

FORESTRY

FORESTS OF VICTORIA

Introduction

Forests are complex and dynamic ecosystems of living organisms and their physical habitat. The living organisms include plants, animals, birds, fungi, and a vast collection of micro flora and fauna. The physical components of the ecosystem include those associated with the atmosphere, the soils, and the rock formations from which the soils have been derived.

The objectives of forest management vary according to the demand for the benefits that a forest ecosystem can provide and the capability of the ecosystem to supply the desired benefits without detriment to its long-term productive capacity. Forests owned by the community, such as the State forests of Victoria, provide a wide range of benefits both tangible and intangible. The efficient management of forest ecosystems to produce these benefits is a demanding task involving considerable resources of skilled manpower, finance, and equipment. The services of a wide range of expert personnel are required, including foresters, botanists, zoologists, pathologists, entomologists, hydrologists, engineers, surveyors, management specialists, economists, sociologists, landscape architects, and administrators.

Approximately 36 per cent or 8.1 million hectares of the total land area of Victoria is occupied by forests. Most of Victoria's forests are in public ownership. Forests cover about 84 per cent of the 8.7 million hectares of Crown land and 6 per cent of the 14 million hectares of freehold land in the State. Over the last decade the area set aside in parks and reserves has grown rapidly and about 30 per cent of forested public land is reserved for conservation and recreation.

The major belt of forest in Victoria is located in the eastern half of the State extending from a point to the north of Melbourne to the New South Wales border. This area forms the southern end of the vast and continuous belt of forest that straddles the Great Dividing Range along the length of the eastern coast of Australia. Other extensive areas of forest in Victoria are situated to the north-west of Melbourne, in the South Gippsland Ranges, the Otway Ranges, the south-western region, the Mallee, and the northern and central parts of Victoria where forests of red gum, ironbark, and box are present.

Types

The forests of Victoria embrace many types ranging from the tallest of hardwood forests in the world, which occupy the cool mountain regions in the east, to the stunted mallee heathlands of the arid north-west. The main types recognised within State forests are mountain forests, stringybark forests, red gum forests, ironbark and box forests, arid woodlands, arid heathlands, and forest plantations. The majority of native forests are hardwoods, while most forest plantations are of introduced softwood species.

Mountain forests

The mountain forests occupy about 840,000 hectares of the cool, high rainfall country in the Central and Eastern Highlands, the South Gippsland Ranges, and the Otway Ranges. The forests comprise two main types, namely, sub-alpine woodland, and ash forests of alpine ash, mountain ash, and shining gum.

The mountain forests play an important role in Victoria's economy because they are among the most productive forests in the State, yielding large quantities of wood and water, and providing an environment for recreational activities. They produce large volumes of timber of seasoning quality, and the majority of the hardwood pulpwood used by the paper making industry in Victoria. They occupy significant portions of the catchment areas used to supply water to major population centres. The very tall trees and dense understorey of shrubs and ferns found in ash forests provide magnificent

scenery, and afford an excellent habitat for well known wildlife species, such as lyrebirds, possums, and wallabies.

Stringybark forests

The stringybark forests of Victoria include a wide variety of forest types in which various stringybark eucalypts and associated species occur. They are the most extensive of the Victorian forest types and occupy practically all the forest land on the coastal plains, and in the foothills to the north and south of the Great Dividing Range up to elevations of 900 metres. The total area of stringybark forests is 4,300,000 hectares.

The stringybark forests provide wood, water, and recreation. They yield some 65 per cent of the total volume of timber produced from State forests. Stringybark forests occupy the water catchments of many cities and towns in Victoria. They are rich in birds, animals, and wildflowers, and their distinctive character makes them an attractive location for recreational activities, such as fishing, camping and hiking.

Red gum forests

The red gum forests are the most widely distributed of the Victorian forest types although their total area is relatively small. Extensive areas of river red gum can be found along the flood plains of the Murray River and its tributaries. Savannah woodlands of red gum occur on the western plains and the species is common along watercourses throughout most of Victoria.

The red gum forests produce substantial quantities of wood and are extensively used for recreational pursuits. In addition, they play an important role in the control of water flows along the Murray River system and its tributaries. The forests have supported a viable timber industry since the earliest days of settlement. Red gum timber is used for sawmilling, sleepers, posts, and piles, and because of its strength, durability, and attractive appearance it is keenly sought.

The open woodland and gentle slopes of the red gum forests are well suited for outdoor recreation with many suitable sites for camps and picnics. Streams and billabongs are focal points for recreation and the numerous species of birds and animals associated with the water are major attractions. The red gum forests also provide an excellent grazing area for domestic stock and native animals.

Ironbark and box forests

The major areas of ironbark and box forests occur on poor soils in the north-central regions of Victoria where low rainfall and hot, dry summers are characteristic of the climate. The main forests are mixtures of red ironbark and box eucalypts with the species mixture generally being determined by the fertility and water holding capacity of the soil. The ironbark and box forests are used for railway sleepers, fencing timbers, and fuel, and they are highly valued for honey production and recreation.

Arid woodlands and heathlands

The arid woodlands and heathlands occupy large areas of the Murray Basin plain in the north-west of Victoria. They are forests of tremendous diversity with a wealth of plant species and many distinct associations. The diversity of these ecosystems is mainly a result of variations in soil type and the history of the areas they occupy. The arid woodlands and shrublands offer environments suitable for recreation and they are of considerable scientific and aesthetic interest. Because they occupy low rainfall areas, and are of a stunted form, they are of relatively minor value for water and wood production.

Forest plantations

The lack of native species suitable for the commercial production of softwood and the presence of derelict and marginal farmland have led to the development of extensive forest plantations in Victoria. The total area of these plantations (including privately owned plantations) is approximately 195,000 hectares.

Early planting trials covering a wide range of softwood species indicated that radiata pine was eminently suited to the medium rainfall environments of Victoria, and it has been used in the majority of plantations. Small areas of Corsican pine, maritime pine, ponderosa pine, and Douglas fir have also been established. Mountain ash is the only native species that has been used on any significant scale for plantation purposes.

The prime use of forest plantations is for wood production, but they also provide valuable cover for water catchments, and recreational benefits, such as those obtained from driving, picnics, and general scenic enjoyment. Another benefit from plantation development has been the reforestation of abandoned farmlands and rehabilitation of lands degraded by mining and bad farming practices.

Management

Since 1919, the State forests of Victoria were managed by the Forests Commission under various Forests Acts. In 1983, the Forests Commission was amalgamated with the Department of Crown Lands and Survey and parts of the Ministry for Conservation, to form the Department of Conservation, Forests and Lands. This Department is responsible for the management of most of the public land in Victoria. In 1984, the State Forests and Lands Service, one of the divisions of the new Department, became responsible for the management of State forests. Field management is organised through eighteen regions.

Establishment and tending of State forest plantations

The establishment of plantations to meet future requirements for wood and to reforest derelict areas of farmland continued in 1984-85. A total of 275 hectares of native hardwood plantations was established during 1984-85, the main planting being mountain species in the eastern Strzelecki Ranges of South Gippsland. A total of 1,638 hectares of new softwood plantations was established in 1984-85, almost all of which was radiata pine. Softwood plantings were concentrated in six of the eight development zones where it is planned to establish an area of plantation sufficient to support large and integrated wood-using industries.

STATE FOREST SOFTWOOD PLANTATIONS, ESTABLISHMENT AND TENDING ACTIVITIES, VICTORIA (hectares)

Activity	Area					
	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85
New planting	2,940	2,608	3,128	3,512	2,068	1,638
Re-planting felled areas	719	620	568	607	605	608
Thinning -						
Commercial	1,094	1,775	2,120	1,523	1,840	2,376
Non-commercial	5	—	167	22	11	22
Pruning	127	196	101	172	351	368
Fertilisation	3,488	2,218	743	3,327	2,642	3,650
Cleaning -						
Ground	6,064	4,558	4,435	5,594	4,437	3,132
Aerial	—	398	760	1,796	3,071	2,378

Source: Department of Conservation, Forests and Lands.

STATE FOREST HARDWOOD PLANTATIONS, ESTABLISHMENT ACTIVITY, VICTORIA (hectares)

Activity	Mountain forests			Stringybark and other species		
	1982-83	1983-84	1984-85	1982-83	1983-84	1984-85
New planting	245	432	242	198	147	33

Source: Department of Conservation, Forests and Lands.

Regeneration and tending of native forests

The regeneration and tending of native forests is aimed at maintaining them in a healthy, productive condition so that they can continue to supply benefits to the community in perpetuity.

A total of 28,311 hectares of native forests was subjected to regeneration or other silvicultural treatment in 1983-84.

NATIVE STATE FORESTS ESTABLISHMENT AND SILVICULTURAL TREATMENT, VICTORIA (hectares)

Activity	Mountain forests			Stringybark and other species		
	1982-83	1983-84	1984-85	1982-83	1983-84	1984-85
Aerial seeding	323	2,109	1,308	636	1,793	302
Hand seeding	604	782	638	706	585	839
Induced seed fall (a)	15	14	22	2,411	2,582	1,725

NATIVE STATE FORESTS ESTABLISHMENT AND SILVICULTURAL
TREATMENT, VICTORIA – *continued*
(hectares)

Activity	Mountain forests			Stringybark and other species		
	1982-83	1983-84	1984-85	1982-83	1983-84	1984-85
Regeneration felling/ natural seed fall	243	191	94	6,968	7,328	9,231
Liberation felling	54	64	50	1,003	5,688	1,621
Thinning	16	14	50	2,483	3,503	917
Coppicing	—	—	—	389	493	187
Other	130	129	—	2,989	3,036	425

(a) Artificially induced seed fall from standing trees.
Source: Department of Conservation, Forests and Lands.

SILVICULTURAL TREATMENT OF NATIVE FOREST TYPES IN STATE
FORESTS, VICTORIA, 1984-85
(hectares)

Treatment	Area treated				Total
	Ash	Stringy- bark gum	Box, Iron- bark	Red gum	
Aerial seeding	1,308	302	—	—	1,610
Hand seeding	638	817	7	15	1,477
Induced seedfall	22	1,695	—	30	1,747
Regeneration felling/ natural seed fall	94	7,431	643	1,157	9,325
Liberation felling	50	1,611	—	10	1,671
Thinning	50	61	370	486	967
Coppicing	—	15	147	25	187
Other	187	110	—	355	652
Total	2,349	12,042	1,167	2,078	17,636

Source: Department of Conservation, Forests and Lands.

Research and development

The Department of Conservation, Forests and Lands maintains a research programme to ensure that factual information is available for planning and monitoring forest management practices to meet changing community needs. Both short and long-term studies are in progress into many aspects of silviculture of both native hardwood and exotic softwood forests, and also into genetics and tree breeding, entomology and pathology, protection, hydrology, other environmental effects, and planning techniques.

In nurseries, studies are being made of the nutritional and soil physical requirements of both eucalypts and conifers, the treatment of seeds and seedlings, methods of site preparation, planting and seeding, fertiliser and nursery techniques, and the identification and control of pests, weeds, and diseases, for the efficient production of seedlings.

Investigations are being conducted to develop cultural practices for optimal establishment and growth of first and second rotation radiata pine plantations and maintenance of long-term site productivity. A tree breeding programme with *Pinus radiata* is now yielding improved seeds for general planting purposes.

The use of tree planting for salinity control in dry land and irrigated farming areas is under investigation with regard to the short-term and long-term salt tolerance of tree and shrub species, their annual water use and effect on the water table.

Other silvicultural studies concern the use of native trees as an effluent disposal system; the regeneration of burnt sites and high-elevation forests; the reforestation of former pine plantation sites; the effects of thinning on growth and wood quality of eucalypts and conifers; and the natural variation of several eucalypt species.

The major emphasis in entomological research is directed at a bark beetle (*Ips grandicollis*) which is potentially a serious pest of *Pinus radiata*. Pathological research continues on the cinnamon fungus (*Phytophthora cinnamomi*) and honey fungus (*Armillaria*) including assessment of site and stand characteristics associated with eucalyptus-crown dieback, and the rate of spread and effect of the fungi on different species in mixed eucalypt forests.

Research into the ecology of birds and animals in the forests is being conducted to assess the influence of management practices on forest flora and fauna. Studies look at the distribution and abundance of species and their habitats in the various layers of forest vegetation, especially in streamside reserves and corridors of native vegetation in plantations, and in plantations and adjacent native forests after utilisation. Emphasis is also being given to evaluating the effect of harvesting, flooding, pesticide application, fire, and controlled burning on water quality and yield, nutrient status, site productivity, and flora, fauna, and wildlife habitats. This information is used to develop forest management procedures which allow for the efficient production of wood consistent with the conservation of other forest values such as water quality, recreation, and wildlife habitat.

Reliable information on the future availability of wood from the State's forests is of the utmost importance. Improving techniques for predicting the growth of major commercial species, upgrading existing systems of recording and retrieving information about softwood plantations and forecasting the availability of sawlogs and pulpwood is being given a high priority.

Forest protection

During the 1984-85 fire season, Departmental personnel attended 522 wildfires. These fires burnt a total of 233,000 hectares of State forest, national park, and protected public land. The total area of these public lands burnt in the past six fire seasons up to and including 1984-85, is shown in the following table:

AREAS OF STATE FOREST, NATIONAL PARK,
AND PROTECTED PUBLIC LAND BURNT BY
WILDFIRES, VICTORIA
(hectares)

Year	State forest	National park	Protected public land	Total
1979-80	25,773	628	1,235	27,636
1980-81	388,681	40,561	2,731	431,973
1981-82	16,657	2,139	67	18,863
1982-83	360,430	74,725	158	435,313
1983-84	8,983	2,559	3,193	14,735
1984-85	193,146	39,758	96	233,000

Source: Department of Conservation, Forests and Lands.

The 1984-85 fire season was relatively mild except for mid-January when a serious emergency occurred. Very high temperatures (40° – 44°C), strong north-west winds followed by equally strong south-west winds on 14 January, together with 'dry' thunderstorms later in the day and overnight combined to produce a spate of forest fires throughout the State.

The wildfires occurring in State forest, national park, and protected public land originated from a variety of sources and by various agencies. The tables below illustrate the respective 'agency' and 'source' which caused wildfires in these areas during each of the past six years.

In 1984-85, lightning accounted for 10.3 per cent of the total outbreaks, while of the balance, 10.5 per cent were attributed to deliberate lighting, 10.3 per cent to landholders' burn-off escapes, 8.6 per cent to campfires and barbecues, and 10.0 per cent to cigarettes and matches. The ten-year averages for these causes are 26.8, 17.3, 9.2, 8.8, and 8.1 per cent, respectively.

CAUSES OF FOREST WILDFIRES BY AGENCY, VICTORIA

Cause by agency	Number of fires					
	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85
Lightning	154	207	128	230	23	215
Children	20	38	26	39	13	23
Employee –						
Forest industry	10	19	7	27	6	7
Forest Department	31	26	21	24	10	18
Other Departments	10	10	14	14	10	4
Other industry	8	13	4	5	3	6
Recreationist –						
Bushwalker	2	4	4	2	1	2
Camper	28	27	23	31	21	20

CAUSES OF FOREST WILDFIRES BY AGENCY, VICTORIA – *continued*

Cause by agency	Number of fires					
	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85
<i>Recreationist – continued</i>						
Hunter	31	23	9	35	18	21
Day Visitor	36	50	19	53	7	25
<i>Resident –</i>						
Permanent	31	45	39	49	22	51
Part-time	22	19	10	18	6	19
<i>Farmer –</i>						
Full-time	47	79	40	66	20	36
Part-time	20	26	14	32	10	12
Military	1	1	—	2	—	—
Traveller	18	17	22	54	14	31
Grazing leaseholder	6	7	—	5	—	—
Other	50	32	18	89	15	24
Unknown	188	150	70	48	18	8
Total	713	793	468	823	217	522

Source: Department of Conservation, Forests and Lands.

CAUSES OF FOREST WILDFIRES BY SOURCE, VICTORIA

Cause by source	Number of fires					
	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85
Lightning	154	207	128	230	23	215
<i>Exhaust –</i>						
Chainsaw	4	2	7	7	1	—
Other	15	7	8	11	2	6
Snigging, hauling	—	—	—	2	2	1
Burning vehicle, etc.	14	7	4	11	7	7
Pipe/cigarette/match	50	56	39	78	26	52
Campfire/barbeque	75	60	43	66	28	45
Prescribed burning	18	15	8	5	4	8
<i>Burn off –</i>						
Railway	1	—	—	—	—	—
Grass/scrub, etc.	34	70	21	39	13	31
Windrow/heap	19	36	19	30	8	23
Train	2	2	6	2	2	—
Deliberate lighting	157	167	84	149	40	55
<i>Waste disposal –</i>						
Domestic	13	10	12	15	5	14
Industrial	18	17	13	26	11	16
Power transmission	15	5	10	17	4	4
House, stove/flue	5	5	4	9	3	4
Burning building	6	2	1	2	1	2
Fireworks	—	1	—	—	—	—
<i>Relight –</i>						
Wildfire	4	10	3	12	1	3
Prescribed fire	9	10	10	9	7	4
Burn-off	28	27	21	61	13	19
Other	21	29	14	24	10	10
Unknown	51	48	13	18	6	3
Total	713	793	468	823	217	522

Source: Department of Conservation, Forests and Lands.

Fire prevention works are effected in State forests in accordance with the fire prevention plans prepared for each of the eighteen regions. The summary of major works (excluding fuel reduction burning) during 1984-85 is shown in the following table:

**MAJOR FIRE PROTECTION INSTALLATIONS ON STATE FOREST,
VICTORIA, 30 JUNE 1985**

Work	Unit	Construction	Maintenance	Total in use
Firebreaks	kilometres	388	3,017	3,581
Helipads	number	43	150	296
Airstrips	"	5	13	25
Dams, weirs, tanks	"	18	1,400	2,204
Towers and lookouts	"	—	85	85
Dugouts and shelters	"	1	40	40

Source: Department of Conservation, Forests and Lands.

A summary of fuel reduction burning effected in State forest during each of the past six years is shown in the following table:

**AREA OF STATE FOREST TREATED
BY FUEL REDUCTION BURNING,
VICTORIA**

Year	Area	Percentage of State forest
	(hectares)	
1979-80	345,045	5.5
1980-81	477,160	7.5
1981-82	167,135	2.6
1982-83	62,345	1.0
1983-84	370,000	5.8
1984-85	106,400	1.7

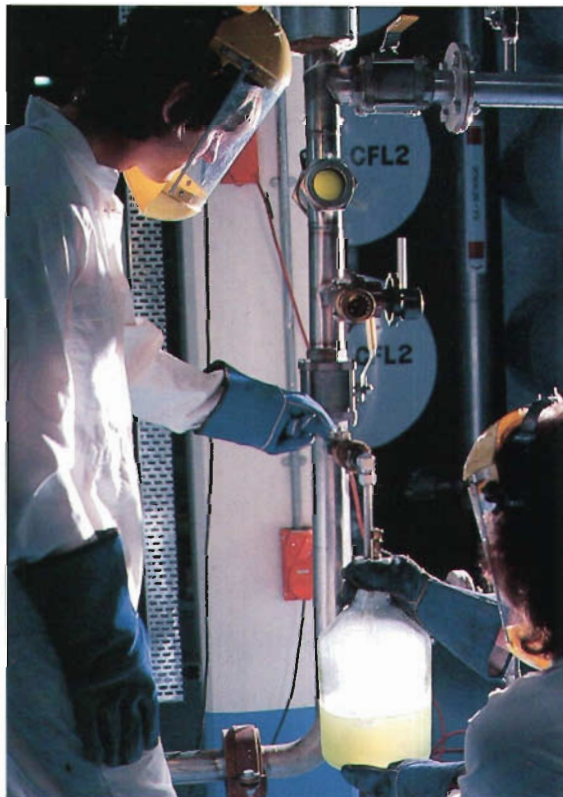
Source: Department of Conservation, Forests and Lands.

A central strategy of fire protection in Victorian forests is to dispose of the dry plant litter, such as bark and leaves, which is shed by eucalypt trees every year in great quantities. The periodic removal of accumulations of this flammable material is the most effective way of preventing intense destructive wildfires during the fire season and enables firefighters to more readily control any such outbreak.

Control of these accumulated fine fuels in eucalypt forests is an important factor in protecting adjacent settled areas and private property, intensive-use forest recreation areas, softwood and hardwood timber production areas, plus water supply catchments and significant wildlife habitat areas. This control is achieved by the most natural means of fuel reduction (or controlled) burning operations during the spring and autumn months when weather conditions and dryness of the fuels are suitable for slow, controllable fires that burn at low intensities. These operations are carried out in accordance with regional fire prevention plans, updated each year, and have resulted in an average of approximately 200,000 hectares being treated in this way each year over the past two decades.

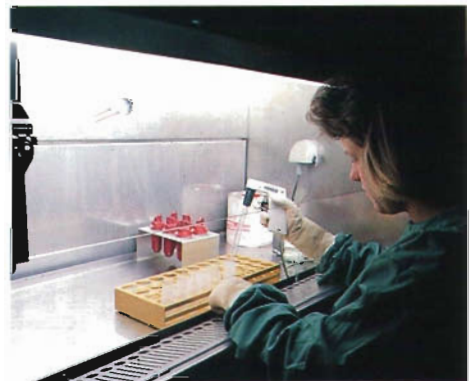
Major improvements have been made during the past decade in the methods of suppressing wildfires by the use of aircraft. An effective technique of aerial attack on some fires has been developed in which small agriculture-type aircraft, fitted with hoppers of 550 to 1,500 litres capacity, are loaded with fire retardant which is released during flight on the vegetation near the fire edge. The retardant slows up or prevents the spread of the fire edge and enable firefighters to more readily achieve control of the fire. These aircraft operate from airstrips within the forest where facilities have been installed for storage, mixing and loading the retardant mixture, and also from other airstrips with similar facilities, near the forest. Similar light aircraft are also used for fire reconnaissance of extensive forest areas, especially after 'dry' thunderstorms have occurred, to pin-point any fires resulting from lightning strikes or other causes.

Helicopters are also used to great effect in fire suppression to transport fire observers searching for new or suspected fires, fire control officers directing ground firefighting operations from the air, and men, equipment, and supplies into remote or difficult access areas. There are 296 helipads which have been developed in forest areas to enable helicopters to land with firefighting resources. In more recent years, a helicopter has been fitted with a suspended bucket of about 1,600 litres capacity which is filled with water by immersion in a water storage and the load released vertically on to the fire, this method being especially effective on a troublesome hot-spot or a 'spot' fire away from the main fire.



The Australian Animal Health Laboratory (AAHL), Geelong –
(Above) An exterior view of the Laboratory.
(Left) Collecting a test sample, used to monitor the effectiveness of the sewerage treatment process.
(Below) All laboratory work involving infectious agents at AAHL is carried out in biosafety cabinets.

Australian Animal Health Laboratory





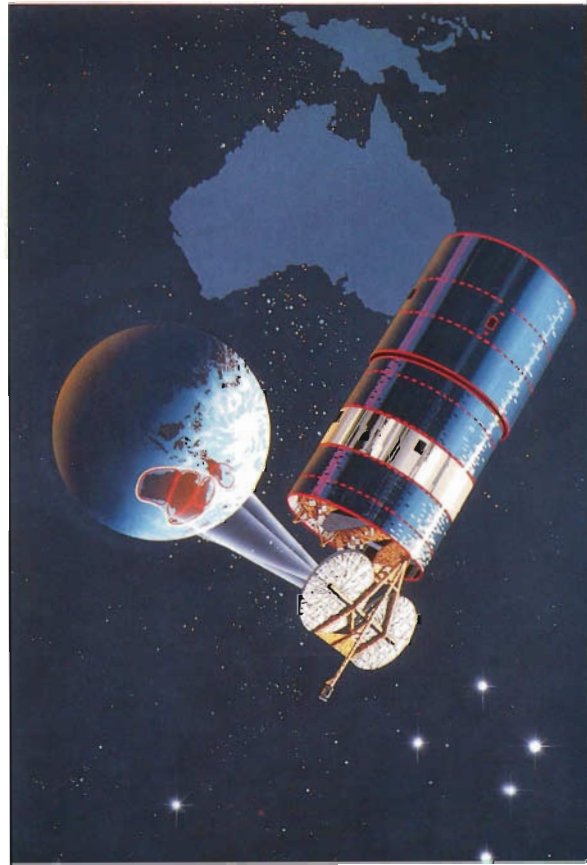
Aussat –

(Above) Launch of a space shuttle, used to carry the Aussat satellite into space.

(Below left) Releasing the satellite into orbit.

(Below right) Diagrammatic representation of the proposed coverage of the satellite over Australia.

Aussat Pty Ltd





Forty years separates these two aircraft. An RAAF F/A-18 flies above a restored Second World War Mustang.

Department of Defence



(Right) The Australia Post Electronic Mail Acceptance Centre, Melbourne.

Australia Post

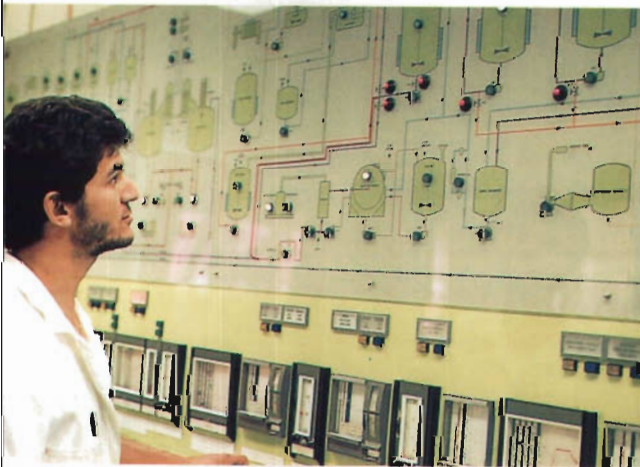


(Above) Commonwealth Serum Laboratories, Parkville –

The high technology P.L. Bazeley Human Vaccine Building, named in honour of Australia's penicillin and Salk polio vaccine pioneer.

(Left and below) Various examples of biotechnology in action at the Commonwealth Serum Laboratories.

Commonwealth Serum Laboratories



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