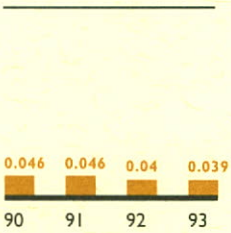


Biochemical Oxygen Demand
kg/t (annual mean)
— Permit Level 2.3

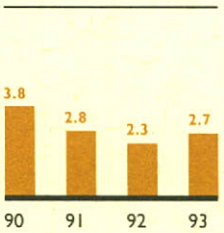


Total Suspended Solids
kg/t (annual mean)
— Permit Level 4.6

Air Emissions

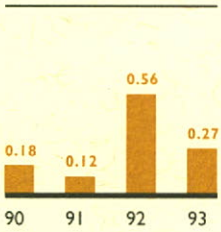


Total Reduced Sulphur Emissions
kg/t (annual mean)
— Permit Level 0.35

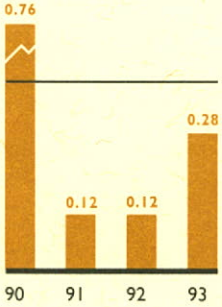


Sulphur Dioxide
kg/t (annual mean)
— Permit Level 7.7

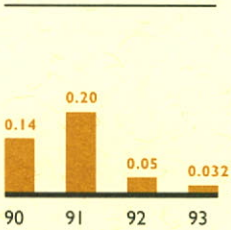
Air Emissions



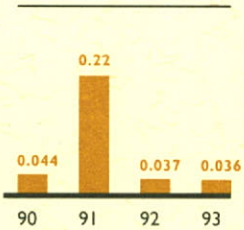
Particulate #1 Power Boiler
kg/t (annual mean)
— Permit Level 1.02



Particulate #2 Power Boiler
kg/t (annual mean)
— Permit Level 0.38



Particulate Recovery Boilers
kg/t (annual mean)
— Permit Level 0.44



Particulate Lime Kiln
kg/t (annual mean)
— Permit Level 0.34

into the Sturgeon River. Effluent BOD was reduced by 85 percent.

SpaceKraft®

SpaceKraft® is an environmentally friendly bulk packaging product developed by MB Research. Most bulk containers are made of metal or plastic and are disposed of in landfills because they cannot be economically refilled or recycled. SpaceKraft® looks similar to a giant cardboard box and is lined with a thin, flexible plastic liner. After use, the entire package can be folded flat and returned for refilling or the cardboard portion can be recycled with other paper products.

SpaceKraft® is produced in Atlanta and Indianapolis.

MacMillan Bloedel produces solid wood products and has a 49 percent interest in Trus Joist MacMillan which manufactures engineered wood products. During 1993 environmental programs at the company's building materials divisions focused on reducing boiler emissions and upgrading fuel and chemical storage facilities.

Over the past decade air emissions have declined significantly as natural gas fired boilers have replaced wood fired units at sawmills and other divisions. Miscellaneous dust emissions from equipment such as driers, saws and planers are controlled by dust control systems.

The Particleboard Division manufactures products from industry waste sawdust and planer shavings and is upgrading its emissions control system with the installation of an electrified filter bed. When the new system is operational in May 1994, it will reduce particulate emissions to below new air emission standards.

Hudson Bay Division is converting its plant boiler fuel to natural gas from oil which will allow the mill to decommission above and below ground fuel storage tanks.

MacMillan Bloedel voluntarily eliminated the use of pentachlorophenols (PCPs) for lumber protection in 1988. Work by MB Research was fundamental in the replacement of PCPs with NP-1, the formulation now used by much of the forest industry in B.C.

Wood Recovery

The maximum amount of wood is recovered from timber for use in solid wood products. Residues such as sawdust, planer shavings and wood chips serve as raw materials in company particleboard and pulp and paper operations. Bark is burned as fuel at the pulp and paper mills.

As a result of the company's research and development activities, a number of innovative wood recovery technologies have been implemented that maximize the use of timber and reduce sawmill waste:

- computerized edger optimizers that minimize the amount of wood trimmed off lumber;
- log scanners that measure logs so computers can adjust saws for optimum cutting patterns; and
- a pilot plant using an X-ray system that scans the log for defects and adjusts the cutting accordingly.

MacMillan Bloedel actively promotes sound waste management at all of its operations. Wastes are eliminated or minimized through process modifications and material substitutions and, where possible, are recycled.

The remainder are disposed of in government approved facilities.

Paper Recycling

The primary method of paper recycling is through the purchase of 60,000 tonnes per year of recycled pulp fibre from Newstech Recycling Industries in B.C. for the Powell River and Alberni mills. Alberni also repulps newspapers collected by the Port Alberni community recycling program. In addition, employees at company offices participate in active recycling programs.

Wastes Recycling

Where practicable, MacMillan Bloedel logging and manufacturing divisions collect and recycle non-hazardous wastes, including wood debris, scrap metals, tires and paper. Efforts are underway to increase the recovery of bark and other wood debris from log sorting operations for use as fuel in pulp and paper mill power boilers.

Chlorofluorocarbons

In 1993 Corporate Risk Management developed a corporate policy to ensure ongoing safe management of all chlorofluorocarbons (CFCs) relating to the company's fire suppression systems. The policy includes eventual phaseout of these materials.

Hazardous Wastes

Some hazardous wastes are inevitably produced as part of manufacturing operations. Where possible, these are eliminated or minimized. Hazardous wastes that cannot be eliminated or recycled are sent to government approved waste disposal facilities for final destruction or secure landfilling. All divisional waste inventories and disposal programs are reviewed as part of the company environmental audit program.

PCB Management

The majority of the company's stored PCB equipment is being disposed of at the Swan Hills hazardous waste disposal facility in northern Alberta.

The disposal will eliminate all PCBs in storage at the building materials and pulp and paper operations in B.C. The PCB equipment remaining in service will continue to be phased out.

Research and development play a vital role in meeting the changing demands of the marketplace, specifically in process and new product development and assisting operations to meet evolving environmental regulations. In addition to its own research, MB Research monitors and evaluates relevant worldwide technological developments, sponsors university projects and actively participates in industry-consortia projects with the Pulp and Paper Research Institute of Canada and the Forest Engineering Research Institute of Canada.

Current environmental research initiatives focus on upgrading production processes to meet government standards, developing an information base for long-term strategic actions, developing new products to meet society's environmental needs and minimizing the use of virgin fibre resources through recycling and other strategies.

MB Research has been instrumental in developing new bleaching process technologies, enabling company mills to meet new AOX standards.

Climate Change

A major study of the impacts of the company's forest practices, manufacturing systems and product life cycles on climate change issues in the Alberni valley was completed in 1992. The study showed that, with sustainable forestry practices, over the long-term CO_2 absorption by new forest growth is in balance with CO_2 emissions from forest harvesting and manufacturing processes. This study provides an important database for the forest industry's role in emerging climate change issues.

New Product Development

MacMillan Bloedel is a world leader in engineered lumber and panel products that make more efficient use of the tree and utilize sawmill residues. SpaceKraft,® a product developed by MB Research and successfully introduced three years ago, is a recyclable fibreboard container that replaces steel and plastic drums for bulk packaging of foods and chemicals.

Forestry

Allowable Annual Cut (AAC) – The annual timber volume that may be harvested from a specified area of land. AACs are determined as part of a Tree Farm Licence's Management and Working Plan and are subject to periodic reassessment, normally every five years.

Biodiversity – The diversity of life in all its forms and levels of organization, including genes, species, ecosystems and the evolutionary and functional processes that link them.

Clearcut System – A forest regeneration system which involves logging all the trees in a given area in order to establish a new, even-aged forest stand either through seeding, planting or natural regeneration.

Hydroseeding – Spraying a mixture of seed, fertilizer, tackifier (sticky stuff) and mulch on roadsides and steep slopes to reduce erosion.

NSR (Not Satisfactorily Restocked) – Productive forest land that after harvesting, fire or other situation such as insect infestation has not reforested to meet regulatory standards. The licensee must ensure that areas meet established renewal standards. MB requires successful reforestation on all areas within three to five years.

Pre-harvest Silvicultural Prescriptions (PHSP) – A site-specific management plan for a proposed cutblock that is completed in advance of logging. The PHSP identifies the harvesting, regeneration and silvicultural activities to be carried out on the area until the stand is free growing. The PHSP must consider existing resource values and characteristics of the site. The PHSPs are legal prerequisites to logging on all Crown lands. They must be advertised for public inspection and response to public concerns is required before approval by the Ministry of Forests.

Regeneration Systems – The means used to regenerate the forest. Common systems used to achieve regeneration include clearcut, selection and shelterwood.

Second Growth – A forest or forest stand which develops after harvesting or a natural disturbance in an old growth forest.

Selection System – A forest regeneration system designed to establish and maintain an "uneven-aged" or "all-aged" forest, intermixing trees of many sizes and ages. Selected trees are removed periodically (every 5 to 10 years), and a variety of sizes is retained.

Silviculture – The practice of growing and tending forests using accepted scientific and natural methods.

Sustained Yield– The level of harvest that can be cut from a forest so that continuous production is possible over the foreseeable future and which reflects the growing capacity of a managed forest. The amount of harvest may vary up or down on a periodic basis depending upon the amount of forest that is of sufficient age for harvest.

Manufacturing

AOX (Adsorbable Organic Halides) – Chlorinated organic compounds that are produced as unwanted by-products during the bleaching of pulp with chlorine containing compounds.

Bleaching – Chemical processes that are used to brighten pulps.

Biochemical Oxygen Demand (BOD) – The amount of oxygen microbes use when they break down organic matter in water.

Effluent – The liquid discharge of a waste material from a mill process.

Electrostatic Precipitators – Air quality control devices that use electrostatic charges to remove particles from gaseous discharges.

LC_{50}– A test that uses living organisms such as fish to measure the relative toxicity of an effluent.

Leachate – Contaminated water generated by percolation through solid materials such as that contained in a landfill.

Lignin – The natural compounds in wood that glue the cellulose fibers together.

NP-1 – A mixture of two chemicals found in household and hospital disinfectants used to prevent the growth of microorganisms on freshly cut lumber.

Particulate – Finely divided solid materials suspended in air or gaseous discharges.

PCBs – A particular type of organic compound containing chlorine that has been used in electrical equipment as a transformer fluid.

Secondary Treatment Systems – Effluent treatment that utilizes microbes to remove suspended and dissolved solids and organic matter from effluent.

Total Reduced Sulfur (TRS) – Sulfur compounds produced in the Kraft pulping process which have a rotten egg odor.

Total Suspended Solids (TSS) – The total amount of solid particles dispersed in an effluent.

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